

Organic Farming and Agricultural Landscape Preservation for the Sustainable Development of Uttarakhand Mountain Villages

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Abstract In India, organic farming is increasingly considered a promising way to increase the income of small-scale farmers, while at the same time protecting ecologically fragile areas. This is especially true for farmers in areas considered “marginal,” such as those in the Himalayan hill areas of the state of Uttarakhand. This research focuses on the current situation of the agricultural sector in K village, located in Uttarakhand. Following a general analysis, the paper will focus in more detail on two intertwined aspects: knowledge and perception about organic farming among local farmers on one hand, and traditional agricultural practices and landscape on the other. The purpose of this study is to observe the farming methods practiced in the village and to explore the potential and challenges for the adoption of organic farming practices, both to increase farmers’ income and to preserve the traditional agricultural landscape and culture of mountain villages. Researching the agricultural landscape in K Village and its connection with local culture can also deepen our understanding of the agricultural landscape in the Himalayan region of India and its potential to support the sustainable development of these areas.

Key words organic farming, agricultural landscape, Indian Himalayas, sustainable tourism, mountain areas

I. Introduction

The importance of the survival of small scale family farms for sustainable development of mountain areas has now been widely recognized (Khanal and Watanabe, 2006; Wymann von Dach et al., 2013). In places such as the Himalayas, one of the most densely populated mountain areas of the world, improving the livelihood of people living in mountain villages is necessary to slow down youth out-migration and to prevent environmental degradation and loss of traditional knowledge (Khanal and Watanabe, 2006; Punch and Sugden, 2013).

In this region, farming remains one of the main sources of livelihood for people living in mountain villages. The accomplishments of the Green Revolution, however, evident in other parts of South Asia, have reached mountainous areas only marginally: here, agricultural expansion and intensive farming practices are either not feasible or environmentally unsustainable. In ecologically fragile areas such as the Himalayas, population increase coupled with agricultural intensification may heighten the pressure on natural resources, and intensify existing patterns of deforestation, water pollution, increased runoff and soil erosion, leading to problems to downstream areas as well (Hauswirth et al., 2012). On the other hand, small scale sustainable farming such as organic farming, can provide a variety of ecosystem services that range from

soil and freshwater management, disaster risk reduction, biodiversity and agrobiodiversity conservation, and the provision of spaces for tourism and recreation activities (White, 2007; Wymann von Dach et al., 2013). Moreover, mountain farming communities are “custodians of place identity, spiritual and cultural values, and of site-specific knowledge” (Wymann von Dach et al., 2013, p. 10).

In recent times, the constraints that small scale farmers face in mountain areas have started to be seen as opportunities for change, especially in the form of value-added productions (e.g. organic, niche, healthy, local and traditional products). Tourism can also benefit from the specific characteristics and attractiveness of agriculture in mountain areas (Hauswirth et al., 2012). To do so, it is essential to blend local traditional systems of knowledge such as the use of terraces, indigenous species, crop rotations, etc., with new forms of knowledge. From a sustainable development standpoint, the cultural landscape is also important for the co-orientation of a local community with its living environment (Antrop, 2005; Koohafkan, 2009).

II. Literature Review

The northern Indian state of Uttarakhand (53,000 km²) is located in the central part of the Himalayas. It shares a border with China in the north and with Nepal in the east.

The state is composed of two regions, Kumaon in the east, and Garhwal in the west, which are further divided into 13 districts. Of these, four have large areas located in the plains, while the remaining ones are entirely mountainous, with an altitude ranging from 300 to over 7,000 m (Mittal et al., 2008) (Picture 1). Forest covers about 58% of the total area.

As of 2011, Uttarakhand had a population of 10,116,752, of which 70% were rural residents (Office of the Registrar General and Census Commissioners, 2017b). This figure is in line with the national trend, con-

sidering that Indian people living in rural areas represent 68% of the total population (Singh, 2011). While agriculture remains the main source of livelihood for most of the people living in the hill areas of the state, the plains are going through a period of rapid economic development and industrialization (Tomozawa, 2014).

Nainital is one of the highly urbanized districts in the state, with about 39% of the population living in urban areas (Directorate of Census Operations Uttarakhand, 2011). Migration from the higher altitude areas to the urban centers is a common phenomenon, and the hill



Picture 1. A view of the fields in K village, Uttarakhand, with the Himalayas in the background
Source: Zollet and Qu, March 2017

