

Anwasha Borthakur
Pardeep Singh *Editors*

People and Mountain Environments

Interconnectedness for Sustainable
Development in the Himalayas

 Springer

People and Mountain Environments

Anwasha Borthakur · Pardeep Singh
Editors

People and Mountain Environments

Interconnectedness for Sustainable
Development in the Himalayas

 Springer

Editors

Anwasha Borthakur
Katholieke Universiteit Leuven
(KU Leuven)
Leuven, Belgium

Pardeep Singh
PGDAV College
University of Delhi
Delhi, India

ISBN 978-3-031-83552-0 ISBN 978-3-031-83553-7 (eBook)

<https://doi.org/10.1007/978-3-031-83553-7>

© The Editor(s) (if applicable) and The Author(s), under exclusive license to Springer Nature Switzerland AG 2025

This work is subject to copyright. All rights are solely and exclusively licensed by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, expressed or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Springer imprint is published by the registered company Springer Nature Switzerland AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

If disposing of this product, please recycle the paper.

Acknowledgements

We, the editors, are grateful to the University of Leuven (KU Leuven), Belgium, and Indian Council of Social Science Research (ICSSR), India (ICSSR/RPD/MJ/2023-24/ST/98), for the financial support provided to conduct our research in the Indian Himalaya. This book is a result of our experiences working in this majestic mountain range. We would also like to thank our respective current institutions—Rachel Carson Center at Ludwig Maximilian University of Munich (LMU), Germany and PGDAV College, University of Delhi, India—for their support. Further, we acknowledge with thanks all the authors who contributed to this book along with the peer reviewers who were kind enough to comment on the chapters.

Contents

1 Resilience and Sustainability Practices with Local Communities in Singalila National Park (SNP), India: Exploring Traditional Food, Festivals and Culture in a Globalized World	1
Antara Sanyal and Arindam Sarkar	
2 Community Dependence on the Wild Habitats: A Case Study from Manipur, Indo-Burma Hotspot Region	53
Elizabeth Huidrom, Ngairangbam Yaipharembi, Somananda Thokchom, N. Abem Devi, and Huidrom Birkumar Singh	
3 A Qualitative Study on People’s Dependence on Ecosystem Services in Har-ki-Dun Valley, Uttarakhand, Garhwal Himalayas	75
Arindam Sarkar, Antara Sanyal, Olivia Halder, and Rimjhim Ganguly	
4 Impacts of Land Use Changes in Indian Himalayas: A Socio-economic and Ecological Perspective	115
Dharitri Borah, Jayashree Rout, and Thajuddin Nooruddin	
5 Interconnection Between Agriculture and Livelihoods in Har-ki-Dun Valley, Uttarakhand, Indian Himalaya	149
Olivia Halder, Arindam Sarkar, Antara Sanyal, and Liya Mandal	
6 Waste Management Challenges and Potential Solutions in the Indian Himalayan Region	177
Naman Sharma, Sengottaiyan Priyatharshini, Nagajothilakshmi Kaliappan, Ramesh Poornima, Ambikapathi Ramya, and Periyasamy Dhevagi	

7	Trade-Offs Between Plant Conservation and Ecosystem Services Entail Intricate Socioecological System in Northeast India	215
	Panna Deb, Madhusmita Dutta, Sibam Sarkar, Ram Bahadur Chimariya, and Abantika Pradhan	
8	Biodiversity Conservation as an Optimistic Approach to Tackle Climate Change in the Indian Himalayan Region	231
	Anil Kumar, Monika Chauhan, Vaneet Jishtu, and Raj Kumar Verma	
9	Where the Wild Things Are: Identifying the Factors Behind and Mitigation Measures for Biodiversity Conservation Crisis in Himalayas	247
	Chandranshu Tiwari and Mala Rani	
10	Cinchona Plantation in the Eastern Himalayas and Its Potential in Prevention and Treatment of COVID-19 and Other Viral Diseases	287
	Sayan Bhattacharya and Prabhakar Sharma	
11	A Comparative Analysis of Sustainable Development in Bhutan Himalaya and India Himalaya, from a Conservation Perspective	297
	Tej Kumar Nepal and Sourajit Ghosh	
12	Rights of Indigenous Peoples Vis-a-Vis Environmental Justice in the Himalayan Region	323
	P. Sahana Florence and Achyutananda Mishra	
13	Environmental Justice in the Himalayan Region	339
	Seda H. Bostancı and Seda Yıldırım	
14	Assessment of Ecosystem Service Reliance: A Case Study of Upper Valley of Kullu District, Himachal Pradesh	355
	Usha Thakur and Sarla Shashni	

Chapter 1

Resilience and Sustainability Practices with Local Communities in Singalila National Park (SNP), India: Exploring Traditional Food, Festivals and Culture in a Globalized World



Antara Sanyal  and Arindam Sarkar 

Abstract Singalila National Park is situated on the extreme northwestern border of the Darjeeling district in West Bengal, India, adjacent to Nepal and the state of Sikkim. The area is home to 20 small settlements and hamlets, from Chitrey to Phalut, along the Indo-Nepal border and the Singalila Ridge. Within the park, there are five settlements, each with unique significance for festivals, cultural practices, and food habits. The population of these settlements is mainly comprised of Nepalis and Tibetans. The Nepalese community celebrates festivals such as Dashain, Tihar, Meghe Sankranti, Shree Panchami, Gajjantantri, and Buddha Purnima, while Tibetan festivals, like Losar, are celebrated on different days by different communities. Different festivals are associated with diverse traditional food culture. Various ethnic groups consume various traditional foods, including fermented and non-fermented items and preserved and fresh food. This diversity encompasses dairy products such as cow or yak milk, which are used to make Churpi (processed hard cheese) and ghee (clarified butter). Additionally, many alcoholic beverages are popular, including Tongba, made from fermented millet; Roxy/Rakshi, a distilled spirit typically made from grains like millet, rice, or barley; and another type infused with Rhododendron flowers for their pink and red coloring. Local wines and beers from wild strawberries and kiwi fruit are also popular. Pickles are made from young bamboo shoots and Dalle Khursani. The diverse array of hot foods includes staples like Daal Bhat (rice and lentils), various vegetable and meat fillings of Momo, Thukpa, Selroti (bread), Saak, and more. Some communities also have the food tradition of consuming beef and yak meat, as well as its dried form known as Sukuti. The significance and preference of tea vary among different communities, and tea is popular for its health benefits. Extensive field studies are currently being conducted in 23 settlements and hamlets within

A. Sanyal (✉)

Department of Geography, University of Calcutta, Kolkata, India
e-mail: antara.sanyal.8@gmail.com

A. Sarkar

Department of Geography, PK.H.N. College, University of Calcutta, Kolkata, India

the Singalila National Park (SNP) to gain a deeper understanding of the cultural practices and dietary habits of the indigenous people. The preliminary investigation and observations have unearthed a remarkable commitment among the local communities to preserve their rich cultural heritage and traditional festivals, despite their diverse ethnic backgrounds. These time-honored traditions are not only cherished by the locals but also capture the interest of intrepid tourists. This comprehensive study underscores the significance of acknowledging and appreciating the diverse cultural facets found within the SNP, including its festivals, culinary practices, and architectural heritage. Moreover, it underscores the indigenous people's innovative cultural preservation methods and their ability to adapt to the modern world. By fostering a sense of pride and ownership among community members, this approach fortifies their dedication to safeguarding the SNP's cultural and environmental treasures for generations to come.

