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Evaluating The Effectiveness Of Community Forest Management In Uttarakhand: A Case Study Of Van Panchayats

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Abstract: Uttarakhand state holds a unique and pioneering position in the history of Van Panchayat in India. The system was first introduced in the Kumaon region in 1931 during British colonial rule as response to growing conflicts between local communities and the colonial forest administration, which had curtailed traditional access to forest resources. Van Panchayat were designed to empower village communities to manage and protect forest land collectively, ensuring sustainable use forest resources. This model of decentralized forest governance was deeply rooted in the traditional practices and communal decision making systems of hill communities in the state, particularly in Kumaon and Garhwal regions. The study evaluates and illustrates the effectiveness of forest governance through study of challenges in Forest Governance and Resource Management in Van Panchayats. Present study and field observations suggest that the sustainability of this governance model is increasingly under pressure.

Keywords: Van Panchayat, Decentralized, Forest Governance, Sustainable use.

INTRODUCTION:

Forests Covers about 31% of the world‘s land surface, constituting largest and one of the most important natural resources. They have been long recognized as the reservoirs and source of numerous species diversity on earth (Wilson, 1988). They also are an important component of global carbon cycle, sequestrating billions of tons of Co_2 globally every year (Bonan, 2008; Canadell and Raupach, 2008). These statistics about forests are important to convey their immense significance for the survival of humanity as a species. In addition to this, the variety of forest trees and shrubs play a pivotal role in the daily life of rural communities as sources of wood and non-wood products, as contributors to soil and water conservation,

and as repositories of aesthetic, ethical, cultural and religious values. Until the late 1980s, forests in most developing countries have been managed largely through a centralized governance system where forests were held exclusively by the central governments and human use of the resource was either prohibited or severely limited by means of acts and laws (Barrett *et al.*, 2001). However, given the dependence of a huge population on these forests for sustenance, these kind of exclusionary policies were found ineffective in conserving forests while simultaneously contributing to the marginalization of rural communities (Brandon et al., 1998). Community forest management (CFM) has been seen over the past few decades as a potential approach to overcome these challenges (Ranganathan et al., 2008). Although majority of forests across the world are still being managed through Centralized Governance System, the spatial expansion of community forests has been increased substantially during the past few decades. Today more than 62 countries across all regions claim to have transferred use and management rights over >700 million hectares of forests to local users and communities (Gilmour, 2016). In India 76.1% of the total forest is administered by government, 16.5% by the communities and reaming 7.4% forest is owned by individual/private firms (White and Martin, 2002). There is limited information and understanding about the relative condition and contribution of the forests managed through different governance regimes (Woollenberg *et al.*, 2007).

The forest governance is increasingly seen as a key building block for maintaining forest health, supporting environmental, social and economic outcomes, and achieving sustainable forest management (SFM) goals (Cowling *et al.*, 2014). Governance regimes vary with region and mainly practiced under centralized, mutual (co-governance), and at community level. In recent years there has been a growing interest to understand, monitor and report the performance of various governance regimes on forest quality. It is suggested that governance is shaped by history (and culture) of forest management, socio-economic status, extent of resource, tenure systems, actors, benefit sharing mechanisms, decision-making process, accountability, property rights, appropriate forest laws, and political determination; and that the poor governance is main impediment to attain developmental outcomes (Agrawal *et al.*, 2008). Accordingly many countries are articulating commitment to improve forest governance and taking needful actions (Sandström *et al.*, 2017; Secco *et al.*, 2014).

MATERIAL AND METHODS

Study area: This study was conducted in ten Van Panchayats across Gairsain block in District Chamoli of the Garhwal region in Uttarakhand, India (Fig. 1). Gairsain Block was selected as the focal study site due to its unique socio-ecological setting in the middle Himalayas, representing a transition zone between the Garhwal hills and higher alpine zones. The area features diverse forest types and a rich history of VPs institutions, many of which predate post-independence forest policies.

Methodology: The required data was collected through Primary survey, to examine the perception and approach of local people towards the management of Van Panchayat a mixed methodology was employed which included quick appraisals, questionnaire survey, and in depth and individual level interviews of VP sarpanch, management committee members and local stakeholders. The overall strategy was a combination

of qualitative and quantitative techniques which were used to inform increasingly specific question templates for various stages of the study.

