

STATUS AND DISTRIBUTION OF SEABUCKTHORN



IN BAGMATI PROVINCE OF NEPAL



Government of Bagmati Province
Ministry of forest and environment
Hetauda, Nepal

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Acronyms and abbreviations

CBO:	Community-Based Organization
CF:	Community Forest
CFUGs:	Community Forestry User Groups
DFO:	Division Forest Office
FGD:	Focus Group Discussion
GESI:	Gender Equality and Social Inclusion
GLOFs:	Glacial Lake Outburst Floods
HACCP:	Hazard Analysis Critical Control Point
IPLC:	Indigenous People and Local Communities
KII:	Key Informant Interview
LNP:	Langtang National Park
PA:	Protected Area
RM:	Rural Municipality

Acknowledgement

This comprehensive study on seabuckthorn was made possible through the invaluable support and collaboration of numerous institutions and individuals. We extend our deepest gratitude to the Ministry of Forests and Environment, Bagmati Province, Hetauda, for commissioning this survey and providing essential guidance throughout the research process. Special thanks to the Division Forest Offices of Rasuwa, Dolakha, Sindhupalchowk, Ramechhap, and Dhading for sharing critical data. In particular, the DFO teams in Dolakha and Rasuwa offered invaluable insights into localized conservation challenges and harvesting practices.

We honor the extraordinary efforts of our field researchers, Dr. Gauri Shankar Bhandari and Mr. Sandesh Koirala, who traversed extreme high-altitude terrain, including the perilous slopes near Tso Rolpa Glacier (4,200+ masl) in Dolakha, to document seabuckthorn populations under harsh climatic conditions. Their dedication to rigorous data collection in isolated areas formed the empirical backbone of this report. Our profound appreciation extends to the Indigenous Peoples and local communities across the study districts. The Tamang communities of Langtang (Rasuwa) generously shared techniques for traditional juice preparation, while residents of Panchpokhari-Thangpal (Sindhupalchowk) demonstrated the art of crafting Achare pickles from *H. tibetana*. These ethnobotanical exchanges profoundly enriched our understanding of seabuckthorn's socio-cultural significance.

We are indebted to the National Trust for Nature Conservation (NTNC) for granting access to the Gaurishankar conservation area and providing us useful information on the distribution of seabuckthorn in Dolakha and insights into conservation challenges.

The Bagmati Provincial Government's vision for sustainable mountain resource management inspired this initiative. Finally, we acknowledge the mountain ecosystems themselves, the silent stakeholders in this endeavor. This report stands as a collective effort toward harnessing seabuckthorn's potential for ecological resilience and inclusive growth in Bagmati's high-altitude landscapes.

Executive Summary

Background: This study assesses the status, distribution, and socio-ecological potential of seabuckthorn (*Hippophae salicifolia* and *H. tibetana*) in Bagmati Province, Nepal. Field surveys, literature reviews, and stakeholder consultations reveal that both species occur naturally in high-altitude districts (Rasuwa, Dolakha, Sindhupalchowk, Ramechhap, and potentially Dhading), with *H. tibetana* dominant above 4,200 m (e.g., Tso Rolpa Lake, Dolakha) at record densities of 37,840 plants/ha. Despite their ecological value, soil stabilization, nitrogen fixation (180 kg N/ha/year), and climate resilience, seabuckthorn remains underutilized due to fragmented value chains, limited processing, and policy neglect.

Key findings:

Ecological Significance: In Bagmati province, seabuckthorn is commonly found in erosion-prone areas, dry moraines, riverine zones, and high-altitude mountains that remain snow-covered for much of the year. It exhibits remarkable tolerance to extreme conditions, freezing temperatures below -15°C , drought, and saline soils. This resilience makes it ecologically significant for stabilizing fragile ecosystems. As a primary producer in harsh environments, it contributes to ecosystem productivity and may also provide habitat for various mammals and bird species.

Socio-economic Gaps: Only Rasuwa has developed a few enterprises for the production of homemade juice for tourists and local consumptions. No registered industries exist. Kathmandu and other markets are dominated by imported products (China, India, Europe). Local use is primarily subsistence-based (food, medicine, fodder).

Threats: Environmental degradation (landslides, overharvesting), habitat loss, invasive species, climate change, and institutional gaps (absent from most forest management plans).

Opportunities: High potential for product diversification (juices, oils, nutraceuticals, cosmetics) and market expansion, leveraging growing demand for organic health products.

Recommendation:

Policy Integration: Mandate all Division Forest Offices (DFOs) in Rasuwa, Dolakha, Sindhupalchowk, Ramechhap, and Dhading to include seabuckthorn conservation and sustainable harvesting quotas in their

annual operational plans, Local Adaptation Plans of Action (LAPAs), Provincial Climate Change Adaptation Plans and community forest policies.

Value Chain Development: Establish small-scale processing unit in Rasuwa (expanding existing cottage juice production for tourists) for juice, seed oil, and cosmetics; enforce quality standards (e.g., organic certification, combat adulteration).

Ecological Restoration: Promote community-based cultivation on degraded lands for soil conservation and income generation.

Local Capacity and Market Linkage: Train CFUGs in high-altitude districts in sustainable harvesting, propagation, and enterprise management. Link women/youth cooperatives in Rasuwa to Kathmandu organic retailers (e.g., Kathmandu Organics) for branded tourism products.

Research & Threat Mitigation: Partner with NAST/NARC/TU to develop thornless varieties of seabuckthorn and map climate-vulnerable populations (e.g., Dolakha's high-density sites) and control invasive species.

Chapter I

Introduction

1.1. Background

The genus *Hippophae* (seabuckthorn) comprises about seven species with several subspecies of hardy, deciduous, dioecious, thorny (spinescent) shrubs or small trees. Believed to have originated in the central Himalayas and southern Tibet, the genus now spans subtropical to temperate regions of Asia, Europe and North America (Jia & Bartish, 2018, POWO, 2025; Figure 1). There are two species of *Hippophae* distribution in Nepal- *H. salicifolia* and *H. tibetana*. These species occur between 1,500 – 4,700 m elevation, with overlapping distributions (Gupta et al., 2000; Lu, 1992; Swenson & Bartish, 2003). *H. salicifolia* has been distributed from 1,500 – 3,500 m from msl whereas *H. tibetana* is distributed from 3,000 – 4,700 m altitude in Nepal (Gupta et al., 2000; Swenson and Bartish, 2002; Ansari, 2003).

