Annex 2:

THE BASELINE ASSESSMENT FOR

TINAU-RESUNGA-RAMPUR SOCIO ECOLOGICAL PRODUCTION LANDSCAPE

Details to the

OPERATIONAL PHASE 8 (OP8)

SGP COUNTRY PROGRAMME STRATEGY (CPS)

Nepal

1. Introduction

The Tinau-Resunga-Rampur Socio Ecological Production Landscape (TRRL) represents a critical river basin in western Nepal, encompassing a unique convergence of ecological diversity, cultural heritage, and developmental challenges. Selected as one of the priority landscapes for GEF-SGP Operational Phase 8 (OP8), the TRRL embodies the program's strategic evolution towards concentrated, evidence-based interventions that link conservation with sustainable livelihoods. This landscape selection reflects lessons learned from previous operational phases, particularly the recognition that focused geographic targeting enhances program impact, fosters synergies among projects, and creates demonstrable pathways for scaling up successful interventions. The TRRL is characterized by its rugged topography, ranging from the Siwalik hills to the fertile Terai plains, and faces significant environmental pressures including forest depletion, high susceptibility to landslides and floods, and threats to aquatic biodiversity. What makes this landscape particularly compelling for SGP intervention is the dual nature of its challenges and opportunities. The rural areas of Palpa and Gulmi present opportunities for proven community-based natural resource management models, while the rapidly urbanizing center of Butwal demands innovative approaches to sustainable urban development. This duality positions the TRRL as a testing ground for integrated rural-urban conservation strategies that can inform national-level policy and practice. The landscape is home to the Magar ethnic group, Nepal's largest indigenous community, whose traditional knowledge and practices provide a foundation for community-led conservation. The region's socio-economic profile, marked by significant dependence on land-based livelihoods and out-migration trends, underscores the need for interventions that simultaneously address environmental degradation and livelihood security.

2. Geographic Coverage

The TRRL spans across four districts in Lumbini Province: Palpa, Gulmi, and Rupandehi. This multi-district landscape encompasses diverse ecological zones, from the high hills of the Mahabharat range to the flat alluvial plains of the Terai. The landscape covers a total area of approximately 2840 square kilometers across 232 wards in 33 municipalities. The landscape selected lies within two major landscapes: the Chitwan Annapurna Landscape and the Terai Arc Landscape. The Tinau River, a significant hydrological feature, originates in the Mahabharat Range and flows south through the Siwalik Hills before reaching the Terai Plain at Butwal, Nepal, where it ultimately joins the Ganges river system. Its basin forms a central component of the landscape, encompassing the main river and a network of key tributaries, including the *Chidiya Khola* and *Dovan Khola*, and other rivers in the basin *Dano*, *Banganga*, and *Ghodaha Khola*. Adjacent to the Tinau Basin, the landscape also incorporates the southern portion of the Kali Gandaki River

basin, notable for the distinctive bend of the Kali Gandaki River itself and the presence of its significant tributaries, the *Badigad* and *Ridi Khola*.

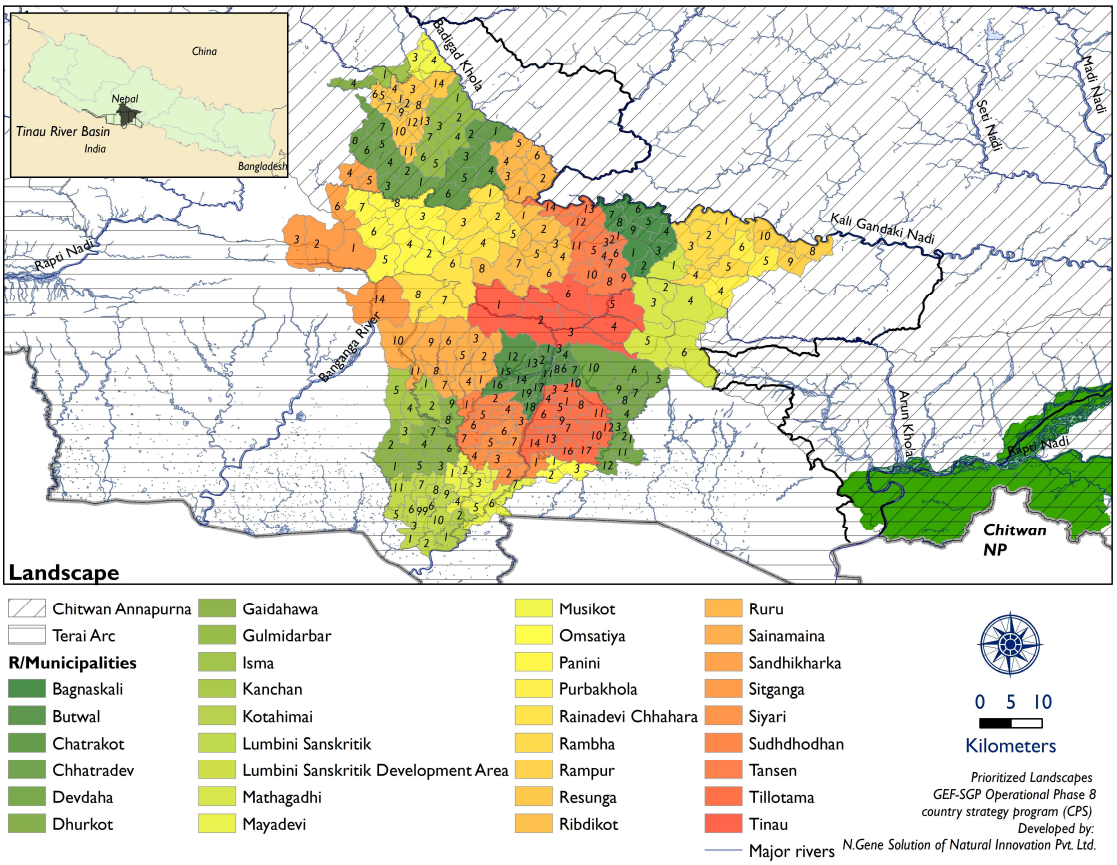

Figure 1: Map of Tinau-Resunga-Rampur Landscape

Palpa District forms the upper catchment of the Tinau river basin, contributing 21 wards across ten municipalities: Tinau Rural Municipality (6 wards; 201.99 SQKM) , Rampur Municipality (3 wards; 45.17 SQKM) , Rainadevi Chhahara Rural Municipality (8 wards; 175.89 SQKM) , Mathagadhi Rural Municipality (6 wards; 171.12 SQKM) , Rambha Rural Municipality (5 wards; 94.12 SQKM) , Bagnaskali Rural Municipality (9 wards; 84.16 SQKM) , Ribdikot Rural Municipality (8 wards; 124.55 SQKM) , Tansen Municipality (14 wards; 109.80 SQKM) , Purbakhola Rural Municipality (3 wards; 48.24 SQKM), and Nisdi Rural Municipality (not listed in table). The district is characterized by steep terrain. This rugged landscape, while ecologically rich, faces significant challenges related to soil erosion and landslides, particularly along the expanding Madan Bhandari Highway corridor.