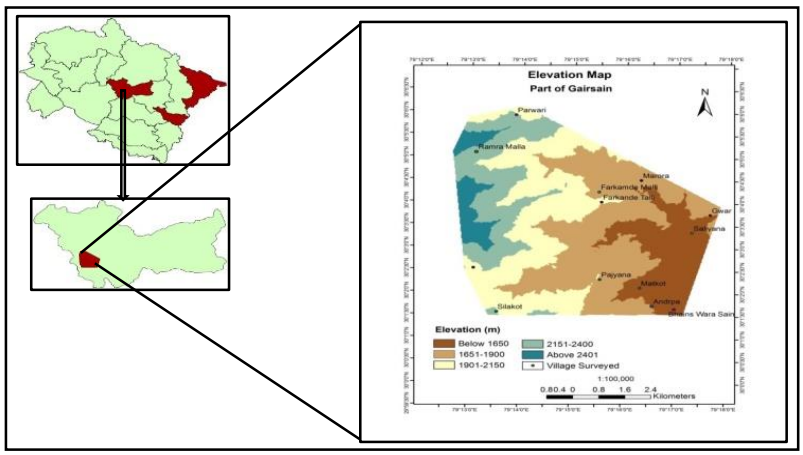

Fig 1. Location Map of the study region

RESULTS AND DISCUSSION

The studied Van panchayats across the Gairsain block of District Chamoli indicated management with regular community meetings, effective leadership, and active rule enforcement demonstrated stronger environmental performance. A key finding was the role of institutional trust and transparency in shaping community compliance. VP that practiced equitable distribution of felled trees (for rituals or house-building) and involved women and marginalized groups in decision-making showed stronger ecological and social outcomes.

Decentralized Governance in the Central Himalayas: Insights from Van Panchayat Leadership and Community Participation: Decentralized forest governance in the Central Himalayas has taken shape through the unique institution of Van Panchayats, which empower local communities to manage and protect forest resources. Van Panchayats are led by locally selected Sarpanch and executive committees, reflecting both traditional authority and evolving democratic processes. This system not only facilitates collective decision-making but also fosters community participation in ecological stewardship. However, variations in leadership selection, community involvement, and enforcement practices reveal both the strengths and challenges of decentralized governance in practice. Van Panchayats, despite being an excellent example of state-people partnership which has been relatively successful in managing forest resources in the region, are facing challenges from unrealistic and target-driven policies which are likely to affect its democratic functioning (Hussain *et al.*, 2013).

Van Panchayats (VPs) in Uttarakhand, India, remain a landmark model of community-led forest governance, originating from grassroots resistance against colonial forest reservation policies in the early 20th century (Agrawal & Ostrom, 2001; Balooni et al., 2007; Lodhiyal, 2002). Unlike more recent top-down decentralization initiatives, VPs emerged from local mobilization and have historically demonstrated effective management of forest resources, contributing significantly to both ecological conservation and rural livelihoods (Somanathan, 1991; Agrawal & Goyal, 2001). VPs are characterized by participatory rule-

making, rotational use of forest compartments, and community-led enforcement, and many still operate with relative autonomy while collaborating with state actors like the Forest and Revenue departments. However, recent studies and field observations suggest that the sustainability of this governance model is increasingly under pressure. Institutional challenges such as youth migration, leadership turn over, limited capacity-building support, and increasing bureaucratic interference are affecting collective action and forest condition (Ballabh et al., 2022; Negi & Maikhuri, 2021; Singh et al., 2020). In addition, market pressures for non-timber forest products (NTFPs), encroachment, and climate-related events such as forest fires and erratic rainfall have further complicated forest management (Tiwari et al., 2023). Many communities are struggling to maintain traditional norms of forest use and face procedural and financial delays in accessing government schemes such as CAMPA and MGNREGA (Rawat, 2020; Bhattacharya & Basnyat, 2022). Despite these issues, VPs continue to provide an important institutional base for participatory governance and could serve as adaptive models for community-based climate resilience and forest restoration — provided that supportive policy reforms, decentralized financing, and technical capacity-building measures are prioritized.

