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Ecological living in Nepali Food Systems:
a Synthesis of Circular Nutrient and Knowledge Flows in the Kathmandu Valley

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Abstract

Researching food-systems in Nepal can feel like drinking from a fire hydrant. Sixty-six percent of the population is directly involved in agriculture and a diverse set of ecocultural understandings influence the practice across the country’s landscapes, ranging from the Himalayas to urban centers to southern plains. In the Kathmandu Valley and peripheral hills where I conducted my research, seemingly any spare land was under cultivation, enabled by fertile ground, optimal climate, and market potential. But despite the prevalence of farming in daily life throughout the country, Nepal’s food system is not domestically self-sufficient. A complex web of imports and exports confuse diversified local systems. Food, fertilizer, and other life-supporting resources are imported to the country at incredible rates. Meanwhile, the country’s major export is humans, emigrating in masses from farm life to opportunity in cities or abroad. Thus, fronts of change in food systems are incoming. In the face of urbanization and globalization, I set out to study the loss of intrinsically ecological ways of living and farming. My research focused on the viability of efforts to preserve traditional knowledge, keeping the flows of nutrient and knowledge locally contained, or circular. The initiatives included Everything organic training center, Raithaane restaurant, Hasera Permaculture training center, Himgri Organic Permaculture farm, and the Farmer’s Market at Le Sherpa. I also spent a week living with a dairy farming family that had not been trained in organic method, which serves as a respective look at what these initiatives are seeking to address. Over the course of a month, I met many passionate people working to stabilize Nepal’s food system, striking the balance between traditional ways of life and contemporary thinking.
Introduction

When first walking down a street in Nepal, just outside the city of Kathmandu, I was surprised to see corn. It was growing in plots of land sandwiched between houses and framed by tangles of telephone wire. Even in the dusty and dry winter month of February, the people of the valley were cultivating patches of viable land that would be left as lawn in the United States. Before coming to Nepal, I had learned that the majority of the population is subsistence farmers who commonly grow corn. But nonetheless the endemic nature of farming across Nepal respective to my homeland was striking and inspiring, even in the country’s largest city.

I came to the understanding that Nepal was an abundant land, overrun by cultivated plants and native biodiversity. Especially in the fertile Himalayan Valley of Kathmandu. I excitedly embraced the lifestyle I thought appropriate for such a bountiful land, confidently buying fruits in the street, and awing at the pomegranate tree out my kitchen window. But, in retrospect, I should have noted that the tree had barely blossomed, much less produced a fruit resembling those in the street carts. But this lesson came later.

When given a month to study with open-ended instructions of where and what, I decided to stay immersed in this perceived agricultural abundance. And the learning happened quickly when I left the Kathmandu valley and its markets. When visiting various farms in the low hills past Dulikhel, the only papaya I saw was incredibly unripe and growing in a greenhouse. The peach trees were the first to fruit, but the harvest still sour and barely edible. And so the reality of Kathmandu’s reliance on food imports set in. All the fruits that I consumed and lovingly associating with Nepal were likely imported from India. The organic farmers I lived with were wary to buy and eat fruit from the market, favoring local produce and citing the uncertain existence of lingering pesticides. At the Himgri Permaculture farm, a mango was gifted by a less skeptical visitor. The gift was soaked in water for twenty hours before being offered to me for lunch, along with the warning it may still have trace pesticides.

But my reformed view and loss of guiltfree tropical fruit was cushioned by the introduction of new, more authentic Nepali foods. Entering homes all located on farms, I threw myself into infatuation with the inventive pickles, or achaars, offered up with plates of daal bhat. From bitter gundruk to the bright flavor of pickled lapsi, my hope in the vibrancy and self-sufficiency of Nepal’s domestic food systems was not all lost. In fact, it was stronger than ever. There were no pomegranates at this time of year, but it was the season of aineslu (ऐँसेलु), small yellow berries growing wild along streets and casually picked by locals.

I entered this project with little set agenda or intention on what I would find. I wanted to tread lightly. I wanted to understand the way that nutrients and knowledge move around Nepal and if they were moving circularly. And to observe this overarching schematic, I couldn’t be limited in the scope of my agricultural research-- from abstract conceptualizations of where knowledge is going, to the benefits of achar, to the calculated approach of the biointensive compost. Through my time researching these things, the connections between them were obvious. And in fact, it’s the importance of these connections that became my focus.

My research started on a crowded bus in Kathmandu and passed through neighboring cities that turned to pine forests and terraced fields, disembarking after an hour and a half in the village of Patlekhet. The region is hilly, falling just outside my schematic area of the Kathmandu valley. However, the BP highway runs directly through it. This connects the village closely with Kathmandu markets and culture, making it a ripe place for research on tension between traditional and modern
living in Nepal. Many villagers have found success running guesthouses and agriculturally themed destinations. Others have shops carrying products the same as are seen in Kathmandu. And as Patlekhet welcomes city-dwellers and urban ways of life, cities still draw inhabitants from their farms and family homes, towards opportunity in cities or abroad.

In the context of how nutrients and knowledge move through the village, the past years have seen a monumental shift. I observed the traditional lifestyle being followed by older generations. Children never moved from their parent's homes unless they are a married woman moving in with their husband's family. Most everyone farmed for subsistence and recycled resources out of necessity. Everything flowed on a local scale, and the focus was on maintaining the home and the farm. In comparison I met young people who lived by themselves in cities and eat food imported from unknown places. With the introduction of global media and better roads, the local thinking and distribution of goods once existing in the region was being blown open. Socioecologically, there are positives and negatives to this phenomenon. To turn backwards to subsistence agriculture would limit the environmental footprint of food imports and commercially scaled agriculture. But it would also reduce the autonomy and empowerment of the young generations excited to live and study outside of agricultural contexts. A balance between traditional ways of living and modern attitudes exists. My research brought me to innovative establishments run by empowered farmers that convinced me this was true.

