

# **Achieving food security through opting cash generating crops: a case study on Nepali immigrants in Khanda Gad sub watershed, Garhwal Himalaya, India**

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## **Abstract**

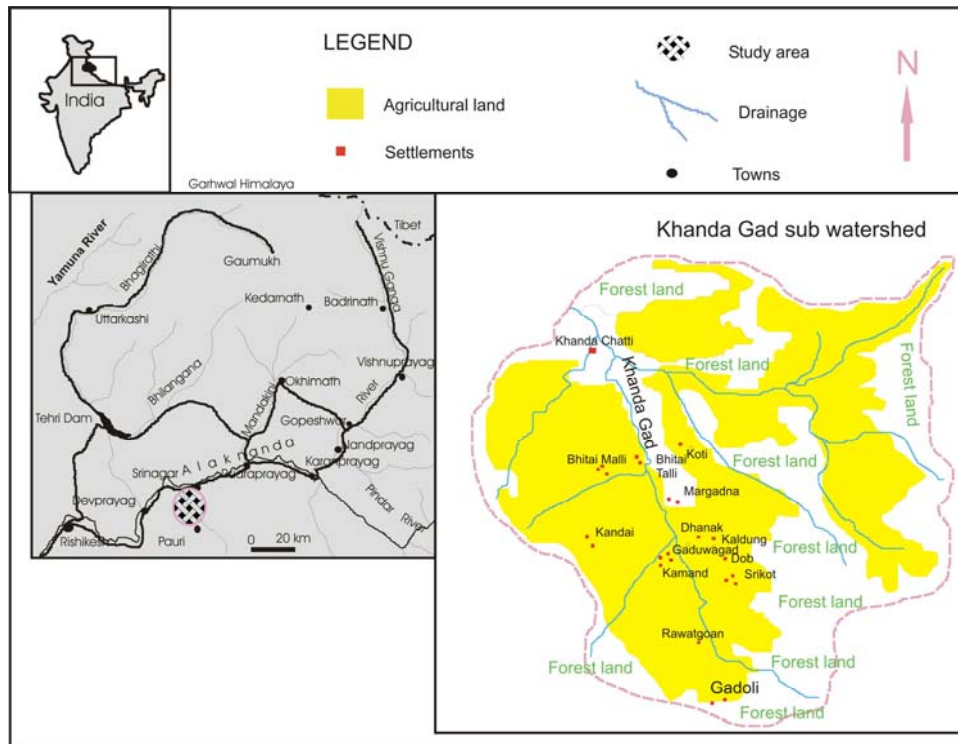
Issues in food security are becoming a prime concern over the globe partly due to increase in population and because of food scarcity. In the Garhwal region, where subsistence cereal crops are dominating in the agricultural system, food scarcity becomes a common phenomenon. The reason behind this is lacking in expansion and modernization of the agricultural fields and tremendous growth in population. The farming community of the region is searching a new possibility for enhancing crop productivity through changes in farming systems on trial and error methods but until now, no specific farming system established that could keep food security for the poor farmers of the region. Cropping pattern has been transformed from cultivation of subsistence crops to paddy and wheat, mainly in the low-lying areas. Cash generating crops such as off-season vegetables, fruits and medicinal plants are getting its footings slowly but steady as the agro-ecological conditions of the region have the potentials for cultivating these crops. This article examines the potentials of subsistence and cash generating crops keeping food security in view and suggests a best practice for cultivating suitable crops, which could lead a way for food security for the next generation. Case study of 62 Nepali households in the Khanda Gad sub watershed was carried out. It was also supported by participatory observation method after routinely field visit.