Challenges in Forest Governance and Resource Management in Van Panchayats of Chamoli District

The study highlights several interrelated challenges faced by Van Panchayats in Chamoli District, Uttarakhand, which impede effective forest governance and resource management. Community participation is compromised due to out migration, leadership gaps, and decreased engagement, leading to weakened conservation efforts. Resource constraints further exacerbate these issues, with inadequate financial support, equipment, and infrastructure hindering largescale conservation and restoration projects. Policy gaps and poor coordination with external entities, such as the Forest Department, contribute to conflicts and inefficiencies in forest management. The exclusion of Van Panchayats from adjacent forest areas, compounded by ecological disconnect and community tensions, further complicates management. Climate change poses an additional threat, with shifting weather patterns straining traditional practices and forest health. Legal and bureaucratic hurdles, including complex procedures and inconsistent enforcement, delay conservation efforts and undermine compliance. Economic pressures, such as commercial exploitation and market volatility in non-timber forest products (NTFPs), intensify the risk of forest degradation. Finally, cultural erosion, stemming from the loss of indigenous knowledge and shifting values, weakens the foundation of community-based management and conservation. These findings underscore the need for comprehensive policy reforms, capacity building, and strengthened institutional collaboration to address these challenges and enhance the sustainability of forest governance systems.

The challenges identified in the Van Panchayats of Chamoli District underscore the multifaceted nature of forest governance and resource management. The interconnection between community participation, resource constraints, policy gaps, and external pressures reveals a complex web of issues that undermine effective forest management. To address these challenges, a holistic approach is required, incorporating better coordination among stakeholders, improved financial and technical support, and the revitalization of traditional knowledge and leadership. Strengthening the role of the community, enhancing capacity for adaptation to climate change, and addressing legal and economic pressures will be critical to ensuring

sustainable management of forest resources in the region. Ultimately, overcoming these barriers will not only support the ecological health of the forests but also safeguard the livelihoods and cultural heritage.

Table 1. Historical Profile and Socio-Ecological Characteristics of Selected Van Panchayat

Name of VP	Formation year	Forest area (ha)	Altitude (masl)	Broad forest type	Dependent HHs				No. of years records available for	Total amount in VPN (Rs.)
					1991	2001	2011	2019		
Marora	1944	288	1880	Oak	142	154	166	200	58	62342
Sare-Gwar	1946	46	1780	Oak	39	47	61	47	51	4532
Farkendey – Tallii	1947	23	1886	Pine- oak mixed	86	89	97	91	45	40476
Mathkot-Moja	1949	728	1880	Oak	-	-	-	315	54	30322
Ghandiyal	1949	160	1880	Oak	94	98	113	54	62	9642
Nail	1950	70	1980	Oak	110	118	136	50	51	23719
Chorda	1955	317.75	2160	Oak	24	33	39	73	28	36442
Pajyana	1981	148	1785	Oak	75	94	128	190	31	58000
Mathkot-civil	1976	81	1780	Oak	-	-	-	75	24	5024
Gwar	1948	185	1750	Oak	110	74	113	78	23	114000

The table presents an overview of ten Van Panchayats (VPs) in Gairsain Block, detailing their formation history, forest characteristics, household dependency, financial records, and available archival data. Most of these VPs were established in the mid-20th century, with formation years ranging from 1944 (Marora) to 1981 (Pajyana), reflecting the phased evolution of community- based forest governance in the region. Forest areas managed under these VPs vary significantly—from small patches like Saregwar (46 ha) to expansive tracts such as Mathkot- Moja (728 ha) and Chorda (317.75 ha). The altitudinal range of these VPs (1750–2160 masl) situates them predominantly within mid-Himalayan ecosystems, and the dominant forest type across the sites is oak (Quercus spp.), although mixed oak-pine forests are also observed, particularly in Farkendey-Talli. Household dependency on these forests has shown steady growth in most villages across the census years (1991–2019), highlighting increasing community reliance on forest resources. However, some villages, such as Nail and Ghandiyal, report a sharp decline in dependency by 2019, potentially indicating outmigration or a shift in livelihood strategies. The number of years for which Van Panchayat records is available ranges from 23 to 62 years, underscoring variability in documentation and possibly institutional continuity. The financial strength of these VPs, as captured by the total amount in the VP Nidhi (VPN), varies widely. Gwar, despite having a moderate forest area (185 ha), reports the highest VPN (Rs. 114,000), likely due to proactive forest governance or effective utilization of forest products and funds. In contrast, smaller VPs like Sare-Gwar and Madkot-Civil maintain relatively modest financial reserves, reflecting limited forest productivity or lower economic engagement.