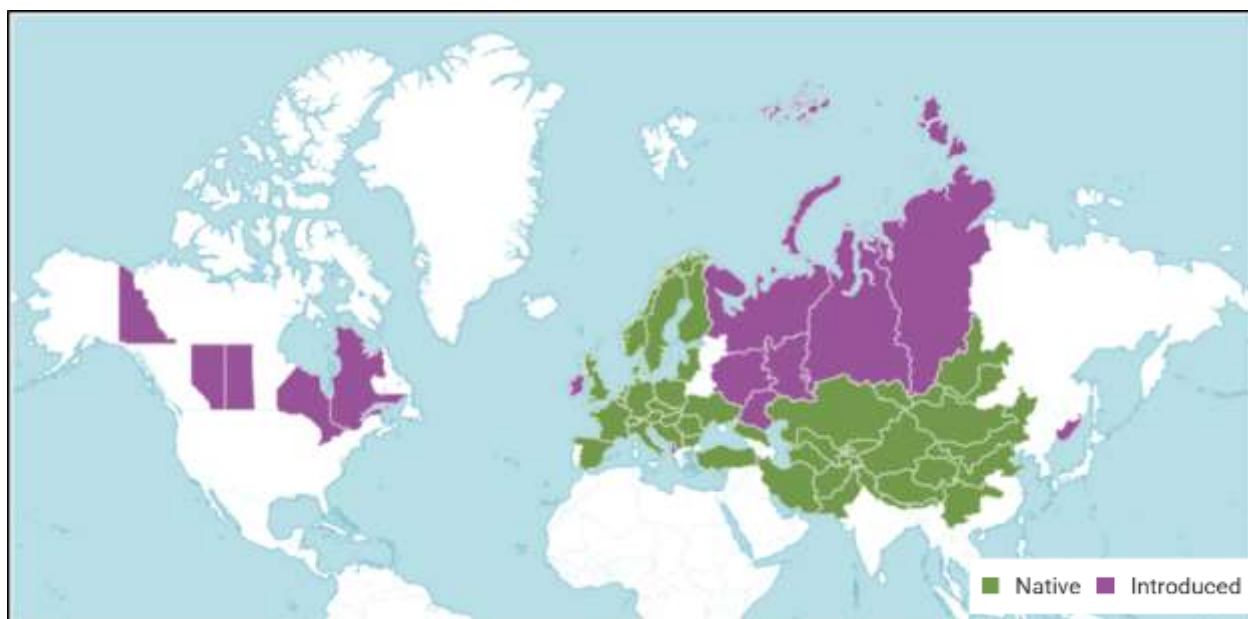


Figure 1 Distribution of the seabuckthorn in the world

H. tibetana is a perennial dense thorny shrub that can be found at elevations ranging from 3600-4700 m. *Hippophae salicifolia* is deciduous willow like thorny tree distributed between 2000-3000m. It is light demander species and cannot tolerate shady condition near large trees. It is hydrophilous plant that grows in areas that receives an annual precipitation of 400-600mm. It has

been recorded to grow in an area having annual moisture ranges from 600-700 mm (Rongsen, 1992).

Seabuckthorn is dioecious plant with no remarkable distinct between male and female plant. Pollination is anemophilous, i.e.; by wind. Sex of plant is difficult to distinguish till the flowering stage (Rongsen, 1990). It generally propagates through seed but can be regenerated through vegetative means (root/stem cutting). Vegetative propagation is aided by “root turion” present in horizontal root.

People from different parts of Nepal have their own local names for seabuckthorn, reflecting cultural and linguistic diversity. In Rasuwa, the Tamang community calls it Taru or Govo. And Sherpa call it Khurpu. The Thakali community of Mustang calls *H. salicifolia* Chichi and the community in Myagdi calls it Amilchi. Specifically, *H. tibetana* is called Tserken Kyun in Manang, and Tora in Mustang. It is called Torwa, Tirchuk, Tarachuk or Dalechuk in Dolpa, and Tarachuk in Mugu, Jumla, and Humla (Lu, 1992; TISC, 2001). *H. salicifolia* is also known as Shankhadhara in Api Nampa Conservation Area (ANCA) (Joshi et al. 2021)

H. salicifolia

Hippophae salicifolia is native to the East and West Himalaya, including Nepal and Tibet, and is found in lower to upper temperate zones (Figure 2).

This deciduous, willow-like thorny tree grows up to about 10 meters tall. Its leaves are short-stalked, oblong to lanceolate in shape, measuring 3–7 cm in length and 6–8 mm in width, with star-shaped hairs on the underside. The male flowers are stalkless, while the female flowers occur solitarily on the leafless stem. The fruits are yellowish to orange in color. Flowering occurs from April to May, and fruiting takes place between October and March. Seeds are typically collected from September to November (Bhadra to Kartik), with an estimated 90,000 to 110,000 seeds per kilogram. This species is commonly associated with *Alnus nepalensis*, *Debregeasia salicifolia*, *Desmodium elegans*, *Pinus wallichiana*, and *Populus* species at lower elevations, while at higher elevations, it is found alongside *Abies spectabilis*, *Taxus wallichiana*, and *Tsuga dumosa*.

H. tibetana

H. tibetana, native to North-Central China, Nepal, and Tibet, occurs in upper temperate to subalpine regions (Gupta et al., 2000; Pokharel, 2004a, 2004b) (Figure 2). This deciduous shrublet grows to a height of about 60 cm. Its leaves are elliptical in shape, measuring 1.5–2 cm in length and 2–4 mm in width, and are covered with rust-colored scales. The yellowish, unisexual flowers are stalkless. Its fruits are orange-red in color. Flowering occurs from April to June, and fruiting takes place between August and September. Seeds are typically collected from October to November (Ashwin to Kartik), with an estimated 50,000 to 70,000 seeds per kilogram. This species is commonly associated with *Anemone* sp., *Berberis* sp., *Geranium* sp., *Iris* sp., *Juniperus indica*, *Lonicera spinosa*, *Rosa* sp., *Salix* sp., and *Sophora* sp. (Polunin and Stainton 1984; Manandhar 2002; Pyakurel and Gurung 2006).

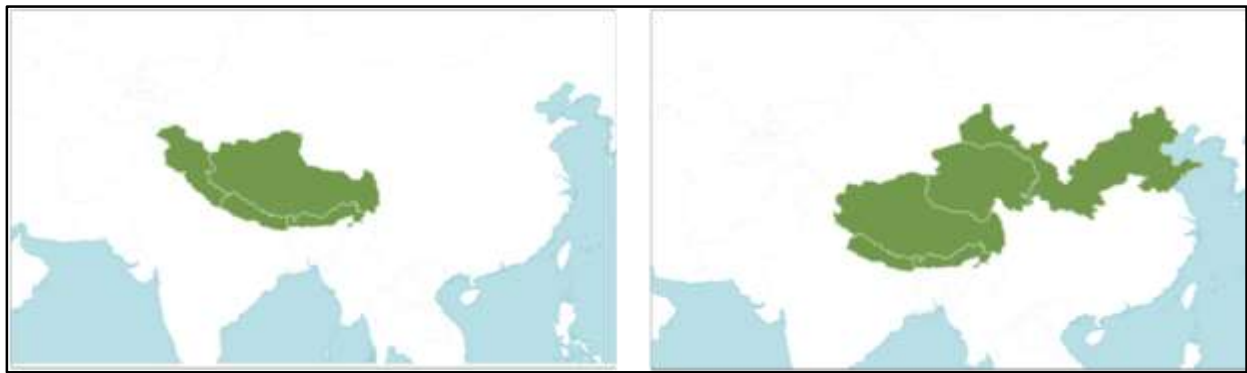


Figure 2. Distribution of *H. salicifolia* (Left) and *H. tibetana* (Right)

Uses and importance

a. Ecological Significance:

Seabuckthorn is valued for its ecological and socio-economic benefits, including soil stabilization, climate resilience, and support for rural livelihoods (ICIMOD, 2024). It has an extensive root system that spreads widely through the soil, making it effective in controlling erosion and enhancing soil and water conservation (Figure 3). It tolerates drought, saline soils, and extreme cold (-43°C), and forms nitrogen-fixing symbioses with *Frankia* spp., fixing up to 180 kg N/ha/year (Jia & Bartish, 2018; Tamchos & Kaul, 2015; Husain et al., 2018).