Rupandehi District, encompassing wards across thirteen municipalities, represents the transition zone from hills to plains and includes the rapidly urbanizing center of Butwal. The municipalities include Butwal Sub-Metropolitan City (19 wards; 101.61 SQKM) , Devdaha Municipality (12 wards; 136.96 SQKM) , Sainamaina Municipality (11 wards; 161.21 SQKM) , Gaidahawa Rural Municipality (9 wards; 96.80 SQKM) , Lumbini Sanskritik Municipality (10 wards; 80.90 SQKM) , Kanchan Rural Municipality (5 wards; 58.50 SQKM) , Sudhdhodhan Rural Municipality (7 wards; 57.56 SQKM) , Tillotama Municipality (17 wards; 126.19 SQKM) , Siyari Rural Municipality (7 wards; 66.35 SQKM) , Mayadevi Rural Municipality (7 wards; 69.06 SQKM) , Omsatiya Rural Municipality (3 wards; 19.53 SQKM) , Kotahimai Rural Municipality (2 wards; 20.43 SQKM) , and the Lumbini Sanskritik Development Area (1 ward; 7.86 SQKM). Butwal, as the largest urban center in the landscape, faces unique challenges related to unplanned urbanization, waste management, and climate vulnerability through increased flood risk. The district also encompasses significant wetland areas, including portions near Lumbini, which are critical for waterfowl conservation, particularly the endangered Sarus Crane.

Gulmi District contributes 37 wards from seven municipalities to the landscape: Resunga Municipality (14 wards; 83.77 SQKM), Chatrakot Rural Municipality (6 wards; 87.02 SQKM), Gulmidarbar Rural Municipality (7 wards; 80.00 SQKM) , Dhurkot Rural Municipality (1 ward; 9.28 SQKM) , Isma Rural Municipality (1 ward; 13.93 SQKM) , Musikot Municipality (2 wards; 26.59 SQKM), and Ruru Rural Municipality (6 wards; 67.36 SQKM). Resunga, the district's focal conservation area, is renowned for its biodiversity, particularly as a critical habitat for endangered vultures. The district's forest coverage, estimated at approximately 50% in certain areas, provides crucial ecosystem services while supporting the livelihoods of forest-dependent communities. However, increasing forest fires, driven by reduced human presence due to migration and accumulation of dry forest litter, pose a growing threat to this resource base. Resunga, the district's focal conservation area, is renowned for its biodiversity, particularly as a critical habitat for endangered vultures. However, increasing forest fires, driven by reduced human presence due to migration and accumulation of dry forest litter, pose a growing threat to this resource base.

Table 1: *Summary of geographical coverage in TRRL*

District	No. of Municipalities	No. of Wards	Approximate Area (sq km)
ARGHAKHANCHI	**4**	**23**	**413.08**
GULMI	**7**	**37**	**367.95**
PALPA	**9**	**62**	**1055.05**
RUPANDEHI	**13**	**110**	**1002.95**
	33	**232**	**2839.04**

3. Ecological and Geographic Characteristics

The TRRL encompasses three distinct ecological zones: the high hills of the Mahabharat range in the north, the fragile mid-hills dominated by Siwalik formations, and the fertile Terai plains in the south. This ecological gradient creates diverse habitats supporting varied biodiversity while presenting distinct conservation and development challenges in each zone.

3.1 Forest Resources and Biodiversity

Forest cover in the TRRL varies significantly by location, with some rural municipalities reporting up to 70% forest coverage. The major tree species include Sal (*Shorea robusta*), Chilaune (*Schima wallichii*), Sallo (*Pinus roxburghii*), Uttis (*Alnus nepalensis*), Asna (*Terminalia elliptica*), cotton tree (*Bombax ceiba*) and Khayar (*Acacia catechu*) in different elevation zones. Pine (Salla) forests are common in certain areas, while Sal forests dominate the lower elevations and Terai margins. However, forest composition is changing, with respondents noting that while overall forest area may be stable or increasing in some locations, this increase is driven more by non-woody vegetation than timber species. Traditional valuable timber species like Sal, Khayar, and Asna are reported to be declining or maintaining only constant numbers.

Table 2: *Major Tree Species in the Tinau Landscape*

Tree (Common Name)	Scientific Name	Primary Zones/Uses
Sal (Sakhu)	*Shorea robusta*	Lower elevations, Terai margins; valuable timber, leaf plates
Chilaune	*Schima wallichii*	Mid-hills; fuelwood, leaf litter (fire risk)
Sallo (Pine)	*Pinus roxburghii*	Mid-hills; resin, timber, leaf litter for Duna Tapari
Uttis	*Alnus nepalensis*	Higher elevations; nitrogen-fixing, fodder, expanding
Khayar	*Acacia catechu*	Mid-hills; slow-growing timber (15 years), declining
Asna	*Terminalia tomentosa*	Lower hills; timber, declining
Simal	*Bombax ceiba*	Various elevations; vulture nesting tree, culturally important

The landscape's forests provide critical habitat for diverse wildlife, including leopards, deer, wild boar, monkeys, and smaller mammals. However, human-wildlife conflict is emerging as a significant issue, particularly with crop-raiding by monkeys, wild boar, and Dumsi (porcupine). The forests also harbor important medicinal plant species, though these remain largely underutilized due to lack of supportive policies and limited market

linkages. Key medicinal plants include Sugandha Kokila (*Cinnamomum glaucescens*), which has significant commercial potential for essential oil extraction, Satuwa (*Paris polyphylla* - now critically endangered and cultivated in Rampur Municipality of Palpa), Timur (*Zanthoxylum armatum*), Harro (*Terminalia chebula*), Barro (*Terminalia bellirica*), and Aamala (*Phyllanthus emblica*). The underutilization of these valuable non-timber forest products represents both a lost livelihood opportunity and a conservation gap.

3.2 Avian Biodiversity and Vulture Conservation

The TRRL supports exceptional avian diversity, with over 266 bird species recorded in the Resunga forest conservation area alone. The landscape is particularly significant as a critical habitat for endangered vulture species. Historically, Nepal hosted lakhs of vultures across nine species found in South Asia. However, the vulture population experienced a catastrophic decline of 99.9% by the 2000s, bringing several species to the verge of extinction. This decline, primarily attributed to the veterinary use of Diclofenac, which is fatal to vultures when they consume carcasses of treated animals, represents one of the most dramatic population collapses of any bird species globally. Current conservation efforts focus on the Resunga area, where vulture populations persist but remain threatened. The decline in vulture numbers is attributed to multiple factors: loss of tall nesting trees (particularly Simal trees, which were banned for cutting but are now again legally harvestable), reduced food availability as fewer cattle carcasses are left in the open due to changing agricultural practices and reduced livestock holdings, and continued use of harmful veterinary drugs. Traditional vulture feeding sites have diminished as village-based meat consumption has decreased with urbanization and dietary changes.

Bird Conservation Nepal operates in the landscape, working with local communities on vulture conservation through awareness raising, supporting the establishment of vulture feeding sites at Gaushala (cattle shelters) where naturally deceased cattle can serve as safe food sources, monitoring and fire protection in nesting areas, and working towards veterinary drug monitoring to eliminate the use of vulture-toxic medications in livestock. The Rampur Vulture Conservation Park, which hosts more than 300 vultures, represents a significant conservation success, though it also operates as a wildlife rescue center addressing human-wildlife conflicts involving monkeys and leopards. The landscape also supports populations of the endangered Sarus Crane, particularly in wetland areas of Rupandehi districts. Lumbini Sanskritik Municipality has declared the Sarus Crane as its municipal bird (*Nagar Panchhi*), reflecting local commitment to its conservation. However, Sarus populations face threats from agricultural intensification, particularly the use of chemical fertilizers (urea and DAP) in rice fields, which may impact their food sources, and wetland degradation and conversion.

