

## Agricultural Sustainability in North-Western Himalayan Region: Issues and Challenges

Shakir Hussain Malik<sup>1</sup>, Kamlesh Kumar<sup>2</sup>, Abnish Kumar<sup>3</sup>

*Research Scholar<sup>1</sup>, Department of Economics & Public Policy,*

*Central University of Himachal Pradesh, Dharamshala(India)*

*Research Scholar<sup>2</sup>, Department of Marketing and Supply Chain Management, Central University of Himachal Pradesh, Dharamshala (India)*

*Research Scholar<sup>3</sup>, Department of Social Work, Central University of Himachal Pradesh, Dharamshala(India)*

### Abstract:

*Sustainability in agriculture means the ability to maintain productivity, whether of a field or farm or nation, in the face of stress or shock. In other words, it means to develop practices and technologies that will mitigate the major problems in agriculture like erratic weather conditions, pests, increase in the cost of production, climate change, soil erosion, etc. Though the Himalayan mountainous states are rich in biodiversity but there are issues like climate change, degradation of natural resources, soil erosion, fragmentation of land, etc. that poses a great threat to entire Himalayan biodiversity, agriculture, ecosystem and livelihood of its human population. Due to increasing population and growing demand of food, it became very important to support for agricultural sustainability that would be economically viable and environment friendly. The present study will focus on issues and challenges for agricultural sustainability with reference to North-West Himalayan region.*

**Keywords:** *Agriculture, Biodiversity, Climate change, Fragile, Himalayas, Sustainability.*

### I. Introduction

The term “Sustainable development” became famous in 1987 with the publication of Our Common Future in Brundtland report. There are various definitions for sustainable development but the most often cited definition is of Brundtland Report that defines sustainable development as, “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (“Brundtland Report”, n.d.). Sustainable development as holistic approach for improving the quality of life interlinks the three dimensions of social, economic, and environmental well-being and the change in any one of them will impact the other two dimensions (Torjman, 2000).

However, the agriculture sector that continues to be the main source of livelihood for majority of population in developing countries, remained top priority in the overall debate on sustainable development because of various environmental problems that raised from farming activities (Reddy, 1995). Agriculture

performance can be measured by different indicators like: i) productivity, which can be measured in terms of the output of product to input, ii) stability, which is the constancy of output in the face of fluctuations in the surrounding environment, iii) equitability, in terms of income distribution and iv) sustainability, that is difficult to be measured in quantity terms (Conway and Barbier, 1988; Reddy, 1995). Though the agricultural sustainability is difficult to be measured in quantity terms (Reddy, 1995), it can be determined with the sustainable use of natural resources, viz. land, water and agricultural biodiversity (Shiva and Bedi, 2002). Sustainability in agriculture means the ability to maintain productivity, whether of a field or farm or nation, in the face of stress or shock (Conway and Barbier, 1988). In other words, it means to develop practices and technologies that will mitigate the major problems in agriculture like erratic weather conditions, pests, increase in the cost of production, climate change, soil erosion, etc. Jodha defines sustainable agriculture in terms of sustainability as the ability of a system, i.e. the fragile resource-agriculture to maintain a certain well-defined level of output over time to enhance the same without damaging the essential ecological integrity of the system (Jodha, 1991).

Sustainable agriculture also means the use of organic materials, minimal use of synthetic fertilizers, pesticides and antibiotics, and on-farm resources (Hill and MacRae, 1988; Hansen, 1996).

## II. North-West Himalayan Region

The Himalayas in India covers about 18 per cent of the geographical area and accounts for more than 50 per cent of the country's forest cover and 40 per cent of the species endemic to the Indian subcontinent. The Himalayan states consists approximately 4 per cent of total population in India and majority of the population depends on agriculture, animal husbandry and horticultural products. Though the Himalayan region is rich in biodiversity, but there are challenges like climate change, degradation of natural resources, soil erosion, fragmentation of land, etc. that poses a great threat to entire Himalayan biodiversity, agriculture, ecosystem and livelihood of its human population. Problems like the loss of biodiversity, forest cover, agricultural productivity and ecosystem services are interlinked in the Himalayan region that threatens the sustainable livelihoods of not only millions of populations living in the mountainous region but also much larger population inhabiting the adjoining Indo-gangetic plains ("Himalayan Resources", 2012). There are also issues like lack of livelihood opportunities, access to jobs, increasing outmigration that need to be addressed and efforts have to be taken for sustainable development.