Figure 3: Naturally grown seabuckthorn (*H. salicifolia*) seedlings in an erosion-prone area (Mundu, Langtang)

(Photo Source: DoFSC, 2022)

Its roots form a symbiotic relationship with Frankia, a nitrogen-fixing actinomycete, allowing the plant to fix up to 180 kg of atmospheric nitrogen per hectare per year (Rongsen, 1992; Singh et al., 2001). The shrub's dense structure serves as a windbreak, helps stabilize riverbanks and slopes, and provides habitat for wildlife, adding to its ecological utility. Additionally, it is valued as an ornamental plant that contributes to landscape protection.

b. Medicinal Properties:

Various parts of the plant are traditionally used in herbal medicine. The bark and leaves are employed in treating diarrhea and skin-related ailments. The fruits are rich in vitamins (especially Vitamin C: 53–3909 mg/100g), amino acids, proteins (such as globulin and albumin), fatty acids, flavonoids, soluble sugars, 27 different minerals, phytosterols, and other bioactive compounds contributing to their antioxidant properties (Rongsen, 1992; Li, 2002; Rajchal, 2008; Chen et al., 2023) (Table 1). Seabuckthorn seed oil is known for its therapeutic properties, including anti-inflammatory, antimicrobial, and anti-cancer effects, and is used in the treatment of conditions such as mucositis, radiation-induced damage, ulcers, and burns (Xu, 1999).

Table 1 Vitamins found per 100 grams in seabuckthorn and other fruits and vegetables (in mg)

(Source: Rongsen 1990, Ghimire and Sharma 2018; Stobdan and Phunchok, 2017)

	A	B1	B2	C	K
Amala	-	-	-	478.5	—
Carrot	4.00	0.02	0.05	8	—
Orange	0.55	0.08	0.03	35-56	—
Tomato	0.31	0.03	0.02	11.8	—
Seabuckthorn	11.00	0.04	0.56	300–1600	100–200

c. Market products

The fruits are processed into various food products like jams, jellies, wine, tea, traditional medicine, and health beverages. The seeds and fruit pulp are also utilized in the cosmetics industry. In Manang, Mustang and Rasuwa districts of Nepal, commercial juice production from seabuckthorn began around 1990 and sold along the trekking routes (Figure 4). The fruits are also used for dyeing fabrics and making beverages.

Figure 4 Langtang Village, Nepal. Drinking Seabuckthorn juice made with warm water seabuckthorn berry and honey in the himalayan mountains of Nepal

(Photo source: <https://www.dreamstime.com/langtang-village-nepal-october-drinking-seabuck-thorn-juice-made-warm-water-seabuckthorn-berry-honey-himalayan-image351398816>)



Despite its potential, the seabuckthorn value chain remains underdeveloped due to fragmented supply chains, limited processing infrastructure, and poor market integration (DoFSC, 2022; Pokharel et al., 2021). Habitat degradation from overharvesting, grazing, urbanization, landslides, GLOFs, and invasive succession (e.g., *Pinus wallichiana*) further threaten populations (Rajchal, 2008; Pal et al., 2022).

Climate change is shifting species distributions in the Himalayas, with projected temperature increases of 1.6–2.5°C and changing precipitation patterns (MoFE, 2019; Bhattacharjee et al.,

2017; Shrestha & Bawa, 2014). Seabuckthorn's adaptability makes it a promising candidate for climate adaptation, soil restoration, and livelihood resilience in erosion-prone areas (Sharma et al., 2019).

1.2. Rationale

This study on the status of seabuckthorn in Bagmati Province, Nepal, is crucial for understanding its ecological, economic, and cultural significance, especially given its natural abundance in high-altitude districts such as Rasuwa, Dolakha, and Sindhupalchowk. Despite its recognized value in soil conservation, traditional medicine, and livelihoods, seabuckthorn remains underutilized due to fragmented value chains, limited processing infrastructure, and weak institutional integration. By mapping its distribution, assessing population density, and documenting associated uses and enterprises, this study provides evidence to guide sustainable management, product diversification, and value addition. It also identifies threats such as environmental degradation and biotic stressors, offering strategic recommendations for conservation and commercialization.

1.3. Objectives

The main aim of this study was to assess the current status and past initiatives on seabuckthorn in Bagmati Province, review the distribution of *Hippophae salicifolia* and *H. tibetana*, and provide recommendations to inform policy, investment, and capacity-building for inclusive economic development while addressing environmental and social challenges.

The specific objectives were to:

- survey and map the distribution and population density of *H. salicifolia* and *H. tibetana* in Ramechhap, Dolakha, Sindhupalchowk, Rasuwa and Dhading districts, and assess their conservation status through literature review and field research.
- conduct an in-depth study on the economic (e.g., enterprise potential), ecological (e.g., erosion control, pioneer species), subsistence (e.g., local uses, livelihoods), and cultural (e.g., traditional practices) values of seabuckthorn and its derivatives.
- identify and map relevant institutions, enterprises, farmers, and forest user groups involved in seabuckthorn cultivation and management for various purposes within the province.

- locate key production zones and existing processing facilities in the districts to assess potential for future commercial development of seabuckthorn.
- evaluate the contribution of seabuckthorn to household economies.
- identify and prioritize the key drivers and threats impacting seabuckthorn populations and ecosystems, and propose strategic recommendations for the species' long-term sustainable conservation.

Chapter II

Scope and Methods

2.1. Scope

This study focuses on assessing the current status, ecological distribution, and socio-economic relevance of seabuckthorn (*H. salicifolia* and *H. tibetana*) across Bagmati Province, Nepal. It combines field-based surveys with literature reviews to map the species' distribution, population density, and conservation status. The study also investigates the ecological functions, subsistence and cultural uses, and economic potential of seabuckthorn, while identifying key actors involved in its cultivation, management, and processing. Furthermore, it evaluates seabuckthorn's contribution to household economies and examines environmental and socio-economic threats impacting the species. Based on these insights, the study provides strategic recommendations for sustainable conservation, inclusive value chain development, and policy and investment support. Key thematic areas of the study are: Key Thematic Areas:

- Ecological and Conservation Assessment
- Economic, Cultural, and Livelihood Values
- Stakeholder and Institutional Mapping
- Commercial Potential and Value Chain Analysis
- Threats, Drivers, and Strategic Recommendations

2.2. Methods

2.2.1. Methodological Refinement through Stakeholder Consultation

Prior to field implementation, an inception meeting was held with the Ministry of Forests and Environment, Bagmati Province, to present and validate the proposed research framework. Critical feedback received during this consultation directly informed refinements to our methodology, particularly in:

- Assessing seabuckthorn's erosion control potential and climate resilience.
- Strengthening ethnobotanical data collection tools to capture localized knowledge
- Evaluate Nepal-specific enterprise potential through value-chain analysis of locally produced items (juices, oils), excluding imported products, with Rasuwa's nursery as a propagation case study.

2.2.2. Study Area

This study was conducted in four Himalayan districts of Bagmati Province, including Ramechhap, Dolakha, Sindhupalchowk, Rasuwa and Dhading (Figure 5). The geographical and other characteristics of these districts are presented in Table 2.