3.3 Aquatic Ecosystems and Wetlands

The TRRL encompasses several significant wetland areas that provide critical ecosystem services and biodiversity value. These include the Jagdishpur wetland complex, one of Nepal's Ramsar sites, Satyabati Tal (lake) in Tinau Rural Municipality, multiple smaller wetlands (dhaha and taal) across Devdaha and other municipalities, and seasonally flooded agricultural lands that serve as foraging areas for waterfowl.

These wetlands support diverse waterbird populations, including migratory species, and provide important breeding and feeding grounds. Local reports indicate seasonal variations in bird abundance, with certain species like Sat Patre and other waterfowl being particularly abundant during early morning and evening hours. Some farmers report that prolonged water retention in their rice fields attracts Sarus Cranes, which feed on fish and other aquatic organisms.

The Tinau River itself historically supported diverse fish biodiversity, though this is now threatened by dam construction and habitat degradation. There are emerging opportunities for sustainable fisheries development, particularly fish farming in village ponds and reservoir areas. The Bote Majhi community, traditionally associated with fishing, represents a potential target group for fisheries-based livelihood interventions, particularly in areas like Rampur where dam construction has created potential for fish farming linked to improved road connectivity (Gaidakot-Palpa Gandaki Corridor Highway).

However, wetlands face multiple threats including drainage for agricultural expansion, sedimentation from upstream erosion, pollution from agricultural runoff and urban waste, and encroachment from urban expansion. Conservation efforts have been initiated by local governments and NGOs, including wetland development and park creation along riversides in Lumbini Sanskritik Municipality, community-based management of 12 bigha wetlands in Sainamaina Municipality involving Tharu community engagement, and efforts to develop integrated land-use plans for major wetlands combining water, grassland, and tree components.

4. Geological Context and Disaster Risk

The Tinau River Basin represents an exceptionally dynamic geological landscape shaped by the ongoing collision of the Indian and Eurasian tectonic plates. Understanding this geological foundation is essential for designing effective and resilient interventions in land degradation control, climate change adaptation, and sustainable land management. The landscape's geology is fundamentally structured by a primary tectonic boundaries: the

Main Boundary Thrust (MBT), which define zones of contrasting rock types, stability, and environmental vulnerability.

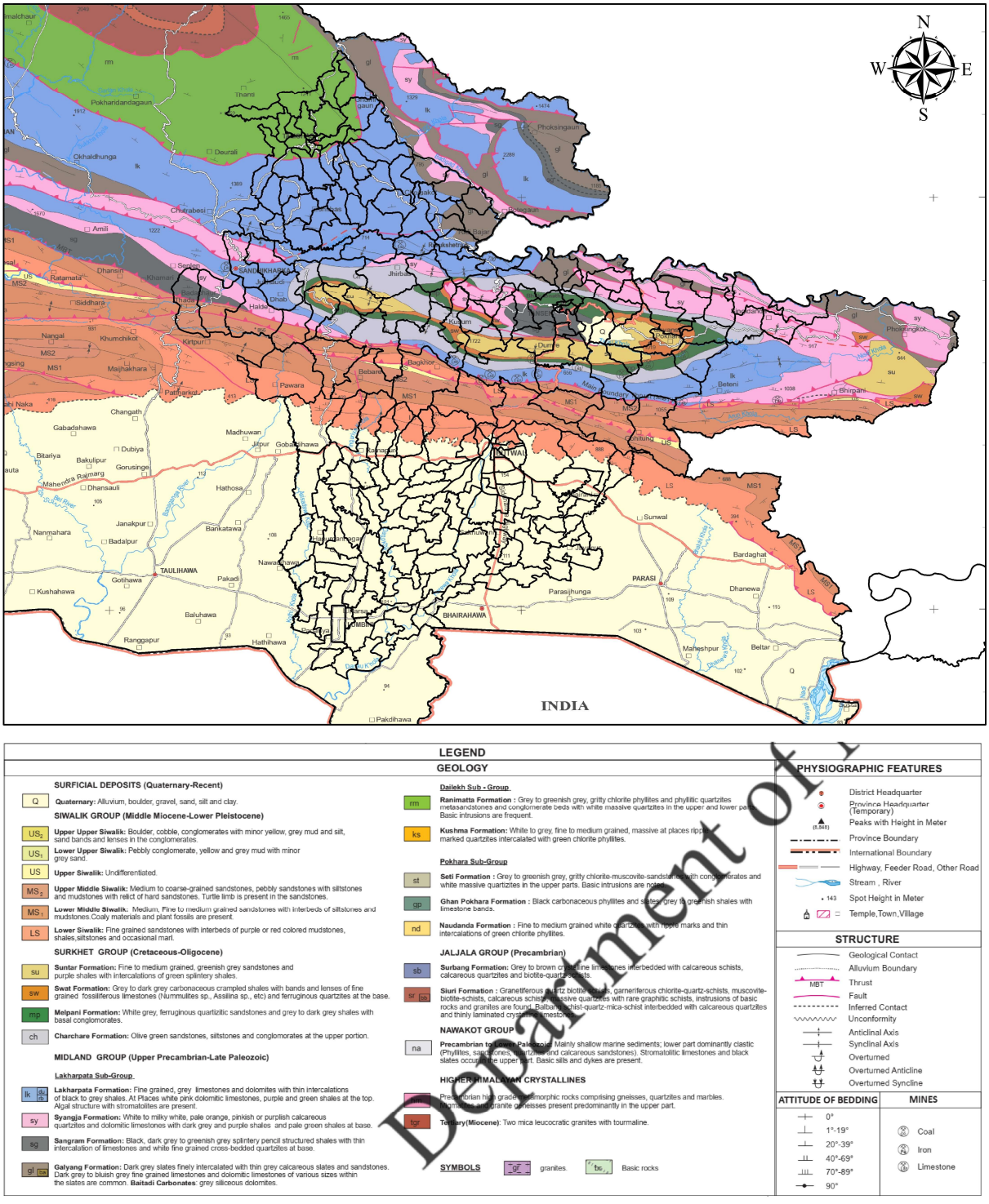

***Figure 2**: Geology of Tinau Landscape*

4.1 The Main Boundary Thrust and Its Implications

The Main Boundary Thrust (MBT) is the most immediately relevant tectonic structure for environmental interventions in the Tinau area, forming the southern edge of the major mountain-building zone. The MBT marks the structural boundary between the younger, fragile Siwalik Group rocks (Churia Hills) to the south and the older, more resistant Lesser Himalayan Sequence rocks to the north. In the Tinau region, the MBT runs roughly east-west, typically dipping steeply northwards, and is visible as the line separating highly folded Lesser Himalayan rock layers from Siwalik sediments.

The significance of the MBT cannot be overstated: it is a zone of intense brittle deformation, resulting in highly fractured, sheared, and fragmented rocks along its trace. This fracturing makes the entire zone, and the immediately adjacent Siwalik hills, extremely unstable and prone to mass wasting events. The Tinau River cuts directly across this active tectonic zone, creating a corridor of particularly high geohazard risk. This tectonic activity is not historical but ongoing, meaning that the landscape is continuously being uplifted and deformed, making it inherently dynamic and requiring adaptive, risk-informed development approaches rather than static engineering solutions.