Keywords Cultural preservation · Food practices · Ethnic diversity · Resilience · Sustainability · Globalization · Local community

Introduction

Resilience is the ability to recover from a particular state of change. In a natural ecosystem, people sustain themselves by adapting to physical and mental changes and the current situation. In the Himalayan Mountains community, resilience is a major concern as people adapt to the adverse situation of the changing environment through their experience, knowledge, and skill. Mechanisms of environmental change include climate change, population pressure, decrease in man-land ratio, and anthropogenic intervention in ecosystem services. Sustainability in the Himalayan ecosystem is the community's ability to continuously adapt to environmental changes while improving capability for the future. The World Commission of Environment and Development (WCED) released the Brundtland Report, titled "Our Common Future," in October 1987 (Secretary-General, 1987). According to the report, sustainability means taking care of the present without sacrificing the capacity of future generations to take care of themselves. Resilience and sustainability are processes of adapting to environmental change, with different dimensions of sustainability being critical concerns of resilience. Environmental sustainability in the Himalayan Mountain Forest ecosystem occurs when human consumption does not exceed natural reproduction. Social sustainability refers to a society's ability to uphold inherent human rights and provide essentials like healthcare, education, and mobility. Economic sustainability is the capacity of mountain communities to maintain their livelihood by limiting access to non-renewable natural resources. Variations in temperature and rainfall, along with elevation changes, are correlated with the character and mechanism of the mountain ecosystem. Altitude, temperature, air pressure, and rainfall diversity have been observed in the Himalayan Mountains ecosystem in short-distance spatial changes. The relationship between forest

communities and altitudinal climate has been studied by Sinha et al. (2018). The SNP Mountain ecosystem is known for being the habitat of Rhododendron and Red pandas. People within this ecosystem coexist with these species without any human-animal conflicts. The ecosystem of SNP is associated with various rare species and medicinal plants.

The Nepali community's traditional food, festivals, and cultural attire in the Singalila National Park (SNP) are closely connected to the local ecosystem. Traditional foods are of great social and economic importance. However, innovation in the food industry is needed to develop new products that align with modern trends while preserving the essence of traditional products (Guiné et al., 2021). Research has shown that traditional food holds greater nutritional value (Mihiranie et al., 2020). The knowledge of traditional food preparation is passed down through generations, preserving Nepali cultural practices and beliefs (Al-khusaibi & Rahman, 2019). Local communities in the SNP region have various traditional foods and beverages, both fermented and non-fermented, reflecting the country's diverse cultural and dietary heritage (Dahal et al., 2005). Various studies have been conducted on Nepali traditional food by researchers such as Gittelsohn et al. (1997), Eigner and Scholz (1999), Dahal et al. (2020), Yonzan and Tamang (2010), Karki et al. (2016), and Khadka and Lama (2020). Furthermore, festivals in the SNP and the surrounding area significantly boost economic activities by encouraging people to buy new clothes, household items, and essential gadgets (Dhakal, 2022). Extensive research has been done on festivals and cultural practices in the area by Upreti et al. (2012), Gauli et al. (2022), and Gharti (2023).

While studies on the ecology and environment of Singalila National Park (SNP) are abundant, there is a notable gap in understanding the resilience and sustainability strategies of the nearby populations in relation to the mountain ecology. Further investigation is required to explore dietary habits, festivals, and culture in relation to ecosystem services. The study aims to determine resilience and sustainability behaviours among the local populations in Singalila National Park (SNP) in the context of customary foods, celebrations, and cultural traditions in today's globalized society. SNP covers a geographic area of 79 km², with an elevation ranging from 2000 to 3636 meters above sea level. It is situated between 27°13'15 N and 22°1'46 N latitude and 83°1'91 N and 83°7'54 E longitude. The park is near the border with Nepal and the state of Sikkim, at the far northwest edge of the Darjeeling district in West Bengal, India. The main areas of study within the park include *Chitrey*, *Upper Chitrey*, *Lameydhure*, *Meghma*, *Tonglu*, *Tumling Phatak*, *Jaubari*, *Gairibas*, *Kaiyakatta*, *Kalapokhri/Kalipokhri*, *Chairichowk (Upper and Lower)*, *Bikeybjhanjang*, *Sandakphu*, *Ahal*, *Chandu*, *Thakum Valley*, and *Phalut*. SNP is renowned for its rich biodiversity, which has evolved to adapt to the extreme variations in altitude and climate. However, the rugged landscape, challenging physiography, and harsh climate make surveying the park difficult. The park also contains settlements within its boundaries. SNP is inaccessible due to heavy rainfall throughout the year. Language barriers and limited transportation options further complicate survey efforts. Furthermore, the cost of transportation within the park is higher than in any other national park in India. To navigate the park, the historic Land Rover and Bolero,

operated by the Land Rover Association based in Maneybhanjyang, are the primary modes of transportation.

Data and Methodology

The study gathered data primarily through door-to-door surveys, direct observation, and interviews. Key informants, including homestay chefs, housewives, elderly individuals, and restaurant personnel, were interviewed to ensure a comprehensive understanding of the topic. Respondents were selected using a purposive, systematic sampling method, ensuring a diverse representation of the community's perspectives. The methodology aims to achieve specific objectives. Firstly, it collects qualitative insights through in-depth interviews and observations. Secondly, it validates these insights by cross-referencing information from various sources, such as literature reviews and blogs. Thirdly, it quantifies survey data systematically for analytical purposes. Data modelling represents and interprets the findings, ensuring the results are reliable and relevant to the study's objectives.

Geographical Backgrounds of the Area

Singalila National Park is in West Bengal, bordering Nepal to the northwest and Sikkim to the northeast. The highest peaks in the Singalila range are Sandakphu (3630 m) and Phalut (3600 m). There are 18 small settlements, with only one hut between Chitrey and Phalut. The elevation of SNP ranges from 2000 to 3636 m MSL (Fig. 1.13). The Singalila Ridge is a mountain range that runs from north to south and is bordered by Sikkim to the west, India to the north, and Nepal to the east. It is located in the northwest of West Bengal. Singalila National Park encompasses the ridge and is famous for its views of Mount Everest and Kanchenjunga. The journey from Maneybhanjyang to Sandakphu and Phalut is well-known, popular, and exciting. The Rammam and Srikhola Rivers run through the park. The only source of drinking water for the villages in the national park is glacier meltwater, and purified drinking water is supplied to a limited extent through pipelines. Water is free from Chitrey to Kalipokhri, but from Kalipokhri onward, water is subject to charges, and the supply is not unlimited.

Embark on a journey to Sandakphu and witness the majestic Red Panda in the lush forests between Gairibas and Molley. The Red Panda has a specialized herbivorous diet of bamboo leaves but also has carnivorous features. Other animals in the area include the barking deer, wild bear, and Himalayan bear. Darjeeling is also home to various birds and butterflies. The Singalila National Park boasts diverse large and small trees, different forest and tree community types, and medicinal plants. Tibetans traditionally use wild food plants to supplement their diet, particularly during famines, and consider them potential medicinal plants (Boesi, 2014).

With their unique demographic composition, the SNP villages offer a rich tapestry of human life. The total population of these villages is 1632, with a balanced gender distribution of 51% male and 49% female. The village is home to 189 children, with a slightly higher representation of girls at 52%. The majority, 63%, of the population in SNP belongs to Scheduled Tribes. The literacy rate in SNP villages is commendable, with 63% of the population being literate. The workforce distribution is also interesting, with 49% of the people in SNP villages being non-workers. Among the total workers, 57% are male, and 43% are female. The female ratio is high in the non-working category, accounting for 54% of the total non-workers.

Results and Discussion

Food and Beverages: Seasonality and Local Ingredients as Raw Materials

Singalila National Park has a temperate climate with variations based on altitude. In the higher altitudes, the area experiences colder winters. People in SNP use seasonal ingredients based on local agriculture practices and climatic conditions. The culinary offerings reflect simplicity and complexity, from the crispy Selroti made of rice flour, sugar, and ghee to the savory *Sha Phaley* filled with minced meat (Table 1.1). Dried, fermented, and smoked ingredients like dried yak meat, fermented soybeans (*kineman*), fermented finger millet (*chang*), rice flour, sugar, and ghee remain constant year-round. Factors such as imported goods and preservation methods affect availability. Staples like *Dhido*, made from buckwheat flour, are complimented with *Gundruk*. *Tsampa* is a porridge made with roasted barley flour, showcasing the region's reliance on hearty grains. Maida (all-purpose flour) is imported from the nearest city, like *Sukiapokhri*, *Darjeeling*, or *Siliguri*, making it less affected by local seasons.