The North-West Himalayan region consists of three states: Himachal Pradesh, Jammu & Kashmir, and Uttarakhand.

The state of Himachal Pradesh, which is almost wholly mountainous can be divided into five zones: (i) wet sub-temperate zone, (ii) humid sub-temperate zone, (iii) dry temperate-alpine high lands, (iv) humid sub-tropical zone, and (v) sub-humid sub-tropical zone. Agriculture is the main source of livelihood as it contributes about 16.20 per cent to the net state domestic product and 69 per cent of population directly depend upon agriculture. The sector also employs about 3.10 per cent of total population. The state is extremely rich in hydroelectric

resources and it has been estimated that about 20,300 MW of hydroelectric power can be generated. Due to the geographical and climatic conditions, the fragile ecology of this mountainous state is vulnerable to various natural disasters. The environmental problems that has been created through the increased and consistent pressure on the mountain environment like landslides, heavy snowfall, flash floods, forest fires, land degradation, removal of vegetation and soil erosion is of great concern for agriculture sustainability in the state. It has been estimated that about 58 per cent of the land which is mostly located in Himalayas is subject to intense soil erosion (Govt. of Himachal Pradesh, 2012).

The state of Jammu and Kashmir comprises of three distinct climatic regions: cold arid desert areas of Ladakh, temperate Kashmir Valley, and the humid sub-tropical region of Jammu. Jammu & Kashmir State is predominantly an agrarian economy with about 80% of its population engaged in agriculture and allied sectors. Major food crops are wheat, paddy and maize. Barley, jowar and bajra are cultivated in some parts of the state. Agro-climatic condition of this state supports horticulture. About 5 lakh families directly or indirectly related with horticulture activities. The economy of J&K mainly depends on agriculture, horticulture, tourism, water supply and the water towers for hydroelectric and mountains of the state played an important role for the region's economy. The fragile ecosystem of J&K is vulnerable to issues like climate change, floods, human induced changes, deforestation, landslides, uncertain weather conditions, etc. Due to climate change, the state will face serious threat to biodiversity, forests, wildlife, fisheries and water resources in the coming decades. It will also badly affect the productivity of agriculture and thus will lead to deficit in food productions (Govt. of India, 2011).

Geographically, the state of Uttarakhand can be broadly divided into three zones: upper hills, middle hills, and foothills. Most of the northern part of state is covered by Himalayan peaks and glaciers. About 14 per cent of total area are used for cultivation which is small amount because most of the area is under the forests and wastelands. Economies of scale cannot be availed and the input cost per unit of output is higher, because majority of the farmers are sub-marginal and small (89 per cent). The soil of tarai region is very fertile and support to number of crops. Indiscriminate use of chemicals and overexploitation of groundwater makes the soil of this region less fertile, causing the reduction in the sustainability in productivity. On the other hand, the hill region is prone to constant soil erosion due to steep slopes making it less and less fertile, which could be achieved through adoption of better management practices. Besides the threats there are ample opportunities of increasing production and productivity, especially in the field of pulses and oilseeds, availability of cultivable waste land, conservation of rain water harvesting activities. There is also a good opportunity of organic farming, diversification of agriculture, post-harvest technologies, strengthening of market interventions, and use of farm machinery to make the agriculture more profitable occupation (Govt. of India).