Table 2. Status of Record Maintenance, Monitoring, and Working Agencies in studied VPs

Register maintained (Van Panchayat having the following records)										
VP name	Sarpanch name	proceedings register	Cash register	receipt book	Penalty register	Cash book	Punishment type	Last Inspection	**inspection by MC (monthly)**	**Working agency**
Gwar	Devendra Singh	Y	Y	Y	Y	Y	Penalty (in Rs.)	2020	3	Campa
Nail	Anand S. Negi	Y	Y	Y	Y	Y	Penalty (in Rs.)	2019	2	JAYKA
Farkendey Talli	Prem Singh	Y	Y	Y	Y	Y	Penalty (in Rs.)	2017 (in 2 years)	3	Campa
Pajyana	Vijay S. Negi	Y	Y	Y	Y	Y	Penalty (in Rs.)	2019	Monthly	Jayka
Ghandiyal	Rajey Singh	Y	Y	Y	Y	Y	Penalty (in Rs.)	2016	During govt. works	Jayka
Marora	Balwant S.Rawat	Y	Y	Y	Y	Y	Penalty (in Rs.)	1015	During fire season	Jayka
Mathkotkot Moja	Shyam Singh	Y	Y	Y	Y	Y	Penalty (in Rs.)	2017 (3-4 years)	6	Jayka and GIM
Mathkot Civil	Umrao Singh	Y	Y	Y	Y	Y	Penalty (in Rs.)	2019	6	Jayka and GIM
Saregwar	Dharam Singh	Y	Y	Y	Y	Y	Penalty (in Rs.)	2018	3	CAMPA
Chorda	Gopal Singh	Y	Y	Y	Y	Y	Penalty (in Rs.)	0	6	FD

Documentation, Monitoring, Inspections, and Institutional Support: All surveyed Van Panchayats in Gairsain Block maintain essential documentation, including the proceedings register, cash register, receipt book, penalty register, and cash book. These records are critical for ensuring transparency and accountability in forest governance. Each Van Panchayat imposes penalties in monetary terms for violations, with records maintained accordingly. Villages such as Gwar, Pajyana and Nail had their last official inspection in 2019, while others like Ghandiyal and Maroda had not been inspected since 2016 and 2015, respectively. Some inspections are timed with specific events such as government projects (Ghandiyal) or fire seasons (Marora).

Notably, Chorda reported no official inspections to date. The role of the Management Committee (MC) in regular forest monitoring also differs. While some villages like Pajyana carry out monthly inspections, others such as Mathkot Moja, Mathkot Civil, and Chorda conduct inspections six times a year, showing a relatively higher degree of engagement. The working agencies associated with these Van Panchayats also differ. Most are supported by programs such as JAYKA or CAMPA, with a few villages—namely Madkot Moja and Madkot Civil—linked with both JAYKA and GIM (Green India Mission). Chorda is the only Van

Panchayat where the Forest Department (FD) is recorded as the primary working agency. Overall, while record maintenance appears consistent across Van Panchayats, variability in inspection frequency and external agency involvement reflects differing levels of institutional oversight and engagement across the region.