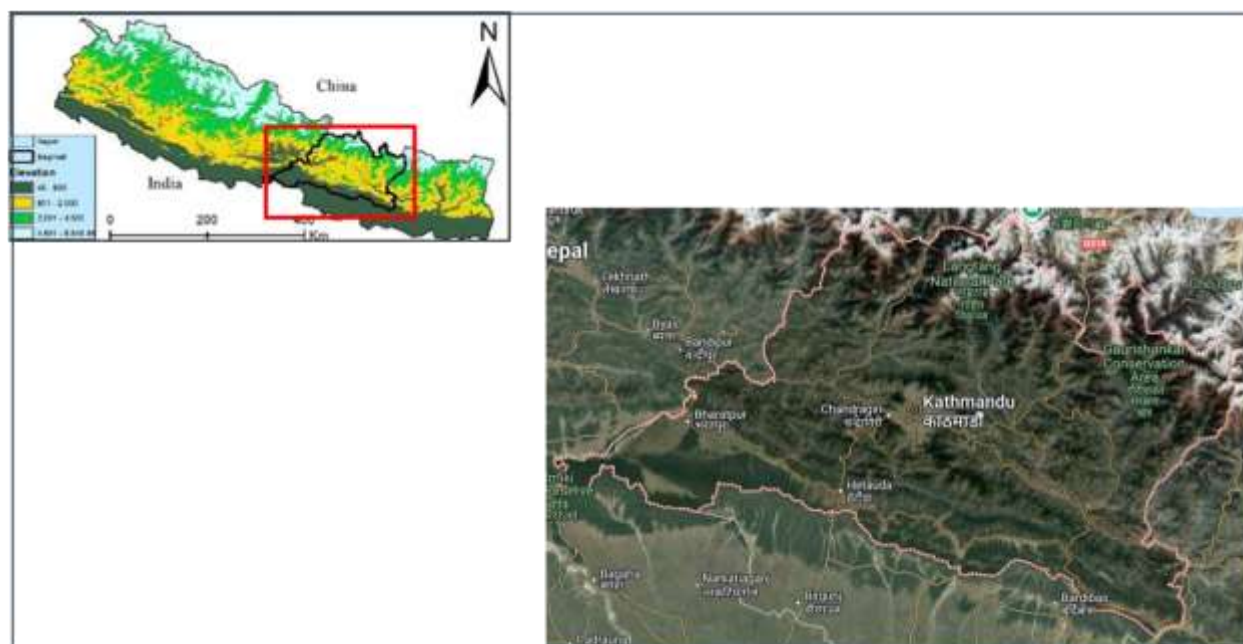


Figure 5 map of the study area

Table 2. Districts of Bagmati with distribution or potential distribution of seabuckthorn, and their characteristics

District	Characteristic Features
Ramechhap	Covers an area of 1,546 km ² , upper tropical to Nival. Natural populations of seabuckthorn have been reported in this district, indicating its potential for commercial plantations.
Dolakha	Covers an area of 2,191 km ² , upper tropical to Nival. Natural populations of seabuckthorn have been reported in this district, indicating its potential for commercial plantations.
Dhading	Covers an area of 1,926 km ² , upper tropical to Nival climate. Although natural populations of seabuckthorn have not been reported so far, it has climate and habitat suitable for commercial plantations.

Rasuwa	covers an area of 1,544 km ² , upper tropical to Nival. Natural populations of seabuckthorn have been reported in this district, indicating its potential for commercial plantations.
Sindhupalchok	covers an area of 2,542 km ² , upper tropical to Nival. Natural populations of seabuckthorn have been reported in this district, indicating its potential for commercial plantations.

2.2.3. Conceptual framework

The conceptual framework of this study was based on four key dimensions- **Practices**, **Production**, **Perception**, and **Prospects**, to explore the current status, challenges, and opportunities of seabuckthorn in Bagmati Province (Figure 6).

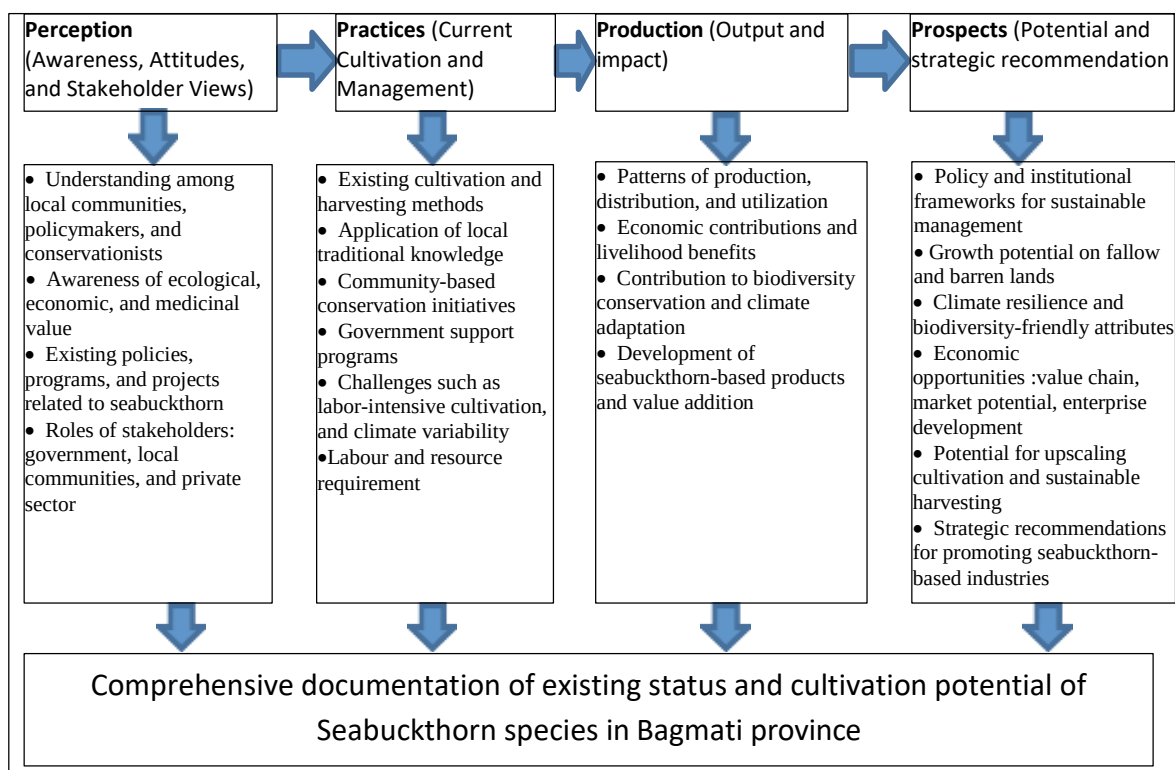


Figure 6. Conceptual Framework of the study

2.2.4. Data collection and processing

To evaluate community perceptions, conservation practices, population dynamics, and challenges related to seabuckthorn in Bagmati Province, Nepal, a field survey was conducted and qualitative and quantitative data was gathered. The research focused on key seabuckthorn-growing areas in Bagmati Province. The data collection process included structured and semi-structured interviews, focus group discussions (FGDs), and direct field observations. FGDs were conducted in selected districts with Division and Sub-Division Forest Offices, Community Forest User Groups, local bodies, forest-related NGOs, and other stakeholders. The FGDs aimed to assess the potential of seabuckthorn in Bagmati Province by examining its distribution, density, and factors contributing to its decline. Topics included production, processing, marketing, and development needs. In total, 6 FGDs were conducted to gather insights for guiding sustainable cultivation and value-chain development. Key informant interviews (KIIs) was conducted with local community members, conservation practitioners, and policymakers who are directly involved in various aspects of seabuckthorn, including production, cultivation, ethnobotany, marketing, and policy planning. Secondary data was collected from published literature, government reports, and institutional databases.

2.2.5. Comprehensive desk review and web browsing

A comprehensive review of secondary data and information is a crucial aspect of this study, enabling the research team to consolidate existing knowledge on various aspects of seabuckthorn. The review encompassed:

- A report published by the Tree Improvement and Silviculture Unit and Forest Promotion Unit under the Forest Department and other related institutions concerning the sea buckthorn species.
- Manuals, occasional papers, research papers and working papers published by ICIMOD and WWF.
- Policies and programs related to seabuckthorn management, processing, and marketing in Bagmati Province.
- Relevant government policies, laws, and directives concerning Non-Timber Forest Products (NTFPs), with a particular focus on seabuckthorn.