This paper is a synthesis of my experience with and my understanding of circularity in Kathmandu and on farms in its peripheral regions. It provides a background for the places and people I learned from. My findings are organized by where they fall in the flow of nutrients and knowledge between plants, soil, animals, and humans. There is an emphasis on circular flows within this system. To be a circular system is to recycle all resources, free from imports and waste. This schematic is observed on the scale of individual farms, villages, and the whole of Nepal.
Farm Profiles and Circularity Schematics
Homestay on a Dairy Farm

The Pyakurel family in the town of Patlekhet greeted me warmly into their complex of one cement and one traditionally built home. I was first ushered into the bright blue concrete house to set down my big backpack. A room with two big beds covered in patterned fleece blankets became mine for four days. At dinner time, I was led to the house directly adjacent to the blue one I had become acquainted with. The family kitchen was in the separate home also used for cows and constructed traditionally with mud and manure. The worn floors and dim lighting were immediately comforting and satisfying, and I felt as though I had walked into a flowerpot that was kept diligently swept. A pressure cooker hissed on the small woodstove molded from mud by the door. In the opposite corner, a raised section of floor was occupied with various steel pots and my host aama (mother) mixing away. After watching TikToks with the fifteen-year-old host sister in the house over, I felt as though I had time travelled instead of walked 15 feet. A wooden stool was placed for me on the floor along the raised corner. I was handed a bronze plate with a mountain of rice and bowls of mixed vegetable and daal and achar. The meal was so nourishing and complemented perfected by spicy bitter pickled tomatoes, known as achar, and bitter fermented greens, called gundruk. And to finish I was handed a metal cup full of incredibly local milk from the room over. Burning my mouth, I drank it quickly, in awe of its natural sweetness.

My experience with the Pyakurel family was an enjoyable and informative look into way of live in this hilly region of Nepal. Understanding each household to be unique, I would say I was welcomed into a typical farming family. When telling Judith Condant Chase, an American woman and active community member, where I was staying, I gave the futile description that it was the Pyakurel family that keeps cows. She replied, “Everyone on that hill is Pyakurels, and they all keep cows”.

Over my four days there, aama, Gyanu, and baba, Ganesh, were kept busy with farm chores—harvesting and threshing oats, collecting and selling milk, and moving manure. Their three children, Prakriti (21), Pradeep (20) and Pravita (15) spent afternoons making tiktoks and snacking on Jilebi, a Nepali sweet that was around for Mother’s Day festivities. The children too were around only for the holiday. The three of them live together in Dulikhel, the nearest city about 30 minutes away by bus. Prakriti works in a furniture store and was leaving in a month to study management in Japan. Pradeep studies hotel management at Kathmandu University, which is ironically located in Dulhikel. Pravita is now in high school and expressed aspirations of becoming an engineer.
My first meal with the Pyakurel family was so comforting and precious, and the first of many. It seemed someone was always cooking or asking if I was “feeling hungry”. One morning it hadn’t been 10 minutes after I woke up and I was given an egg sandwich and sweetened masala tea. Then, an hour and a half later Pradeep was excited to ask if I was feeling hungry and to say he would have “dinner” ready soon. My experience lent to an understanding of the significance of food preparation and other domestic tasks for the people in the village. But, the attitudes toward such things vary incredibly between generations. The three representatives from the younger generation has their mind outside of the home. They helped with house chores willingly, but none expressed a desire to inherent the farm or their parent’s lifestyle. When I asked Pravita what would happen with the cows when her parents were too old to care for them, she shrugged shyly. But while not wanting to live out their lives on the farm, they did express gratitude to be home. Along with me, they savored each meal offered by aama and warm milk provided by the cows.
Hasera Agriculture Research and Training Center

It's an easy journey from Kathmandu to Hasera permaculture farm. The local bus will take you down the BP highway through Bhaktapur and Banepa, towards the town of Paklehet situated over hilltops. Through the bus window I watched these areas pass by, surprised to see signs for the “Oyo Sunshine Garden Resort”, “Green Hotel”, “Dulikhel Eco-resort” on average concrete buildings. It was unclear what the environmental buzz words were referring to. The Hasera sign stood out from its predecessor “eco” destinations. It promised an organic lunch, permaculture training, and a farm stay. The words seemed less empty when hand painted on plywood. And as I walked up a short driveway winding past a greenhouse, my initial impression appeared correct. The motorbike engines and melodic honking of buses still carried from the highway, but I felt transported by an abundance of potted plants, rows of crops, and a display labelled “permaculture spider web”. A complex of buildings for the family and guests are sandwiched between terraced land that’s diversified and flowering. Seedling were emerging, herbs were harvestable and winter crops such as cabbage were numerous. But while the food surrounding is abundant, Hasera’s aim is not the grow produce for market. Their product is knowledge.

In 1992, Govinda Sharma founded the farm seeking to live a balanced, happy, and fulfilling life. It wasn’t his intention to make a training farm, or even a farm labelled permaculture. His goals were more personal-- to have a community around him, healthy soil, diversified crops, and a home arranged enjoyable in the center of it all. In the farm’s early days, permaculture was not a word commonly used in any of Asia. However, the concept was slowly spreading over from Europe and the Americas, and Hasera’s inherent method of farming noticeably fit in the conceptual framework. The family was living according to natural ecology and putting the health their natural ecology above high output, with considerable success. Govinda, now a master teacher on the methods of permaculture, defines the concept as a balance of health, food, nature, society, economics, and positive psychology.

Govinda began receiving requests to lead trainings at conference center, but he didn’t see the value in learning about permaculture out of proper context. Thus inspired his reconfiguration of Hasera as a farm learning center in 2004. With the help of his wife Muthu, their three sons, and various staff members, Govinda now operates a permaculture farm, guesthouse, research projects, and robust training course offerings. Some of the things on a long list of permaculture principles that can be learned on the farm are “rainwater collection”, “vermi-compost” “food forest” and “seed bank”. While on the farm, I observed all these aspects in action, producing food for the soil and for the people living there.