4.2 The Fragile Siwalik Formations

The central and most extensive part of the Tinau catchment is dominated by formations belonging to the Siwalik Group (Chure Range), which are highly relevant to land degradation interventions. The Siwalik formations are sedimentary, composed primarily of soft, poorly consolidated fluvial deposits: alternating layers of sandstone, mudstone, shale, and conglomerate. Specific formations prevalent in the area include the Seti Formation, Suntar Formation, Swat Formation, and Syangja Formation, categorized into Lower, Middle, and Upper Siwalik units.

These formations are intrinsically prone to mass wasting, landslides, and severe soil erosion. They lack cohesion, and when slopes are destabilized by rainfall, road construction, or improper land use, they generate enormous sediment loads. This directly causes flash floods and river aggradation (bed-raising) in the downstream lowlands, creating a cascading series of environmental and developmental problems. The rapid expansion of the Madan Bhandari Highway through Gulmi is cited by local respondents as a major contributor to increased landslide frequency, reflecting the sensitivity of these formations to anthropogenic disturbance.

Projects targeting Sustainable Land Management and erosion control must be prioritized in these Siwalik zones. However, interventions must be designed with the understanding that this is not simply "bad soil management" but rather a fundamental geological

vulnerability. Appropriate interventions include bioengineering approaches that work with natural erosion processes rather than against them, strategic afforestation with deep-rooted native species appropriate for unstable slopes, community-based monitoring and early warning systems for landslide risk, and land-use planning that restricts high-risk activities (intensive agriculture, uncontrolled construction) on the most unstable slopes.

4.3 The Terai Alluvial Plains

The southern boundary of the TRRL extends into the flat, fertile Terai plains, where Butwal and the Lumbini area are located. This area is characterized by Recent (Quaternary) Alluvium: young, unconsolidated sediments deposited by the Tinau, Dano, and other rivers over millennia. While these soils are highly fertile and support intensive agriculture, the zone faces two primary challenges linked to its geological character.

First, the high sediment load carried from the unstable Siwalik hills rapidly raises the riverbeds through deposition. This "aggradation" means that rivers flow on elevated beds above the surrounding floodplain, dramatically increasing the risk of riverbank cutting, channel migration, and catastrophic flooding. Butwal's increasing flood vulnerability is directly linked to this geological process, making flood resilience projects critical. Second, the shallow water table and porous nature of alluvial sediments make groundwater highly vulnerable to contamination from agricultural chemicals, urban waste, and industrial effluents.

Conservation and development interventions in this zone must focus on integrated watershed management that addresses sediment generation upstream, flood-resilient urban planning and nature-based solutions for flood management in Butwal, riverbank stabilization using bioengineering techniques, and groundwater protection and monitoring programs.

5. Socio-economic Profile and Community Characteristics

The TRRL is characterized by significant ethnic and social diversity, with distinct community composition patterns across its ecological zones. Understanding this social landscape is critical for designing inclusive and effective SGP interventions.

5.1 Ethnic and Social Composition

The hill districts of Palpa and Gulmi are dominated by the Magar ethnic group, Nepal's largest indigenous community, who constitute approximately 15% of Lumbini Province's population and are the majority or largest group in multiple municipalities. The Magar

community has a rich cultural heritage and traditional land management practices that provide a foundation for community-based conservation initiatives. The hills also host significant populations of Khas people (Brahmin and Chhetri), comprising approximately 37% of the provincial population, and Khas Dalits (10% of the population), who face particular socio-economic vulnerabilities.

The Terai and foothill areas of Rupandehi districts show greater ethnic mixing. The Tharu indigenous community is present, particularly in Sainamaina and other western Terai areas, traditionally associated with forest and wetland management. Madheshi communities are found in eastern Terai portions of the landscape, and there are significant populations of hill-origin migrants (Pahadi) who have settled in the plains. The landscape also includes several occupational castes with traditional livelihoods linked to natural resources: Kumal (traditionally potters), Bote Majhi (traditionally fishers and boatmen), Chudara (artisans working with wood), and various Dalit communities with traditional craft skills.

This ethnic and occupational diversity represents both an opportunity and a challenge for SGP. Different communities have distinct relationships with natural resources, varying levels of formal education and access to services, different traditional knowledge systems, and varying degrees of social and political marginalization that must be addressed through targeted inclusion strategies.

Table 4: *Ethnic and Caste Composition of the Tinau Landscape*

Ethnic/Caste Group	Primary Location	Population %	Traditional Livelihood/Practices	SDG Contributions
Magar	Hill districts (Palpa, Gulmi)	~15%	Terrace agriculture, bamboo handicrafts, traditional architecture	SDG 1, 2, 10, 15
Khas (Brahmin/Chhetri)	Throughout landscape	~37%	Agriculture, livestock rearing, religious practices	SDG 1, 2, 5, 10
Khas Dalit	Throughout landscape	~10%	Traditional crafts (metalwork, tailoring, leather)	SDG 1, 5, 8, 10
Tharu	Terai areas	~14%	Wetland management, fishing, Dhakiya weaving, traditional medicine	SDG 1, 2, 6, 13, 15
Madheshi	Eastern Terai	Significant	Intensive agriculture, trade, cultural festivals	SDG 1, 2, 8
Kumal	Riverside areas	Small	Traditional pottery, riverbank cultivation	SDG 1, 8, 12, 15
Bote Majhi	River corridors	Small	Fishing, boat operation, river resource management	SDG 1, 2, 14, 15
Chudara	Hill areas	Small	Woodworking (Theki, Chauthi making)	SDG 1, 8, 12, 15

Newar	Urban centers	Minority	Trade, business, traditional crafts	SDG 8, 11
Musahar	Terai margins	Small	Agriculture (historically marginalized community)	SDG 1, 2, 10

5.2 Livelihood Patterns and Economic Base

Agriculture remains the primary livelihood base across the TRRL, though patterns vary significantly by elevation and proximity to urban centers. In the hill areas of Palpa and Gulmi, agriculture is predominantly subsistence-oriented, with rice, wheat, maize, and barley as primary cereals. Traditional crops like buckwheat (fapar), foxtail millet (kodo), finger millet (junu), and barnyard millet (sama) are reported to be disappearing, attributed to changed rainfall patterns and longer growing seasons that favor other crops, as well as reduced labor availability due to migration. Commercial agriculture focuses on sugarcane in mid-hill areas, mandarin oranges and citrus, which have emerged as a significant cash crop, off-season vegetables (cauliflower, tomato, beans) targeting lowland markets, and ginger and turmeric as medicinal crops.

In the Terai areas of Rupandehi, agriculture is more intensive and market-oriented, with rice-wheat systems dominating. However, agricultural practices face multiple challenges including erratic rainfall and water scarcity, particularly affecting winter crops; soil degradation and declining fertility; limited access to irrigation infrastructure; market access issues, despite proximity to Butwal and highway networks; and declining agricultural labor due to out-migration, particularly of youth.

Forest-based livelihoods remain important, particularly in Gulmi and Palpa, where communities depend on forests for fuelwood collection, fodder for livestock (particularly "Daale grass" species), collection of medicinal plants and herbs, though largely unorganized, and bamboo and other non-timber forest products for handicrafts. However, the economic viability of forest-based livelihoods is constrained by policy restrictions on harvest, lack of market linkages and processing facilities, inadequate technical knowledge for sustainable harvesting and value addition, and high transaction costs relative to returns.

Livestock rearing is practiced across the landscape but is declining due to labor constraints and reduced profitability. However, specific livestock-based enterprises show potential, including beekeeping, which has been actively promoted by local governments with distribution of beehives, dairy farming linked to existing *Gaushalas* (cattle shelters), and goat rearing by marginalized groups.