- Statistics from the Ministry of Forests and Environment to assess seabuckthorn's status in production and trade.
- Climate change adaptation and mitigation policies, considering seabuckthorn's role as a carbon sequester.
- Other relevant literature to provide a broader contextual understanding.

2.2.6. Field observation and sampling

Snowball sampling was employed to identify and locate farmers, collectors, cooperatives, traders, and processors involved in seabuckthorn cultivation, financing and trade within the province. A free-listing key actors in the seabuckthorn value chain, from harvesting to final product marketing was compiled.

2.2.7. Market analysis and value chain assessment

The study examined how seabuckthorn is collected, processed, and sold. It assessed current processing technologies, including drying, oil extraction, and juice production. Additionally, it evaluated domestic and international market potential, focusing on market demand and pricing.

2.2.8. Seabuckthorn value chain mapping

Key sites related to the production, processing, and marketing of seabuckthorn were mapped. These maps served as valuable tools for understanding the spatial distribution of seabuckthorn cultivation, processing facilities, and marketing centers, enabling stakeholders to identify gaps, areas for improvement, and potential opportunities for expansion in the seabuckthorn value chain. The visualization supported strategic planning, resource allocation, and the development of targeted interventions to promote sustainable seabuckthorn production in the region.

2.2.9. Data filtering and analysis

The data analysis for the Seabuckthorn survey combined both qualitative and quantitative methods. Qualitative data from FGDs and KIIs were analyzed using thematic analysis to identify key themes, challenges, and opportunities related to Seabuckthorn production, marketing, and conservation. For quantitative analysis, mapping data were used to visualize the distribution of cultivation sites, production, and processing locations. Excel played a key role

in organizing, cleaning, and performing basic data analysis, helping to create tables, charts, and conduct preliminary calculations.

2.2.10.Data interpretation and thematic analysis

a. Analysis of population distribution and dynamics

Field surveys were conducted in different locations in Dolakha district to record seabuckthorn populations. Data on plant density, habitat conditions, and regeneration status were collected using random sampling techniques. We analyzed spatial distribution patterns and any observable changes in population dynamics over time.

b. Identification of threats and challenges

Threats to seabuckthorn sustainability were identified through FGDs and KIIs with local communities, conservationists, and policymakers. Major challenges, such as overharvesting, habitat degradation, climate change impacts, and socio-economic factors, were documented and analyzed.

c. Assessment of opportunities and future strategies

Based on field findings and stakeholder consultations, we assessed potential opportunities for sustainable seabuckthorn management. This included identifying market potential, value addition, policy interventions, and community-driven conservation strategies. Recommendations were formulated for long-term conservation and sustainable utilization of seabuckthorn in Bagmati Province.

d. Evaluation of conservation measures and management practices

To evaluate the conservation efforts and gaps in seabuckthorn management, we documented local and institutional conservation initiatives. Information on cultivation techniques, harvesting practices, and processing methods were gathered from farmers, cooperatives, and industries involved in seabuckthorn-related activities. We also analyzed policy documents to identify the frameworks governing seabuckthorn conservation and utilization.

2.3. Composition of the consultant team, including specific roles

This survey was undertaken by a three-person team consisting of a Team Lead, a botanist and a field assistant. The table in Annex I highlights their respective subject-matter expertise, their roles and responsibilities for this assignment.

2.4. Limitations of this study

During the implementation of this survey, the consultant team encountered the following limitations:

- The wide geographical area of project landscape constrained community engagement due to limited timeframe of fieldwork and data analysis.
- Due to logistical and resource limitations, not all critical areas or stakeholder groups within the project intervention area could be equally represented.
- In some locations, low literacy levels or language differences may have affected participants' understanding of survey questions.

Chapter III

Findings

3.1. Distribution of *Hippophae* in Bagmati province

Hippophae tibetana was recorded in Dolakha District above 4,200 m, particularly abundant along trails from Naa village to Tso Rolpa glacial lake, and on the southern bank of the lake (Figure 7).

Recent modeling by Kunwar et al. (2025) indicates that 13.5% (2793.95 sq km) of Nepal's suitable habitat for seabuckthorn lies in Bagmati Province. The suitable area outside the Langtang National Park is 1984.9 sq km. Previous studies have indicated natural distribution of seabuckthorn in Ramechhap, Dolakha, Sindhupalchowk and Rasuwa of Bagmati province (DoFSC, 2022) and potentially in Dhading (Hem Raj Paudel Pers. Comm). The distribution of seabuckthorn in Rasuwa particularly noteworthy. In Sindhupalchowk district, *H. tibetana* is reported from Panchpokhari-Thangpal RM Ward no. 2,3 and 5, In Ramechhap district, it is found in Ghilke area of Umakunda RM, and Galkali CF of Gokulganga RM (Table 3). In Dolakha, Sindhupalchowk, and Ramechhap, local communities had limited awareness of the distribution and significance of this valuable herb in their areas. Staff from the Division Forest Office (DFO) and the National Trust for Nature Conservation (NTNC), responsible for the Gaurishankar Conservation Area, also acknowledged their lack of knowledge about the plant. Moreover, informational leaflets produced by NTNC did not specifically mention seabuckthorn.

Table 3 Occurrence of *Hippophae* spp in Bagmati province

District	Present	Reference
Dolakha	Naa village to Tso Rolpa glacial lake	Present study 2025
Ramechhap	Ghilke area of Umakunda RM, and Galkali CF of Gokulganga RM	DoFSC 2022, present study
Sindhupalchowk	Panchpokhari-Thangpal RM Ward no. 2,3 and 5	DoFSC 2022, present study
Rasuwa	Dhunchu, Chilime, Langtang valley	DoFSC 2022, present study
Dhading	Around Jaisulikunda	Hem Raj Paudel (Pers. Com.)

3.2. Population density and associated species

In Dolakha, the plant height of *H. tibetana* was 9 cm to 69 cm with an average height of 38 cm. Previous report has also found that the height of this species less than 90 cm (ANSAB, 2003b). The population density of *H. tibetana* ranged from 1600 – 90,000 per hectare with an average density of 37,840 per hectare. Consequently, the average density of the site was found higher than Dolpa (28,000/hectare), Mustang (18140/hectare) and Manang (10450/hectare) (Pokharel et al., 2021). The plant height was low and the density was the highest at the bank of Tsho Rolpa glacial lake (Table 4). With the decreasing elevation, the height of the plant increased but density decreased. Previous studies (Dolkar et al. 2018; Sekar et al. 2023) have shown that high-altitude biomes exhibit extreme climatic conditions such as diurnal temperature fluctuations, scanty rainfall, and high wind velocity and are completely snowbound for months. This may have caused stunted growth and higher density of seabuckthorn at the bank of Tsho-Rolpa lake.

Table 4 A comparison of plant density reported from different localities

Location	Plant Height (cm)	Average Height (cm)	Density Range (plants/ha)	Average Density (plants/ha)	Reference
Dolakha (overall)	9 – 69	38	1,600 – 90,000	37,840	Present study
Tso Rolpa glacial lake (bank)	Low (towards 9 cm)	–	High (towards 90,000)	–	Present study
Dolpa	–	–	–	28,000	Pokharel et al., 2021
Mustang	–	–	–	18,140	Pokharel et al., 2021
Manang	–	–	–	10,450	Pokharel et al., 2021



a



b



c

Figure 7: a. *H. tibetana* growing along the trail, b. at the bank of Tso Rolpa glacial lake, and c. a dense thicket of the plants along the stream in flat land

Dolakha district, *H. tibetana* was found growing alongside *Anemone rivularis*, *Berberis aristata*, *Geranium donianum*, *Cotoneaster microphyllus*, *Iris kemaonensis*, *Juniperus indica*, *Lonicera spinosa*, *Rosa sericea*, *Salix denticulata*, and *Sophora moorcroftiana*.

