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Incentive for Ecosystem Services: Governance and Policy Coherence in Nepal

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ABSTRACT: This research highlights the governance of landscape and policy coherence to ensure a sustainable supply of ecosystem services through incentives for ecosystem schemes at the municipal level in Nepal. The study was carried out in Dhankuta and Dasarath Chand municipalities representing Nepal's Koshi and Sudur Paschim provinces. Six aggregate governance indicators adopted by the World Bank Group were assessed through interviews with primary stakeholders of selected landscapes in two municipalities, followed by Key Informant Interviews. The study indicates that implementation of the Incentive for Ecosystem service scheme is feasible, creating multi-stakeholder institutions at the local level. However, there are several governance challenges to ensure its success. In particular, incentives for ecosystem schemes must be part of local government planning, where multisectoral coordination and collaboration are essential. While municipal authorities have constitutional jurisdictions to initiate such schemes, they lack the human resources to understand ecosystem management for a sustainable supply of ecosystem services. Therefore, landscape governance is essential to make incentive schemes successful and ensure transparency and equitable benefits among ecosystem service providers.

Keywords: Coordination; Ecosystem; Governance; Incentives; Landscape; Policy

1. Introduction

The Fifth Conference of Parties of the United Nations Convention on Biological Diversity (UNCBD) introduces the ecosystem approach for the proper function of ecosystem services and conservation of ecosystem structures [1]. Ecosystem services concept has evolved to a landscape approach ensuring wider stakeholders' engagement in sustainable natural resources management options [2]. The landscape approach is the siloed approach that reduces land use problems such as forest degradation while addressing land rights or community ownership over natural resources [3]. Landscape approach is more relevant as an integrated solution to a sustainable supply of ecosystem services that emphasizes the interconnection and interdependencies among the resources. The concept has gained momentum for its comprehensive approach to the effectively using resources, lessening the anthropogenic and climate impacts. Therefore, the approach is considered efficient in reducing risks and adapting to mitigate the negative impacts from climatic and anthropogenic stresses [4].

While the landscape approach suggests adopting interrelation among various elements of landscape, there is a need to understand policy coherence and nexus among thesedifferent elements [5]. In particular, water resources, agriculture and forests are major landscape entities interlinked with each other, contributing to the supply of ecosystem services [6] where there is a need for an inter-sectoral policy for adaptation and implementation at different governance levels. For example, almost 70% of water is used for the agriculture sector for food production and energy use, whereas forests play a crucial role in regenerating water flow [7].

Nepal has adopted a landscape approach in managing its high-value biodiversity and ecosystem services [8,9]. In order to measure the susceptibility and threat to the communities and ecosystem, significant conducive policies and

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legal instruments are developed to reduce the impact of climate change and other anthropogenic stresses [5]. However, there are significant policy gaps and contradictory legal instruments within various sectors [10].

A number of policies, such as National Forest Policy 2019 and Climate Change Policy 2019, discussed ecosystem financing mechanisms for a sustainable supply of ecosystem services. The Forest Act 2019 and Forest Regulation 2021 discussed Payment for ecosystem services (PES) as a sustainable ecosystem financing mechanism to conserve biodiversity and ecosystems for a sustainable supply of ecosystem services. At the same time, Local Government Operation Act 2020 empowers municipal governments to initiate innovation to conserve ecosystems and biodiversity within their area of jurisdiction. However, there is a significant gap in strategies and operational guidelines to initiate innovation on local-level ecosystem financing mechanisms [11]. More importantly, the PES mechanism needs multi-sectoral coordination and participation. PES mechanism was initially conceptualized to improve natural resources management for indirect benefits [12]. For example, European schemes aim to increase positive externalities such as landscape beauty, cultural heritage or preservation of the countryside and carbon markets [13]. However, developing countries like Nepal are more attracted to the PES scheme, which is targeted at enhancing the provisioning of services such as water resources because water management is a critical issue in developing economies [10,14,15].

In this context, this research aims to understand policy coherence and governance at the local level to initiate municipal-level ecosystem financing mechanisms and the incentive for ecosystem services schemes for water services. Unlike Wunder [16], this research discussed more on incentives for ecosystem services (IES), as Wunder's concept of PES is a market-driven, which may not always be functional in poor countries like Nepal where communities may be willing to contribute through kind contributions as they may lack cash to contribute [17].