The culinary traditions of the SNP villages are deeply rooted in the use of local resources. Fresh vegetables like potatoes, cucumber, radish, bamboo shoots, mustard, and spinach leaves are likely more abundant and cultivated in the summer. *Momo*, a ubiquitous dumpling filled with a mix of meat and vegetables, represents a culinary bridge between Nepali and Tibetan cuisine. Accompanying condiments like *Tibetan* and *Dalle Khursani chutney* add flavor to meals, while beverages like Tibetan butter tea and *Chyang* offer a unique taste experience. The inclusion of indigenous ingredients such as *Yak butter*, *ghee*, and *Churpi* underscores the importance of local resources in sustaining the culinary traditions. Wild strawberries and kiwi ripen during the rainy season (Fig. 1.15). Autumn is the harvest time for finger millet and other millets used in fermented drinks. Fermented delicacies like *Tongba*, *Rakshi*, and local beer and wine are made from the wild fruits of Singalila Forest, reflecting the ingenuity of preserving food and creating beverages in mountain terrain, contributing to a gastronomic tapestry that celebrates the diverse cultural heritage of SNP.

Table 1.1 Principal ingredients of the traditional food and beverages

Serial No.	Food and beverage	Community	Principal ingredient
1	<i>Selroti</i>	Nepali and Tibetan	Rice flour, Sugar and Ghee
2	<i>Tibetan Roti/Bread/ Bhaley/Balep</i>	Tibetan	Maida (all-purpose flour) and Yeast
3	<i>Tingmo</i>	Tibetan	Maida (all-purpose flour), Sugar and Milk
4	<i>Sha phaley</i>	Tibetan	Maida (all-purpose flour), minced meat typically Yaks or Chicken
5	<i>Khapse</i>	Tibetan	Maida (all-purpose flour)
6	<i>Tibetan fried bread</i>	Tibetan	Maida (all-purpose flour)
7	<i>Phaley</i>	Tibetan	Maida (all-purpose flour) and Atta (whole wheat flour)
9	<i>Tsampa</i>	Tibetan	Roasted barley flour
8	<i>Dhido</i>	Nepali	Buckwheat flour
10	<i>Gundruk</i>	Nepali	Dried and fermented mustard and spinach leaf
11	<i>Aloo tama</i>	Nepali	Potatoes, Bamboo shoots, Fermented soybeans
12	<i>Sukuti</i>	Nepali and Tibetan	Dried and smoked yak meat
13	<i>Aloo Achar</i>	Nepali	Potato, Cucumber, Black sesame seeds, Niger seeds and fenugreek seeds
14	<i>Aloo Dum</i>	Nepali	Potatoes
15	<i>Shapta</i>	Tibetan	Meat (Pork, Yak or Beef)
16	<i>Thakali thali</i>	Nepali	A variety of dishes as a combined
17	<i>Momo</i>	Nepali and Tibetan	Maida (all-purpose flour), Meat and Vegetable
18	<i>Jhol Momo</i>	Nepali	Maida (all-purpose flour), Meat, Vegetable and chutney
19	<i>Thukpa</i>	Nepali and Tibetan	Flour noodles. Chicken and vegetables broth
20	<i>Gorkha chutney/ achar</i>	Nepali	Dry Chickpea, Potato, Black sesame seeds and Niger seeds
21	<i>Thakali chutney</i>	Nepali	Tomato and Chilli
22	<i>Dalle Khursani achar</i>	Nepali	Dalle Khursani chilli
23	<i>Golbhedo ko achar</i>	Nepali	Tomato
24	<i>Khadeka Mula ko achar</i>	Nepali	Radish
25	<i>Tibetan momo chutney</i>	Tibetan	Tomato, Chilli and Peanut
26	<i>Kheer</i>	Nepali	Milk, Rice and Sugar

(continued)

Table 1.1 (continued)

Serial No.	Food and beverage	Community	Principal ingredient
27	<i>Yak butter/ghee</i>	Nepali and Tibetan	Yak milk
28	<i>Churpi</i>	Nepali and Tibetan	Yak cheese
29	<i>Tibetan butter tea</i>	Tibetan	Butter (Yak or Cow), Tea leaves
30	<i>Chyang</i>	Tibetan	Fermented Ragi, finger millet and Aconitum
31	<i>Tongba</i>	Nepali and Tibetan	Fermented millet
32	<i>Rakshi</i>	Nepali	Fermented finger millet and Red Rhododendron
33	<i>Roxi</i>	Nepali	Fermented rice or millet
34	<i>Local wine/beer</i>	Nepali	Wild Strawberries, rhododendron and Kiwi
35	<i>Aila</i>	Nepali	Fermented rice

Traditional Preparation Method of Food and Beverages and Revelry

In SNP, people from all settlements make *Selroti* during the festive occasions of *Dashain* and *Tihar*, the major Nepali festivals in SNP. However, it is not limited to just these celebrations. Due to its deliciousness, it is also prepared for weddings, ceremonies, and other special events within Nepali communities. *Selroti* is a sweet rice flatbread primarily available in settlements like *Chitrey*, *Gurdum*, and *Dhotrey*. Soak rice for a few hours, then grind it with ghee, sugar, and cardamom. Combine this mixture with fenugreek seeds, baking powder, and water to make a thick batter (Fig. 1.1). Let it rest to ferment, then cook small flattened dough rounds on the hot *kadhai* (griddle) until golden brown. It is mainly served hot or at room temperature, and enjoy it as a sweet and chewy treat (Century-Foods, 2024; Ne Nepal USA, 2022; Pabs Kitchen, 2019a, 2019b; Ramakrishnan, 2023; Topno, 2024).

Tibetan bread, called *Balep*, *Bhaley*, or *Phaley*, is a simple flatbread made with flour, yeast, water, and a touch of sugar and salt. These are mainly popular in the settlements like *Maneybhanjyang*, *Gurdum*, *Chitrey*, and *Tumling* (Fig. 1.2). To make it, you first need to mix dry ingredients, knead in wet ingredients to form a dough, let it rise, roll out the dough, and cook it on a pan until golden brown. The locals of SNP enjoy it warm with stews and curry and mainly have it for breakfast as an everyday meal (Dickeydol Palden's Kitchen, 2021; Recipe., 2021a, 2021b).

Tingmo, a Tibetan steamed bread, is surprisingly simple to make and is observed to be made in the Tibetan families of *Maneybhanjyang*, *Chitrey*, and *upper Chitrey* (Fig. 1.3). Combine flour, yeast, sugar, and water to create a dough that rises twice. After shaping the dough into balls, let them rise again before seaming them for a fluffy, delicious delicacy (Augustine, n.d.; Bong Eats, 2017; Foodie Trail, 2024; Food Tube Nepal, 2023; Kalsang, 2023; Mill, n.d.; Tasty Treasure, 2018). *Tingmo*

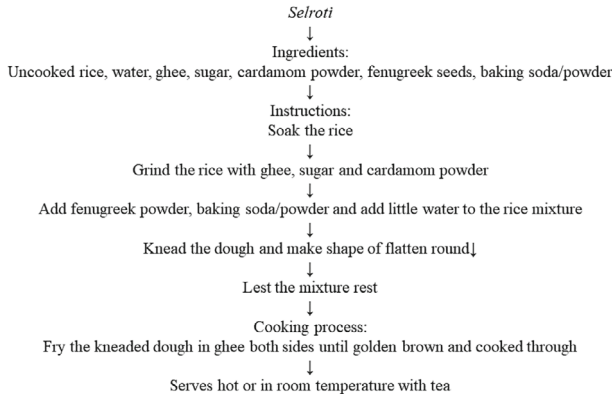


Fig. 1.1 Flow chart of the preparation technique of *Selroti*

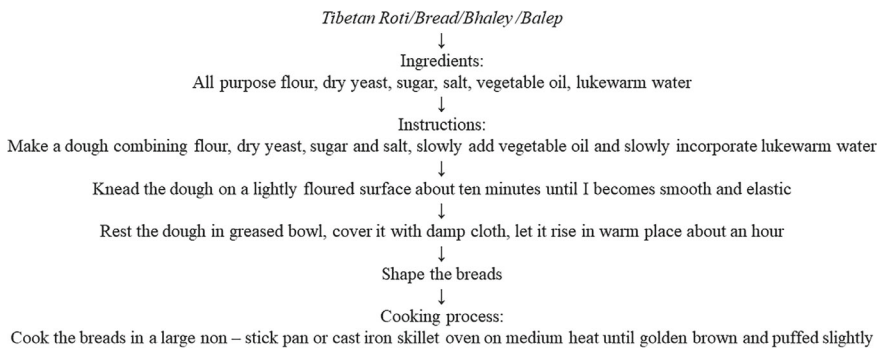


Fig. 1.2 Flow chart of the preparation technique of *Tibetan Roti/Bread/Bhaley/Balep*