3.3. Potential Areas for Cultivation

Our direct field observation and interviews with the local farmers indicated that the ideal zones for cultivation of *H. tibetana* were arid to semi-arid regions of high altitude (4,200–4,500 m) with well-drained, gravelly soils, riparian zones and moraines and precipitation of 300–600 mm annually. However, the cultivation has not been reported from any of the districts of the province. In Rasuwa, the respondents of Division Forest Office said that seabuckthorn were grown in the DFO nursery few years ago. However, they stopped growing it in the nursery due to lack of seeds. They are planning to grow it in their nursery again in near future. According to the respondents from DFO of Ramechhap, they have not grown seabuckthorn in their nursery yet.

3.4. Ethnobotanical Uses

Seabuckthorn is widely used in traditional foods and medicine in high-altitude regions like Rasuwa. The ripe, sour berries are consumed raw or processed into vinegar-like “chuk,” juice, jam, and pickles, while the leaves are used fresh or dried as herbal tea. In addition to its nutritional value, seabuckthorn provides fodder, with leaves, young branches, and fruit pulp commonly fed to livestock. In Dolakha district, some residents reported consuming the fruits of *Hippophae tibetana* as a remedy for digestive ailments. According to them, it was a very effective medicine. These diverse uses highlight its significance in local diets, healthcare, and livelihoods. In Panchpokhari-Thangpal RM of Sindhupalchowk district, *H. tibetana* is locally known as ‘Achare’ and used for making pickles (achar) by local communities. Local herders consume it raw because of its taste. The table below (Table 5) summarizes its diverse uses, ranging from food, medicine, and livestock fodder to cultural practices and potential economic benefits.

Table 5 Diverse uses of Seabuckthorn (*Hippophae tibetana*) in high-altitude regions of Bagmati Province, highlighting its subsistence, cultural, ecological, and economic significance.

Category	Specific Uses
1. Subsistence / Domestic Uses	- Consumed raw (ripe, sour berries)
	- Processed into “chuk” (vinegar-like), juice, jam, pickles
	- Leaves used fresh or dried as herbal tea
	- Remedy for digestive ailments (fruit)
	- Fodder: leaves, young branches, and fruit pulp
	- Consumed raw by herders for taste
2. Cultural Uses	- Known as ‘Achare’ in Panchpokhari-Thangpal RM

	- Used in traditional pickle-making (achar)
	- Part of local traditional medicine and knowledge systems
3. Ecological Uses	- Fodder use supports livestock systems in fragile high-altitude ecosystems
	- Presence in harsh environments reflects ecological adaptability
4. Economic Uses	- Processed products (juice, jam, pickles) with potential for household-level income
	- Valued for nutritional and medicinal properties (potential commercial value)

3.5. Seabuckthorn-based Enterprises & Value Chain

There was little practice of juice preparation from seabuckthorn among local communities in Dolakha district. There was no cottage industry, enterprise or entrepreneurship in Dolakha. It was also not reported from Sindhupalchowk or Ramechhap. In Rasuwa district, seabuckthorn squash is marketed in tourist hubs such as Dhunche, Langtang valley, Chilime, and Chandanbari to cater to trekkers. A local trader in Dhunche was found producing homemade seabuckthorn juice in small quantities, bottling it and selling it to both residents and tourists. Locals also indicated that community-level processing and value addition remain limited. The respondents from Rasuwa stated that there is no registered industry for seabuckthorn juice. According to the respondent from the DFO of Ramechhap, there are no enterprises based on seabuckthorn products.

In Kathmandu, the juice and squash are sold through supermarkets and local outlets. In addition to juice and squash, handmade herbal soaps made from locally harvested seabuckthorn are produced in Nepal (Figure 8). However, most other seabuckthorn-based products, such as cosmetics and skincare items containing seabuckthorn oil, are imported. At present, imported seabuckthorn cosmetics and supplements, especially those from China, India, Europe and USA, dominate the Nepali market. These products are often marketed as premium health and beauty items, emphasizing antioxidant, anti-aging, and anti-inflammatory properties of seabuckthorn oil. This highlights the potential for Nepal to scale up domestic seabuckthorn processing with appropriate technology, quality assurance, and branding strategies.

In Kathmandu, seabuckthorn products are mainly distributed through online platforms, including Ubuy Nepal, Hamro Shringar, Hamro Saman, and Kathmandu Organics. Among these, Kathmandu Organics also operates a physical store in Bansbari, where customers can visit and shop in person.

Despite natural abundance of wild seabuckthorn (*Hippophae spp.*) in high altitude districts of Bagmati province, commercial-scale processing and branding of seabuckthorn-based products remain limited. Local entrepreneurs have developed a few value-added products such as squash in cottage industries.

However, there is a growing interest among urban consumers in natural and organic health products, which could create market opportunities for expanding seabuckthorn-based product lines. This is evident from the absence of seabuckthorn squash currently in retail outlets in Kathmandu, indicating a clear gap between supply and growing consumer demand.

ntfpofnepal.blogspot.com+2nripeshawasthi.blogspot.com+2academia.edu+2.



Figure 8 Commercial seabuckthorn products sold from various outlets of Kathmandu. a. Himalayan Botanicals Seabuckthorn and Rosehip Facial Herbal Soap handmade in Nepal, b and c. Imported products of seabuckthorn sold in Nepal

3.6. Supply Chain gaps

Seabuckthorn (*Hippophae spp.*), found in high-altitude regions of Nepal, holds significant ecological and economic potential. In Bagmati Province, its natural distribution spans districts such as Rasuwa, Dolakha, Sindhupalchowk, Dhading, and Ramechhap. However, despite its presence, the value chain of seabuckthorn, from production to marketing, remains largely underdeveloped. Field observations and stakeholder consultations in these districts, particularly in Dolakha and Rasuwa, revealed multiple gaps across production, processing, marketing, and institutional levels. The following table summarizes the major supply chain gaps that limit the sustainable utilization and commercialization of seabuckthorn in the region. A summary of supply chain gaps is presented in Table 6.

Table 6 Summary of the supply chain gaps in Bagmati province

Supply Chain Stage	Identified Gaps
Production	Unmanaged wild harvest, lack of cultivation efforts, pest/disease issues, poor ecological monitoring
Processing	No industrial-scale facilities, poor access to technology, quality control and standardization issues
Marketing	Limited branding and distribution, dependency on local sales, competition with imports
Institutional	Weak policy integration, lack of coordination, minimal support from government agencies

3.7. Opportunities for Product Diversification & Market Expansion

Seabuckthorn holds significant potential for high-value product diversification in Nepal. Key products include juices, jams, wines, oils, cosmetics, nutraceuticals, and medicinal teas. Its bioactive seed oil is especially valuable, being rich in linoleic and linolenic acids, vitamins C and E, and carotenoids making it ideal for functional foods, skincare, and therapeutic formulations.

Currently, the Nepali market is dominated by imported seabuckthorn-based cosmetics and supplements from countries such as China, India, and various European nations. These imported products are typically positioned as premium health and beauty items, promoted for their antioxidant, anti-aging, and anti-inflammatory benefits. This market trend underscores a clear opportunity for Nepal to scale up domestic seabuckthorn processing. With investment in appropriate technology, quality assurance mechanisms, and strategic branding, Nepal can tap into both domestic and export markets while promoting local enterprise and value addition.