Migration for employment, both seasonal and long-term, is a dominant feature of the landscape's economy, particularly affecting youth. This has contradictory implications: it

reduces agricultural labor availability and traditional forest use patterns (contributing to forest fire risk), but it also provides crucial remittance income that supports household food security and invests in land and housing. The challenge for SGP is to create locally-based economic opportunities that can retain or attract back migrants while being competitive with external wage opportunities.

6. Community-Based Forest Management

Community-based forest management is well-established in the TRRL, operating through multiple modalities. Within Lumbini Province, there are 4,057 Community Forest User Groups (CFUGs) managing 443,017.53 hectares of government forest, benefiting 940,130 households. Additionally, 416 pro-poor leasehold forest groups manage 2,476.39 hectares, specifically targeting 4,563 economically disadvantaged households. This represents a significant institutional foundation for community-level natural resource management interventions.

6.1 Community Forest User Groups

CFUGs in the TRRL vary significantly in their organizational capacity and functionality. Stronger CFUGs conduct regular monthly meetings, implement forest management plans developed with District Forest Office support, undertake plantation activities (species include Sunkauli, Malgadi, Khannu, Aamriso, and others), provide forest products (timber, fuelwood, fodder grass) to member households, and implement some fire control measures during the dry season.

However, CFUGs face multiple challenges that limit their potential contribution to conservation and livelihoods. These include limited capacity for enterprise development and value addition to forest products; weak market linkages for timber and non-timber forest products; insufficient technical support for sustainable harvesting of medicinal plants and herbs; inadequate resources (financial and human) for forest fire prevention and control; declining active membership due to migration and aging of active forest users; and policy constraints that limit commercial utilization of certain species and products. There is significant variability across the landscape, with some CFUGs effectively managing their forests and providing benefits to members, while others exist largely on paper with minimal active management. Women's groups manage certain community forests and have shown particular interest in non-timber forest product enterprises, though they face constraints in accessing training and market support.

6.2 Leasehold Forestry: A Pro-Poor Model

Leasehold forestry (LF) represents a particularly relevant model for the TRRL given SGP's focus on poverty alleviation linked to environmental restoration. Under this modality, degraded forest land is leased to groups of economically disadvantaged households for 40 years, with rights to harvest and sell forest products, creating direct income incentives for rehabilitation. The model has proven successful in other parts of Nepal in restoring degraded lands through intensive plantation and management, providing regular income to extremely poor households through sale of fodder, fuelwood, and other products, building organizational capacity of marginalized groups, and creating demonstration effects that can influence broader land management practices.

The presence of 416 leasehold groups in Lumbini Province, managing over 2,476 hectares specifically for 4,563 poor households, represents a ready platform for SGP interventions. These groups could be supported with improved silvicultural practices and diversification of plantation species, technical and financial support for developing forest-based enterprises, market linkages for products, training in Sloping Agricultural Land Technology (SALT), which SGP has successfully promoted in other landscapes, and support for adopting climate-resilient species and practices.

Leasehold forestry aligns perfectly with SGP's strategic objectives of linking biodiversity conservation to poverty reduction, demonstrating replicable models that can be scaled by government and other programs, and empowering marginalized communities to be active stewards of natural resources. The approach can be particularly effective in the degraded Siwalik areas where environmental restoration and livelihood enhancement are equally urgent.

7. Critical Environmental Challenges

The TRRL faces a complex of interconnected environmental challenges that both justify its selection as an OP8 priority landscape and define the strategic focus areas for SGP intervention.

7.1 Forest Fires: An Escalating Threat

Forest fires have emerged as one of the most critical and worsening environmental problems across the TRRL, mentioned consistently across all field assessments and stakeholder consultations. The fire season, typically during the dry months before the monsoon (roughly February to May), has become increasingly severe in recent years. The fundamental drivers of increased fire risk are linked to socio-economic changes rather than purely climatic factors.

Historical forest use patterns involved intensive daily interaction with forests: collection of fuelwood, harvesting of fodder and leaf litter for animal bedding (which naturally removed combustible materials), and regular presence of people moving through forests. This intensive use kept forests relatively clean and created natural firebreaks. However, widespread out-migration has dramatically reduced the number of people living in hill villages and active in forests. Simultaneously, livestock populations have declined in many households, reducing demand for fodder and leaf litter collection. The result is accumulation of large quantities of dry leaf litter, particularly in oak (Chilaune) and pine (Salla) forests, creating ideal fuel conditions.

The impacts of forest fires are severe and multifaceted: direct loss of standing timber and forest biomass, destruction of vulture nesting sites and habitat for other wildlife, loss of medicinal plants and biodiversity, soil degradation and increased erosion vulnerability on burned slopes, smoke and air quality impacts on nearby villages, and loss of valuable ecosystem services. Paradoxically, policy constraints on harvesting contribute to fire risk. Current regulations prohibit cutting and selling "fresh" timber from community forests, only allowing dried or dead wood. This policy, intended to prevent over-exploitation, creates perverse incentives: some respondents reported that locals deliberately set fires to create "dried wood" that can then be legally harvested and sold. This suggests that purely restrictive policies without alternative economic incentives may be counterproductive.

Effective fire management requires an integrated approach combining prevention through strategic utilization that reduces fuel loads, such as controlled harvest of leaf litter for composting and enterprises (Duna Tapari production, described below), promotion of fuel breaks through grazing or mechanical clearing, and vegetation management that reduces continuous fuel loads. Community-based fire management systems need strengthening with adequate equipment and training for CFUGs and local communities, establishment of village fire management committees with clear roles and resources, development of community fire management plans linked to CFUG operational plans, and creation of early warning and rapid response systems using technology (including potential for drone-based monitoring).

Creation of economic incentives for forest protection, such as support for sustainable forest-based enterprises that require healthy forests, payment for ecosystem services schemes, and revision of restrictive policies that create perverse incentives, are also essential. Fire management represents both an urgent need and a potential entry point for broader community engagement in forest stewardship, making it a priority for OP8 interventions.

7.2 Land Degradation and Erosion

The TRRL is experiencing severe land degradation, primarily driven by the inherent geological instability of Siwalik formations combined with anthropogenic pressures. The problem manifests differently across elevation zones but has landscape-wide consequences through sediment transfer from hills to plains.

In the Siwalik hill zone, the fundamental issue is the soft, poorly consolidated nature of the underlying geology. However, human activities have dramatically accelerated natural erosion rates. The expansion of the Madan Bhandari Highway through Gulmi is repeatedly cited as a major trigger for increased landslides, reflecting inadequate attention to geological constraints in road design and construction. Deforestation and forest degradation, though overall forest cover may be stable or increasing in some areas, the quality of forest cover has declined, with less dense canopy and reduced presence of deep-rooted tree species, reduces slope stability. Agricultural expansion onto marginal, steep lands, particularly as population pressure increases and valleys fill, extends cultivation to inherently unstable slopes. Abandoned agricultural terraces, a consequence of migration, collapse and trigger erosion as their maintenance systems (terrace walls, drainage) fail. The consequences are severe: loss of productive agricultural land through gullying and landslides, increased disaster risk to settlements and infrastructure, generation of enormous sediment loads that degrade downstream water quality and ecosystems, and reduced water retention capacity leading to increased dry-season water scarcity.

8. Agricultural and Development Constraints

While not strictly "environmental" issues, several agricultural and developmental constraints in the TRRL have direct environmental implications and shape the context for SGP interventions.