2. Materials and Methods

2.1. Study Area

Dhankuta municipality is located upstream of the Koshi River and has been facing water scarcity for a long time. The present water supply is around 11 L per second in the dry season, whereas demand is around 24 L per second. The present drinking water supply is taken from the Nibuwa Khola source, upstream of Nibuwakhola, the water source, heavily suffering from forest degradation and land conservation to agricultural land, resulting in water stress.

Dasarath Chand municipality is part of the Baitadi district in the far western hilly region of Nepal and within the larger catchment of Mahakali River. Currently, municipal households face acute water scarcity. The water supply in the town was 155 m^3/day against a demand of 492 m^3/day [17]. Ghattigadh/Madhkhola is the source of the proposed drinking water project, 5 km from the main urban town. Madhkhola lies in the Gwallek forest area, where the forest on the top of the hills is under government management, while the middle and lower parts of the hills are controlled by the local communities. Figure 1: Approximately here.

Figure 1. Map Showing Research area.

2.2. Governance Indicators and Policy Review

Seven aggregate governance indicators were taken to assess the present landscape governance status in the selected landscapes. These governance indicators were contextualized from the United Nations and the World Bank Worldwide Governance Indicators 1999 to understand the ecosystem governance for the sustainable supply of ecosystem services in the Nepali context. Both the United Nations and the World Bank provided six major indicator categories. These indicators were translated into Nepali language. We consulted with 10 Nepali experts on ecosystems, forests, agriculture, local government and policy to contextualize these indicators. Based on expert opinion, seven broad governance indicators were developed for ecosystem and landscape management in Nepal. These seven indicators were further pre-tested in rural settings to validate their applicability before administrating a survey in the research area. Based on these indicators, relevant policies and legal instruments in Nepal were reviewed. A total of 42 relevant policies, development plans and legal instruments (Act and Regulation) were reviewed. Based on the policy review, each indicator was assigned a 1 to 5 score with a description, which helps respondents express their scoring to each indicator.

2.3. Key Informant Interviews (KIIs)

Thirty-eight key informants' interviews represented various stakeholders, including local governments, government authorities, civil society organizations and sectoral experts, fifteen in each research site and eight in Kathmandu. Key Informant interviews were primarily based on identified governance indicators and were asked their scoring on each indicator.

2.4. Focus Group Discussions (FGD)

Eight FGDs, four at each research site, were carried out by different stakeholders. The stakeholders include, (a) municipal authorities (b) Government offices (Division Forest Office (DFO), Watershed management office, agriculture office, (c) Ecosystem service providers and consumers.

Focus group discussions were primarily focusing on existing ecosystem service demand, existing management and governance practices and the possibility of integrating within the municipal development planning process.

2.5. Household Survey and Sample Size

A total of 203 household-level questionnaires were administered, 101 in Dhankuta and 102 in Dasarath Chand municipality, using Salvin's formula ($n = N/(1 + Ne^2)$ to determine sample size from a total of 16,558 existing households in both municipalities. Household questionnaires were randomly administered to both upstream and downstream communities to understand their willingness to participate in IES schemes, present management and governance practices and possible institutional structures they prefer. Household heads were selected as the respondents for this questionnaire survey. If a household head was unavailable, any members above 18 years of age were selected for household interview.

2.6. Data Analysis

We analyze quantitative data using simple statistical tools in Microsoft Excel. Governance indicators' perceptions are rated from 1 (very poor) to 5 (excellent). Each key informants were asked to provide their scoring (1–5) against each set of governance indicator. Frequency Participants of the FGDs agreed on one score against each indicator after discussion among themselves. Perceptions of each indicator are further analyzed using frequency, where higher frequency is considered the final rating for that particular indicator. Qualitative data relating to governance analysis are discussed.

3. Results

3.1. Household Characteristics

Out of 203 respondents interviewed, 93 were female respondents. Female respondents in Dasarath Chand municipality are much lower than that of Dhankuta municipality, which may be because of the workload of womenand cultural limitations in Dasarath Chand municipality. The average household size in both municipalities is higher than the national average of 4.37. Average land holding is Dhankuta is 6.16 Ropani, whereas 6.06 Ropani in Dasarath Chand municipality (Table 1).

Table 1. Household characteristics (standard deviation in parentheses).