3.8. Institutions involved in protection, production and processing Seabuckthorn

Several governmental and non-governmental institutions play key roles in the conservation, cultivation, and value addition of seabuckthorn (*Hippophae* spp.) in Bagmati Province. The Department of Forests and Soil Conservation and local Forest User Groups actively engage in protecting natural seabuckthorn populations and promoting its sustainable harvesting. Research organizations such as the Nepal Agricultural Research Council (NARC) contribute to the development of improved cultivation techniques and propagation methods. Additionally, community-based cooperatives and small-scale enterprises

support processing activities, producing products like juice, jam, and herbal teas, which enhance local livelihoods and encourage the commercialization of seabuckthorn in the region (Table 7).

Table 7 Key institutions involved in the protection, production, and processing of seabuckthorn in Bagmati Province

Institution/Organization	Role	Involvement Area
Division Forest Offices (DFOs)	Protection and conservation of wild seabuckthorn habitats; community forest coordination	Rasuwa, Sindhupalchowk, Dolakha
Langtang National Park (LNP)	In-situ conservation of seabuckthorn; habitat monitoring and protection	Rasuwa
Local Governments (Municipalities/RMs)	Promotion of seabuckthorn through local plans; support to farmers and local processors	Dolakha, Rasuwa, Sindhupalchowk
Local Community Forest User Groups (CFUGs)	Sustainable harvesting and protection of natural seabuckthorn stands	Various locations across the province
Agriculture Knowledge Center (AKC)	Technical support for cultivation and processing; promotion of value chain development	Bagmati Province
Herbal and NTFP-based Cooperatives/Enterprises	Small-scale processing (juice, jam, pickles); local marketing	Rasuwa, Dolakha
Research Institutions (e.g., NAST, TU, RHF)	Research on ecology, uses, propagation, and value addition of seabuckthorn	Kathmandu (with fieldwork in districts)
Non-Governmental Organizations (NGOs)	Awareness, training, and value chain development support	Various districts,

3.9. Key Policies and Initiatives

Seabuckthorn is increasingly recognized in Nepal for its ecological, nutritional, and economic value, especially in high-altitude regions. To promote its sustainable use, the Government of Nepal has formulated various policies and legal instruments focusing on biodiversity conservation, non-timber forest product (NTFP) management, and agroforestry. The table below (Table 8) summarizes key national policies that support the protection, cultivation, processing, and commercialization of seabuckthorn.

Table 8 Key government policies and legal frameworks in Nepal relevant to the protection, cultivation, and utilization of seabuckthorn.

Policy / Act	Year	Key Focus Related to Seabuckthorn
National Biodiversity Strategy	2002	Emphasizes protection and sustainable use of biodiversity, including medicinal plants like seabuckthorn; promotes community involvement and benefit sharing.
Forest Act and Forest Regulations	1993 / 1995	Governs collection, use, and trade of forest products including seabuckthorn; mandates permits and sustainable harvesting practices.
Herb and NTFP Development Policy	2005	Encourages cultivation of medicinal and aromatic plants (MAPs) including seabuckthorn; supports sustainable production and processing to enhance livelihoods.
National Forest Policy	2019	Focuses on sustainable management of forests and NTFPs; promotes processing, certification, entrepreneurship, and export of seabuckthorn products.
National Agroforestry Policy	—	Supports integration of trees like seabuckthorn into agricultural landscapes for ecological stability and economic benefit.

3.10. Key Challenges & Threats

Lack of Institutional Integration: The Division Forest Offices in the four districts where seabuckthorn naturally occurs have not adequately incorporated its management into their annual plans as well as in the operational plan of the community forests of the districts. While the Division Forest Office of Rasuwa has taken a step by allocating a quota for annual harvesting in its planning documents, this effort remains limited and insufficient for promoting sustainable management and utilization of the resource.

Environmental Degradation: Factors such as overharvesting in localized areas, unregulated trekking routes, wildfires, floods, and landslides are major obstacles to the natural regeneration and range expansion of seabuckthorn.

Socio-economic Constraints: The absence of local processing facilities, fragmented and underdeveloped value chains, and limited extension services such as training on sustainable harvesting, post-harvest handling, value addition, seasonal harvest collection, poor accessibility of the seabuckthorn growing area, underutilized wild harvest, and weak market linkage pose significant barriers to the sustainable utilization and commercialization of seabuckthorn.

Illegal Practice: A respondent from Ramechhap reported that seabuckthorn fruits are sometimes mixed with the more valuable fruits of *Berberis* (Chutro) due to their similar appearance. Traders engage in this practice to increase profits, and deceive buyers.

Chapter IV

Conclusions and Recommendation

4.1. Conclusions

Seabuckthorn (*Hippophae spp.*) is an ecologically vital and culturally significant resource in Bagmati Province, yet it remains underutilized and increasingly threatened. As a nitrogen-fixing pioneer species, it plays a crucial ecological role by stabilizing erosion-prone slopes and enhancing biodiversity in extreme Himalayan environments. Despite its socio-economic potential, especially through derivatives like juice, oil, and medicinal products, fragmented value chains and limited market integration hinder its broader livelihood benefits for high-altitude communities. Critical threats such as climate change, habitat degradation, and institutional gaps further jeopardize natural populations, with the stunted, high-density growth of *H. tibetana* near Tso Rolpa Lake illustrating its vulnerability to environmental stressors. Nonetheless, untapped opportunities exist in product diversification (e.g., cosmetics, nutraceuticals) and market expansion, which could reduce reliance on imports if supported by investment in technology, branding, and policy frameworks. Urgent interventions are needed to sustainably manage seabuckthorn by integrating it into forest management plans, enhancing processing capabilities, and empowering local communities through inclusive and equitable value chains.

4.2. Recommendation

Seabuckthorn is a high-altitude, nitrogen-fixing shrub with exceptional ecological, economic, and cultural value in Nepal. It plays a vital role in stabilizing fragile mountain ecosystems, restoring degraded lands, and supporting biodiversity. Moreover, its fruit, rich in vitamins and antioxidants, holds immense potential for use in food, medicine, and cosmetics. Despite these benefits, seabuckthorn remains underutilized and largely unmanaged in Nepal due to weak institutional focus, fragmented value chains, and limited research and development. To unlock its full potential and ensure its conservation, the following policy recommendations are proposed with strong emphasis

- Integrate seabuckthorn in the Master Plan for Forestry Sector, Local Adaptation Plans of Action (LAPAs), Provincial Climate Change Adaptation Plans, Community Forest Operational Plans and biodiversity policies.
- Promote community-based seabuckthorn plantation in degraded or marginal lands to support both ecological restoration and generate local livelihood.

- Encourage seabuckthorn-based agroforestry systems in erosion-prone and degraded landscapes for slope stabilization.
- Advocate for legal recognition of community rights to Non-Timber Forest Products (NTFPs), including seabuckthorn.
- Partner with NAST/NARC/TU to develop propagation techniques, to develop high yield and thornless varieties of seabuckthorn, control invasive species and map climate-vulnerable populations (e.g., Dolakha's high-density sites).
- Train local communities on sustainable harvesting practices, pest and disease management, and post-harvest processing.
- Develop and enforce quality standards for seabuckthorn products to prevent adulteration and ensure consumer safety.
- Establish small-scale processing unit in Rasuwa (expanding existing cottage juice production for tourists) for juice, seed oil, and cosmetics; enforce quality standards (e.g., organic certification, combat adulteration).
- Strengthen linkages to markets through certification schemes (e.g., organic, NTFP-certified) and support brand development for regional and export markets.
- Link women's groups, youth, and local cooperatives to seabuckthorn-based enterprises across the value chain—from cultivation and harvesting to processing and marketing.