Nintey percent food prepared at Hasera is sourced from the farm. During my week-long stay, the guests in the kitchen ranged from three to twenty. And even when feeding big groups, meals always included various components and culturally important ingredients. Commonly breakfast consisted of a buckwheat or millet pancakes with honey. Daal bhat with farm vegetables would be served for lunch out of large pressure-cooking pots. And for dinner Mithu or her sons would patiently fry fritters and potatoes, assist visitors with momo construction, or serve the unconventional combo meal of chowmein and gundruk soup.
The family at Hasera diligently and joyfully worked to maintain a low negative environmental impact and high positive socioecological impact. They educate anyone interested to listen on the beauty of permaculture and what it looks like in practice. And further, they integrated indigenous ways of knowing and living, finding empowerment in the preservation of their Nepali culture. In result, their farm is a popular place for travelers to stay and learn. What makes Hasera stand out from the eco resorts around is encapsulated in one of the sons, Bibek’s, definition—“Permaculture is when you follow the ideology first, then capitalize on what you can. It is not when you capitalize on the word permaculture”.
Everything Organic Nursery
And the biointensive method

In the early summer, the road between Hasera and Everything Organic Nursery was dusty and bordered by fallow terraced fields waiting to be planted with corn. Clouds rolled in the distance over the hills that foreground the Himalayas shadowed by smog. Following a footpath through clovers and full bushes, I descended from the ridge road to a small valley, sensing greater fertility than I did in the lands around me. No soil was exposed, every inch was covered by wheat to soon be harvested, young potato plants, a horticultural crop, or a grassy-clover mix. Even the water storage pond was coated in a green algae and aquatic plants.

Before my visit to the farm, I had only heard the phrase bio-intensive, and had little idea what it meant or would look like. But the small flowers growing below gargantuan coriander plants didn't appear nearly as intense as the name would imply. Once I began talking with the farm owner Judith Condant Chase, and my understanding of the farm expanded beyond visual assumptions, and the use of the word intensive made more sense.

Sitting at a low table on her back patio in the center of the farm, Judith discussed the history of organic agriculture in Nepal and her role at the forefront of its organized movement. She hails from the United States and first came to Nepal in the early nineteen-seventies to lead a backpacking trip. When the eighties came along, she was still living in Nepal and had started farming by chance, wanting to “join the rest of the people in the country, who all were farmers”. But her farm, then located closer to Kathmandu in the town of Gamcha, drew upon an established western farming philosophy that the subsistence farms in the region did not previously have access too. Judith was inspired by John Jeavons and his well-researched philosophy “bio-intensive”. It combined the methods of biodynamic and French-intensive, calling for dense plantings managed with ecological understanding. John Jeavons’ book *How to Grow More Vegetables Than You Ever Thought Possible on Less Land with Less Water Than You Can Imagine* became the handbook for Judith's way of agriculture. And she found that the people took to the idea, glad to have vegetables free of pesticides.

There are eight basic principles to be followed – deep soil preparation, composting, intensive planting, companion planting, carbon farming, calorie farming, open-pollinated seeds and whole system method (grow biointensive, n.d.). Each of these principles comes with specific instructions. I delved the most into rules for creating compost, detailing the ratios of carbon and nitrogen for each ingredient and then further the ratios of ingredients. The reasoning for this particular and somewhat tedious method had strong chemical and ecological reasoning. However, the esoteric nature of the reasoning creates a barrier to entry in the context of Nepali subsistence farmers. But the basic premise of biointensive aligns practically with the reality of Nepali agriculture. In the seventies and today, the majority of Nepali people are cultivating their land for subsistence. To grow more on this land would be of nutritional and economic benefit. The biointensive method promises a more efficient use of land- in terms of biomass and in terms of diversified nutrition.

In her older age, Judith is as less active in farming and training. However, her neighbor Shyam Pyakurel is carrying on her mission to spread biointensive method and its benefits in Nepal. After
going to college for journalism, Shyam was introduced to Judith’s method of farming and found himself changing gears on his career. He keeps a biointensive garden on the land of his dairy-farming family. Also, he works as an advisor and agricultural technician at the Yantra House, Akasha Academy, and the Orkhabot Organic Farm. Additionally, he travels places much further from the Kathmandu valley to lead trainings in his methods.
Himgri Permaculture Farm

My visit to the Himgri Permaculture farm followed the encouragement of my hosts at Hasera. The owners of Himgri had been their permaculture students and are now running their own farm in Godavari. And so, I got back on the public bus towards this northeastern side of the Kathmandu valley. What I found had evident influences with the permaculture method taught at Hasera, but also a unique personal approach. A carved out and cultivated valley in this peri-urban area was filled with vegetables and grains and animals in harmony. The appearance of saturation by biodiversity could have been confused with poor upkeep on weeds. Hence is the mission of permaculture. It is not random that the farm emulates the untouched ecology of an average hillside.

Nima Nawang Yolmo happened upon permaculture by chance. Before her run in with the concept in 2015, Nima owned a cosmetic shop selling products from Thailand and China. When an offer came along from her cousin to join him on the board of Himgri Ecofriendly Agricultural Cooperative, she took the opportunity. But first, she was required to take a permaculture training course at Hasera. Going into the training, all she knew is that she had to be there fifteen days and was consistently forgetting the word “permaculture”. In her first few days at the farm, Nima found herself completely moved by Govinda’s teachings. Recalling the experience brought a smile to her face, saying that she “was very happy during this time”. Upon returning from the training, she tried to relay to her husband all the valuable teachings that had given her a new outlook. Finding it hard to properly express herself, Nima sent her him to a Hasera training in her footsteps. The couple was then inspired and bought their own land to carry out what they had learned (N. Yolmo, personal communication, 2 May 2023).

In seven years, Nima and her family are profiting off an agroecological landscape of their creation. During my four days living and working on the farm, I saw more species of birds than anywhere else in my travels. Maybe I was being more observant or maybe I was finding some ecological truth. There were big beaked brown birds that only nested in bamboo plants. Other birds swooped around the farm and feasted on the fresh strawberries. All the mulberries that year were eaten before the farmers could get to them, but there didn’t seem to be any hard feelings. Last year, a small species of bird made a nest in one of the cucumber leaves, where it raised its babies and entertained the farmers.