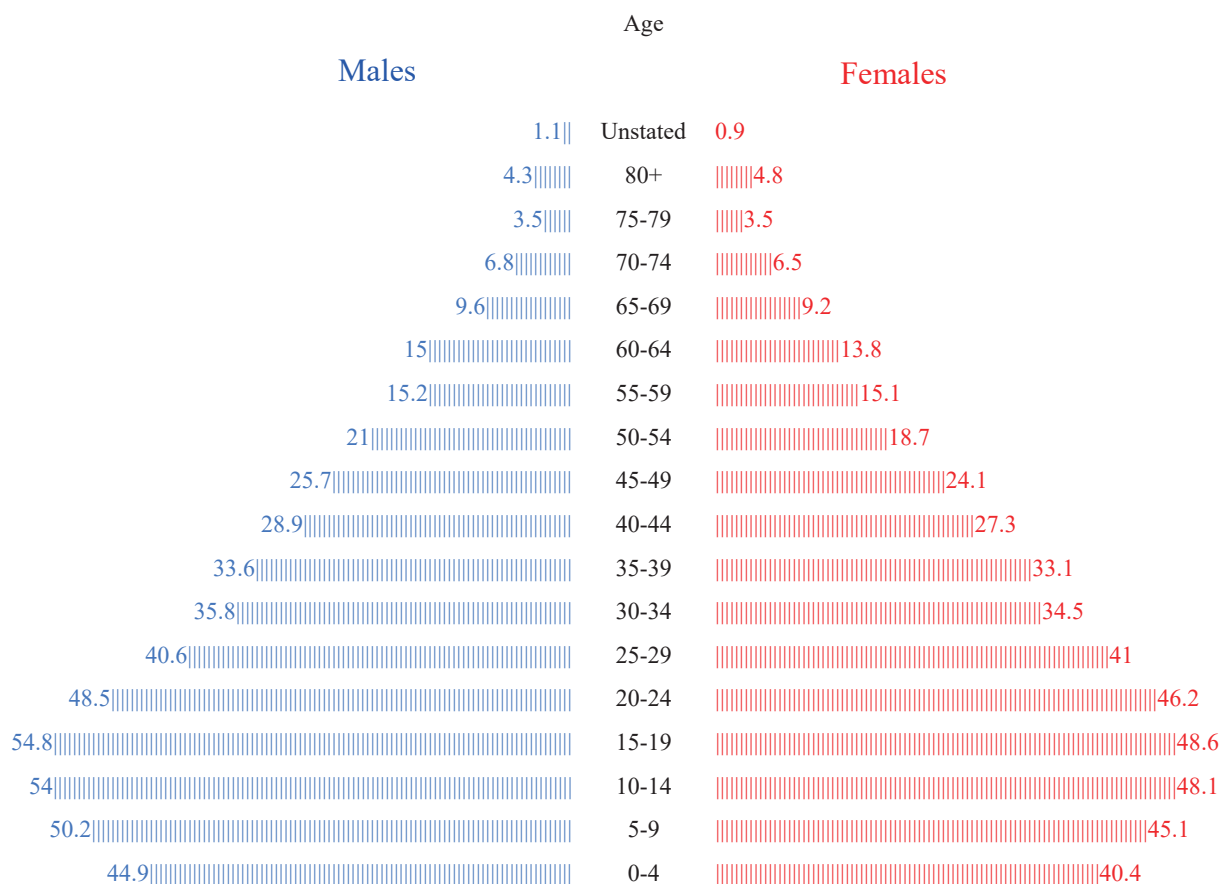


Figure 1. Population pyramid of Nainital district, Uttarakhand state (total population: 954,605 in 2011)
Source: Directorate of Census Operations Uttarakhand, 2011

areas of the state have witnessed a steady outflow of people, especially youth, seeking employment opportunities (Mittal et al., 2008; Sharma, 2007).

Figure 1 shows several relatively large gaps between males and females in the age groups 15–19, 20–24 and 25–29. Another characteristic is that the population peaked around the age groups of 10–14 to 15–19. Nainital district ranks second in literacy (84%), higher than the state average (79%) (Directorate of Census Operations Uttarakhand, 2011). Given this high literacy rate, most young people are eager to leave their villages to seek new employment opportunities after graduation, abandoning traditional farming occupations.

While in some hilly areas of Uttarakhand commercial agriculture has expanded starting from the 1990s (Okahashi, 2016), it is limited to those places with relatively good transportation system and the presence of irrigation infrastructures (Noor, 1992; Okahashi, 2016).

Considering both the intrinsic environmental importance and fragility of hill regions and the small and fragmented nature of agricultural landholdings to be found there, the promotion of conventional input-intensive agriculture is neither environmentally sustainable nor economically feasible. For this reason, the Uttarakhand state is attempting to promote tourism and high-value agricultural production, including organic farming, as a strategy to create income and employment locally (Mittal et al., 2008). Uttarakhand was the first state in India to be given the title of “organic state,” following the reasoning that “most of the farming is organic by default” (Subrahmanyeswari and Chander, 2008). The Uttarakhand Organic Commodity Board (UOCB) was created to coordinate scattered organic farming initiatives, as well as to promote the adoption of organic farming in the state (Mittal et al., 2008; Subrahmanyeswari and Chander, 2013). As a result of the UOCB’s activities, participating farmers were able to produce organic products and to market them for premium prices both locally and internationally (Subrahmanyeswari and Chander, 2008).

Traditional farming practices, on which organic farming is partly based, shaped by centuries of experience and adapted to the specific locality, have a strong influence on the landscape as well. Cultural landscapes represent local memory and its identity (Whelan, 2016, p. 134). The changes from traditional to modern agricultural practices brought both a new lifestyle and changes in the agricultural landscape, traditionally represented by nucleated settlements surrounded by farmland (Singh, 2011), but many traditional practices have been maintained.