is often served with *Shapta* or curry, butter, or jam. *Shapta* is a flavourful and spicy Tibetan stir-fried dish, typically made with thinly sliced beef or yak meat. The meat is marinated in soy sauce, chilli paste, cumin, coriander, and salt, then stir-fried with garlic, ginger, onions, and etcetera (Fig. 1.4). Vegetables like bell paper and tomato are added and cooked until tender-crisp. After garnishing the dish with chopped spring onion, the *Shapta* is ready (Food of the Himalayas n.d.; Hood, 2021; Tasty Flavour, 2020). It is served hot with *Tingmo* or Rice. *Tingmo* and *Shapta* are not necessarily tied to specific occasions. However, they are commonly enjoyed as part of Tibetan cuisine in everyday meals and during special gatherings like *Losar* and religious ceremonies.

Sha Paley is a traditional savory Tibetan dish that consists of bread stuffed with seasoned meat and cabbage. It is also known as *Shapale* or *Sha Balep* and is very famous in the households and homestays of SNP. To make them, whip up a simple dough with flour and water. Meanwhile, cook ground meat, cabbage, aromatics, and seasonings for a flavourful filling (Fig. 1.5). Roll out the dough, fill dough circles

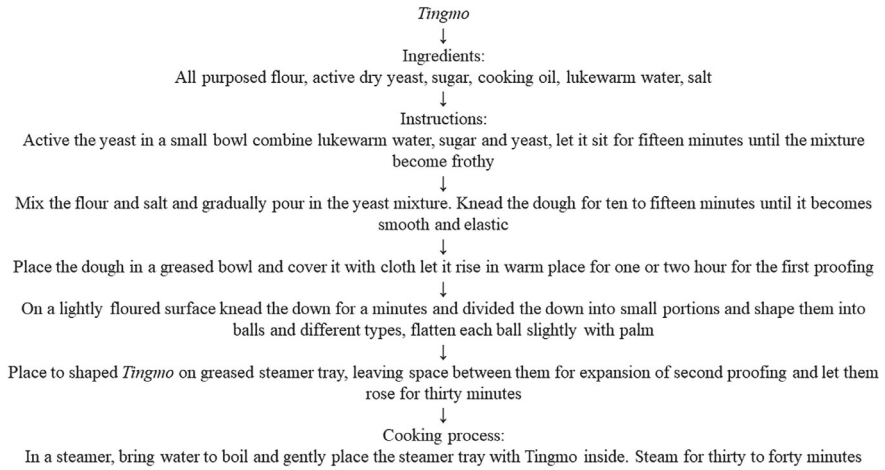


Fig. 1.3 Flow chart of the preparation technique of *Tingmo*

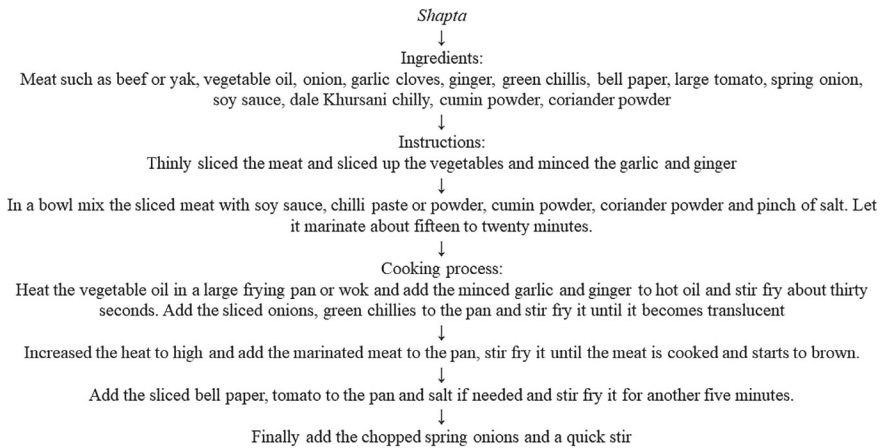


Fig. 1.4 Flow chart of the preparation technique of *Shapta*

with the mixture, seal them, and deep fry until golden brown (Cherie Media, 2024; Dubey, 2021; Ganguly, 2022; Sikkim Tourism, n.d; TasteAtlas, 2022). *Shaphaley* is not necessarily tied to specific special occasions. It is a popular and versatile dish enjoyed throughout the year. Its portability and deliciousness make it a great anytime snack, perfect for cafés and restaurants in *Maneybhanjyang*, *Tumling*, and *Dhotrey*. It is also an ideal snack for picnics and casual gatherings at home.

Khapse is a delicious deep-fried pastry, and it is enjoyed during *Losar* (Tibetan New Year) and other special occasions like *Gutor*, which is celebrated on the 29th day and the 12th Tibetan month as a part of the New Year festivities. *Khapse* is also made for weddings, birthdays, and other significant events and symbolizes joy

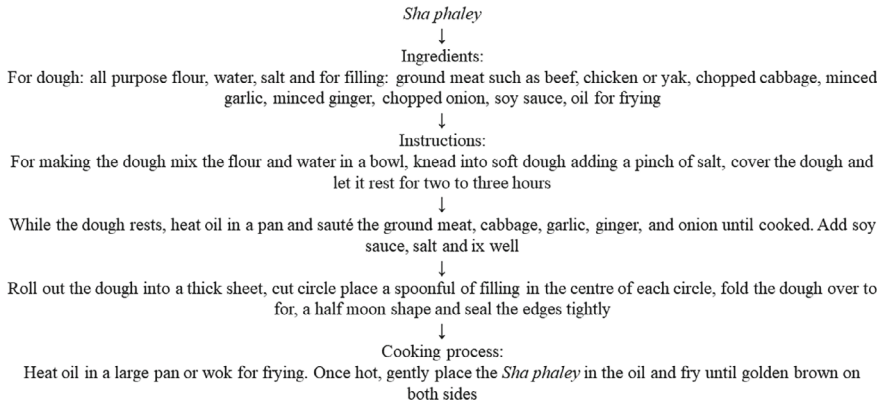


Fig. 1.5 Flow chart of the preparation technique of *Sha phaley*

and celebration. This celebration marks a fresh start and is a time for families and communities to gather. To make *khapse*, combine flour, oil, milk, and sugar into a kneaded dough (Fig. 1.6). Let it rest, roll it thin, and decorate with cutters or a knife. Fry in hot oil until golden brown, then drain and cool. *Khapse* comes in different shapes and sizes, each with its traditional significance. The *bulus* is a small, round shape often given to children. *Donkey Ear Khapse*, shaped like a donkey’s ear, symbolizes good fortune and protection from evil spirits (Cuisine, 2015; DeGlopper, 2024; Times Food, 2017).