Variables	Municipality	
	Dhankuta	**Dasarath Chand**
Female respondents (%)	66	27
Age	43.17 (15.45)	48 (13.02)
Family size	6.96 (3.37)	5.184 (2.12)
Annual household income (000, Nepali Rupees) *	202 (8.643)	128.92 (6.946)
Land holding (Ropani) **	6.16 (4.045)	6.06 (8.78)
Years of Education	8.72 (0.492)	4.16 (0.468)

*1USD is 132 Nepali Rupees (2024); **1 ha of land is 19.66 Ropani.

3.2. Governance Indicators and Community Perception

We analysed major policies related to ecosystem management and incentive for ecosystem services based on secondary literature and stakeholder's perception. Together with the policy review, we analysed stakeholders' perception of seven governance indicators. Respondents of household surveys and key informant interviews were asked to provide their scoring (1 to 5) for each indicator. Respondents were asked to provide their scoring in the range of 0.5 (10%) against each indicator based on their experiences and understanding of governance indicators. Narratives of each indicator ere provided to the respondent before scoring. The mean scores for the household survey were 2.589 and 2.505 in Dhankuta and Dasarath Chand municipalities, respectively. This means that household respondents from Dhankuta municipality perceived slightly better governance of the ecosystem than that of Dasarath Chand municipality. Perceived scoring on ecosystem governance indicators ranges from 1 (very poor) to 4 (good enough) in Dasarath Chand municipality, whereas 1.5 to 4 in Dhankuta municipality. Summary of the overall governance of the ecosystem perceived by the respondents of the household survey is presented in Table 2.

Table 2. Descriptive statistics of overall perceived ecosystem governance.

Dhankuta Municipality		**Dasarath Chand Municipality**	
Mean	2.589	Mean	2.505
Standard Deviation	0.5933	Standard Deviation	0.5694
Sample Variance	0.3520	Sample Variance	0.3242
Range	2.5	Range	3
Minimum	1.5	Minimum	1
Maximum	4	Maximum	4
Count	101	Count	102

Ecosystem governance is crucial for the sustainable supply of ecosystem services and equitable sharing of benefits for the livelihoods of local communities. In particular, rural communities heavily rely on ecosystem services for diversifying their income options and practicing good governance is a high concern of these rural population. We analysed seven key governance indicators based on households' respondents and key informants scoring against each indicator. Among seven indicators, tenure security is found most satisfactory in both municipalities, which reflects that Nepal's policy and legal instruments are clear on tenure rights of ecosystem resources, such as forests water. Household respondents perceived that the government administration and service delivery mechanism was unsatisfactory, as this indicator received scores ranging from 1.5 to 2.5. The mode and frequency of scoring against each indicator are provided in Table 3.

Table 3. Mode and frequency of scoring against each governance indicator.

Governance Indicator	Household Respondent Indicator Scoring-Mode (Frequency)		KII Respondent Indicator Scoring-Mode (Frequency)	
	Dhankuta (η 101)	***Dasarath Chand (η 102)***	***Dhankuta (η 15)***	***Dasarath Chand (η 15)***
I1: Agency Coordination	**2.5** (53), 2 (28), 3 (19), 4 (1)	**2** (56), 2.5 (38), 3 (8)	2 (9)	2 (11)
I2: Policies, legal framework and coherence	**3** (41), 3.5 (27), 2.5 (16), 4 (8), 2(6), 1.5(3)	**3** (48), 4 (22), 3.5 (26), 2.5 (6)	3 (8)	2.5 (10)
I3: Multistakeholder participation and engagement	**3** (56), 2.5 (24), 3.5 (14), 2 (7)	**2.5** (57), 3 (42), 3.5 (3.5)	3 (8)	3 (9)
I4: Tenure security	**4** (82), 3.5 (15), 3 (4)	**4** (78), 4.5 (14), 3.5 (10)	4.5 (11)	4 (12)
I5: Landscape focus and planning	**2** (63), 3 (28), 2.5 (8), 3.5 (2)	**2** (68), 3 (22), 2.5 (12)	3 (10)	3 (8)
I6: Government administration and delivery	**2** (73), 2.5 (18), 1.5 (10)	**2** (59), 2.5 (29), 1.5 (14)	3 (8)	2.5 (8)
I7: Sustainable production and Resilience	**3** (43), 3.5 (28), 2.5 (16), 2 (14)	**2.5** (47), 3 (32), 2 (23)	2.5 (8)	2.5 (9)

We further analyse the weighted score of each indicator using the weightage value of frequency against respondent scoring. The weighted score of each indicator is assessed as:

Weighted score = Σ (score value × frequency of that particular score/sample size).