**Keywords:** Farming system, food security, subsistence, cash generating crop, Nepali immigrant, Garhwal Himalaya

## **Introduction**

Subsistence agriculture is the main occupation of the populace of Garhwal Himalaya, which is mainly based upon the centuries old practices and carried out on the narrow patches of terraced fields. The possibility for further expansion and modernization of agriculture is considerably low because of fragility and steepness of the landscape. Furthermore, the viability of outcome from the subsistence crops in the form of production and productivity is tremendously low. The practice of cereal farming with rearing of draught animals in mixed crop- livestock farming system, has limited potential to maintain the food security and for centuries, the populace mostly remain under-nutrition. As population grow, the insecurity in food staples increases. In the emerging trend of global change, the farmers are fighting with market forces. Meanwhile, the agro-ecological conditions are quite feasible for achieving food security through cultivating cash generating crops such as fruits of various kind mainly apple, citrus and stone, off-season vegetables; potato, onion, tomato, garlic, ginger, turmeric, capsicum, spinach, beans and many other green leaves vegetables and herbs. Cultivating these crops restores environment and pave a way for food security. The proportion of land under cash generating crops is critically low. However, subsistence crops cover more than 80% cultivable land. The main purpose of the study is to discuss the potentials of cash generating crops keeping economic viability of these crops and ecology of the landscape in view. The main questions raised during the study were why should be given priority to the cultivation of cash generating crops and how these crops are economically viable?

The study area (**Figure 1**) is located in Khanda Gad, sub watershed of the Alaknanda River in Garhwal Himalaya. This perennial stream has its source in Khirsu block of Pauri district, which inlet into the Alaknanda River at Kirtinagar, 3 km away from Srinagar Garhwal towards Rishikesh. Twelve villages were selected for case study. These villages are located along the Khanda Gad (both sides) where ample irrigation facilities are available. A survey of Nepali immigrants (65 HHs) was carried out to know the cost-benefit analysis of cash generating and subsistence crops. The households were also interviewed to understand the potentials of both cropping systems. Secondary data of three decades from 1971 to 2007 pertaining to land use pattern were gathered from District Statistical Office and Tahsil Patwari Circles.



**Figure 1:** Location map of Khanda Gad, sub watershed of the Alaknanda River, showing case study villages

## Results

### Changes in Land Use Pattern in the Study Villages

Land use data of twelve villages of Khanda Gad sub-watershed were gathered from census handbook of 1971 and Patwari circle, Srinagar and Pauri of 2007. Three categories of land use such as forest cover, irrigated land and un-irrigated land including total area of the villages were gathered and changes in land use from 1971 to 2007 were calculated. Table 1 shows changes in land use (ha).

**Table 1: Changes in Land use (ha) in the villages of Khanda Gad 1971\*-2007\*\***

Village name	Total Area	Forest land	Irrigated land	Un irrigated land
Margaon	-22.7	3.6	1.9	-12.3
Shrikot Khanda	-10.4	12.8	5.0	2.9
Margadna	5.9	-	0.4	6.7
Bhitai Malli	-0.6	5.2	3.7	28.5
Kaldung	-11.9	4.9	-0.1	35.2
Dhanak	0.5	3.0	0.2	6.9
Gaduwa Gad	-2.9	-	-0.5	17.1
Kamand	-0.3	5.5	-0.4	0.5
Dov	10.1	14.3	-	2.0
Shiyar Malla	20.6	-	1.3	-1.5
Rawat Gaon	-0.2	-	0.4	14.8
Bhitai Talli	-94.5	7.1	-0.7	-55.2
<b>Total</b>	<b>-105.8</b>	<b>56.4</b>	<b>8.8</b>	<b>45.6</b>

Source: \* Census handbook 1971, \*\* Patwari circles, Srinagar and Pauri.

For the last three decades or so, the total land area of the villages decreased as it was 726 ha in 1971 and 620.2 ha in 2007 (-105.8 ha). Contrary, forestland increased from 2.4 ha in 1971 to 58.8 ha in 2007 (56.4). Irrigated land also increased from 14.4 to 261.6 ha (8.8 ha) and similarly un-irrigated land increased from 23.2 to 307.2 (45.6 ha). The increase in forestland was mainly due to Forest Act of India 1982, establishment of *van panchayat* to ensure peoples' participation and because of the uprising awareness among the villagers towards conservation of forest. Increase in sown area was due to high growth in population. Although, the rate of increase is considerably less as compare to increase in population. It was due to large-scale emigration and land abandonment. The other categories of land such as wasteland and cultivable wasteland have decreased simultaneously.