There is a tendency, however, of considering mountain

agriculture as organic “by default” (Mittal et al., 2008), but this claim has not been sufficiently discussed and is frequently taken for granted. This study therefore tries to explore recent changes in agriculture and agricultural landscape in K Village by comparing the agricultural practices of the past with current ones, and by exploring the perception, knowledge and interest of farmers in organic farming. Understanding local agriculture and the cultural elements associated to it is essential to foresee future developments of agriculture in the area and to strive for the sustainable development in mountain areas.

III. Methods

This study focuses on K Hamlet, one of the settlements that compose K Village in the mountain area of Nainital district. K Village is located about 12 km from Nainital, the major city in the Kumaon region, and has a central elevation of about 1,635 m. K Village had a population of 1,552 people as of 2011, 51% of which male and 49% female (Office of the Registrar General and Census Commissioner, 2017a). Literacy among people aged 6 and older is high (95% among males and 88% among females). There are no official data specific to K Hamlet, but agriculture employs 25% of males and 32% of females in K Village. Compared to other hill settlements, vegetable cultivation for commercial purposes is widespread among K Village farmers, thanks to a well-developed irrigation system and the relative closeness to Nainital. In recent years, tourism has also increased thanks to the construction of a resort hotel and of apartments for retired military personnel and for summer vacationers (Okahashi, 2016).

This research follows a previous study conducted in 2007 by Okahashi (2016). The research design was based on the explanatory sequential mixed method approach (Creswell, 2014). Mixed methods involve the collection and integration of quantitative and qualitative data. In the explanatory sequential mixed method approach, in particular, the researcher first conducts quantitative research, then uses qualitative research to explain the quantitative results in more detail (Creswell, 2014).

In line with the research method, data was collected in two steps: in the first step, a general household survey (GHS), meant to be a follow-up of the 2007 one, was carried out among all households in the village. The questionnaire used in the survey provided a broad range of data, part of which will be used in this paper.

Following the GHS, a second round of data collection, here termed Organic Farming Survey (OFS), was conducted by selecting 11 households¹ (out of the 75 sur-

veyed) based on three criteria: 1) households who derive their income mainly from agriculture; 2) who wished for their children to continue agriculture according to the GHS; 3) and representative of different agricultural land size categories.

For each household, the head (or another family member, if the head was not available) took part in a semi-structured interview which aimed at collecting information about the following topics: 1) main characteristics of the farming household, such as number of people (both family members and hired labor) involved in agriculture, land size, etc.; 2) changes in agricultural practices over the last 20 years; 3) soil fertility and pest management techniques, including agronomic practices compatible with organic farming such as mulching and green manures; 4) markets for (organic) agricultural products and farmers' satisfaction with them; 5) major challenges related to agricultural production encountered by farmers in the village; 6) knowledge, perception and awareness of organic farming, as well as barriers to diversification towards organic farming; 7) farmers' impression of K village and its landscape; 8) festivals related to agriculture and their connection with religion and local food traditions, and 9) expectations of farming households regarding their children's future as agricultural successors.

Quantitative data was analyzed through descriptive statistics. Qualitative data from the interviews was grouped into common themes and discussed in deeper detail. Some of the results reflected the expected outcomes of the questions, while others emerged from the data analysis process.

For a clearer understanding of the cultural value of agricultural landscape, the model of six value elements

(Girard and Nijkamp, 2009) was used as a lens through which to analyze the data. This model deconstructs the cultural value of heritage into six individual elements, namely: aesthetic, spiritual, social, historical, symbolic, and authenticity values. Aesthetic value indicates the visual beauty of farmland and agriculture-related elements; spiritual value is reflected in those agricultural elements or activities representing religious traditions; social value indicates the relationship between agricultural landscape and cultural identity (sense of being); historical value highlights the connections with the past (continuing agrarian culture); symbolic value portrays agriculture sites as repositories of meaning; and finally, authenticity value reflects a place's quality of feeling "real," not contrived.

After analyzing the data according to these elements, a SWOT (strength, opportunity, weakness, and threat) analysis (Hill and Westbrook, 1997) was used to highlight strong and weak points, opportunities and threats, which become a starting point to imagine the area's potential to go towards a sustainable future.

IV. Results and Discussion

1. General results

General household survey (GHS) data was collected for 75 households. The demographic data shows that 32 households (43%) have household heads engaged in agriculture as main occupation, and that 16% of the population surveyed works full-time in the agricultural sector. If we consider the total number of people engaged in agriculture as main occupation, however, we can observe a scarcity of young farmers (Figure 2). The absence of males under 30 employed in agriculture is especially striking.