Tibetan fried bread, or *Woeshang Balep*, is a fluffy, deep-fried treat mostly seen in *Tumling* as part of the breakfast menu of the local community. This can be made with yeast or without. The yeast version involves mixing the yeast, sugar, and water, letting it rise, then kneading it with flour, baking soda, and salt (Fig. 1.7). After shaping the dough balls and flattening them, fry them until golden brown. *Tibetan*

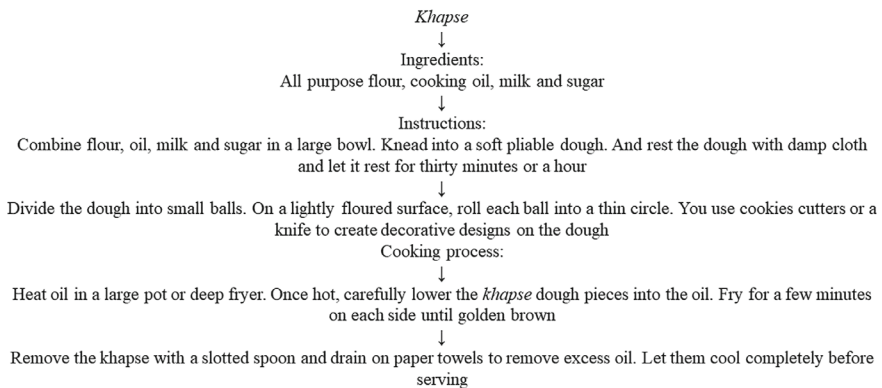


Fig. 1.6 Flow chart of the preparation technique of *Khapse*

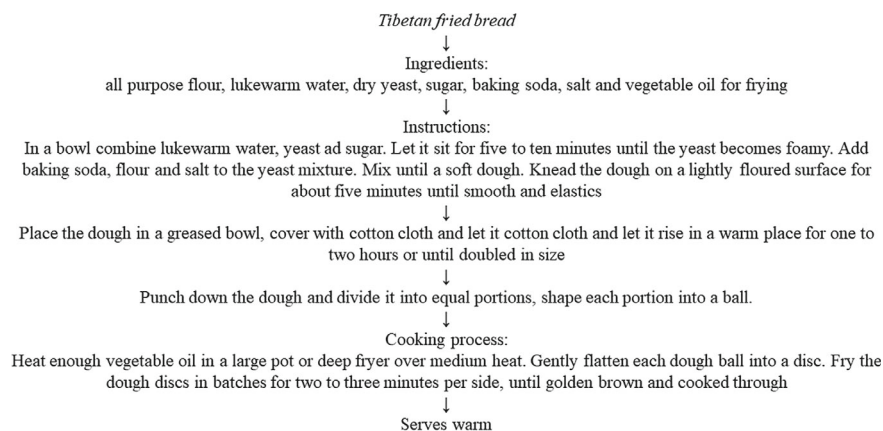


Fig. 1.7 Flow chart of the preparation technique of *Tibetan fried bread*

fried bread, or *Woeshang bales*, is a cherished treat often enjoyed during various Tibetan festivals and occasions. It is prominently featured in celebrations such as Losar and Saga Dawa, where traditional foods are central to the festivities (Gouin, 2010; Nye, 2024; Tasty Flavour, 2021). *Tibetan fried bread* is also made for weddings and other communal gatherings.

Dhido and *Gundruk* are traditional foods in the Nepali community that hold cultural significance. *Dhido*, a dense dough made from flour like buckwheat or wheat, is prepared by slowly adding flour to boiling water while stirring constantly (Fig. 1.8). The key is to continue stirring over medium–low heat to ensure a smooth texture, transforming the grumpy mixture into a warm, dense dough. *Dhido* is highly nutritious and filling, and it is a typical meal in a daily diet. *Gundruk* is a fermented, leafy green vegetable dish. It has a solid Savory flavour and is often served as a dish with *Dhido*. Making *gundruk* involves a fermentation process that takes several weeks. However, you can buy pre-made *Gundruk* at grocery stores in *Maneybhanjyang*, *Sukiapokhri*, and *Darjeeling*. To make the *gundruk*, soak the *gundruk* in warm water for thirty minutes to soften it. Squeeze out the excess water. Heat some oil in a pan and add chopped onions, garlic, ginger, and sauté until fragrant. Add the soaked *gundruk* and cook for a few minutes until heated through—season with salt, pepper, and other spices. Chopped tomatoes and other vegetables can also be added for an extra tangy flavour and texture (Come Alive with Gundruk, n.d.; Dhido - We All Nepali, n.d.; Dhido, 2017; Dhido Economy—Nepali Times, n.d.; Global Press Journal, 2020; Hasnain, 2024; Marquez, n.d.; Sabi Cooks, 2020; Taste Atlas, 2016; Yummy et al., 2017). Serving Dhido and Gundruk to guests is a way of showcasing traditional hospitality.

Tsampa, a Tibetan staple, is made from roasted barley flour. To prepare it, rinse and dry hulled barley, then roast it in a pan or with hot sand until golden brown (Fig. 1.9). Grind the roasted barley into fine flour and store it in an airtight container (Simplytibetan, 2017; Marvellina, 2017; October 2, 2017; March 10, 2017). *Tsampa*

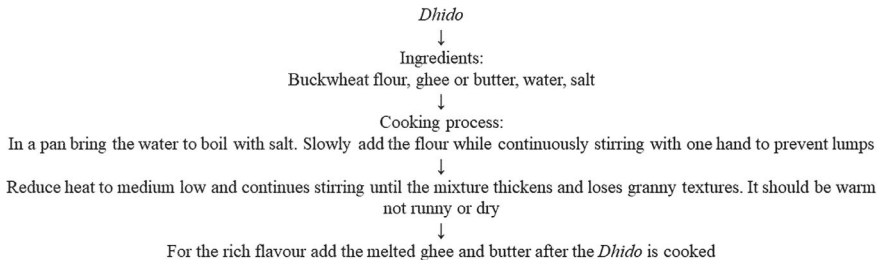


Fig. 1.8 Flow chart of the preparation technique of *Dhido*

is prepared for a few Tibetan festivals. While it is a dietary staple, it also plays a role in celebrations. Traditionally, Tibetans throw pinches of *tsampa* into the air during festivals to symbolize joy and mark festive occasions, mainly observed during the Tibetan New Year (Trehaan, 2024).

Aloo Tama features the comforting texture of potatoes (*aloo*) alongside the unique tanginess of sour bamboo shoots (*tama*), black-eyed peas or fermented soybeans, and heartiness. Meanwhile, a blend of warming species like coriander, turmeric, and chillis creates a complex flavour profile (Century Foods, 2023; Dixya, 2024; Yau et al., 2023; Yummy et al., 2016). There is a strict restriction on collecting plants from the Singalila forest, so people buy pre-cut bamboo shots from the Nepali market. *Aloo tama* is enjoyed casually in Dashain and major festivals or whenever guests arrive. It takes boiled potatoes and dresses them up with a symphony of flavor to make *aloo achar* with chopped onions, chilies, and coriander's freshness. The main ingredient, or masala, is a mix of ground black sesame seeds, niger seeds, and fenugreek seeds (DickeydolPj, 2017; Recipe, 2021b). *Aloo achar* is served as a salad as a side dish for main courses. *Aloo dum* is a beloved curry enjoyed throughout the SNP. Golden brown potatoes are nestled in rich and flavourful gravy. Making *aloo dum* involves frying cumin seeds and onions, adding ginger, garlic paste, chopped

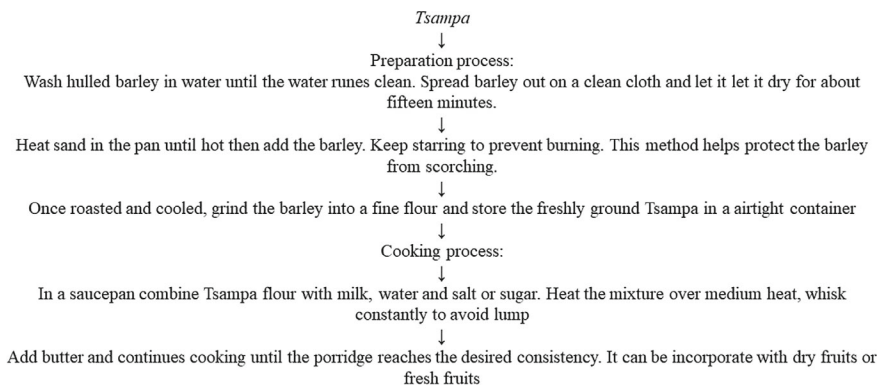


Fig. 1.9 Flow chart of the preparation technique of *Tsampa*

tomatoes, spices, and red food colouring to make the food look attractive. After the tomatoes and spices are cooked, the potatoes are submerged in water and simmered until tender. The dish is finished with chopped coriander and enjoyed with *Tibetan roti* for breakfast and everyday meals (Round Chilli, 2021). *Churpi Ra Mulla Ko Achar* is a delightful radish and Himalayan cheese pickle. To make it grated or julienne radish, when fried in spices and peas in mustard oil. Add the radish, and cook until softened. Mix in the chilli powder, crumble *the Churpi*, and adjust the salt. After cooking, pickles are stored in a cool place and can be stored for months (Lhamu Tshering Recipes, 2021).