The most significant difference between Himgri and the other farms I visited was its participation in Kathmandu’s food markets. Unlike Hasera and Everything Organic Nursery, whose products are shared knowledge, Himgri relied on selling produce for their income. While I was there, the learning did not take place sitting around the kitchen table for hours after each meal like at Hasera. Instead, I jumped into farm work of which there was always something to be done. Nima and her younger sister Dickie conducted the farm work in alternation or collaboration. Morning hours were spent in one of the four greenhouses before the day’s heat set in. Pruning and planting and cleaning were the predominate tasks during this season before bulk harvests. During my visit in early May, zucchini harvest had begun, and strawberry season was nearing its end. At dinner time, Dickie and Nima would still be busy with farm tasks, sorting strawberries and bagging milk for delivery the next day. The best berries were brough to the Himgri Eco-Friendly Agricultural Cooperative store where they can be sold for a premium price. The others were brought to various shops that don’t brand as organic. The milk is brought to shops as well as dropped at “many many” individual homes by request.
My stay at Himgri and conversations with Dickie and Nima over fresh mushroom soup and farm tasks made me incredibly hopeful for the future of Nepali agriculture. The inspired family finding personal and financial empowerment through sustainable farming methods revealed the viability of ecological living in modern contexts.
Each step in the Flow of Nutrients and Knowledge

Plants \(\rightarrow\) soil

Ecological agriculture methods are driven by a basic understanding that is often overlooked in conventional agriculture. Instead of regarding soil as the location and medium for plant growth, permaculture and biodynamic farmers express an understanding that soil provides life for their farm and their selves. And to provide life, it needs to be fed and cared for properly. To cultivate healthy soils, the farmers I learned from didn’t question the necessity of compost to keep nutrients in the system. At Hasera, there was a bucket by the kitchen sink for any uneaten food. And behind the building was a much larger pile for waste collected on the farm—weeds or wheat stalks or anything miscellaneous in between. The pile decomposes over a few months with the help of microbes living happily inside the carbon rich environment. The result is a soil amendment used liberally around the farm, replacing the nutrients taken by previous plantings.

The biodynamic compost method is much less freestyle than piles I saw scattered around Hasera and Himgri. Instead of collecting gradually as waste is produced, the biointensive method demands a larger initial time investment and source of waste. For his personal garden, Shyam Pykurel walked me through the process that follows a precise set of rules. First, a measurement stick was required to place four bamboo sticks at the four corners of a square where the perfectly shaped pile will ultimately stand. The goal was to make “cold-compost” that promises greater “compost power” and a yield increase of two to six percent as compared to typical hot-compost (ecology action, n.d.). Then, materials were collected around the property, making sure to gather sufficient ratios of young biomass in the form of weeds growing in marginal areas and larger branches from living trees. Such large branches are not a conventional compost ingredient, but they serve with a much higher nitrogen: carbon ratio, therefore decomposing slowly. This contributes to the longevity of the compost’s fertility. Leafy green plants have a lower nitrogen: carbon ratio, offering immediate nutrients for microbes and plants. Making sure to have the proper proportions of each categorical ingredient, we built in layers with water and existing soil. After an hour and half, the pile was complete and measured equal length and height. The final product looked vastly different my previous understanding of compost as a low-maintenance and catchall pile in the corner. However, the philosophy is the same.

In an ingenious effort to use all space intentionally, Everything Organic Nursury harvested water hyacinth and azolla from the water holding pond. Over a locally sourced lunch of artichokes and freshly made paneer, Judith and I discussed the “NPK”, or nutritional composition, of these plants in the context of compost. In their low maintenance and prolific biomass, the aquatic plants have an incredible return in organic matter value. This is especially helpful in the biointensive method when all compost ingredients should be plants sourced from the farm.

But dead and recycled plants are not the only way nutrients flow to the soil. Living plants can make contributions as well. Most commonly this is done by legumes, that host nitrogen fixing bacteria in special root structures. Understanding this chemical process and its potential, farmers commonly grow beans and other legumes to enhance their soils fertility. At every farm I visited, clover covered most uncultivated soil space. The abundant and easily grown legume brings nitrogen to the soil and
keeps it covered, so nutrients won’t leave the system. Just as humans expend energy to compost and get nutrients to the soil for good plant growth, the plants themselves have found methods of bringing the resources they need to the soil where they can use it.

Figure 1 compost in Himgri's nursery

Figure 2 cold compost pile at Shyam’s garden
Animals ➔ soil

While biointensive agriculture preaches against use of manure, I witnessed other farming methods that used the abundant resource out of necessity. Observing the quantity of manure on every terrace around Patlekheta gives the effect that most families have at least one cow or buffalo. Everything Organic Nursery and Hasera were the only two farms visited with no livestock. Hasera didn’t keep cows because the labor demands couldn’t be met. However, they get manure from their neighbors in exchange for hay. The Pyakurel family had eight cows and a pile of manure to be moved. One full day was spent shoveling it into empty sacs to be carried to their fields. I had the easy job of holding the bag while my aama filled it shovel after shovel. At the end of the day, a mountainous pile of manure sacs had collected at the front of the house, and yet unbagged manure remained.

The family at Himgri kept twenty cows. Dickie explained that they were for milk and manure, the two reasons listed to me in tandem as if with equal importance to the farm. Chicken manure was also used, often mixed with that from the cows to make a compost of more balanced nutrients. For the cucumber plants, I was given a special mix of the two that also included manure from the neighbor’s goat. As she scooped the extra smallly compost from its bag, Dickie covered her nose with her sweater. With the unbearable smell comes also super strength in its influence of the soil. Dickie instructed me to take only a handful and spread in a circle around the base of the plant. If placed too near to the stem, the roots could be burned.

Biointensive philosophy deems manure additions to systems as “not sustainable” and not in alignment with the chemical requirements of cold compost. Generally, it’s not as efficient a use of space and materials to raise livestock. When starting with the biointensive methods its possible there wouldn’t be enough plant biomass on the farm to support the compost pile. In this case, they have a set of rules for incorporating manure. It cannot exceed 1/6 of the piles total volume and “must not be continued for longer than three years (ecology action, n.d.)”. But the reality I witnessed was a culture where raising livestock is essential to people’s livelihoods and spirituality. The accommodation of 1/6 manure compost for three years would still not suit the farms in Patlekheta. Using manure is convenient if not necessary.
Humans ➔ soil

Along with adding nutrients and water that’s been taken back to the soil, humans can play a role in keeping these resources in the soil to begin with. In the hilly land directly surrounding the Kathmandu valley, farmland is almost all terraced. During heavy rainfall, land in terraces is more susceptible to erosion than level fields. Gravity is stronger in this context and the result can be “slopey” terraces appear rounded and are more vulnerable to further erosion. Soil erosion is defined by the loss of soil particles and nutrients, to the detriment to the health of the system. This phenomenon was on display looking at the farms situated on hills in the area around Patlekhet. The edges of the terraces all rounded and pointed downwards, and their beds were currently left fallow. The common rotation in the area is wheat and corn. The wheat was being harvested currently, but without rain during this abnormally dry two April weeks, corn planting waited for the end of the drought.