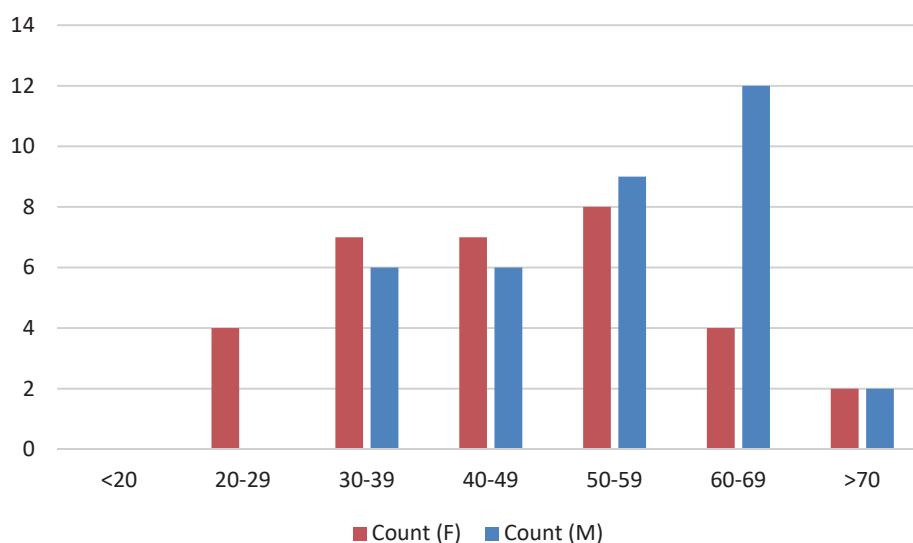


Figure 2. Age distribution of people engaged in agriculture as main occupation

Source: GHS data collected by the Taoyaka onsite training in March 2017

Table 1. Land ownership by land size range

Total owned land size (nali)	HH number	%
no land	14	19
<4	33	44
5–9	9	12
10–14	0	0
15–19	4	5
20–24	1	1
25–29	3	4
30–50	8	11
>50	3	4
<i>Total</i>	75	100

Source: GHS data collected by the Taoyaka onsite training in March 2017

Table 2. Reasons for not wanting children to continue or pursue agricultural activities in the future

Reasons	% of respondents
No land or small land	37
Agriculture is not profitable	21
Children not interested/have no knowledge	18
Good education/better jobs	13
Other	11

Source: GHS data collected by the Taoyaka onsite training in March 2017

Out of the 75 households surveyed, those owning land represent the 81% (61 households). Most land-owning households have access to irrigation (54 out of 61). The average land size for non-irrigated land is 14, 5 nali, while for irrigated land is 12,3 nali. A more detailed breakdown of land ownership by size range is shown in Table 1. Only 3 households own more than 50 nali, meaning that the so-called “marginal” farmers (those owning less than 50 nali, or 1 ha)² (Mittal et al., 2008) represent the overwhelming majority. Within this category, we can further observe that most households own less than 4 nali of land.

In the GHS, respondents were asked about whether they wished for their children to continue doing agriculture in the future. Only 6 (9%) gave a positive answer, while 49 respondents (74%) answered “no” and the remaining 11 (17%) were not sure. Out of the 49 respondents who gave a negative answer, 35 also gave reasons. The results obtained from grouping similar answers into common themes are shown in Table 2.

2. Agricultural practices

Farmers in K Hamlet typically harvest three crops per year. Potato is the most common crop, followed by cori-

Table 3. Crops planted by K Hamlet farmers

Crop	Frequency	%
Potato	48	79
Coriander	41	67
Peas	37	61
Beans	28	46
Radish	25	41
Cabbage	20	33
Carrot	18	30
Wheat	5	8
Garlic	5	8
Onion	4	7
Tomato	4	7
Spinach	2	3
Barley	2	3
Cauliflower	1	2
Sesame	1	2
Beets	1	2
Mathi (fenugreek)	1	2
Chili	1	2

Source: GHS data collected by the Taoyaka onsite training in March 2017

ander (Table 3). Crop rotations often include legumes, mainly peas and various bean species. Radish, cabbage and carrot are another popular choice of vegetable, while we can observe how just a small number of farmers plant traditional staple crops such as wheat and barley.

3. Organic farming survey and agricultural landscape

Most of the respondents are not the sole person of the household involved in agriculture, as family members, from a minimum of one to a maximum of six (three on average), usually contribute to farming activities. Almost half of the respondents also reported using hired labor, mainly on a seasonal basis and because of the impossibility of family members to supply all the necessary labor, especially compared to the past (Table 4).

All farmers, no matter their land size, sell around 70–80% of their harvest, while the rest is kept for self-consumption. This figure is similar among farmers despite the differences in land size, which suggest that the amount sold is not composed (or not entirely), of surplus crops, and that farmers may not be able to meet their family's dietary needs with their own crops.