Sukuti, a savory dried dish from the Nepali community and parts of the Himalayas, is traditionally made from buffalo or yak meat. It is a convenient and delicious element in Himalayan life. *Sukuti* can be made using pre-dried meat for a quicker approach. Also made from scratch (Fig. 1.10) (Junifoods, 2023; McDevitt, 2024; Pabs Kitchen, 2020a, 2020b). Its long shelf life and portability make it more sustainable. From *Kalipokhri* to *Chandu*, *Sukuti* has been made for the limited availability of fresh meat. It is an excellent adventure food for travellers and trekkers. *Sukuti* is a versatile food enjoyed yearly for its satisfying protein and intact sources (Figs. 1.11, 1.12 and 1.13).

Gorkha chutney or achar is a popular Nepali condiment made with dry chickpeas, potatoes, black sesame seeds, and niger seeds. It is a spicy, savoury, slightly nutty chutney often served with rice or *roti*. This chutney is made by boiling chickpeas and potatoes until they are soft. The mixture is mashed and combined with black sesame seeds, niger seeds, and other spices. The chutney is then cooked until it thickens and the flavours have melted (Shivakumar, 2023). *Thakali chutney* is another popular Nepali condiment made with tomatoes, chilies, and spices. It is a tangy, spicy, and flavourful chutney often served with *Thakali*. The chutney is made by

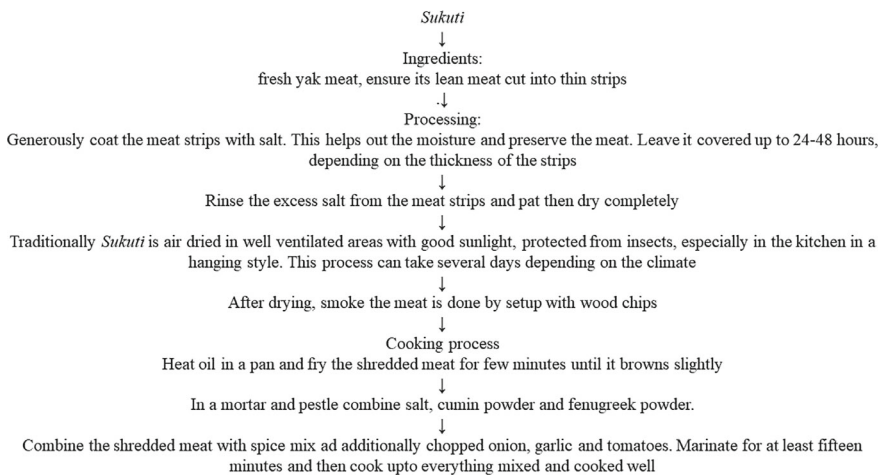


Fig. 1.10 Flow chart of the preparation technique of *Sukuti*

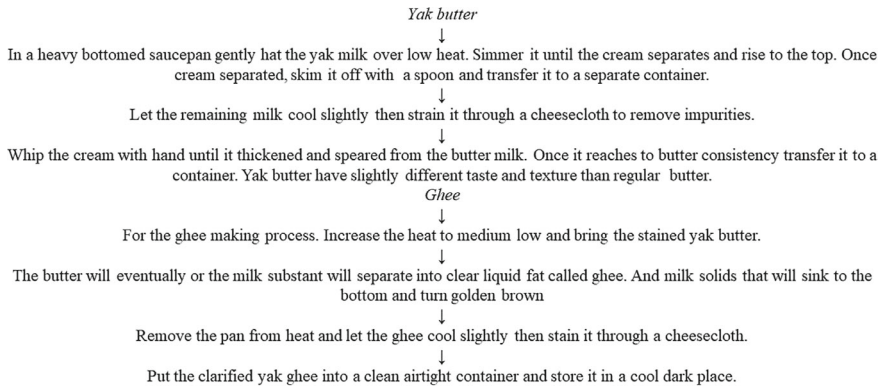


Fig. 1.11 Flow chart of the preparation technique of *Yak butter/ghee*

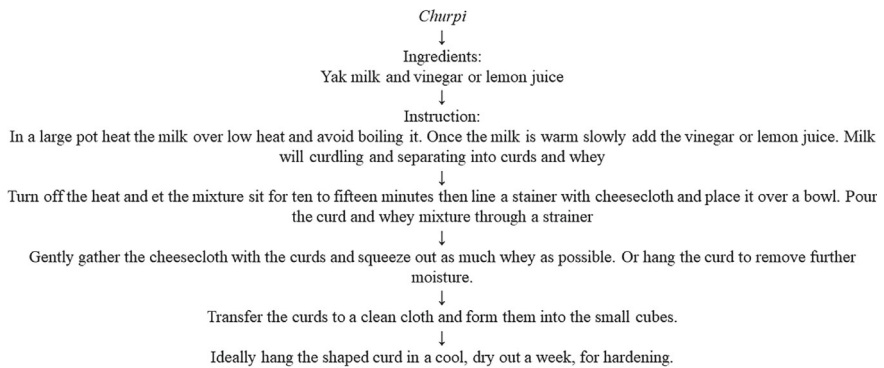
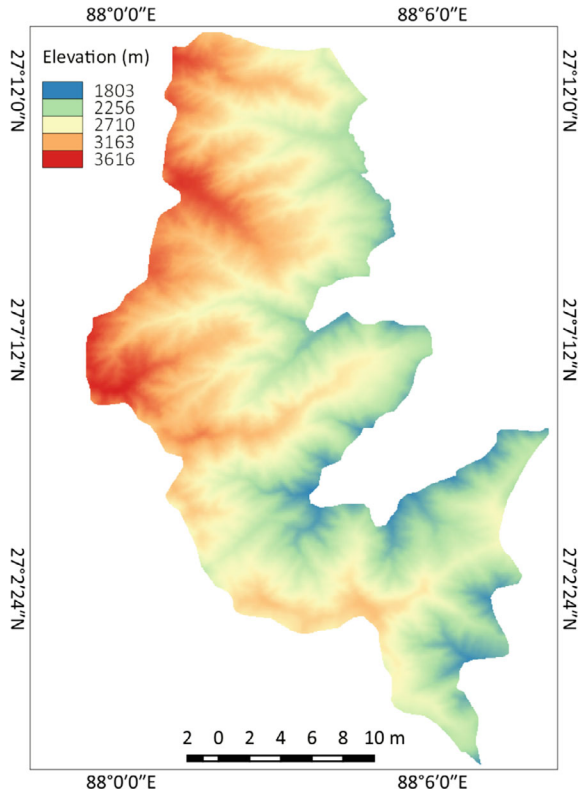


Fig. 1.12 Flow chart of the preparation technique of *Churpi*

roasting the tomatoes and chilies until they are blackened. Then, the mixture is ground into a paste and combined with the other spices. The chutney is then cooked until thickened (Anand, 2021). *Dalle khursani ko achar* is a pickle made with Dalle khursani chilies, a chili pepper native to Nepal. The chilies are pickled in oil with mustard seeds, fenugreek seeds, and turmeric (Fig. 1.14). This pickle is tangy, very spicy, and flavourful. It is often served with roti and rice (Prashanta, 2015). *Golbhedo Ko Achar* is a pickle made with tomatoes. The tomatoes are pickled with oil and spices such as mustard seeds, fenugreek seeds, and turmeric. Ripe *Tyammatar* tomatoes are used primarily to make this kind of chutney; these tomatoes are native to Nepal (Bonneau, 2022; Pathak, 2012). *Khadeka Mula Ko Achar* is made with small red radishes and is also pickled in mustard oil with different spices. It is served with roti and rice in every household (Pabs Kitchen., 2020b). *Tibetan momo chutney* is a Tibetan condiment made with tomatoes, chilies, and peanuts. It is a spicy, savoury, and nutty chutney often served with momo or Tibetan dumplings. The chutney is made by roasting the tomatoes and chilies until they are blackened. Then, the mixture is

Fig. 1.13 Physiography map of Singalila National Park



ground into a paste and combined with peanuts and other spices. The chutney is often cooked until it thickens. All kinds of chutneys and pickles are enjoyed throughout the years, accompanying various dishes (Figs. 1.15 and 1.16).