To prevent this damaging phenomenon, the permaculture farms I visited exercised methods to preserve soil structure, and thereby soil nutrients. The methods varied but all rooted from the simple and effective rule that covered soil is protected from erosion. And crops, or even weeds, are the most ecological cover. The practical implementation of this method differed between farms and ideologies.

First, at Hasera, permanent crops could be seen growing from the sides of terraces. Roots of trees and perennial shrubs offer roots hold the soil together and keeping the shape of the terrace intact. And on the beds, clovers and other living mulches were allowed to prosper. Planting and harvest
timing can act as a barrier to having constant crops in the ground, but overall, the was very little bare soil on display at Hasera.

At Everything Organic Nursery, in accordance with biointensive philosophies, an additional approach is taken to keep the nutrients in the soil. First, the soil is prepared into raised beds by a practice called “deep digging”. Using shovels and rakes, twenty-four inches of soil are loosened, and compost is integrated. This creates a non-compacted soil environment that promotes water, air, and nutrient flow. And in turn, plant roots and beneficial microbes can prosper. And with increased soil fertility and loosened depth, crops can be arranged in denser plantings. This grows more food per unit land. Further, soil resources are better absorbed into the farm system instead of being eroded away. Looking around the farm, New Zealand spinach in prolific biomass took over ground cover. It rubbed leafy shoulders with large artichoke plants and fruit trees. A bed of closely planted pepper seedlings infringed upon the spacing rules I had learned at larger scaled vegetable farms. Instead, it mirrored what would exist in an uncultivated ecology— fertile soil supporting growth of however many plants can fit.

Given the information thus far, a nearly perfect system of keeping soil nutrients local could be outlined—all plant residue and animal waste are composted and used to cultivate beds with constant and dense cover. However, to close the loop, one further step accounting for the nutrients harvested and eaten is needed. The return of digested farm food to the farmland, in the form of human waste compost, provides greater sustainability.

The practice of using human waste as fertilizer is not new to Nepal. The history and modern innovation were outlined to me by Govinda. First, he discussed the most traditional method--a simple hole dug into a terrace. One will then use the hole as a toilet, cover it, and wait three to four months for decomposition. The soil resulting from this process is so optimal it inspired the metaphorical Nepali saying used to describe quickly growing children as “a radish in shit compost.”

Another simple method of human waste composting is the peat toilet. Creating a dry composts, the peat toilet required its users to place a few handfuls of sawdust or other dry carbon material into the bowl after use. Around once a month, a mulchy compost can be emptied from the toilet and spread in the garden. Hasera had a composting toilet that now goes mostly unused. When the farm was first established, there was greater effort to recycle human waste using the dry composting toilet system. However, now the farm has sufficient compost from plant and animal sources and has paused work on creating human compost.

Along with harvesting nutrients waste coming directly from humans, Hasera was also harvesting grey water. From the shower and sinks used by guests and family, soapy water ran through tubes, gutters, and multiple filtration systems towards to water holding pond used to irrigate the farm. Both physical and biofilters can be used. This means soil, mesh and plant roots clean the water and make it suitable for another use.

More modern methods of human compost can be found across Nepal with the technologies of Biogas and EcoSan latrine. These technologies can be used in cities and less local scales while still benefiting farmers as well as city sanitation (Rajbhandari, 2008). Currently, this methodology is the
least accessible to farmers, permaculture or otherwise. But it does show incredible promise in replacing unsustainable fertilizer consumption with a waste management solution. And on the farm scale, human can contribute to soil fertility and simplify waste management infrastructure.

**Soil → Humans**

My research into natural building was not as deep as my fascination and appreciation. Hence, it is included in this paper though not in great detail. In terms of ecological living, sourcing building materials from the local landscape is of incredible value. And for a long time in Nepal, it was essential if a family wanted a roof over their head, and so they would thatch it out of straw. A straw roof would now be near impossible to find in areas close to Kathmandu. Low maintenance metal roofs are the typical top for the mud houses scattered around the peri-urban region. And just as metal roofs replaced straw, concrete is beginning to replace mud. Concrete homes are increasingly intermixed with brick and mud buildings in the rural areas of Nepal. The Pyakurel family owned and used both a mud and a concrete home, one from a somewhat bygone era and the other constructed in 2020, respectively.

![Pyakurel family kitchen](image)

I had never been in a mud home before entering the Pyakurel family kitchen, and I was instantly enamored. Small bits of hay were visible in the smooth reddish-brown walls. The plaster is a fermented mix of a combination of soil, manure, and rice husks (D. Smith, personal communication,
This method comes from traditional practice and is extremely logical in context of Nepal’s ecology. Respective to concrete homes, mud homes are temperature regulative. Also, they are made of locally available materials. Nepal imports seventy percent of its concrete from India, when mud and manure are sometimes overabundant in front yards (Yin, 2013). Other common traditional building materials are bamboo and sun-dried brick.

As Nepal gets greater access to global media and building materials, natural building has fallen out of favor. In turn, the knowledge it requires and the attention it takes has become less accessible. Further, new government regulations to make buildings earthquake resilient can be intimidating. Building a mud home greater than two stories now requires an internal concrete support (D. Smith, personal communication, 2 May 2023). Many farmers I talked to express a general perception that under current circumstances, natural building would be more expensive than concrete.