Table:3 Seasonal Calendar of VP activities for forest resources and management (Yearly Calendar)

S/N	Activities	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	De
1	Fodder collection												
2	Worshiping Van Bherav Devta												
3	Opening/closing of VPs compartments												
4	Fuel wood collection												
5	Pine needle collection												
6	Collection of Moss												
7	Migration to higher elevation (Van Gujjar)												
8	Community audit												
9	External audit												
10	In kind (Nali) to the chokidar/ Cash												

The seasonal activity calendar of studied VPs reveals a structured rhythm of forest use and management activities throughout the year. Core resource extraction activities such as fodder and fuel wood collection peak during the dry and colder months (October to March), reflecting the household need to stock biomass for livestock and domestic energy use. Ritual worship of the forest deity, Van Bherav Devta, typically takes place during June and December, coinciding with agricultural transitions and seasonal closures. Pine needle and moss collection—important for fire prevention and compost—are concentrated in the summer monsoon months (May to August). Van Gujjars' seasonal migration to higher elevations is observed from April to June. Administrative duties such as compartment opening/closure and audits are interspersed throughout the year, with external audits typically scheduled in the post-monsoon months (October/November). The pattern of chokidar payment—either in kind (nali) or cash—is most commonly observed in January and December, aligning with annual harvests and year-end settlements. This temporal spread of activities underscores a harmonious blend of ecological management, cultural practice, and administrative order that defines Van Panchayat governance.

Table 4. Rules and Approaches to the Use of Forest Resources in a Van panchayat forest

	Gwar	Nail	Farkandey Talli	Pajyana	Ghandiyal	Marora	Mathkot Moja	Mathkot Civil	Saregwar	Chorda
Worship of van Devta	Yes	yes	Yes	yes	yes	yes	Yes	Yes	yes	yes
Opening/ closing compartment	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Grazing	Unrestricted (prohibited in areas with new plantation)	Unrestricted (prohibited in areas with new plantation	Unrestricted	Unrestricted (prohibited in areas with new plantation	Unrestricted	Unrestricted	Unrestricted (prohibited in areas with new plantation	Unrestricted	Unrestricted	Unrestricted
Grass cutting	Restricted in newly planted area.	Unrestricted (only rainy season)	Unrestricted (only rainy season)	Unrestricted (only rainy season)	Unrestricted (only rainy season)	restricted	Unrestricted (only rainy season)	Unrestricted (only rainy season)	Restricted	Unrestricted (only rainy season)
Migration to higher elevation	No	Yes	**No**	**No**	**Yes**	**Yes**	**Yes**	**yes**	**No**	**No**
Lopping for fodder	Prohibited	Prohibited								
Collection of dry and fallen leaves	Non-restricted	Unrestricted	Restricted during planted area	Unrestricted	Unrestricted	Unrestricted	Unrestricted	Unrestricted	Unrestricted	Unrestricted
Collection of fallen twigs Timber	Unrestricted	Unrestricted	Unrestricted	Unrestricted	Unrestricted	Unrestricted	Unrestricted	Unrestricted	Unrestricted	Unrestricted
Tree cutting	Ban	Ban	Ban	Ban	Ban	Ban	Ban	Ban	Ban	Ban
Tapping of resin Chir-pine	Not available	On contract basis (income From is shared between FD and VP)	Only on contract basis	Only on contract basis	Only on contract basis	Only on contract basis	Only on contract basis	Only on contract basis	Only on contract basis	**No**
Collection of Lichen	**No**	**No**	**NO**	**NO**	**Yes**	**No**	**yes**	**yes**	**NO**	**NO**
In kinds of Grains	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**
Internal audit	**yes**	**yes**	**yes**	**yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**No**
External audit	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**No**	**Yes**	**Yes**	**Yes**	**No**

All studied VPs maintain the traditional practice of worshipping the Van Devta and enforce regulated opening and closing of forest compartments. While grazing is generally unrestricted, most VPs prohibit it in areas with new plantations to protect regenerating vegetation. Grass cutting is seasonally allowed, typically during the monsoon, though restrictions are placed on recently planted zones. Lopping for fodder is uniformly prohibited across the panchayats, highlighting conservation priorities. Similarly, dry leaf and

twig collection is mostly unrestricted except in sensitive or recently reforested patches. Timber use from fallen or dead trees is permitted, but live tree cutting is banned across all VPs, underscoring strong protection norms. Chir-pine resin tapping is largely permitted on a contractual basis where available, with income shared between the Forest Department (FD) and VP. However, not all areas have chir-pine, as in the case of Gwar and Chorda. The collection of lichen is restricted and permitted only in a few VPs like Ghandiyal, Mathkot Moja, and Mathkot Civil, possibly due to its ecological sensitivity and high commercial value. In-kind contributions in the form of grains to forest guards (chokidars) are consistently practiced across all VPs, demonstrating a blend of traditional reciprocity and local remuneration systems. Internal audits are conducted regularly in all but one VP (Chorda), while external audits are less uniformly implemented—absent in Marora and Chorda—indicating variability in formal oversight mechanisms. This comparative view highlights both shared norms and localized adaptations in forest governance, reflecting the balance between tradition, resource dependence, and evolving management structures within the Van Panchayat system.