Momo is steamed or fried dumplings with savory ingredients like vegetables, meat, potatoes, or cheese. *Momos* are staple foods in SNP and come in various shapes and sizes (Kitchen, 2019a, 2019b; Pinto, 2023). Vegetable momos are filled with chopped vegetables, such as cabbage, carrots, and onions. Chicken momo is filled with minced chicken combined with chopped ginger and onion. *Jhol momo* is a type of momo served in a spicy tomato and sesame gravy, similar to *Tibetan momo chutney*. Thukpa is a noodle soup with vegetables, meat, and sometimes eggs. Thukpa is a hearty and comforting dish perfect for SNP’s cold climate (Fig. 1.17). Thukpa can be of various types, such as Thukpa *Bhatuk*, which is made with handmade flat wheat noodles. Some use hand-pulled noodles called Thentuk. *Gyanthuk* is a spicy noodle soup made with dried yak cheese. These are mainly popular in the cafes and restaurants of SNP and sell from the afternoon to the evening in little cozy shops.

Maghe Sankranti marks the beginning of the new month of the Nepali Hindu calendar. *Til ko laddu* are sweet balls made with sesame seeds and jaggery. They are a staple sweet for this festival. To make *Til Ko Laddu*, roasted sesame seeds are

Fig. 1.14 Pickle *Dalle*
Khursani, Chairichowk;



Fig. 1.15 Wine made with
wild strawberries and kiwi,
Chairichowk



Fig. 1.16 Wine made with Rhododendron, Kalipokhri



mixed with jaggery. Combine hot jaggery with sesame seeds and quickly shape the mixture into balls while it is still warm using a greased spoon and wet hands. This can be stored at room temperature for days (Simple & Yummy Nepali Food, 2020).

Butter and *ghee* made by churning yak milk boast a high-fat content and nutty taste, making it a staple in Himalayan cuisine for everything. The process involves boiling the yak milk, likely at high altitudes due to the yak-hardened lifestyles. Yak butter is transformed into *ghee* (Fig. 1.11), and through the simmering process, the solids and water are removed, leaving behind the clarified ghee. This golden goodness is a higher smoke point for a high-heat cooking nut and boasts more decadent nutty flavors and aromas than its butter counterpart (Ali, 2024; Kalwar et al., 2023). In Himalayan cultures, yak ghee is delicious and offers a good dose of vitamins and potential health-promoting fatty acids.

Yak Churpi, a hard cheese from the Himalayas, is traditionally made with yak milk. The process involves boiling the milk, likely at high altitudes due to the yak herder lifestyles. Natural acids like lemon juice or yogurt are introduced to curdle the milk, separating it into curds and whey (Fig. 1.12) (Chhurpi (Hard Variety), n.d.; Nath, 2023; Panda et al., 2016). The soft cheese is air-dried for weeks in the cool,

Fig. 1.17 *Thukpa* made by local nepali community, *Maneybhanjyang*



dry mountain air, concentrating the flavours and hardening the cheese into a chewy, enjoyed by the local community of SNP.

Chyang is a rice wine enjoyed in the Himalayas and by every household in SNP. Furthermore, *Chyang* can be made at home. Firstly, the rice is soaked and partially steamed. Then grid *murcha*, or yeast. Once the rice cools, mix it with *murcha* and water for the porridge. It is left to ferment in a warm, covered container for several days. When slight sourness and alcohol develop, strain the *Chyang* and enjoy it at a cool room temperature (Altitude Himalaya, 2023; Sarda, 2017). Religious festivals, harvest celebrations, or community events could involve sharing *Chyang*.

Tongba, a millet-based ethnic drink, has ethnomedicinal and therapeutic properties against high-altitude illnesses. Metabolites like glycosides, amino acids, fatty acids, terpenoids, and phenols were detected, similar to sake (Majumder et al., 2022). The tonga-making process starts by cooking whole millet grains. Moreover, it makes them extraordinary. Then, place the cooled millet gains in a woven bamboo basket. Cover the basket with warm clothes. The grains will turn slightly set during this time. Then, the fermented millet grains are packed tightly into an earthenware pot for 7 to 15 days, and only after that is the fermentation process completed. Traditionally, *tongba* is sipped through a special straw with a perforated bottom, which also acts as a filter (Aggarwal, 2021; Bokhim, 2021; TasteAtlas, 2021).

Rakshi is a traditional homemade alcoholic beverage in the Nepali community. It is typically made from fermented grains such as millet or rice. The *Rakshi*-making process includes five stages: soaking the grains for 8–10 h or overnight. Mix the

gains with the yeast, cool it, and set it aside for fermentation. For distilling *Rakshi*, grains are transferred gently to separate alcohol from water, and the distilled *Rakshi* is collected in an airtight container. *Rakshi* agrees to sweeten by adding sugar or jaggery. Lastly, *Rakshi* is poured into clean-glass bottles and sealed tightly, which allows it to age for a few weeks to develop the flavor (Newari KhajaGhar, 2019). For the coloring, people in the local community of SNP add red rhododendron flower petals to give *Rakshi* a beautiful pinkish color (Fig. 1.16).

Food Habit

The traditional cuisines of the SNP have rich fusions of flavours that are influenced by its geography, climate, and diverse ethnic groups. The food habits of these people are adopted by the Nepali and Tibetan cuisines. These people practice their food habits by consuming four big and small portions of meals. In the morning, they usually make *Puri* or traditional Tibetan bread called *Bhaley* or *Balep*, Tibetan fried bread, *Chapatti*, and sometimes toasted bread, serving it with *Aloo-Dum*, dried field pea curry, *Aloo soup* and other savory side dishes and pickles. On the other hand, they consume a few sweet breakfast items, such as *Tsampa* porridge and *Sel Roti* (Tibetan sweet bread) with butter or jam on the side. They consume these themselves and also serve them to their guests in their homestays in their day-to-day lives. For lunch, the staple food these people eat is *Daal-Bhat*, which they consume every day. *Daal-Bhat* consists of lentil soup (*Daal*) and rice (*Bhat*) typically served with a variety of side dishes, such as *Sabzi tarkari* (fried or sautéed vegetables), eggs as a source of protein and salad or *achar* (pickles). Their lunch is simple, hearty, and fulfilling at the same time. In the evening, the surroundings of all households become vibrant and charming. People make *Aloo-chop* or onion *pakora*, a fried item combined with sliced onions and chickpea flour.

The most delicious evening snack includes *Momo* and *Thukpa* in two varieties, including different meat or vegetables. *Momo* is floured dough stuffed with different types of meat, such as chicken, buffalo, pork, or vegetables. *Momo* is often served with a spicy tomato-based dipping sauce (*Chutney*) or a milder sesame-based sauce. These *chutneys* are made with *Dalle Khorasani* chili (Fig. 1.18), giving them a pungent spicy flavour. *Thukpa* (Fig. 1.17) is a soup noodle with many vegetables, bone broth, or vegetable stocks. In contrast, they also make steamed fried noodles called *Chawmein* in Nepali style. The most famous instant noodles *Wai-Wai* also served as their go-to evening snack. Homemade chicken or pork sausages are also popular among these people, fried and served as a hot meal. The alcohol culture is prevalent in this area. People in SNP or any hilly station areas combat cold weather with alcohol. It can be whisky, rum, beer, or local brews like *Rakshi*, *Tongba*, and Nepali rum *Khukri*. Dinner offers a variety of flavours and includes different meats and dairy products. *Daal-Bhat* with fried potatoes is also included in their dinner. They incorporate vegetables as one side dish. They add chicken, pork, and *yak* meat curry as their source of protein. Occasionally they make *Khasi Ko Masu*, which

Fig. 1.18 Dalle Khursani chilli which are uses to make pickle and chutney, *Kalipokhri*



typically means mutton or goat curry. As yak meat is not always available fresh, they preserve the meat and make curry with dried yak. Pickles or different chutneys are constant in their every meal. This food habit represents the diversely rich culinary traditions of the Singalila region.