When asked about the changes that have occurred in their agricultural activities over the past 20 years, nearly all respondents stressed the shift from subsistence to com-

Table 4. Outline of interviewed households

Household No.	Landholding (Unit: Nali)		Number of workers in agriculture	Total family members
	Operating land	Irrigated land		
01	120	20	5	7
02	42	32	5	7
03	3	3	4	6
04	30	30	5	10
05	4	4	2 (hired laborers)	10
06	40	32	0 (rents to others)	8
07	3	3	4	4
08	20	20	1	6
09	30	20	6	4
10	30	18	3	3
11	40	40	2	10

Source: Individual survey data collected by the Taoyaka onsite training in March 2017

Table 5. Farm animal ownership

Animal	Households	Avg. n. of animals per household
Cow	41 (55%)	1,78
Buffalo	7 (9%)	1,85
Ox	2 (3%)	2
Goat	2 (3%)	10
Chicken	2 (3%)	4,5

Source: GHS data collected by the Taoyaka onsite training in March 2017

mercial agriculture. There was a consensus that agricultural income has increased significantly, although some farmers pointed out that this has been accompanied by an increase in costs as well. The use of hybrid seeds was widely reported as one of the biggest changes contributing to increased productivity, although farmers seemed to have mixed opinions about them. Mechanization and the introduction of chemical fertilizers and pesticides were cited often as well: 5 out of 11 respondents own small tiller tractors, and virtually all respondents own a pesticide sprayer.

The use of organic fertilizers (compost, forest materials, wood ash) is still prevalent, but 73% of the farmers also report using chemical fertilizer. Even if 55% of all households own cows, buffaloes or oxen (Table 5), according to the interview results the number of farming families owning cattle is decreasing, so it is unlikely that the quantity of manure can provide enough fertilizer for agricultural purposes.

82% of farmers report using pesticides, with almost no other method of pest control being employed. In addition to insects and diseases, encroachment of wild animals is a problem strongly felt by all farmers.

All respondents purchase hybrid seed from the market, but most of them save some seeds by themselves year after year. This is especially the case with coriander and cabbage. The quantity of self-saved seed, however, is small if compared to the quantity that is purchased. Even though

**Picture 2.** Farmland in K Hamlet mentioned on Figure 3

Source: Zollet and Qu, March 2017

farmers agreed that hybrid seed grow faster, many farmers had mixed feelings about them, especially considering that they need more chemical inputs to grow, they are weaker to pests and diseases, and they are not suitable for small scale farming and traditional cultivation methods in mountain areas. The impression is that farmers tend to see hybrid seeds as a sort of “necessary evil,” rather than embracing them without criticism, and would like to have more suitable options.

Regarding the use of practices that are employed in organic farming to improve yield and soil fertility, such as crop rotation, manual weeding, using green manures/cover crops, mulching, using pest traps, and intercropping, only the first two were practiced by all respondents, while the others showed very low levels of adoption, or were not known by farmers at all.

4. Issues with agricultural production

The major challenges of farming according to respondents are summarized in Figure 3. Extreme weather events, above all hailstorms and droughts, were universally reported as a major issue, sometimes (in the case of hailstorms) leading to the loss of entire crops. Pest attacks were another common concern, as well as labor shortage. The categories “small land size,” “lack of agricultural machinery” and “insufficient income from agriculture” were indicated by five respondents each.

About half of the respondents also indicated the existence of problems related to the water supply, a result mirrored by the GHS where 31% of the respondents said there are issues with the water supply in the village. In the GHS, out of the people who highlighted water-related issues,

54% mentioned a decreasing amount of water, which is most acutely felt during summer. This is attributed to the increase in population (including the use by tourism businesses and by temporary residents), but also to decreasing rainfalls, which is causing springs to dry up. Water pollution is cited by 35% of respondents, and it is again associated to population increase but also to upstream sources of pollution (horse manure, roadside restaurant). Other problems include unequal distribution of water resources (e.g. irrigation canals), decrease of broadleaf forest cover, and pipeline damage due to landslides.

5. Markets for (organic) agricultural products

The markets where farmers sell their products are in Nainital (12 km, 30 minutes), Kaladhungi (25 km, 44 minutes) and Haldwani (40 km, 1 hour and 20 minutes). All the farmers sell their products in Nainital (100%), 55% sell to Haldwani and 27% to Kaladhungi. Selling directly to contractors from lowland areas who come to the village and buy crops in bulk is a popular choice as well, practiced by 73% of the respondents. Farmers consider this the best way of selling crops, because it allows them to fetch a better price by eliminating transportation costs. Given that only 3 out of 11 respondents own a car, they mainly rely on the services of local taxi drivers to bring their products to the market, which reduces their profit margins. There does not seem to be any initiative among local farmers to promote cooperative collection and shipment of agricultural products, so sales are left to individual choices. When discussing about whether they are satisfied with their income and with the market price for their vegetables, a common response was that income from