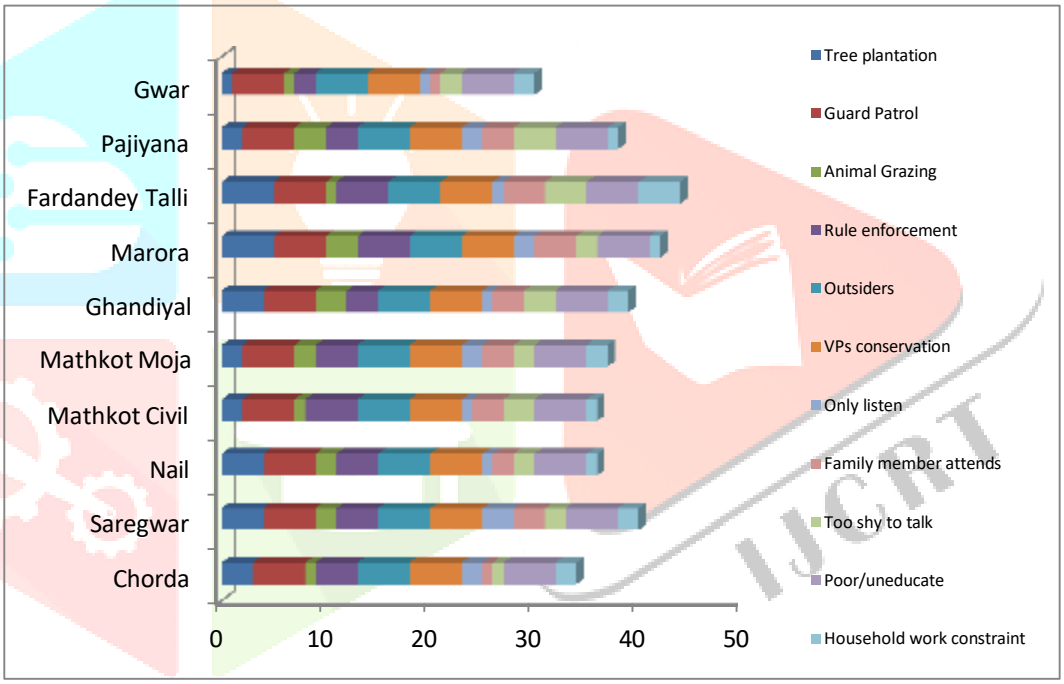

Fig 2. Various resource utilization within different Van Panchayats

Table:5. VPs (oldest) wise development activities by FD, NGOs, VPs (self) local community

Name of VP	Total number of years data available for	Developmental activities conducted (numbers)					
		Fodder tree plantation	Plantation of commercial spp	Nursery development	Soil and water conservation (Check dams, guly plug etc)	Protection measures (boundary wall, pathways etc.)	Village developmental activities (schools, etc)
Marora	58	6	8	2	3	7	6
Sare gwar	51	10	3	3	6	7	4
Fardendey Talli	45	6	4	0	0	6	0
Mathkot Mauja	54	12	3	7	3	9	4
Ghindiyal	62	6	1	3	2	3	6
Nail	51	5	3	6	2	6	1
Chaurara	28	9	5	6	4	6	3
Pajiyana	31	3	5	4	4	2	0
Mathkot civil	24	1	0	2	0	5	0
Gwar	23	6	3	3	3	7	1
Total	-	64	35	36	27	58	25

Forest Offenses and Resource Harvesting Patterns in studied VPs: The table presents data regarding various offences related to forest resources in different Van Panchayats (VPs) of Uttarakhand. The data spans a period ranging from 23 to 62 years, highlighting different levels of infractions such as fuel wood harvest, fodder harvest, timber harvest, grazing in restricted areas, mining, and encroachment.