### Case Study of the villages of Khanda Gad Sub Watershed

About 10 years ago, some Nepali inhabitants of Rolpa District of Nepal visited the villages of Khanda Gad. Initially, they immigrated here for search of Job. Meanwhile, they met with the villagers of Khanda Gad (Margaon, Shrikot Khanda, Margadna, Bhitai Malli, Kaldung, Dhanak, Gaduwa Gad, Kamand, Dov, Shiyar Malla, Rawat Gaon, Bhitai Talli) mostly those who were permanent emigrants. From them, they got small patches of land, along the Khanda Gad in lease (Rs. 4000 (Indian) per family per crop season), which were mostly abandoned. Since, the Khanda Gad is a perennial stream therefore it provides ample irrigation facility. Largely, the households (elders) are illiterate but recently their children have joined primary school. The Literacy rate is 31.3% (among children, it is 90%) with 45.3% girl's literacy. Male and female are equally working on the farmlands. **Table 2** shows demographic profile of Nepali immigrants. Total number of households is 65 and total population is 409. Sex ratio is high as 1034 women are against of 1000 men.

**Table 2: Demographic profile of Nepali immigrants**

Village name	Total Nepali HHs	Total population	Male	Female	Literacy
Margaon (Khanda)	10	64	33	31	22 (9)
Koti	10	65	32	33	18 (7)
Dhamkeshwar	10	63	32	31	20 (11)
Khanda Shrikot	2	11	6	5	5 (2)
Margadana	2	13	7	6	4 (2)
Mitai	1	7	4	3	3 (1)
Kaldung	1	10	6	4	4 (2)
Dhanak	4	26	12	14	10 (6 girls)
Gadowa Gad	2	14	7	7	5 (2)
Kamand	4	20	11	9	6 (2)
Dob Shrikot	4	22	12	10	7 (3)
Malli Sera	5	36	12	24	6 (3)
Rawat Gaon	4	24	11	13	7 (3)
Gadoli (tea state)	6	34	16	18	11 (5)
<b>Total</b>	<b>65</b>	<b>409</b>	<b>201</b>	<b>208</b>	<b>128 (58)</b>

**Source:** Surveyed by the author

The Nepali immigrants started cultivating cash generating crops such as potato, tomato, onion, cauliflower, capsicum, spinach, cucumber, pumpkin and beans, commercially. They use both chemical fertilizer (Rs.1400/ha) and manure (Rs.500/ha). Manure is easily available from the nearby villages. Every cluster of HHs has a pair of oxen, which they use to plow fields and get manure. Responding for a question, a head of Nepali immigrants in Dhanak village informed that there is no negative change in the production of off-season vegetables even they are using chemical fertilizers for high production of vegetable crops. However, still subsistence agriculture is done in the middle patches of agricultural fields by the native farmers but the production and per ha yields of the crops are considerably low. **Table 3** shows production of off-season vegetables in twelve villages of Khanda Gad in 2007-08. Highest production among off-season vegetables is obtained from cauliflower (727 quintal) followed by

tomato (1790 boxes). Potato ranks third. Capsicum (118 quintal), beans (144 quintal) and cucumber (310 quintal) obtain lowest rank in production respectively.

**Table 3: Production of off-season vegetables in Khanda Gad 2007-08**

Village name	Area ha *	Production (quintal/boxes)					
		Cauliflo wer	Cucum ber	Tomato (boxes)	Capsicum	Beans	Potato
Margaon (Khanda)	5	70	30	350	12	15	Nil
Koti	5	70	30	350	12	15	100
Dhamkeshwar	5	70	30	350	12	15	200
Khanda Shrikot	2	30	12	140	4	4	100
Margadana	2	30	12	140	4	4	
Mitai	1	12	06	60	2	2	
Kaldung	1.5	15	08	170	2	3	Nil
Dhanak	5	70	30	350	12	15	Nil
Gadowa Gad	2	30	12	140	4	4	
Kamand	5	70	30	350	12	15	Nil
Dob Shrikot	5	70	30	350	12	15	Nil
Malli Sera	4	60	25	300	09	11	Nil
Rawat Gaon	4	60	25	300	09	11	Nil
Gadoli (tea state)	5	70	30	350	12	15	Nil
<b>Total</b>	<b>51.5</b>	<b>727</b>	<b>310</b>	<b>1790</b>	<b>118</b>	<b>144</b>	<b>400</b>

Source: Primary collection \* Patwari circles Srinagar and Pauri

**Table 4** shows area and annual income of off-season vegetables and cereals in 2007-2008. The total area under off-season vegetables is 51.5 ha and annual income is Rs. 133, 8100 (Rs. 25, 982 per ha) while under cereal crops, it is 330.4 ha land and Rs. 502, 1600 annual income, which is Rs. 15, 198 per ha. Similarly, the numbers of households working for producing off-season vegetables are 65 while, 368 households are involving with cultivation of cereal crops.