Nima Yangchen Yolmo had been interested to build a natural home at Himgri Permaculture farm. However, she is renting the land for only fifteen years, and couldn’t reason spending the money for such a project. Her teacher, Govinda, mentioned in his definition of permaculture the importance of having a home happily situated within the farm. To have this home built from local materials can increase its power in harmonizing humans and their agricultural environment, empowering the farmer and enhancing the sustainability of the land use.

Plants ➔ Humans

The families at my homestay and at Hasera were both Brahmin, eating meat on rare occasion if at all. In both homes I experienced inventive ways of using plants to provide nourishment and flavor to meals. Rice and daal with a curried potato and bean was the base for most meals at the homestay. At Hasera, buckwheat and millet were used in rotation with rice to provide the carbohydrate base. The growth and consumption of these indigenous grains was a point of pride for the family. And the farm stay guests often asked for seconds when served buckwheat roti and local honey for breakfast. However, the stance that these alternatives to rice are special is not unanimous. Unlike rice, buckwheat and millet are both traditionally farmed in this region and in the upper areas of Nepal. Around twenty years ago, rice became the favorable grain for upper classes that could afford it (Lama, 2019). Meanwhile, farmers continued to eat the grains they grew traditionally, and such grains gained connotations of poverty. As rice became more accessible, the farmers adopted it into their diets as well. Eventually, rice eating became so synonymous with daily life across Nepal that the common greeting “खाना खानुभयो” (Khana Khanu Bayo) translates to--Have you had your rice? This history was outlined for me by Prashanta Khanal, an expert on the matter. He is co-founder of the restaurant Raithaane in Lalitpur, specializing in indigenous foods from across Nepal. It was there that I first had buckwheat, in the form of a fry and served with the Himalayan spice, Timmur. A special spice with bright flavor and numbing properties, Timmur is a unique condiment and also the title for Prashanta’s cookbook. Filled with recipes of traditional Nepali foods and profiles of the ethnic groups that eat them, Timmur provides information as well as an effort to preserve these foods and cultures. One of the major arguments for preservation is the greater nutritional value of buckwheat and millet compared to widely available white rice. Another argument is that these
grains are more easily grown locally in the middle hills than rice in terms of water and labor requirements.

I greatly enjoyed the millet cake made from Hasera’s grains, and I’ve ordered the Dhido set with buckwheat porridge instead of rice at Thakali restaurants. However, I sympathize with the Nepali people. I too would be tempted to name daal bhat the unofficial national meal, outshining the official one of millet porridge and gundruk soup. A plate of daal bhat harnesses a balanced and delectable quality that I have experienced in only a few other dishes. And in the same vein, I appreciate the biointensive method’s rule that land use should be broken down to sixty percent carbon and calorie crop (grains), thirty percent high calorie root crops (potato) and ten percent vegetables. Although this rule was born in the United States, it suits the context of a daal bhat plate extremely well.

While staying at Hasera and Himgri, plates of daal bhat were served for lunch without question, and often for dinner. However, unlike at my homestay, the rice was sourced from the farm. At Hasera, ninety percent of the food served they grow themselves. To please the guests and the families’ tastes, fruit needs to be imported over winter and through the spring until the that on the trees ripens. At Himgri, an impressive amount of each meal was also from the farm, from mushrooms to cauliflower to beans. Buckwheat pancakes were also served, as well as a special bean grown only in Yolmo, the ancestral home of the farm owners. At my homestay, the only vegetables I understood to be harvested by the family was green onions chopped and sprinkled in bowls of ramen soup. However, the seasonally available cauliflower and green beans appeared in surrounding fields and on the plate. And in the village, obtaining these ingredients from neighbors would be simpler than going to the nearest market by a fifteen-minute hilly walk.
Plants ➔ animals

In Nepali farming systems as I witness and as I understand, the greatest challenge to close the loop is in providing sufficient feed for the animals. Being so large, cows demand huge amounts of feed, often more than what can be easily grown by farmers with small amounts of land also trying to feed themselves. As told by Shyam, who grew up on a dairy farm himself, my homestay family imports seventy-five percent of their cow feed. The other twenty-five percent comes from oat straw and other hays cultivated and harvested by the family. The expense of feed adds up to around 25,000 rupees a month, around half of the farm's monthly income during an off-season.

The farmers at Himgri actively and thoughtful try to create a circular system, and feed is one of the few remaining imports. They have enough land to let their 20 cows graze on pasture of grass and nutritious legume forages. Additionally, all “clean” weeds and other farm plant waste free from mud is fed to the cows. However, imported grains are essential to the cow's proper nourishment. This feed is grown in Nepal's terai region, where the climate and geography are optimal for high-output agriculture in ways the middle hills are not.

Himgri also imports chicken feed for the same reasons of limited land and need for extra calories. However, the imported feed is supplemented with any rotten strawberries that are carefully separated from the marketable ones.

Figure 7 strawberries fed to the chickens at Himgri
Animals ➔ Humans

Meat consumption was not so prevalent in the places I visited and experiences I had. Speaking to the people of the hills and the outside of the valley, eating locally and ecologically does not bring meat to the plate so often. The first two farms I stayed at were mostly vegetarian, by virtue of being Brahmin. But while beef would never enter the kitchen in accordance with religious tradition, the milk was flowing. Batches of milk tea were brewed multiple times a day to serve all the guests at Hasera. In my homestay, a warm cup of milk was handed to me at the end of each meal. In the mornings, the days collection of milk would be siphoned into a large blue jug and carried to the nearby processing facility. The family is paid sixteen rupees per liter, and at the time getting around twenty liters a day (Shyam, personal communication, 22 April 2023).

At Himgrì, run by Yolmo people, chicken was served with lunch one day and I was assured it hadn’t come from the farm. The chickens there were cherished for the abundant huge-yolked eggs they produced. Eaten hardboiled for breakfast, mid-afternoon snack and sometimes in dinner soups, the eggs were a staple in the family’s diet. Additionally, they were sold by the crate for a good price.

Milk was also a major income source at Himgrì, with eight actively milking cows providing eighty to ninety liters each day (N. Yolmo, 3 May 2023). Warm milk was also served with muesli for breakfast or on its own to follow dinner.