Table: 6 Recorded number of offence in the selected Van Panchayat forests.

Name of VP	data available (years)	Recorded number of offences					
		Fuel wood harvest	Fodder harvest	Timber harvest	Grazing in restricted areas	Mining	Encroachment
Marora	58	27	207	118	95	0	29
Saregwar	51	0	122	35	10	2	14
Fardandey Talli	45	14	39	16	3	0	0
Mathkote Mauja	54	10	24	13	23	5	2
Ghandiyal	62	0	50	7	2	2	3
Nail	51	32	90	30	37	0	10
Chorda	28	0	193	72	39	0	8
Pajiyana	31	13	61	7	23	3	2
Mathkot civil	24	8	9	3	10	0	0
Gwar	23	0	2	1	0	1	3
Total		104	797	302	242	13	71

Among the VPs listed, the highest number of recorded offences was found in Marora, which reported 207 instances of fuel wood harvest, 118 of fodder harvest, and 95 timber harvest offences over a period of 58 years. On the other hand, Ghandiyal, with a slightly longer data availability of 62 years, showed zero instances of fuel wood or fodder harvesting offences, but had 50 instances of timber harvesting, 7 grazing incidents, and minimal other infractions. The lowest number of offences were observed in VPs like Gwar and Mathkot Civil, which reported fewer incidents overall. Encroachment and mining were less

frequently recorded, with encroachment incidents being more noticeable in Marora (29) and Nail (10), while mining- related offences were sparse, with Marora being the only VP reporting such cases (13 instances). This suggests that while fuel wood and fodder collection are widespread concerns, other infractions like mining and encroachment are more localized or sporadic. This data underlines the varying challenges faced by each VP in forest management and the need for tailored strategies to address the different types of offences in these communities.For offences like illegal collection of minor forest produce and fodder collection from closed forests, fines have increased from 5 Rs and 0.5 Rs in 1950 to 100-200 Rs and 200-300 Rs respectively in recent years, reflecting greater emphasis on controlling these activities. Damage to boundary pillars has also become a more serious offence, with fines increasing from 3 Rs in 1950 to 300 Rs today. Interestingly, fines for non-cooperation in fire control and Sharamdan (voluntary community work) have seen more modest increases, starting at 0.5 Rs in 1950 and now standing at 50 Rs for fire control and 100 Rs for Sharamdan-related offences. This overall upward trend in fines suggests a growing recognition of the importance of protecting forest resources and the need for stricter enforcement as pressures on these resources have intensified over the decades.

Livestock Pressure and Resource Condition in Van Panchayat Village: he data highlights significant variations in livestock numbers and corresponding pressure on forest resources among different villages.

Table 7: Forest Dependency and Grazing Pressure Across studied VPs

Village	HHs	Livestock							Resource Condition	Pressure on forest
		Cow	Buffalo	Ox	Goat	Sheep	horse	Total		
Gwar	250	25	9	21	3	0	2	60	**	Internal and external
Nail	65	28	16	13	3	0	2	62	***	Internal
Farkendey Talli	126	24	19	37	86	0	4	170	***	External
Pajyana	64	59	48	59	59	0	2	227	****	External
Ghandiyal	200	93	125	18	49	12	6	303	****	Internal
Marora	250	36	59	26	32	4	4	161	**	Internal and external
Mathkot	750	70	54	90	102	0	0	316	****	Internal
Saregwar	73	136	24	4	15	0	0	179	***	Internal and external
Chorda	95	26	75	38	92	0	12	243	****	Internal and external

Note: 0 to 5. * denotes very poor, ** denotes poor, *** denotes average, ****denotes good, ***** denotes excellent.