Based on the weightage value of each indicator, we found that the governance of the ecosystem is perceived slightly better in Dasarath Chand municipality than in Dhankuta municipality which could be because of the performance of municipal government authorities and better leadership. However, this needs further investigation. Figure 2 provides an overview of the perceived weighted score against each municipal governance indicator.

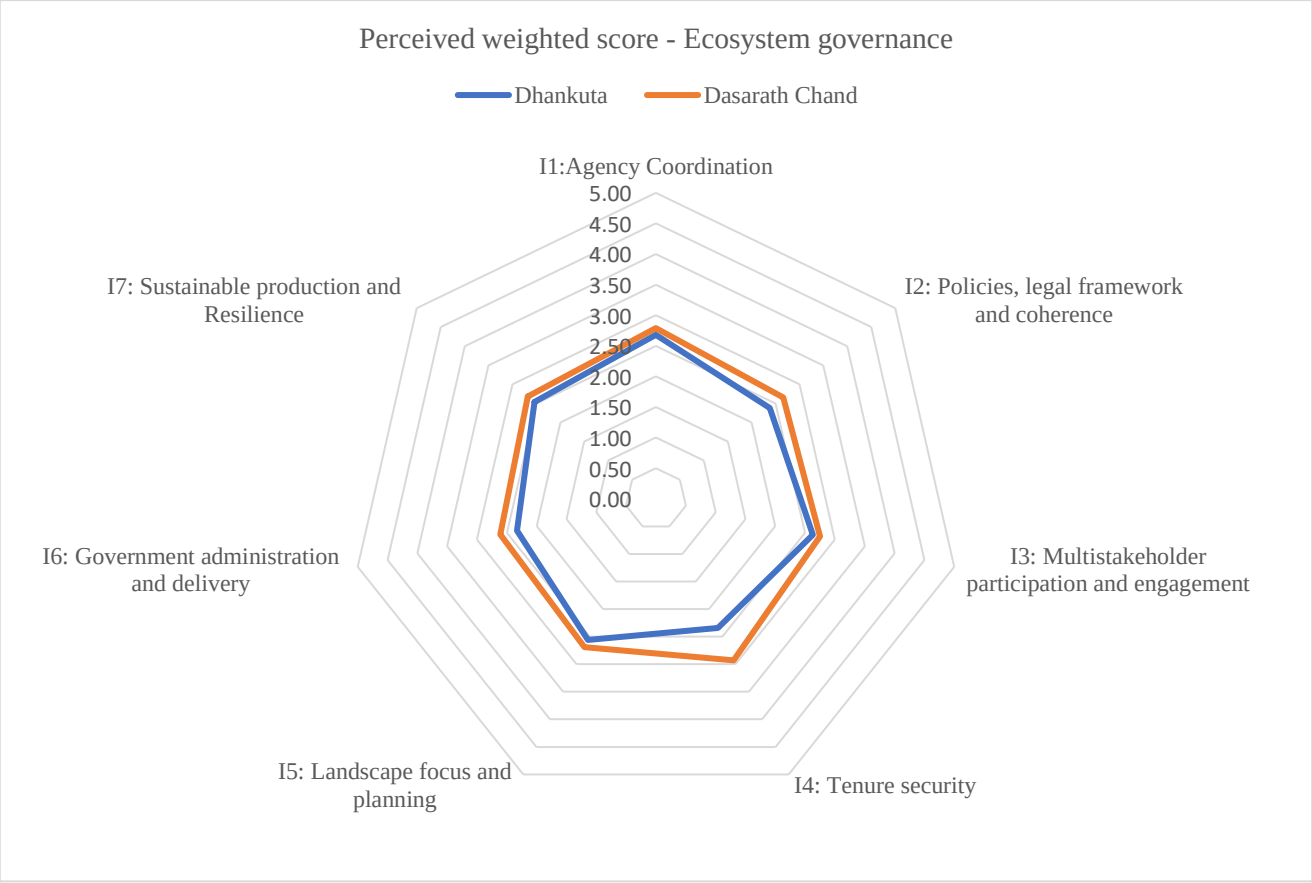

Figure 2. Perceived weighted score on ecosystem governance.

3.3. Interagency Coordination

There are several agencies involved in ecosystem management, and therefore, are also relevant for implementing IES schemes, such as municipal government, forest authorities, soil and watershed management offices, district-based water supply and irrigation offices and agriculture development. In order to ensure successful implementation and

building ownership of policies and programs, an effective interagency coordination mechanism is crucial [18]. Despite the majority of Nepalese policies discussing the need for interagency coordination, the existing coordination mechanism in both municipalities is found to be very weak and debilitated, resulting in conflict on the use of land and water resources. Suhardiman [19] also suggested similar findings with the lack of vertical and horizontal coordination in Nepal.