Raising animals is often a less efficient use of space and other resources as compared to thoughtful plant cultivation. Hence it is often left out of the well-calculated biointensive method. However, farm animals providing products besides meat provide continuous and important nutrients to the human diet.
Humans → Plants
I found two major ways that humans provide plants with nutrition. To accommodate the significant difference in the two topics, this section has been divided accordingly.

i. Seed saving initiatives
Sourcing seeds from the previous year’s harvest is the practice of seed-saving. It is one of the eight principles of biointensive agriculture as well as a fundamental practice in permaculture. The three farms I visited all had designated seed bank areas. Seed-saving replaces reliance on imported seeds with seeds of greater ecological, personal, and indigenous importance. In efforts to created closed loop food systems, it is at the forefront of discussions. While having economic benefits, it’s also an effective way to empower farmers and provide food sovereignty.

Common terminology for savable seeds is ‘open pollinated’, meaning the seed will remain consistent through plant generations and is naturally occurring. Conversely, ‘hybrid’ seeds are what is often sold by commercial seed distributors and are not naturally occurring. Instead, they are pollinated with specific crosses. If the seeds from a hybrid plant are saved and replanted, what grows will be different from the parent. This means that new seed must be bought every year to grow the particular variety.

When asked about the importance of seed saving, Govida gave a passionate and convincing response. He told about the confidence that comes with growing one’s own seeds, creating a visceral sense that “this is ours”. And with this confidence comes an understanding of the plant’s cycles and growing calendar that exists in the farm’s specific ecological context. Govinda referenced seeds coming from the Netherlands that are now commonly used in Nepal straying from historic Nepali growing practices and understandings of timing.

Figure 9 seed bank at Everything Organic Nursery
And further, hybrid seeds and seeds from abroad require greater manure and water applications. They tend to be more susceptible to disease and display other deficiencies in ability to grow in the ecology. This means more pesticide applications, and decreased yield (G. Sharma, personal communication, 28 April 2023). If not managed thoughtfully, the purchasing of seeds instead of saving can extenuate further reliance of resources from off the farm and open the loop even further.

However, if managed thoughtfully, hybrid seeds may give a greater yield than saved ones, as they are produced commercially to do so. Himgrí grows a combination of saved and purchased seeds. I helped to plant green pumpkins in raised beds around the green house, and the seeds came from a generic seed package. Pumpkin fruits are used commonly in Nepali curries and the shoots can be pickled as achaar. Nima said that her customers like the pumpkin variety she grows, and it is high yielding, so she continues to buy the seeds each year. For commercial farmers, growing a seed with reliably high yield and good flavor has economic benefits.

However, Nima finds joy in seed saving for herself, and doesn’t let economics box her in. A special sort of beans with purple tendrils and tinted leaves were growing vigorously around the farm. Nima calls these “Chris beans”. She titled the bean after her British permaculture friend who brought them to the seed exchange at her training at Hasera. Also, Nima has attempted to grow what she calls ‘Yolmo Beans’, a big, speckled seed indigenous to and titled after her mountainous homeland. However, out of their snowy, high elevation climate, the planted seeds never fruited. This highlights the regional specificity that saved seeds can have, making their tie to personal culture and self very powerful. To sell at her farm stand at the Utpala café farmer’s market, Nima goes each year to Yolmo to source a bulk amount of the beans that she finds so special and worth sharing. It is the only product she sells not sourced from her farm.

ii. Fermenting

Achar (अचार) is a non-discriminatory and liberally used categorization for the fermented or fresh condiment found on plates across Nepal. In a limited geographic-scope and four weeks of living with Nepali people, I experienced too many forms of achar to document them all here. But to begin with arguably the most significant achar, Gundruk is a dried and fermented spinach. My first experience trying gundruk was at Hasera, where it was dished as a salty soup. It was introduced as the national food of Nepal. The reaction of the non-Nepali travelers to the new taste of gundruk was observed by the family humorously. They reiterated again and again it was good for health. And then the joke went further with the common claim that the more bitter a food is the better it is for your health. My other memorable experience with gundruk was when staying with the Pyakurel family. Instead of in a soup, it was given in handfuls of dried leaf as a side for daal bhat. Similarly salty and bitter, it balanced the meal nicely.

When offered achar in the Nepali households I stayed in, the contents of the incoming spoonful would come from an impressively diverse collection. It could be a tangy orange cherry tomato salad or a nutty brown powder. Though respectively a small addition to a mountain of rice and ladles of daal, achar plays a vital role in the meal, offering new flavors and micronutrients. This is especially helpful given the frequency in which the meal is eaten.
And beyond its culinary attributes, achaar making is a great way of extending the lifespan of fresh foods. Vegetables and fruits can be saved over winter or for many years, limiting the reliance on imports of such things when they can’t be grown in the local climate. In doing so, waste and imports are mitigated, and the loop is further closed. Additionally, produce that is less palatable raw can be made delicious, such as the green mango achaar that’s more popular in the terai region. Unripe mangos, fallen or harvested, are dried and pickled in a spicy oil (N. Lama Thing, personal communication, 8 April 2023).

And even with achar being so inclusive, Nepali cuisine offers fermented goods beyond pickles as well. Masaura (मस्यौरा), which appeared a mysterious crunchy ball in the potato curry served to me my first day at Hasera, displays a different facet of fermentation inventiveness. As explained by Govinda, Masaura can be made from various starchy vegetables but in this case, taro was used. First the root vegetable is shredded, ground to a flour used to made dough balls. Then, the dough is left to dry in the sun. A dark colored hardened ball of preserved vegetable remains and can be stored for an indefinite but “very very long” time. Masuara is referred to as a “winter vegetable”, indicating its importance for providing nutrients during the season when harvest is lighter.
Humans ➔ Humans

In conversations with Nepali people versed in the country’s food system, I could sense their excitement to meet a young person studying the topic. They shared enthusiastically and willingly, consistently citing a general lack of interest in modern attitudes. This perceived lack is causing destabilization in domestic systems as it turns away from traditional approaches to sustainability. Shyam Pyakurel spoke of outmigration and a widespread belief that there is more honorable work that what’s available in Nepal. To his calculation, 3000 Nepali people emigrate through the Kathmandu airport each day. In Patlekhet, I witnessed the effects of this out-migration. Much of the farm work was being done by people past middle age. At Hasera, Govinda cited labor shortage as a “major, major problem”. There are very few young people and the village. And those that are left are not interested in the “inferior work” to be done on a farm (G. Sharma, personal communication, 28 April 2023).