Villages like Mathkot (316 total livestock) and Ghandiyal (303) show the highest livestock pressure, correlating with a resource condition rating of **** and predominantly internal pressure. Pajyana (227) and Chorda (243) also show high pressure, mostly external or combined. Smaller villages like Nail and Gwar have lower livestock counts (62 and 60 respectively) and report better resource conditions (** or***) with less intense pressure. Interestingly, villages with moderate household counts such as Farkendey Talli and Saregwar also report notable livestock pressure (170 and 179), indicating that even smaller populations can exert significant forest pressure depending on livestock dependency. Overall, high livestock numbers,

especially goats and buffaloes, appear to contribute directly to degraded forest resource conditions, emphasizing the need for improved pasture management and alternative fodder provisioning.

The assessment of forest management issues across ten Van Panchayats (VPs) in Chamoli district highlights considerable variation in institutional performance, resource monitoring, and community engagement. Boundary walls are in place in most VPs except Farkandey Talli and Chorda, contributing to stronger demarcation and reduced encroachment risk elsewhere. Patrolling is generally practiced effectively, except in Gwar and Marora, potentially increasing vulnerability to illicit activities. All VPs report having benefit-sharing mechanisms, indicating fair distribution of forest benefits. Project support is more selectively available, with Marora, Ghandiyal, and Chorda lacking external project assistance. Awareness of forest policies is notably low in several VPs, especially in Marora, Ghandiyal, Mathkot Civil, Saregwar, and Chorda. Only the first five VPs have formulated micro-plans, reflecting better long- term planning. Leadership and fund management quality vary sharply—VPs like Pajyana and Farkandey Talli show strong leadership and good fund management, while others like Gwar, Marora, and Mathkot Civil struggle in these areas. Fire management, however, is uniformly strong across all VPs, showcasing coordinated community response. Fine systems are more robust in areas with strong leadership, while coordination with the forest department remains weak in most VPs, with only Farkandey Talli reporting strong collaboration. Lastly, the number of appointed forest guards ranges from one to four, with Marora having the highest at four, reflecting a likely correlation with forest area or incidence rates.

Discussion:

Van Panchayats (VPs) in Uttarakhand, India, remain a landmark model of community-led forest governance, originating from grassroots resistance against colonial forest reservation policies in the early 20th century (Agrawal & Ostrom, 2001; Balooni et al., 2007; Lodhiyal, 2002). Unlike more recent top-down decentralization initiatives, VPs emerged from local mobilization and have historically demonstrated effective management of forest resources, contributing significantly to both ecological conservation and rural livelihoods (Somanathan, 1991; Agrawal & Goyal, 2001). VPs are characterized by participatory rule-making, rotational use of forest compartments, and community-led enforcement, and many still operate with relative autonomy while collaborating with state actors like the Forest and Revenue departments.

The comparative analysis of the three forest governance systems in Uttarakhand reveals significant differences in governance structures, community involvement, and environmental outcomes. VPs exemplify a decentralized, community-based model of forest governance. Their effectiveness stems largely from active community participation in rule enforcement, resource monitoring, and conflict resolution. With institutional support and collective norms in place, many VPs have succeeded in maintaining ecological integrity, controlling overgrazing and forest fires, and promoting sustainable extraction of forest products. These forests also offer substantial livelihood benefits, especially in terms of fodder, fuelwood, and non-timber forest products (NTFPs). However, the effectiveness of VPs can vary across villages depending on institutional strength, leadership, and access to technical support. However, recent studies and field

observations suggest that the sustainability of this governance model is increasingly under pressure. Institutional challenges such as youth migration, leadership turn over, limited capacity-building support, and increasing bureaucratic interference are affecting collective action and forest condition (Ballabh et al., 2022; Negi & Maikhuri, 2021; Singh et al., 2020). In addition, market pressures for non-timber forest products (NTFPs), encroachment, and climate-related events such as forest fires and erratic rainfall have further complicated forest management (Tiwari et al., 2023). Many communities are struggling to maintain traditional norms of forest use and face procedural and financial delays in accessing government schemes such as CAMPA and MGNREGA (Rawat, 2020; Bhattacharya & Basnyat, 2022). Despite these issues, VPs continue to provide an important institutional base for participatory governance and could serve as adaptive models for community-based climate resilience and forest restoration — provided that supportive policy reforms, decentralized financing, and technical capacity-building measures are prioritized. A comprehensive assessment of current VP functioning, forest health and institutional relationships with government departments is now urgently needed to ensure their long-term viability and environmental effectiveness.

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