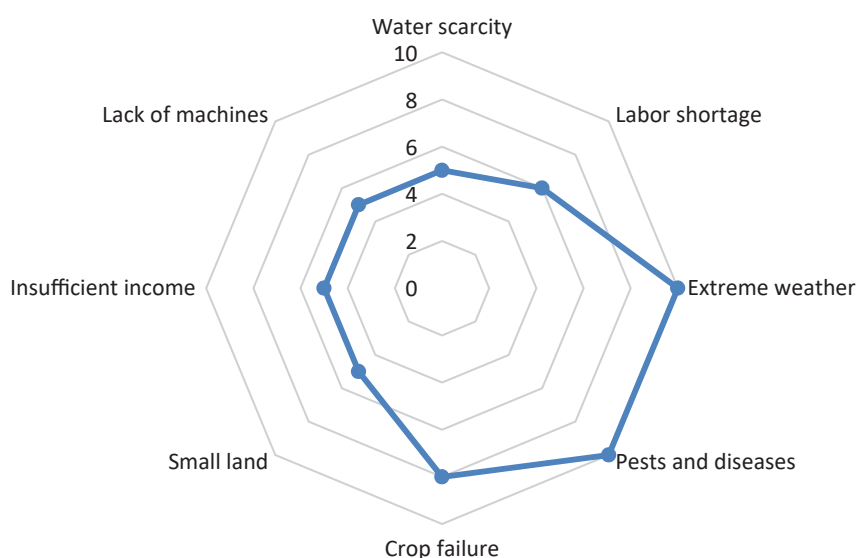


Figure 3. Challenges of farming

Source: Individual survey data collected by the Taoyaka onsite training in March 2017



Picture 3. Vegetables market in Nainital
Source: Zollet and Qu, March 2017

agriculture is “just enough for our survival” and that “we have no other option.” Farmers are not deeply unsatisfied per se, but a sense of hopelessness about the possibility of change seems to prevail.

6. Attitudes towards organic farming

Almost all the respondents (82%) are familiar with the term “organic farming,” and four of them consider their own agricultural products to be “organic” (despite also reporting using pesticides).

The respondents were asked to say whether they agreed or not with a series of statements about organic farming, with the purpose of assessing their perception and knowledge on the topic. Table 6 shows the statements and the frequency of affirmative responses.

The responses show that there is universal or near universal agreement among farmers that organic farming is better for the environment and that it increases soil fertility, and organic produce is believed to be healthier than conventional one. All farmers are also aware of the health risk posed by pesticides to their own health. At the same time, however, nearly all of them (91%) believe that it is not possible to control pests without chemical pesticides. In addition, 73% stated that with organic farming crop yields are lower, and that it is difficult to obtain enough compost or manure to fertilize their fields organically organic fertilizer (64%). In the same vein, 55% believe that organic farming is difficult to implement in practice.

One of the reasons commonly found in literature for the adoption of organic farming is the possibility of getting a premium price for organic products, but in this study less than half of the farmers believed that organic farming is more profitable. When asked whether there is a good market for organic products in the district, all the responses were negative, mainly due to the lack of a specific market.

Finally, only 36% stated that organic farming is popu-

Table 6. Perception of various aspects of organic farming

Statement about organic farming (OF)	Frequency	%
OF is better for the environment	11	100
Organic produce is healthier	11	100
Pesticides can harm farmers' health	11	100
Chemicals are necessary to control pests	10	91
OF increases the fertility of soil	10	91
OF yields are lower	8	73
It is hard to get organic fertilizer	7	64
I am interested in doing OF in future	7	64
OF is difficult to implement	6	55
OF is more profitable	5	45
OF is popular among local farmers	4	36
There is a good market for OF in Nainital	0	0

Source: Individual survey data collected by the Taoyaka onsite training in March 2017

lar among local farmers, but 64% would be interested in doing organic farming in the future (with more support from government and if the market becomes more profitable).

When asked for further comments about organic farming, a common opinion was that the hybrid seeds currently used are not suitable for organic cultivation; the cash crops that make up the bulk of K Hamlet's agricultural production require too many inputs (both in terms of pesticides and fertilizer), and could not be grown successfully in an organic way. Traditional varieties and organic seeds are difficult to obtain, and they grow slowly. Since there is no price premium for organic products, their slow growth and lower yield makes them unattractive to farmers.

Another complaint often voiced is that there is no real support for the promotion of organic farming from the government. The last point becomes particularly striking when confronted with the fact that none of the farmers

interviewed had ever heard of the Uttarakhand Organic Commodity Board. Some of the farmers had received agricultural training in the village through the Government's Horticultural Department initiatives, but none of it was related to organic farming. Some reported having heard about organic farming through radio and TV programs.

Respondents also voiced various concerns: one is that soil fertility has been damaged, and therefore it would not be possible to transition to organic farming; and that organic farming is very labor intensive but that there are no people interested in agriculture anymore. This last claim is indeed a source of concern, considering the demographic data shown previously.

7. Agricultural landscape and traditional culture

K Village is described as being “surrounded by bright green farms that make it an attractive village,” but its popularity as a tourist resort is mostly due to the presence of the lake (Exploring Tourism - Uttarakhand, 2012).

According to the survey, however, farmland is the most significant landscape element for local farmers: 9 out of the 11 farmers interviewed indicated it as the most striking feature of the village, while only 2 mentioned the lake.

Conversely, most of the farmers dislike the new touristic development of hotel and vacation apartments. The development of the hotel caused the biggest conflict between locals and newcomers; local farmers complained about the bad manners of the tourists both in the GHS and in the subsequent interviews. For example, tourists allegedly damaged farmland and caused disruptions of the villagers' life by being loud at night. Some respondents (especially female) also reported a heightened sense of insecurity.