Forests, agriculture, drinking water supply, municipal government and soil and watershed management authorities are key actors in managing the ecosystem and implementation of IES at the municipal level together with communities and civil society organizations such as community forest user groups (CFUGs). Implementation of the IES mechanism to ensure a sustainable supply of water to downstream communities (both quantity and quality), there is a need for strong coordination among these agencies to support upstream ecosystems such as providing alternatives to chemical fertilizer, soil erosion and landslide control, and plantation of water-friendly tree species. However, these agencies are locked with their sectoral annual program and plans, limiting strong coordination to sustain IES schemes. While our research revealed the need for interagency coordination for the sustainable supply of ecosystem services through incentive mechanisms, existing sectoral planning approaches, overlapping jurisdictions and procedural complexities are key barriers to overcoming the issue of inter-agency coordination, which may need substantial reforms in exiting planning, procedure and policies.

3.4. Policies, Legal framework and Coherence

Different policies interact at the operational level; therefore, policy coherence is crucial as it supports effective service delivery and reduces the chances of duplication [20]. It is important to understand whether different but related sectoral policies share a common goal to interact at the local level and also contradictions that they do have limited effective service delivery [21]. Nepal's forest Act discussed the provision of incentives for ecosystem services, and Forest Regulation further described the process and procedure to initiate such incentive mechanisms for ecosystem services. Besides the Forest Act, the Local Government Operation Act empowers municipal governments to initiate innovation on local-level resource financing. With the present constitution [22], the forestry sector is under the jurisdiction of the provincial government. There is limited authority to manage forest resources with local governments, which may limit the role of local government in upstream forest management for a sustainable supply of ecosystem services.

With three tiers of governments operational within the federal governance system, policy coherence is crucial to avoiding duplication and inter-government conflicts in ecosystem management. Our study revealed that many barriers and constraints exist to overcome the issue of policy coherence, such as constitutional concurrent rights of all three tiers of government, which may need a constitutional amendment. A constitutional amendment may not be an easy path within the hung parliament scenario.

3.5. Multi-Stakeholders' Participation and Engagement

A number of IES-related policies emphasized multi-stakeholders' engagement in materializing policies in action, such as Forest Sector Strategy 2015, National Land Policy 2019, Water Resources Policy 2020 and Agriculture Development Strategy 2015. Within the forestry sector strategy, a multi-stakeholder institution is envisioned, namely, the district forest sector coordination committee (DFCC), where forestry sector stakeholders are in a better position to take ownership of processes that improve local people's ability to insert grassroots issues into wider debates and discussions [23]. However, respondents reacted that there is limited opportunity to participate in the policy-making process both at the municipal and provincial levels. Local communities argued that the policy decisions are mostly top-down and local consultations are conducted as formalities where local issues and suggestions are hardly considered in the policy domain.

The Local Government Operation Act (LGOA) 2017 empowers local governments to formulate their natural resources management strategies and local-level policies through a consultative process and community participation. However, participants of the focus group discussions argued that the consultative process is not followed at the highest requirement, which may limit the voice of communities in municipal-level policies. Despite these provisions, there may be several limitations of local government, such as the availability of financial resources and required human and technical resources to reach grassroots communities. We also found that the municipal governments are critically lacking skilled and technical human resources, which may be the reason for limited outreach and consultations.

3.6. Tenure Security

Tenure rights and security over natural resources are crucial to initiate IES like mechanisms to ensure a sustainable supply of ecosystem services as tenure security provides full access to service providers over identified ecosystem

services [10]. There are a number of policies and legal instruments discussed on tenure rights on natural resources, such as Water Resource Act 1992, an umbrella legislation to manage water resources in Nepal, primarily discussing the ownership of water resources to the state. However, the same parliamentary Act discussed community user rights of water resources, prioritizing drinking water. Similarly, the Forest Act discusses forest carbon rights to the state, and a benefit-sharing mechanism is discussed within the Forest regulation to ensure benefits from forest carbon sales reach the communities conserving forests.