8.1 Water Scarcity and Irrigation

Water scarcity is reported as a critical constraint across the entire landscape, affecting both domestic use and agricultural production. In hill areas, the problem is linked to geological and topographical factors (steep terrain, poor water retention in fractured Siwalik rocks), declining spring discharge attributed to deforestation and land-use changes, and lack of water harvesting and storage infrastructure. In the Terai areas, despite the presence of rivers, the problem is linked to seasonal variability (abundant monsoon water but scarcity in winter/spring), limited irrigation infrastructure (canals, pumps) to access surface water, and declining groundwater levels in some areas.

Current coping mechanisms include small-scale rainwater harvesting in drums or small

ponds (pokharis), lift irrigation from rivers and streams (where economically feasible), and spring protection structures (muhan conservation), though maintenance is often inadequate. However, these are insufficient to support intensified or diversified agriculture.

Water scarcity has direct environmental implications: it limits opportunities for profitable agriculture that could compete with labor migration, constraining a major pathway for sustainable rural development; drives agricultural extensification onto marginal lands as farmers cannot intensify production on existing land, increasing erosion risk; limits tree survival in plantation programs, reducing effectiveness of reforestation efforts; and creates competition between domestic use, agriculture, and environmental flows, potentially degrading aquatic ecosystems.

8.2 Market Linkages and Value Chains

Despite proximity to Butwal, a major urban market, and highway networks, farmers and forest product collectors in the TRRL face significant market-related constraints. For agricultural products, issues include price volatility and lack of price information, poor bargaining position of individual farmers, limited processing and storage facilities, and high transaction costs for small producers. For forest products, challenges are even more severe: lack of organized collection and bulking systems for medicinal plants and herbs, absence of processing facilities for value addition, limited knowledge of quality standards and market requirements, policy and regulatory barriers to commercialization, and long and complex supply chains with multiple intermediaries capturing value.

The result is that potentially valuable resources remain underutilized and communities receive minimal economic benefit from their natural resource base. This is particularly evident for medicinal plants. For example, Sugandha Kokila has significant potential for essential oil extraction, with over 2,000 plants reported in Gulmi forests, yet there is no local processing and minimal commercial harvest. Amala is abundant in forests (10-20 quintals available in some areas) but goes largely unused, fetching only Rs. 20-30/kg when sold, far below its potential value with proper processing and marketing.

Several initiatives show promise but require support to scale: Paicho (a vegetable marketing cooperative) assists in marketing products, though farmers complain of low prices and delayed payment. Koseli Ghar, established by Rampur Municipality's Vice Mayor, provides a marketing platform for local products. Agricultural cooperatives distribute inputs (seeds, fertilizers) and could potentially play a greater role in output marketing. Farmers' groups (Sitali Tarkari Utpadan Krishi Samuh) have received some government support, but focus remains primarily on input distribution rather than market linkages.

Strengthening value chains and market linkages is essential for making conservation economically attractive. SGP interventions could support formation and strengthening of producer groups and cooperatives, establishment of collection centers and primary processing facilities, development of market linkages including contracts with buyers, support for certification (organic, fair trade) to access premium markets, and promotion of direct marketing channels including farm-to-consumer models, agritourism, and e-commerce platforms.

9. Strategic Opportunities for SGP OP8 Intervention

The TRRL, despite its challenges, presents numerous strategic opportunities for impactful SGP interventions that align with OP8 priorities and can generate demonstration effects for replication and scaling.

9.1 Scaling Proven Models: Leasehold Forestry and SALT

SGP has successfully promoted Sloping Agricultural Land Technology (SALT) in other landscapes in Nepal and internationally through South-South cooperation. SALT is particularly well-suited to the degraded Siwalik slopes of the TRRL, offering a proven approach to simultaneously address land degradation and livelihood needs. By integrating nitrogen-fixing trees and shrubs into farming systems on slopes, SALT stabilizes soil while maintaining or increasing agricultural productivity. The existence of 416 leasehold forest groups in Lumbini Province provides a ready institutional platform for introducing SALT techniques.

Leasehold forestry itself has proven effective in other parts of Nepal in rehabilitating degraded lands while providing income to extremely poor households. Scaling this model in the TRRL, particularly in degraded Siwalik areas of Palpa and Gulmi, could have significant impacts on both land degradation and poverty. SGP support could enhance existing leasehold groups through technical assistance, market linkages, and enterprise development support.

9.2 Forest-Based Enterprise Development

Several forest-based enterprise opportunities have been identified through field assessments, each addressing both livelihood and conservation objectives. Duna Tapari production using leaf litter from Sallo (Shorea robusta) and other species offers multiple benefits: reduces fuel load for forest fires by removing leaf litter, provides income to marginalized groups, particularly women and Dalits, creates demand for healthy forests, encouraging protection, and offers an environmentally superior alternative to plastic plates in restaurants.

Training programs for Duna Tapari production have been conducted in multiple locations, but have not been sustained due to lack of market development, insufficient startup capital for equipment (motors for pressing machines are cited as costly), lack of organized supply chains, and competition from plastic alternatives due to policy failures (no enforcement of plastic bans in restaurants).

SGP support could revive and scale this model through establishment of marketing networks and contracts with restaurants, provision of appropriate technology and equipment, formation of producer groups and cooperatives, policy advocacy for plastic bans and green procurement, and certification and branding to differentiate product and command premium prices.

Medicinal and aromatic plant cultivation and processing shows tremendous potential given the landscape's biodiversity and elevation range suitable for diverse species. Priority species include *Sugandha Kokila* for essential oil production, *Tejpat* (Bay leaf), *Pipla* (Long pepper), *Timur* (Sichuan pepper), and others. SGP support could include establishment of distillation facilities for essential oil extraction, training in sustainable harvesting techniques, development of cultivation protocols for high-value species, market linkages with pharmaceutical and cosmetic industries, and support for organic certification.

Bamboo and cane handicrafts represent a traditional livelihood for certain groups, particularly the Magar community producing bamboo handicrafts and the Tharu community producing Dhakiya and other items. However, these face market constraints and declining participation. SGP could support design improvement and product diversification, skill training for youth to maintain traditional knowledge, establishment of marketing channels including tourism linkages, and formation of artisan cooperatives.

Non-timber forest products such as honey production (beekeeping is already being promoted), mushroom cultivation, wild fruit processing, and similar activities could be expanded with appropriate technical and marketing support.

9.3 Urban Sustainability in Butwal

Butwal's inclusion in the TRRL represents a strategic innovation for SGP Nepal, bringing an urban dimension to a program traditionally focused on rural conservation. Butwal's rapid, largely unplanned growth creates multiple environmental challenges that require innovative solutions. These challenges include inadequate solid waste management with insufficient collection, sorting, and disposal systems, and lack of public awareness on waste segregation; growing flood vulnerability due to unplanned construction in floodplains, loss of natural drainage channels, and sediment aggradation raising river beds; urban heat island effects from loss of green spaces; air and water pollution from

vehicles, industries, and domestic sources; and loss of urban biodiversity and degradation of urban wetlands and rivers.

SGP can catalyze sustainable urban solutions through pilot projects that can inform municipal policy and planning. Priority interventions include supporting community-based waste management initiatives with waste segregation at source, composting of organic waste, and recycling programs; promoting green infrastructure including urban forestry and parks, green roofs and walls, and restoration of urban wetlands; demonstrating nature-based solutions for flood management such as bioswales and rain gardens, permeable pavements, and restoration of natural drainage channels; and supporting urban agriculture and rooftop farming to enhance food security and reduce urban heat.