Shyam believes that greater access to cellphones and the global media they provide has made generations of people disconnected completely from their environment, no longer living with nature and “playing with pumpkins” in the way he knew as a child a few decades ago. To play his role in reconnecting people with the land, he travels around the country training Nepali people in the biointensive method. He dreams of continuing his work in Nepal and opening a training center and ecological farm.

At Hasera and subsequently at Himgri, I came to understand the ability of farmer trainings in empowering and educating. Nima is just one of the approximately 26,000 people who learned about permaculture from Govinda. Around forty percent of the students are Nepali. If a quarter of this number implemented their learnings into their lives and landscape in Nepal as Nima has, Hasera’s positive impact would be immeasurable.

Even as a person not attending a proper training, every farm I visited generously shared with me both the knowledge and the bounty to be had. The addition of guest accommodation to farms is increasingly prevalent as agritourism takes hold in Nepal. Himgri is new to hosting guests, and individuals visit sporadically. Their guestroom is not currently advertised, but requests to visit still come in. Hasera operates a guesthouse on a greater scale. During my week-long stay, it was rare for a day to pass without new people coming and past guests leaving. Supplemental income as well as an opportunity to spread permaculture’s philosophies make farm-stays a valuable addition to the business. For Hasera, which does not sell produce to any markets, hosting guests brings the market to them. The opportunity keeps the flow of nutrients on the farm especially closed, while that of knowledge spans to 103 countries across the globe (Hasera facebook, 2023).

Himgri’s approach to marketing its produce requires a bit more travel on the part of the farmers, but not much. Along with dropping their goods to shops around Kathmandu, Nima also sells at the Boudha farmer’s market. It’s a twenty-minute drive for herself and her produce every Saturday morning, and well worth the opportunity to cut out the middleman and take the whole profit margin home. In their other business dealings, Himgri is lucky to have a truck to transport food themselves, keeping the line of distribution as short as possible. However, many farmers in Nepal are not so lucky. Mediators can get paid handsome commissions, sometimes more than the farmer. This acted
as the ultimate barrier in a proposed effort to supply the Dulikhel hospital with all organic produce. Such an initiative could have been mutually beneficial to the health of the patients and the economic success of organic farmers (S. Pyakurel, Personal Communication, 22 April 2023).

Meanwhile, smaller scaled efforts to provide Nepali people with organic produce are seeing more success. Since Judith's first involvement in the agricultural scene in the 1980's, there has been a clientele interested in sustainably grown food (J. Chase, personal communication, 26 April 2023). However, then and now, the demographic found at farmers markets in Kathmandu are predominately visitors to Nepal, travelers, and expats. This can be witnessed especially at the popular Saturday farmer's markets at Le’ Sherpa. Sitting down to drink an Americano purchased at a stall between organic vegetables and frozen pizzas, I found myself in a whirl of and European languages, chocolate croissants, sunhats, and trader-joes grocery bags. The number of vegetable stalls seemed to be equal to that of specialty foods, making the place a fair-like event as well as place to get trustworthy produce. It is not the most accessible way for Nepali people to get organic produce, with prices influenced by incomes of more powerful European and American dollars. However, it's an important step in simplifying food systems, making sustainable agriculture economically viable, and connecting urban communities with farmers and ecological ways of living.

Figure 11 vegetables at le sherpa farmer’s market
Conclusion

When living on farms and studying the state of food systems in Kathmandu valley, I found myself in a pivotal moment in Nepal’s ecological history. The rate of change was tangible. Houses made from red soil neighbor bright blue concrete ones. Gundruk and imported noodles are served side by side. Indigenous farming practices such as seed-saving are done under the philosophy of English terms such as permaculture and bio-intensive. Finding a balance of traditional ways of living and modern attitudes is the most practical way forward. At Himgri, Hasera, Everything Organic Nursery, and the other places I was fortunate to live and learn, I witnessed people contesting the false dichotomy between living in a modern global context and living on a farm. In integrating these two ways of being, the farmers found empowerment and satisfaction which they can spread in the form of quality food and intentional knowledge.

Generally, Nepal’s youth may be overlooking the importance of their ancestors’ ways of living for the sustained future of food systems. However, I met inspiring young farmers that act as a powerful antithesis and antidote to the rejection of ecological attitudes. Twenty-five year old Dickie Yolmo moved to her sister Nima’s farm after a year of living in Kathmandu during the pandemic. Her degree in business management and life in the locked-down city found her watching three movies a day and becoming increasingly stir-crazy. And so she changed trajectories, adopting the life of a farmer (N. Yolmo, personal communication, 2 May 2023). While hoeing the land in preparation for squash planting, Nima and I bonded over our appreciation for farm work, and the joy and nourishment provided by integrating oneself into a natural ecology. They may be overshadowed by young Nepali people moving to cities and abroad, but there is a definite subset of the generation going back to the land of their ancestors. The number of farmers in Nepal rose fifteen percent over the three-year pandemic (A. Panthak, personal communication, 18 April 2023). This trend signals a reinvigorated understanding of the importance of self-sufficiency, both personally and domestically within Nepal. They are ascending reliance on volatile and unsustainable globalized markets by creating closed-loop flows of resources and understandings. And in the wake of this radical effort, traditional knowledge of ecological living is working in tandem with modern landscapes to provide farmers with food-sovereignty, financial freedom, and interconnection within Nepal’s abundant ecologies.
Final notes

Any of the topics I just touched on in my generalized look at ecological living in Nepal could become an independent project of their own. For future students, here are a few questions I wish I had time to answer but leave for you if you are so inspired.

1. Urban Agriculture in the Kathmandu valley, and how soil fertility has changed throughout its land-use history.

2. Tungba, the popular and traditional millet alcohol, and Murcha, the necessary starter for fermentation. Murcha is a mysterious substance, and I hear that the old women on many Nepali villages have knowledge to share on the matter.

3. Natural building, the relationship between farming and construction and how shifts in either field influence the other.
References


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