Despite tenure clarity in water resources and forest resources, there are still conflicts over the use of these resources and a proper institutional arrangement is needed at the municipal level to manage these conflicts to ensure the IES mechanism can work sustainably. Paudel [24] reported the conflict between the communities in Terai region with failure to address the traditional forest use and prioritization of policies that promote forest protection and restoration. In both cases, at users' level, local rules, arrangements in operational plans, elite mediations and formal legal procedures are used when conflicts arise [25].

3.7. Landscape Focus and Planning

Incentive for ecosystem services mechanism needs a multi-sectoral approach to ensure upstream-downstream linkages and interconnection between service providers and consumers. Therefore, a landscape approach could be beneficial to implement IES schemes in the municipal area. The ongoing 15th development plan (2020–2024) aims to ensure intersectoral planning with landscape-level focus towards achieving targeted results [26]. However, sectoral development planning, such as agriculture, water resources and forests, follows the sectoral or silo approach failing to adopt landscape-level relationships and interdependence among these sectors [27]. In addition, there are several policy inconsistencies and overlapping provisions among the sectors limiting cross-sectoral focus [5,10,11] where some policies are causing ownership and accountability problems in implementation due to overlapping and conflicting provisions (Table 4).

In Dasarath Chand municipality, water is being supplied from the Gwallek area to the city center, where Department of Roads recently constructed the road with limited consideration for the protection of water springs as a reason, local communities claimed that water springs are under threats with road construction without ensuring environmental safeguards. This will, in the long term, reduce the availability of water downstream and also to the district city center. A similar case is also observed upstream of Dhankuta, which increases the chances of landslides and soil erosion, ultimately contaminating water downstream of Dhankuta city.

Table 4. Overlapping jurisdiction among Federal, Provincial and Local Governments (Constitution of Nepal 2015).

Schedule/Jurisdiction	Water/Agriculture/Forest Relevant
5/Federal	7. International boundary river 11. Policies relating to conservation and multiple uses of water resources 14. Central level large projects such as electricity, irrigation, and others 27. National and international environment management, national parks, wildlife reserves and wetland, national forest policies, carbon service
6/Provincial	7. Province level electricity, irrigation, and water supply services 19. Use of forests and waters and management of environment within the Province 20. Agriculture and livestock development, factories, industrialization, trade, business, transportation
7/Concurrent (Federal and Provincial)	13. State boundary river, waterways, environment protection, biodiversity 18. Tourism, water supply and sanitation 23. Utilization of forests, mountains, forest conservation areas and waters stretching in inter-provincial form
8/Local	11. Local roads, rural roads, agro roads, irrigation 15. Agriculture and animal husbandry, agro-products management, animal health, cooperatives 18. Management, operation and control of agricultural extension 19. Water supply, small hydropower projects, alternative energy 21. Conservation of watersheds
9/Concurrent (Federal, Provincial and Local)	4. Agriculture 5. Services such as electricity, water supply, irrigation 6. Service fee, charge, penalty, and royalty from natural resources 7. Forests, wildlife, birds, water uses, environment, ecology and biodiversity 14. Royalty from natural resources

3.8. Government Administration and Delivery

Nepal's policies and related legislative instruments, such as the Forest Act, provided financial resources through local-level financing mechanisms such as through REDD+, PES and revenue generated from the hydropower sector [28]. Despite the policy provisions, significant institutional capacity gaps, especially at the provincial and local levels, carry out the functions entrusted to them [29]. One of the major assignments that the present legislative instrument assigns to local governments is to develop and implement a land use plan essential for ecosystem management and, thus, also for local-level financing mechanisms such as incentives for ecosystem services (IES). Capacity of Local government to develop land use plans and their implementation is very limited [30,31] and also the fact that adequate attention is not given to developing their capacity [32], as a reason the government delivery mechanism is not found effective at the municipal level to take initiation on IES mechanism to generate local finances for sustainable supply for ecosystem services.

Stakeholders mostly argued aboutthe slow delivery of government services and not coordinated efforts to ensure a sustainable supply of ecosystem services in both municipalities. One key issue that largely impactsservice delivery is that there are many unclear or overlapping jurisdictions. For example, forests are under the jurisdiction of the provincial government and any activities within the forest area need approval or consent from the forest department of the provincial government. In contrast, municipal governments are assigned to watershed management [5]. These contradictory jurisdictions assuming the watershed without forests make further complications in the implementation of IES-like mechanisms at the municipal level.