These interventions align with the OP8 Strategic Initiative on "Catalyzing Sustainable Urban Solutions" and position SGP to influence urban planning policy in rapidly growing secondary cities across Nepal. Butwal can serve as a demonstration site for integrating environmental sustainability into urban development, with lessons applicable to other urbanizing areas in the Terai.

9.4 Vulture and Sarus Crane Conservation

The TRRL's significance for endangered vulture and Sarus Crane populations creates opportunities for high-visibility conservation interventions with strong community engagement potential. For vulture conservation, building on the work of Bird Conservation Nepal and existing initiatives around Resunga and Rampur, SGP could support expansion of vulture restaurants at Gaushalas, ensuring safe food supply; plantation programs focused on tall nesting trees, particularly Simal, in identified vulture habitat areas; veterinary drug monitoring and awareness programs to eliminate use of Diclofenac and other vulture-toxic drugs; community incentive programs rewarding villages for vulture protection; and establishment of vulture watching hubs for ecotourism, creating economic value for conservation.

For Sarus Crane conservation, relevant interventions include integrated wetland management combining conservation with sustainable use, working with farming communities to maintain "crane-friendly" agricultural practices, reducing harmful pesticide and chemical fertilizer use, supporting eco-tourism development linked to birdwatching, and advocacy for wetland protection and wise use policies. These conservation programs have significant potential for community engagement, education, and awareness raising, aligning with SGP's emphasis on building local conservation capacity. They also create opportunities for linking conservation to livelihoods through eco-tourism and sustainable agriculture.

9.5 Integrated Wetland Management

Several significant wetland sites in the TRRL offer opportunities for demonstrating integrated land-use approaches that balance conservation with community livelihoods. The concept involves zoning wetlands into core conservation areas (permanent water bodies for waterfowl), sustainable use zones (managed grasslands for fodder harvest, regulated fishing areas, seasonal grazing areas), and buffer zones with agroforestry and compatible agriculture.

Jagdishpur wetland, a Ramsar site, has national significance and could benefit from improved management planning and community engagement. Satyabati Tal and similar medium-sized wetlands in Palpa and Gulmi could serve as pilot sites for integrated management approaches. Smaller wetlands and seasonal water bodies across Rupandehi could be incorporated into networks managed by local communities, particularly Tharu groups with traditional wetland management knowledge.

Key interventions include participatory management planning with local communities, restoration activities including vegetation management and invasive species control, livelihood support for wetland-dependent communities including fishing, fodder harvest, and handicrafts from wetland plants, and wetland education and awareness programs targeting schools and local communities. These interventions align with SGP's emphasis on community-based natural resource management and can demonstrate pathways for balancing conservation with development.

10. Stakeholder Landscape and Partnership Opportunities

The TRRL has a rich institutional landscape that provides multiple opportunities for partnerships and collaboration to enhance the impact and sustainability of SGP interventions.

10.1 Government Institutions

Lumbini Province Forest Directorate provides strategic oversight for forestry and soil conservation across the province, supports watershed management initiatives, and has identified key priorities including CFUG clustering and enterprise development, forest fire management, and Sarus Crane conservation.

Division Forest Offices in Palpa, Gulmi, and Rupandehi are the primary government actors for forest management, providing technical support to CFUGs, managing protected areas and government forests, implementing forest fire control efforts, and

regulating harvest and trade of forest products. However, they face severe resource constraints in personnel, equipment, and operational budgets, limiting their effectiveness.

Local governments (municipalities and rural municipalities) have significant roles and resources under Nepal's federal system including environmental management within their jurisdictions, budget allocations for conservation and development, implementation of local development plans, and partnerships with NGOs and community organizations. Several local governments have demonstrated active engagement in environmental issues through establishment of Ban Tatha Bipad Samiti (Forest and Disaster Committees), support for CFUG activities and enterprise development, initiatives for wetland conservation and urban greening, and distribution of agricultural inputs and support services.

However, capacity constraints at local government level, particularly in technical areas of conservation and sustainable resource management, represent a gap that SGP can help address through capacity building and technical assistance. Agricultural Knowledge Centers provide extension services to farmers, distribute seeds and planting materials, conduct training programs on improved agricultural practices, and facilitate technology transfer. They represent important partners for interventions linking agriculture to conservation, such as agroforestry and sustainable intensification.

10.2 Civil Society Organizations

Bird Conservation Nepal operates in the Resunga area and beyond, focusing on vulture conservation and monitoring, community awareness and capacity building, and research on avian ecology and conservation. They are a natural partner for bird conservation interventions.

Local NGOs and community-based organizations work on diverse themes including environment and conservation, women's empowerment and livelihoods, and indigenous peoples' rights and cultural preservation. Examples include Saras Conservation NGO focusing on crane conservation, and Devdaha NGO (Prithivi Uma Knowledge Center) working with Musahar community on agroforestry and livelihood diversification. While local CSO capacity varies, with some having strong technical expertise and others requiring capacity building, this diversity offers opportunities for SGP to play its "Grantmaker Plus" role in building civil society capacity.

Community Forest User Groups represent the largest network of community-based natural resource management institutions with over 4,000 CFUGs in Lumbini Province. While their capacity varies significantly, they provide an extensive platform for community-level interventions and could be strengthened and networked through SGP support. Farmer Groups and Cooperatives organized around specific commodities

(vegetables, sugarcane, livestock) or functions (input distribution, marketing) represent another layer of community organization relevant for livelihood-linked conservation interventions.

10.3 Academic and Research Institutions

Lumbini Baudhha University has expressed strong interest in environmental partnerships, particularly in establishing agroforestry demonstration sites, conducting applied research on sustainable land management, developing local seed banks and nurseries for native species, producing aromatic oils and processing medicinal plants, and maintaining wetlands for education and research.

The university's engagement represents a valuable opportunity for SGP to link grassroots projects with academic research and education, generating knowledge and building technical capacity. Specific collaboration opportunities include hosting demonstration sites for SGP-supported models, conducting baseline assessments and monitoring for SGP projects, providing technical training for community groups and CSOs, and facilitating student engagement in community-based conservation through internships and thesis research. Establishing formal partnerships between SGP and academic institutions can enhance the credibility and knowledge management dimensions of the program, creating a virtuous cycle where community practice informs research and research findings improve practice.

11. Conclusion: A Landscape of Strategic Opportunity

The TRRL, with its complex interplay of ecological diversity, geological dynamism, social complexity, and developmental challenges, embodies both the urgency and opportunity that define SGP's mission. This is not a pristine wilderness requiring protection from human presence, nor is it a degraded landscape beyond restoration. Rather, it is a living, working landscape where human communities and natural ecosystems are inextricably linked, and where the pathway to sustainability must be co-created through partnership between conservation and development.

The selection of the TRRL as a priority for OP8 reflects a sophisticated understanding of how environmental programs can achieve transformative impact. By concentrating resources in a defined geography, SGP can move beyond isolated projects to catalyze systemic change. The dual rural-urban character of the landscape enables demonstration of conservation approaches across the full spectrum of human settlement patterns, from remote hill villages to rapidly urbanizing centers. The presence of established institutional frameworks, from CFUGs to local governments to academic institutions, provides a foundation for partnership-based interventions that can be sustained beyond

SGP's direct involvement. The landscape's geological and ecological challenges, while daunting, create opportunities for innovation in nature-based solutions and climate adaptation that can inform national policy and practice.