Another significant aspect of the local agricultural lifestyle is the importance still played by religious agricultural festivals. During the interviews, all respondents answered that Harela Festival and Makar Sankranti Festival are the two most significant festivals for locals. Harela Festival is a Hindu festival exclusive to the Kumaon region of Uttarakhand state. Farming communities celebrate it as the symbol of the beginning of seeding season (Asian Agri-history, 2005). Makar Sankranti Festival is celebrated in most parts of India: after farmers finish the farming season, they use this period for enjoying time with family, taking care of cattle, and celebrating around bonfires (Melton, 2011, pp. 547–548). In K village, farmers pray before planting, harvesting and during festivals for good



Picture 4. Land god temple near farmer's field in K Hamlet

Source: Zollet and Qu, March 2017



Picture 5. A farmhouse in K Hamlet

Source: Zollet and Qu, March 2017

harvest and prosperity. All agricultural products are offered to the gods first before eating or selling. During those festivals, local people celebrate by preparing and eating traditional food together.

Another spiritual and cultural value that emerged from the interview was the fact that each farming household has a small land god (*Bhumi Devita*) shrine near their farmland. As shown in Picture 4, these land god shrines are built of rocks and symbolic handicrafts, which look strikingly different from the Hindu shrines present inside each house.

The appearance of the village and its rural buildings also plays a key role for agricultural landscape. In K Hamlet, a relatively old building from the British colonial period, made of black and white stones, has been preserved. There are also old farmhouses, usually with a building for livestock, and not far from their farmland (Picture 5). Many traditional farmhouses, however, have already been replaced with modern buildings, sometimes to the detriment of the landscape itself.

V. Discussion

A SWOT analysis (Table 7) was used to summarize all the relevant factors that emerged from the study through a cross comparison between the internal and external factors and their advantages and disadvantages.

Strengths are mainly tied to the social and cultural assets of the villagers, who still maintain many of their traditions in the form of local agricultural beliefs, festivals and foods. Local Hindu festivals and celebrations con-

nected with agricultural activities carry deep historical, authenticity and spiritual values for local farming households. The presence of “land god” shrines also highlights how local agricultural activities are still highly connected with spiritual beliefs. Opportunities manifest themselves in the presence of a mix of human-made and nature elements that form the landscape of K Village and that have aesthetic, social and symbolic values for the local community. The lake is the most publicized symbol of K Village to mainstream tourists, but all village respondents agreed that farmland in K Hamlet is beautiful, and mentioned it far more often than the lake.

These strengths and opportunities can be harnessed to support the maintenance and valorization of the agricultural landscape. Also from the point of view of encouraging a touristic development more respectful of the character of the locality.

Threats are represented by extreme weather events, pests and diseases; the low market price of agricultural produce compared to transportation cost; and a widespread perceived lack of support from the government. The new touristic development, completely disconnected from the local community and its lifestyle and potentially a source of pollution and water-related conflicts, in addition to the unruly behavior of tourists, also represent threats according to the proposed SWOT model. Furthermore, as widely reported both in the GHS and OFS, the misbehavior of tourists causes grievances and social conflict among local people and tourists. The style of the new buildings also contrasts with the traditional architecture of the region, and does not harmonize with the landscape

Table 7. SWOT analysis

SWOT Analysis	Internal Factors	External Factors
Advantages	<p>Strengths:</p> <ul style="list-style-type: none"> • (Historical +) All festivals are related with agriculture (Harela, Makar sankranti) • (Authenticity +) People celebrate by making traditional food together • (Spiritual +) Land god (Bhumi Devita) shrines • (Spiritual +) prayers before each of the main farming season events; offerings of agricultural products to deities 	<p>Opportunities:</p> <ul style="list-style-type: none"> • (Aesthetic +, Social+, Symbolic +) Impression of K Hamlet (farmland, lake and irrigation water) • (Aesthetic +) Beauty of agricultural landscape • Closeness to Nainital (both as a source of tourists and as a market for agricultural products) • Perceived high quality of agricultural products produced in mountain areas
Disadvantages	<p>Weaknesses:</p> <ul style="list-style-type: none"> • (Aesthetic -, Historical -, Symbolic -) Disappearance of traditional agricultural practices and seed varieties • (Authenticity -, Social -) use of chemicals and hybrid seeds • (Authenticity -) “organic” claims not always based on reality • (Social -) Future of agriculture at risk for lack of successors 	<p>Threats:</p> <ul style="list-style-type: none"> • (Social -) Farmer’s constraints with extreme weather, pests and diseases • (Social -) Low market price for agricultural products and high transportation costs • (Authenticity -) Lack of information and training about organic farming • (Social -) No ground level support from government • (Social -, Aesthetic -) New touristic development (hotel and apartments) • (Aesthetic -, Social -, Symbolic -) Negative perception of tourists’ behaviour

Source: Authors’ own Elaboration

of K Village.

