

# Commercial medicinal plants in Nepal – moving towards the bioeconomy

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## Executive summary

The commercial medicinal plant sector is of major economic importance to Nepal. Demand is high and increasing, in particular in the huge neighbouring countries of India and Nepal, with opportunities for Nepal to move from being a supplier of raw materials and producer of lower-value domestic consumer products to integrating into the global economy as an exporter of higher-value products that are sustainably sourced. This requires a transition to a bioeconomy for commercial medicinal plants, emphasising sustainable incomes and sustainable harvests. The necessary steps to make the transition can all take place within Nepal.

## Introduction

Greenhouse gasses affect the earth's climate and actions are required to develop affordable and efficient transition pathways to low-carbon economies. Ways forward include renewable natural resource approaches to the bioeconomy in low-income countries, focusing on how the production, processing, and trade of such resources can promote a sustainable economy. This project investigated the commercial medicinal plant sector in Nepal with the aim of establishing the foundation for identification of bio-based transition pathways – that combine sustainable income flows with sustainable resource use. Economic growth need not be synonymous with burning carbon and trashing sustainability. The Nepalese medicinal plant sector potentially offers an opportunity to limit emissions while reducing poverty and contributing to conservation. The aims of this project were (i) improved understanding of the dynamics of transnational production networks for medicinal plants traded in and from Nepal (production networks, sustainability of harvest, factors influencing demand, the institutional context, impact of network dynamics on rural household incomes), and (ii) build human and social capacity to undertake high-quality bioeconomy related research and dissemination at key institutions in Nepal. The project addressed four gaps: *methodologically*, it scaled up local-level studies to provide national estimates; *empirically*, it advances understanding of the complex configuration of the production network of a natural resource sector; *analytically*, it identified feasible interventions to promote economic growth and sustainable resource use; and *theoretically*, it expanded use of global production network theory to supply-side issues in a natural resource sector in a low-income country. We found commercial medicinal plants to be of national economic importance, and that the resource provides a possible way to support a bioeconomy characterised by sustainable incomes and sustainable resource use.

## Background

The economic importance of natural resources to livelihoods in lower income countries (an average of 28% of total rural household income) lead to a design-focus on sustainable resource management (instead of decoupling human welfare and environmental resources). Our theoretical avenue was Global Production Network (GPN) theory. A production network is the nexus of interconnected functions, operations, and transactions through which products are produced, distributed, and consumed. We took a novel supply-side approach. Data was collected using a string of quantitative and qualitative instruments centred on a 15 district trade survey that functioned to provide data that could be generalised to the national level. The main body of economic and trade data was generated through a string of structured interviews (540 harvesters, 393 traders, 73 central wholesalers, 78 regional wholesalers, and 79 processing industries) throughout the global production network, in Nepal, India, and China. This was supplemented with purpose-target additional data generation, such as on consumers (e.g. 464 consumers of *Neopicrorhiza scrophulariiflora* in Nepal). We also collected multiyear biophysical data to estimate habitat suitability, plant density, biomass variation, the effect of harvest on vital functions of plants, and sustainable harvest rates for selected threatened species subject to intensive harvesting (*N. scrophulariiflora* and *Aconitum spicatum*). This included permanent plot

establishment and remeasurements of thousands of individual plants in protected area and open-access populations, as well as additional harvester interviews (n=203).

## Results

For the first time, we identified all traded medicinal plant species from Nepal, analysed their distribution patterns, and assessed their vulnerability. We recorded 300 species in trade, double that of previous estimates, distributed across 97 families and 197 genera. Most species are concentrated in subtropical and lower temperate regions indicating an economic potential for increased cultivation and domestication at middle altitudes. The commercial harvest and sale of medicinal plants in Nepal provides substantial incomes for rural households, in particular in remote villages with limited income options, with annual income flows that exceed district-level budgets. In far-western Nepal, medicinal plant trade had doubled in volume and increased 17 fold in value in the past two decades. There is a backbone of constantly traded species, and an array of species that disappear from trade and new species that enter. The Chinese caterpillar fungus *Ophiocordyceps sinensis* is of particular economic importance to rural households with its functioning production network characterised by conflicts in relation to value creation, a high share of value capture by collectors, limited value enhancement, and a high degree of network and territorial embeddedness. Changes in trade has favoured harvesters and traders at the benefit of central wholesalers whose passive oligopsony is disappearing. Rising incomes in the huge neighbouring markets of India and China has increased demand for many medicinal plant species in Nepal, driving up prices and income well as sustainability concerns. This development has also been facilitated by infrastructural developments in Nepal, in particular road expansion into remote areas and improved communication through mobile telephone networks. Production networks operated by informal actors establishing trust-based relationships allow responses to cross-border market signals, enabling the flow of rural and remote environmental resources to urban centres of demand. This includes an increasing flow of medicinal plant products to China through Tibet; both the Chinese and Indian exports are underreported with a substantial share of illegal trade. At the same time, these products provide the raw material inputs to a growing domestic processing industry in Nepal that have gone from a few dozen to hundreds of enterprises over the past two decades. The domestic medicinal plant processing industry is characterised by small enterprises, catering to a rising domestic demand for primarily Ayurvedic products. Key business obstacles were export barriers, low access to technology, infrastructure and service barriers, labour challenges, socio-economic and political instability, and the inefficient bureaucracy. Actions are needed to transform from being a supplier of raw materials and producer of lower-value domestic consumer products to integrating into the global economy as an exporter of higher-value products that are sustainably sourced. It is likely that some species in high demand are being overharvested. Species-level experimental harvests provide practical guidelines on sustainable harvest rates, e.g. the rhizomes of the high altitude perennial *Neopicrorhiza scrophulariiflora* can be harvested sustainable at a rate of 50% of rhizomes in four-year intervals.

## Conclusions

The medicinal plant sector is of national economic importance to Nepal. The sector provides an opportunity to pursue a sectoral transition to the bioeconomy, providing an example for other sectors, emphasising sustainable incomes and sustainable resource use – demand for Nepalese medicinal plants is high and growing in established markets. The main obstacles are a lack of a coherent vision for the sector and an unaddressed need to identify transition pathways supported by the sector's major actors, from traders and enterprises to governmental agencies.

## Implications

The economic importance of the sector and the established and growing market provides an ideal starting point for developing a bioeconomy focused on renewable natural resources. This should build on an understanding of both legal and extra-legal mechanisms influencing the medicinal plant trade; this can facilitate the simultaneous achievement of sustainable incomes and sustainable harvesting. This requires vision, concerted action, committed leadership, and wise choices. A bioeconomic policy for medicinal plants

needs to span from species-level spatially and temporally specific harvest guidelines to industrial policy interventions conducive to the growth of domestic medicinal plant processing industries.

## Recommendations

A string of key actions need to be taken: (i) establishment of a theory of change for the medicinal plant sector, endorsed and agreed upon by the major actors, (ii) introduction of sustainable harvest guidelines for a few selected key species, followed by more generic guidelines for species subjected to lower harvesting pressure, (iii) use insights from the functioning of the production network for medicinal plants to design feasible approaches to introduce contract farming in lower areas and community-based management of wild resources in higher areas, (iv) take steps to draft a bioeconomic strategy for the medicinal plant sector, and (v) focus future research on the essential knowledge gaps, including the lack of knowledge on demand drivers in the major markets.

## Recommended further readings

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