Most importantly, the TRRL is home to diverse communities whose livelihoods, cultures, and futures are intimately tied to the health of their environment. The Magar communities maintaining traditional land management practices in the hills, the Tharu communities stewarding wetlands in the Terai, the leasehold forest groups transforming degraded lands into productive assets, the youth seeking viable alternatives to migration, and the local governments striving to balance development with sustainability all represent agents of change whose capacities SGP can strengthen and whose innovations SGP can amplify.

The strategic framework for OP8 in the TRRL must therefore be both ambitious and grounded, pursuing large-scale impact through carefully designed, community-led interventions that demonstrate replicable models. By linking land degradation control to livelihood security through leasehold forestry and SALT, supporting forest-based enterprises that make conservation economically attractive, pioneering urban sustainability solutions in Butwal that can inform policy for Nepal's urbanizing future, protecting endangered species while creating benefits for local communities, and strengthening community institutions and civil society capacity to sustain conservation beyond project cycles, SGP can contribute not just to environmental outcomes but to a fundamental shift in how conservation and development are understood and practiced in Nepal.

The TRRL thus represents more than a geographic focus area. It is a strategic investment in demonstrating that environmental sustainability and human well-being are not competing goals but complementary imperatives that can be advanced together through well-designed, community-centered interventions. The lessons learned, models developed, and capacities built in the TRRL have the potential to influence conservation practice and policy far beyond the watershed itself, contributing to Nepal's national goals and global commitments to sustainable development.

Tinau-Resunga-Rampur landscape : District, Municipality/Rural Municipality & Wards

S.N	District	Municipality / Rural Municipality	Ward no./Heritage Site	Total Wards
1	Arghakhanchi	Chhatradev	1,2,3,4,5,6,7,8	8
2	Arghakhanchi	Panini	1,2,3,4,5,6,7,8	8
3	Arghakhanchi	Sandhikharka	4,5,6	3
4	Arghakhanchi	Sitganga	1,2,3,14	4
5	Gulmi	Chatrakot	1,2,3,4,5,6	6
6	Gulmi	Dhurkot	4	1
7	Gulmi	Gulmidarbar	1,2,3,4,5,6,7	7
8	Gulmi	Isma	1	1
9	Gulmi	Musikot	3,4	2
10	Gulmi	Resunga	1,2,3,4,5,6,7,8,9,10,11,12,13,14	14
11	Gulmi	Ruru	1,2,3,4,5,6	6
12	Palpa	Bagnaskali	1,2,3,4,5,6,7,8,9	9
13	Palpa	Mathagadhi	1,2,3,4,5,6	6
14	Palpa	Purbakhola	4,5,6	3
15	Palpa	Rainadevi Chhahara	1,2,3,4,5,6,7,8	8
16	Palpa	Rambha	1,2,3,4,5	5
17	Palpa	Rampur	8,9,10	3
18	Palpa	Ribdikot	1,2,3,4,5,6,7,8	8
19	Palpa	Tansen	1,2,3,4,5,6,7,8,9,10,11,12,13,14	14
20	Palpa	Tinau	1,2,3,4,5,6	6
21	Rupandehi	Butwal	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16, 17,18,19	19
22	Rupandehi	Devdaha	1,2,3,4,5,6,7,8,9,10,11,12	12
23	Rupandehi	Gaidahawa	1,2,3,4,5,6,7,8,9	9
24	Rupandehi	Kanchan	1,2,3,4,5	5
25	Rupandehi	Kotahimai	1,2	2
26	Rupandehi	Lumbini Sanskritik	1,2,3,4,5,6,7,8,9,10,11	11
27	Rupandehi	Lumbini Sanskritik Development Area	GN Code:99 (Heritage Site)	0
28	Rupandehi	Mayadevi	1,2,3,4,5,6,7	7
29	Rupandehi	Omsatiya	1,2,3	3
30	Rupandehi	Sainamaina	1,2,3,4,5,6,7,8,9,10,11	11
31	Rupandehi	Siyari	1,2,3,4,5,6,7	7
32	Rupandehi	Sudhdhodhan	1,2,3,4,5,6,7	7
33	Rupandehi	Tillotama	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16, 17	17
34	Syangja	Galyang	1	1
35	Syangja	Kaligandagi	1,2	2
Total	**5 Districts**	**35 Municipalities**	**Ward**	**235**

Summary Tables

Table 5: *Summary of Critical Environmental Challenges and Response Areas*

Challenge	Primary Drivers	Key Impacts	Priority Response Areas	Relevant SDGs
Forest Fires	Out-migration, leaf litter accumulation, policy constraints	Timber loss, habitat destruction, soil degradation	Duna Tapari enterprises, CFUG capacity building	SDG 13, 15, 11
Land Degradation	Siwalik geology, road construction, deforestation	Landslides, sediment generation, flood risk	SALT technology, bioengineering, leasehold forestry	SDG 13, 15, 2
Water Scarcity	Declining springs, seasonal variability, poor infrastructure	Agricultural constraints, migration pressure	Rainwater harvesting, spring protection, watershed management	SDG 2, 6, 13
Biodiversity Loss	Habitat loss, veterinary drugs (vultures), wetland degradation	Species endangerment, ecosystem service loss	Vulture restaurants, wetland restoration, sustainable harvesting	SDG 14, 15, 13
Urban Flooding (Butwal)	River aggradation, unplanned development	Property damage, climate vulnerability	Nature-based solutions, green infrastructure, upstream sediment control	SDG 11, 13, 6
Market Failures	Weak value chains, lack of processing	Resource underutilization, poverty	Producer groups, processing facilities, market linkages	SDG 1, 8, 9, 10

Table 6: *Strategic Interventions and Expected Outcomes*

Intervention Area	Target Communities	Expected Outcomes	OP8 Strategic Alignment	Primary SDGs
Leasehold Forestry + SALT	Pro-poor households in degraded Siwalik zones	Land rehabilitation, livelihood diversification, food security	Land Degradation, Poverty Reduction	SDG 1, 2, 13, 15
Forest-Based Enterprises	CFUGs, women groups, Dalit communities	Sustainable income, fire risk reduction, market linkages	Biodiversity, Sustainable Forest Management	SDG 1, 8, 12, 15
Urban Green Solutions (Butwal)	Urban communities, municipalities	Flood resilience, waste management, green spaces	Sustainable Cities, Climate Adaptation	SDG 11, 13, 6
Vulture Conservation	Gaushalas, CFUGs, Bird Conservation groups	Species recovery, ecotourism, awareness	Biodiversity, Community Engagement	SDG 15, 11, 4

Integrated Wetland Management	Tharu communities, farmer groups	Sarus Crane habitat, sustainable fisheries, fodder	Biodiversity, Water Management, Livelihoods	SDG 2, 6, 14, 15
Traditional Craft Revival	Magar, Tharu, Kumal, artisan groups	Cultural preservation, alternative income, market access	Inclusive Development, Traditional Knowledge	SDG 1, 8, 10, 12
Agroforestry & Seed Conservation	Small farmers, indigenous groups	Climate resilience, agrobiodiversity, nutrition	Climate Adaptation, Food Security, Biodiversity	SDG 2, 13, 15

Photo features:


कोठा नं-३
प्रशासन,वन सदुपयोग तथा सुद्धा फाँट
डिभिजन वन कार्यालय पाल्पा
कोठा नं-२ (क)


रेसुङ्गा वन संरक्षण क्षेत्र
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