Weaknesses are concentrated on the changes in agricultural practices, chiefly on the abandonment of traditional practices in favor of a model of agriculture that has been imposed by agricultural modernization but that may not be suitable to the specificity of mountain areas. Moreover, only a small percentage of households want their children to carry on with the family's agricultural activities. From a long-term perspective, this jeopardizes the continued maintenance of the agricultural landscape, which depends on traditional, labor-intensive practices. There was a strong disillusionment among respondents about the possibility of agriculture of being a remunerative activity for the young generation, both because of the small size of the land owned by each family, the perceived low productivity of agriculture itself, and the various constraints identified by farmers.

The interviews also identified a general sense of skepticism and lack of accurate information about the potential of organic farming to improve farmers' economic situation. This is another weakness that may hinder the development of the organic sector in the area. Farmers' misconceptions regarding the principles of organic farming and food products may also endanger the growing market for organic products, especially as consumers become gradually more discerning.

VI. Conclusion and Further Research

The main findings from this study can be summarized as follows: small scale commercial vegetable production, while practiced by 40% of families in K Hamlet, is limited to a relatively small number of crops and is conducted with a blend of conventional (especially when it comes to pesticide use) and traditional (use of cow manure) methods. However, sustainable agronomic practices (mulching, green manures, intercropping) that may increase yields and soil fertility while reducing the amount of external inputs and pave the way for organic production are not widely known or practiced. While most respondents are aware of the health and environmental benefits of organic farming, it is not considered a viable option, mainly because of the impossibility of receiving premium prices for organic products in the nearest markets. Information dissemination about organic farming in the village has not been carried out in an effective manner, and farmers are not aware of the existence of the UOCB. The lack of young farmers shows how agriculture is not seen as a profitable occupation, and farmers don't generally believe that organic farming could increase their income. On the other

hand, agriculture in K Hamlet possesses several strengths that set it apart from other villages: the presence of an irrigation system (In Uttarakhand, only 10% of farmland is irrigated), the recent spread of mechanization through small tractors, the high quality of the produce (and the fact that it can be produced out of season compared to lowland agriculture), and its closeness to Nainital.

Moreover, it is necessary to strengthen the linkages between the tourism and agricultural sector, which at present are virtually non-existent. It is evident from the villagers' responses that the current tourism development disregards both the potential for sustainable rural tourism and local people's wishes. Moreover, the disappearance of traditional practices puts at risk the agricultural landscape and with it a potential tourism resource. One relatively easy first step to promote a mutually beneficial relationship between local agriculture and tourism would be the hotel's procurement of vegetables from local farmers. Consumers, including tourists, are starting to appreciate organic and specialty products, and agricultural products from mountain areas are perceived by urban consumers to be of particularly high quality. The possibility of farmers in mountain areas to participate in these emerging markets depends on the creation of better linkages not only with urban consumers, but also with tourist resorts (Wymann von Dach et al., 2013). In the case of K Village, the relative closeness to Nainital, which serves both as a source of tourists and as a market for agricultural products represents an opportunity for the development of the village.

The results of this study highlight further research and action needs. Given the low diffusion of organic farming, it would be useful to collect more and more in-depth data about the specific barriers encountered by farmers, and to promote information dissemination and training on this topic; given the significant role of media (radio and TV) in spreading information about organic farming, increasing the amount of information offered through these channels would likely be useful. The activity of the UOCB, that has been coordinating organic farmers and helping them to market their products, should be extended to K Village as well. To reduce transportation costs and receive better prices for agricultural products, some form of cooperative handling and shipping may be a solution worth exploring. Moreover, more support is needed to strengthen the value chain of agricultural products in mountain communities, from the planning to the transportation and delivery stage, to facilitate small farmers' access to markets in cities or tourist locations. This is paramount in the case of organic produce, which

often (especially at first) is not requested by local markets. A successful example in Uttarakhand is the Malta oranges production and distribution cooperative (Wymann von Dach et al., 2013, p. 62), which could be replicated with other agricultural products.

It should also be a priority to protect the disappearing agricultural landscape and rural buildings. To maintain this landscape, important for its environmental, social, cultural and aesthetic significance, organic farming could play a key role, being closer to traditional agricultural practices but also interesting for its economic potential. Capitalizing on the strengths and opportunities that already exist in K Village is fundamental advance the sustainable development of the areas. To address weaknesses and threats, on the other hand, there is a need of seeking innovative solutions both from the government side and from the village community.

An important limitation of the OFS is the small sample, which makes it impossible to draw general conclusions; many of the responses, however, were consistent across respondents with different characteristics, which gives some confidence about using the results to paint a provisional picture of the state of agriculture in K Village, as well as of the issues faced by local farmers. Another limitation was the low representation of women's voices in the interviews. Respondents were usually male, and this made it difficult to collect information about women's involvement in agriculture and in agricultural decision-making processes. Even in the GHS, the occupation of most women is given as "housewife," rather than "farmer," but it is very likely that most of them are engaged in agriculture. This is even more important when considering how a large part of the male labor force, especially among the younger generations, is employed outside of the village.

Notes

1. In this context, household is meant as a family unit as defined by the respondents themselves in the general questionnaire.
2. 1 nali equals to 0.02 ha, 50 nali equal to 1 ha.

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