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Annexes

Annex I. List of respondents

	Name	Age (Years)	District	Mobile Number	Remarks
1	Ang chhiring Sherpa	26	Naa Gaon, Dolakha		
2	Ang ngimi Sherpa	28	Naa Gaon, Dolakha		
3	Dawa chhiri Sherpa	40	Naa Gaon, Dolakha		Mountain climber
4	Ang Pasang Sherpa	24	Naa Gaon, Dolakha		
5	Pasang chhiri Sherpa	25	Naa Gaon, Dolakha		
6	Yam lal bk	29	Beding, Dolakha		
7	Ngimfuti Sherpa	60	Dolakha		
8	Ngang syake Sherpa	60	Dolakha		
9	Tashi Sherpa	40	Dolakha		
10	Angdiki Sherpa	35	Dolakha		
11	Thundu Sherpa	50	Dolakha		
12	Tolman Tamang	53	Dolakha		
13	Kirte Tamang	32	Dolakha		
14	Tej bahadur Tamang	30	Dolakha		
15	Surya badur Tamang	65	Dolakha		
16	Dane tamang	60	Dolakha		
17	Bal badur Tamang	62	Dolakha		
18	Bir badur Tamang	32	Dolakha		
19	Tul bahadur Tamang	26	Dolakha		
20	Budhi Tamang	25	Dolakha		
21	Manmaya Tamang	45	Dolakha		
22	Man bahadur Tamang	55	Dolakha		
23	Anga sherpa	20	Dolakha		
24	Tenji Sherpa	23	Dolakha		

25	Rinji Sherpa	35	Dolakha		
26	Dorji Sherpa	40	Dolakha		
27	Doma Tamang	35	Dolakha		
28	Nimai Tamang	32	Dolakha		
29	Prem Tamang	40	Dolakha		
30	Furtenji Tamang	23	Dolakha		
31	Shankar Tamang	24	Simi Gaon, Dolakha	9840813526	Trekking guide,
32	Santosh Ghale	42	Dhunchu, Rasuwa	9851164210	
33	Ramesh Ghale	38	Dhunchu, Rasuwa		
34	Shambhu Tamang		Dhunchu, Rasuwa	010-540107	Officer at DFO, Rasuwa
35	Uma Shankar Jaisawal		Ramechhap	9854040068	DFO, Ramechhap
36	Shambhu Baraili		Ramechhap	9854045738	
37	Prakash Bhujhel		Ramechhap	048400068	
38	Kuber Rana Magar		Dhading	9868644060	Officer at DFO, Dhading
39	Alina Ale		Dhading	9851422168	Officer at Darkha Subdivision Forest Office
40	Shree Narayan Chhetri		Panchpokhari-Thangpal RM, Sindhupalchowk	9864112955	Information officer

Annex II: Checklist and questionnaire

अनुसूचि १: प्रश्नावली

समुहगत छलफल प्रश्नावली

ठाउँ

मिति

१ : आधारभूत जानकारी

नाम/थर	लिंग	उमेर	पेशा	शिक्षा पढाई (आधारभूत, १२, उच्चशिक्षा)	डालेचुकका बारेमा जानकारी छ वा छैन रु	डालेचुकलाई अन्य कुन कुन नामले पनि चिनिन्छ रु
१						
२						
३						
४						
५						
६						
७						

२. तपाईंको जानकारीमा यहाँ डालेचुक कुन कुन ठाउँमा पाइन्छ ?

क. नगर तथा गाउँ पालिका तहमा भन्नुहोस् ?

ख. त्यहाँको कस्तो कस्तो ठाउँमा पाइन्छ जस्तै नदी किनार, भूक्षय वा पहिरो गएको ठाउँ वा अन्य

३. डालेचुकको उपयोग के के मा गरिराख्नुभएको छ

क. घरायसी प्रयोग जस्तै

ख. औषधीका रूपमा जस्तै

ग. अन्य प्रयोग (वातावरणीय, पहिरो नियन्त्रण, डालेघाँस इत्यादि).....

४. डालेचुकको प्रयोग ?

प्रयोगको किसिम	के मा /विरुवाको कुन भाग ?	कुन भाग कसरी प्रयोग गर्ने
व्यापारिक प्रयोग		
उद्यममा		

५. तपाईंको जानकारीमा यहाँ डालेचुकको संकलन क्षेत्र र बजार कहाँ छ ?

६. तपाईंको जानकारीमा यहाँ डालेचुकको स्थिति बढ्दो वा घट्दो कस्तो छ ?

क. प्राकृतिक वन क्षेत्रमा (पहिले र हालको तुलना)

ख. वन क्षेत्र बाहिर (पहिले र हालको तुलना)

ग. यदि डालेचुकको स्थिति घट्दो छ भने, मानिसहरुको कृयाकलापले गर्दा होला कि अन्य प्राकृतिक प्रकोपले ले गर्दा समेत यसो भएको होला ?

७. डालेचुकमा काम गर्ने संस्थाहरु कुन कुन होलान् ?

क. सरकारी तहमा

ख. गैर सरकारी तहमा

ग. निजि क्षेत्रबाट

घ अन्य

Annex III: Resource survey

Survey form for identifying Seabuckthorn clusters

Name of respondent:

Date:

District:
RMP/MP

If you know Altitude:

GPS:
Ward No./Place Name:

Others:

Species Clusters in district (location):

Location	Village	Forest type (C, G, P)	Cluster type S, M, D	Number of clusters or trees	Other dominant species in that forest/location
1.					1. 2. 3.
2.					1. 2. 3.
3.					1. 2. 3.
4.					1. 2. 3.
5.					1. 2. 3.

C = Community, G = Gov Managed, P = Protected area; S = sparse, M = Moderate, D = Dense

How is this plant propagated? Seed Rootlings drafting/shoot

Natural Population in last 10 years: Increasing, Decreasing, Constant, unknown

Regeneration of this species in forest: High, Moderate Low None

Nursery beds growing this species in district (location and number of seedlings produced):

Location	Village	Number	Total seedlings	Remarks
1.				
2.				
3.				
4.				
5.				

Uses of seabuckthorn (Give in detail):

- 1.
- 2.
- 3.

Threats/Challenges (Pls tick appropriate): 1) Low awareness 2) Biol invasion 3) Forest fire 4) Grazing 5) Diseases 6) Over exploitation (Fw, timber) 7) Trade and smuggling 8) Habitat degradation and encroachment 9) Trampling and plucking 10) Low regeneration 11) Climate change 12) Landslide

Field Inventory Form Plot size (5 m x 5 m)

District: Site name: Date:

Plot No. Aspect: Slope:

GPS: Lat

Longitude

Alt.....

Site information

- i. Type of forest: Community/Protected/Government managed Name:
- ii. Cluster type: Sparse Moderate Dense
- iii. Regeneration of seabuckthorn: High, Moderate Low None
- iv. Disturbance (tick): Cutting-loping-felling-over-exploitation, Grazing, Firing, Invasion, Trails-trampling- plucking, Habitat degradation, Low regeneration, Diseases, Landslide
- Species in quadrat (5x 5)

Q.N.	Name of the focus species and Tree species	Basal Diameter	Height of plant	Cover (%) in the quadrat by Sbthn	Other dominant associated species in this quadrat	Disturbance
1					1.	
					2	
					3	
					4	
					5	
					6	
					7	
					8	
2					1.	
					2	
					3	
					4	
					5	
					6	
					7	
					8	

3					1.	
					2	
					3	
					4	
					5	
					6	
					7	
					8	

Some glimpses of fieldwork in Dolakha