Standardisation—Commercialization of the Goods—Socio-economic Impact

Standardizing local food or local food items is complex because of their diverse culinary traditions. Identifying and standardizing the key ingredients, such as rice, lentils, spices, and local vegetables ensures consistency in true flavour and quality across different parts of SNP. Documenting and promoting traditional cooking techniques helps preserve the culinary heritage and ensure that the dishes are prepared most authentically. The establishment of guidelines and standards for food safety and hygiene helps to ensure that the food is prepared and served safely, whether in street food, local stalls, home kitchens, or homestays. Educating consumers, such as local people, adventure tourists, and food producers about the importance of heritage preservation promotes awareness and appreciation for the traditional foods of this region both domestically and internationally. The main goal of standardizing SNP's local traditional food is to ensure quality, reliability, and consistency in the products and services. Traditional marketing strategies based on direct connections between consumer and producer are less effective for traditional foods with elevated familiarity (Contini et al., 2016).

On the other hand, commercializing local food or beverage items can promote the cuisines on a global scale, benefiting local producers and their economies. Creating a brand, identifying the products such as *Ghee*, *Churpi*, and local beverages like *Rakshi* or beer, that highlight their authenticity, quality, and unique flavour. This can

involve the design of the packaging and the history behind the product. Identifying the market where there is a demand for ethnic food products through trade fairs. In the exportation of local traditional foods, certifications such as organic and geographic indication (GI) status are used to enhance the products' credibility. Traditional food research with Indigenous Peoples offers pleasures and challenges, including discovering unique species, new cultural practices, and identifying potential nutrient sources (Kuhnlein, 2000).

Developing the opportunity to make value-added products based on traditional ingredients and recipes. This could include ready-to-eat meals, traditional sauces, spice blends, snacks, noodles, and beverages that cater to modern consumer preferences. In SNP, adventure tourism is happening rapidly, as several households have turned into homestays and are already promoting their authentic goods to tourists. All households produce their goods and they consume them by themselves or sell them to tourists, but clear branding is lacking in all the settlements. These products are exported to one settlement or go to the nearest city or popular markets like *Maneybhanjyang*, *Sukiapokhri*, *Darjeeling*, or even *Siliguri*. However, they do not have any authentic branding, collaboration, or fixed price in the market. Utilisation of the e-commerce platform to sell the products directly to consumers, both domestically and internationally can directly impact the development of their economic condition. Establishing an online platform can help them reach a wider audience and facilitate direct customer interaction. Showcasing the food culture through festivals, culinary tours, and workshops throughout the Singalila region can highlight the stories behind local ingredients and communal history. The development of the community is most crucial in preserving their traditional practices, as the region falls under the Indo-Nepal international border, hence community infrastructure development or policies are overlooked by the governments. By using these strategies, the local market for traditional foods and beverages from SNP can get national and international attention and economic growth. The socioeconomic impact of the local food items is significant, multifaceted, and developed in the rural community, which can promote environmental sustainability. Additionally, traditional food production and practices contribute to the conservation of biodiversity and a healthier ecosystem (Fig. 1.19).

Traditional Kitchen Setup

The traditional kitchen setup of SNP households is typical and has a Nepali influence. People of the specific hamlets often had to venture into the forest to collect the firewood for their *chulhas* (Fig. 1.20a) or the traditional cooking stove. Traditionally in Nepali kitchens *chulha* is used, which are mud and clay stoves constructed of bricks and fuelled mainly by firewood, dried cow dung, and other biomasses. The *chulhas* typically have one or two burners where the pots and *kadhais* are placed for the cooking. The design of the *chulha* allows for better combustion and heat retention resulting in more efficient cooking with minimal fuel consumption. The

Fig. 1.19 Burning pine leaf as incense outside of *Upper Chitrey homestay*



modified chulha improves thermal efficiency by 15–17%, conserves wood fuel, and reduces smoke from rural Indian kitchens while maintaining environmental friendliness (Mohan & Kumar, 2006). Traditional Nepali households are often open and semi-open structures, where smoke can accumulate in the kitchen or throughout the house. However, many households are equipped with chimneys or smoke ventilation to reduce indoor pollution. In our study area, there is a lot of cross-border interaction.

People living in the Indo-Nepal border region were the only local communities that started to use the new technology of *chulhas* (Fig. 1.20b), because the West Bengal State Government and the Forest Division have restricted wood collection from the Singalila National Forest. Consequently, the local community has begun to collect or purchase firewood from Nepal and some are switched to domestic gas, sourced from both India and Nepal. *Takka*, commonly known as cooking utensils. These are *Karai* (Wok), *Kadhai* (Deep Pan), *Patra* (Flat Pan), *Handi* (Cooking Pot), *Bartan* (Metal Utensils), *Gargi* (Water Pot), *Chamach* (Wooden Spoons), *Belan* (Rolling Pin), *Thal* (Large Plate or Tray) and *Pateela* (Cooking Pot with Lid). Each



Fig. 1.20 a, b Two different type of tradition *Chulhas* in *Ahal* and *Tumling*

utensil serves a specific purpose and contributes to traditional cooking methods. These utensils are typically made of steel or cast iron, brass, stainless steel, copper, aluminium, and wood. Most serving cups and dinner plates are made of ceramics and bone China. These utensils are essential tools for preparing a wide range of Nepali dishes, from everyday meals to festival delicacies. Different types of knives are commonly found in these traditional kitchens. Each knife serves a specific purpose. *Karuwa* (a utility knife) and *Karda* are both versatile and practical in the kitchen. *Karuwa* is a straight-bladed, pointed-tip knife used for various tasks such as cutting vegetables, fruits, meats, and other food items. The *Karda* is the smaller knife with a straight blade used for more detailed cutting tasks such as peeling fruits trimming meats and slicing. The traditional Nepali knife is the *Khurki* or *Kurki*, a multipurpose tool for cutting, chopping, and even as a weapon in the *Gurkha* community. It holds cultural and religious significance in Nepali society. These knives are often seen hanging in the kitchen setup. *Dhiki* and *Janto* are Nepali utensils that were used in traditional food preparation. A *Dhiki* is a traditional grinding tool primarily used for grains, spices, and other food items. It consists of two parts; a flat circular stone slab called “*silauta*”, typically made of hard stone like granite and placed on a stable surface such as ground. Another one is a cylindrical stone roller called “*bay*”, used to grind ingredients by rolling it back and forth over the saute. On the other hand, *Janto* is a wooden churner that churns milk to make butter and buttermilk from cow’s or yak’s milk. Yak milk-derived products are rich in functional and bioactive components, potentially aiding in maintaining the health status of Tibetan nomads under high-altitude stress conditions (Guo et al., 2014) (Fig. 1.21).

Dhiki and *Janto* were commonly used in local communities in the earlier days, especially when electricity was unavailable. These represent traditional culinary practices passed down from generation to generation. However, in modern times the local community relies on electricity and uses electronic mixing appliances for time efficiency. The traditional storage racks and shelves, *Kharpan* (Fig. 1.22a), are often wooden and bamboo structures for organizing utensils, spices, grains, big cooking pots, bowls, and other food items. The Nepalese traditional drinking cup, *Pauwa*, is



(a)

(b)

Fig. 1.21 a, b Different traditional house type in *Kalipokhri* and *Ahal*