**Table 4: Area and annual income of off-season vegetables and cereal crops 2007-2008**

Off-season vegetables	Area (ha)	Annual income (Rs.)	Cereal crops	Area (ha)	Annual income (Rs.)
Cauliflower	15	5, 08900	Wheat	100	1472000
Cucumber	3	2, 17000	Rice	100	2520000
Tomato	20	1, 79000	Barley	50	760000
Capsicum	3	1, 18000	Millets	50	121600
Beans	3	1, 15200	Pulses	20	70000
Potato	7.5	2, 00000	Oilseed	10.4	78000
<b>Total</b>	<b>51.5</b>	<b>13, 38100</b>	<b>Total</b>	<b>330.4</b>	<b>50, 21600</b>

Source: Primary collection

**Table 5: Production and per ha yield from off-season vegetables and subsistence crops 2007-08**

Off-season vegetables	Area (ha) *	Production (in quintal)	Per ha yield	Subsistence crops	Area (ha) *	Production (in quintal)	Per ha yield
Cauliflower	15	727	48.5	Wheat	100	1520	15.2
Cucumber	3	310	103.3	Rice	100	3680	36.8
Tomato	20	1790	89.5	Barley	50	1840	36.8
Capsicum	3	118	39.3	Millets	50	1472	29.4
Beans	3	144	48.0	Pulses	20	368	18.4
Potato	7.5	400	53.3	Oilseeds	10.4	368	35.4
<b>Total</b>	<b>51.5</b>	<b>3489</b>	<b>67.7</b>	<b>Total</b>	<b>330.4</b>	<b>9248</b>	<b>28.0</b>

*Source:* Primary collection \* Patwari circles Srinagar and Pauri

**Table 5** shows production and per ha yields from off-season vegetables and subsistence crops in 2007-08 in twelve villages of Khanda Gad sub watershed. Main off-season vegetables grown are cauliflower, cucumber, tomato, capsicum, beans and potato. Among cereals, the main crops are wheat, rice, barley, millets, pulses and oilseeds. Land under off-season vegetables is 51.5 ha while under subsistence, it is 330.4 ha. Highest per ha production is of cucumber (103.3) followed by tomato (89.5) and potato (53.3). Under cereal crops, rice and barley (36.8 each) have highest productivity followed by oilseeds (35.4). Concisely, per ha yield of off-season vegetables is 67.7 in comparison of cereals (28.0). This reveals the high potentials of off-season vegetables. If a sizeable proportion of cultivable land is devoted for cultivating cash generating crops, food security can be obtained.

## Conclusions

Cultivation of subsistence cereal crops in the Garhwal Himalaya do not meet with the food requirement for centuries. Increase in population on limited terraced agricultural fields further accelerated food scarcity. This has led a way for transformation of subsistence crops into cash generating crops to achieve food security. Similarly, large-scale emigration towards the metropolitan cities and the plains of Ganges for search of livelihood took place. The change in cultivation does not take shape for large-scale transformation while it was limited on the certain valley regions where ample water supply was available and the uplands. Fruit cultivation was also started during the 1980s but remained failure due to various reasons. The present study area Khanda Gad sub watershed presents a unique example of food security through cultivation of cash generating crops but this is mainly being done by the Nepali immigrants not by the native people even they overlooked the success of Nepali immigrants. The Garhwal Himalaya has suitable agro-ecological conditions for cultivation of various crops subsistence as well as cash generating. Here, the emphasis is much more on the land-based development particularly on cultivation rather searching other options of livelihood because it provides immediate base for food requirement. Industrial development could not take place because of landscape and lacking in infrastructural facilities. The following suggestions may do better for sustainable livelihood and may achieve food security:

1. Keeping suitability of agro-ecological conditions in view, a large proportion of land should be transformed into cultivation of cash generating crops such as off-season vegetables, fruits, medicinal plants and tealeaves.
2. Subsistence cereal farming should go parallel because it maintains ecology and diversity in the cropping pattern.
3. Rearing livestock for milk and milk products may achieve food security as the study area has extensive alpine grasslands and feasible climatic conditions for rearing of high yield variety indigenous livestock.
4. Community participation collectively with government assistance should be insured for cultivating cash generating crops so that the populace can attend food security in due course of time.