3.9. Sustainable Production and Resilience

There are a number of policy and legislative instruments prioritizing sustainable production and resilience of both communities and ecosystems. For example, the Forest sector strategy supported by the Forest Act and Regulation highlights the need for sustainable production of ecosystem services while ensuring ecosystem resilience. Similarly, Nepal's national adaptation plan (NAP) identified eight key areas, including forests and biodiversity, agriculture, and water resources, where innovations are suggested to reduce vulnerability while increasing the adaptive capacity of communities and ecosystems [33]. Agriculture perspective plan also discussed sustainable production while ensuring resilience through Integrated Pest Management (IPM), integrated soil fertility management, organic farming, and renewable energies. In recent years, water has been central to discussions and strategies to ensure multiple water use.

The study primarily focused on water as an ecosystem service in both municipalities. Most respondents argued that water availability has reduced in recent years and, the quality of water is more contaminated than in earlier days. Similarly, household respondents perceived negative changes in forest cover. The perceived change in water availability and forest cover is presented in Table 5.

Table 5. Perception on Water Availability and Forest Cover.

Variable	Municipality	Frequency (Percent)		
		Decreasing	**No Change**	**Increasing**
Change in Forest Cover	Dhankuta	33 (32.67)	56 (55.44)	12 (11.89)
	Dasarath Chand	90 (88.24)	7 (6.86)	5 (4.9)
Change in Water availability	Dhankuta	68 (67.33)	28 (27.72)	5 (4.95)
	Dasarath Chand	74 (72.55)	5 (4.90)	23 (22.55)

While communities argued that the amount of water has decreased, there is a need for proper management in upstream and water source areas through innovative solutions such as water source protection, plantation of water-friendly vegetation species and controlling soil erosion as well as landslides. In order to provide innovative solutions to ensure water supply, there is a need for strong inter-agency coordination and collective sectoral planning as envisioned in many policy documents, including the National Adaptation Plan.

4. Discussion

Ecosystem management needs a multi-sectoral and integrated approach. Therefore, incentives for ecosystem service schemes can only be sustained when all stakeholders participate and contribute to ensure the flow of ecosystem services [10,34]. Nepal promulgated many policies supporting local level ecosystem financing and these policies may be coherent in their stated objectives. However, there is a lack of synergy in the implementation, which is a major hindrance to achieving sustainable production of ecosystem services [35]. More importantly, Nepal still follows a

sectoral approach where different sectors within the ecosystem, such as water, agriculture and forests, prepare their sectoral plan in silos which often do not complement each other, resulting in the limited outcome on production of ecosystem services [11]. Successful implementation of IES schemes depends upon a clear institutional framework, intra- and inter-agency coordination, and the sharing of information. Despite many good policy frameworks, there has no concrete synchronized policy coherence in Nepal [36]. Similarly, many of the ecosystem management projects and innovations are being implemented in project mode. They are more often externally funded, which also means that there are very limited government finances available in ecosystem management and thus, to institutionalize IES schemes at the municipal level. Therefore, we argued that effective ecosystem management and institutionalizing IES-like schemes at the municipal level need long-term planning and resources. Stakeholders' engagement in policy formulation is crucial for the sustainability of the ecosystem and ecosystem services. As a reason, we argued that stakeholders need to be engaged in policy discourse, which not only ensures their policy stake but also ensures their role in implementation. Our study also suggests that municipal government formulate a stakeholder engagement plan for wider outreach and ensure their voices are heard in the policy domain.

A number of scholars and studies have argued that a multi-stakeholder engagement approach at all tiers of government is a prerequisite to ensure policy coherence and overcome barriers to the implementation of common related projects [37,38]. Nepal's forestry sector strategy and forest policy mention the use of a multi-stakeholder approach at different levels of governance for policy formulation, whereas the Forest Act and Regulation discussed the implementation of payment for ecosystem services. However, no specific policy and guidelines have been prepared for the institutionalization of the PES mechanism at the national level [39]. The Local Government Operation Act 2017, however, empowers the municipal government to initiate local-level innovations towards generating local financing for the sustainable management of natural resources. Within the framework of LGOA 2017, we suggest that local government should initiate IES schemes in consultation with ecosystem service providers and consumers where other agencies can be instrumental as subsidiary organizations to support IES schemes. Therefore, we recommend implementing IES or PES mechanism be more clearly spelled out to involve the relevant stakeholders through operation guidelines.

Article 11 of the Local Government Operation Act 2017 [40] discussed the roles and responsibilities of municipal government. Among others, the Act empowers local governments to formulate municipal-level legal instruments and policies to ensure climate-friendly development pathwaysand conserve watersheds as well as water resources and biodiversity within their geographical jurisdiction. Despite the provisions under the federal legislative provision, neither Dasarath Chand nor Dhankuta municipalities have not issued or formulated any local-level policy or legal instruments related to ecosystem management. One of the key provisions within the Local Government Operation Act 2017 is that the local government also needs to generate local-level financing to conserve the ecosystem. Incentives for ecosystem services could be one such mechanism where a municipal government can generate local finances to conserve its ecosystems and, therefore, ensure a sustainable supply of ecosystem services. We argued that the local government develops local-level policy and legal instruments through participatory consultation to ensure the participation of stakeholders.

Governance of the landscape with clear institutional mechanisms is essential to ensure a sustainable supply of ecosystem services and an equitable benefit-sharing mechanism. Governance structures are partly responsible for the rules which result in low economic activity around ecosystem services [11]. One of the major indicators of governance is institutional and individual capacities to deliver designated plans and programs. From our interviews, we found a mismatch between capacities and expectations, which ultimately impacts the government delivery mechanism which is in line with earlier similar research by Willems and Baumert [41] and Tankha [11]. We argued that an institutional mechanism for IES schemes be established and also focus on building institutional and individual capacity to operationalize such schemes for local financing mechanisms at the local level. Our findings suggest that municipal government ensures multi-stakeholders representation in institutional mechanisms, including from the ecosystem producers and consumers.

5. Conclusions

This study discussed the governing landscape for a sustainable supply of ecosystem services and generating local-level financing through incentive for ecosystem services (IES) schemes at the municipal level in Nepal. Multi-stakeholders' engagement, conducive and coherent policies, and clear institutional mechanisms are key to governing commons such as ecosystem services. As a reason, IES-like schemes can sustain to benefit both communities and ecosystems. We found that the capacities and interagency coordination are weak for managing the ecosystem and

institutionalizing IES schemes in both municipalities. Therefore, there is a need for strong inter-agency coordination and investment in building capacities of municipal governments.

The Local Government Operation Act 2017 empowers and authorizes municipal governments to manage their common properties, such as biodiversity, ecosystem and water resources, while generating local-level financing for sustainable management of these resources. Despite strong federal legislative instruments, there are no local-level policies or strategies developed in the Dasarath Chand and Dhankuta municipalities. This may be because of the priority of municipal governments, which mainly focus on small-scale infrastructure projects and social security-related schemes, where ecosystem management is not prioritized. Our study suggests that the municipal government develops its local-level strategies or policies related to ecosystem management and invests in operationalizing IES-like schemes to generate local-level financing. In order to initiate an incentive mechanism for ecosystem services, we found that the institutional arrangement is crucial for the success of such schemes. Therefore, we suggest that the municipal government establish a multistakeholder institution within the municipality to oversee incentive mechanisms. Our study also suggests that such IES institutions be represented by different stakeholders, including ecosystem service providers and consumers. Once the institution is in place within the municipality structure, developing IES guidelines for ecosystem service trade would help further to institutionalize IES schemes. The guidelines should cover ecosystem service type, ecosystem service assessment in quantity and quality, consumers' willingness to pay for the service, fund management, monitoring and compliance.

Our study mainly focused on understanding the governance of ecosystems at the municipal level, where we assessed governance using seven major indicators of landscape governance. We found that the governance of ecosystems at the municipal level is similar in both municipalities where inter-agency coordination is relatively weak, both at horizontal and vertical level. Similarly, the capacity of municipal government needs to strengthen to delivery services. There are very limited technical persons available in both municipalities looking after ecosystem management and nexus among various elements of the ecosystem. Our study is limited to water as an ecosystem service and in two municipalities, representing mid-hills of Nepal. Our findings may not be generalized in regions with different socio-economic and cultural settings. We also suggest that further in-depth research is needed to understand the governance of ecosystem services within the context of local political economy.

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Author Contributions

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Ethics Statement

The study was conducted according to the guidelines of the Declaration of Helsinki, and standard operating procedure for non medical human and animal subject research approved by the Institutional Review Board of AGRICULTURE AND FORESTRY UNIVERSITY, NEPAL (approval received on 7 August 2022).

Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

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Declaration of Competing Interest

The authors declare no conflict of interest.

Data Availability Statement

Data supporting these findings are available within the article or upon request.

Sample Availability

The authors declare that no physical samples were used in this study.

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