### III. Issues and Challenges for Sustainable Agriculture in N-W-H Region

The main challenge for sustainable agriculture in the region is to meet the increasing demand of food and to improve the livelihood of mountainous people. However, there are certain issues and challenges regarding sustainable agriculture that can be assessed in terms of unsustainability which includes different indicators as: first is resource base, i.e., decline of groundwater table and the loss of biodiversity; second is the resource productivity which means the persistent decline in crop productivity and production of biomass, and third indicator is resource management which means the disappearance of various forms of diversification and the disappearance of institutional arrangements to provide support and framework for resource conservation (Jodha, 1993).

The main issue that poses greatest threat for sustainable agriculture in the region is climate change. The problems arise from climatic conditions could have both direct and indirect effects on the crop, soil, livestock and pests. The continuous increase in temperature resulted the widespread melting of glaciers of N-W-H region creates the threat to Himalayan biodiversity and ecosystem, thus creates the unsustainability in agriculture. Though the magnitude of impact may vary over the region, it has been observed that climate change will impact agricultural productivity and shifting in cropping pattern. The vulnerability of agriculture sector in the region would be emphasised at different levels including the crops and livestock, farm, cropping and food systems. The implication of climate change on agriculture is far reaching and would affect the livelihood of mountainous people, food security, water shortage, Himalayan ecosystem, etc. hence majority of hill population would face serious consequences. In the absence of institutional arrangements and measures to mitigate the problem, there would be unsustainability in agriculture that will create food security issues that would endanger the livelihood and food security of the Himalayan region.

Extensive use of chemical fertilizers and pesticides is another problem for agricultural sustainability. Due to the unbalanced and extensive use of pesticides, synthetic fertilizers, antibiotics, etc the toxic residual effects remain unnoticed that pollutes the water and fresh harvest and it resulted the growing of new weeds which is very harmful for human health. Also, the use of farm yard manure or organic materials have been decreased in the region.

Another problem for sustainable agriculture is environmental issues which arises due to faulty human interventions and due to which Himalayan ecology got unbalanced. The environmental issues would affect the agriculture because the conversion of forests into agriculture fields, rivers, streams, etc would erode the adjoining agricultural lands and sloping runoff water causes depletion of ground water resources.

Conversion of agricultural area into horticultural and other residential plots also creates unsustainability for agriculture. In J&K, agriculture land had shrunk due to developments in other sectors like construction of roads, educational institutions, railways, and conversion of agriculture land under horticulture activities (Govt. of J&K, 2014-15). In J&K, the area under paddy cultivation has been decreased from 158000 hectares in 2003 to 141300 hectares in 2012. The area under horticulture crops is 242000 hectares and in Kashmir alone, area under apple

cultivation is 143000 hectares. Similarly, in Himachal Pradesh, area under horticultural products continuously increased from 44329 hectares in 1970-71 to 195684 hectares in 1995-96 and the area under fruit cultivation increased from 792 hectares in 1951-52 to 2.5 lakh hectares in 2004-05 (Govt. of Himachal Pradesh, 2005).

Destruction of agroforestry and surrounding green environment is another issue for unsustainability of agriculture. Agroforestry is source of livelihood to mountainous people as it provides fuel wood, timber, fibre and also adds greenery to surrounding environment. Due to deforestation, new environmental problems arise like soil erosion, changes in weather conditions, reducing soil fertility, low rainfall, loss of flora and fauna, etc which may have direct as well as indirect effects on agriculture and hence on its sustainability.

Besides the above issues and challenges, there are various other challenges for sustainability of agriculture in the hill ecosystem where the traditional methods of farming and cultivating the land is replaced by modern technology and synthetic chemicals that would be the biggest challenge for sustainable agriculture in future. Therefore, there is urgent need to focus on the unsustainability issues in agriculture sector particularly in the mountainous states where the agrobiodiversity is on the verge of destruction and similarly where the livelihood opportunities are limited.

#### IV. Suggestions

For sustaining the agriculture in future, the focus should not only to increase the food production but also to ensure the environment protection and providing the socio-economic opportunities of the mountainous people.

- The government should intervene to create awareness among the people about the causes and consequences of climate change and how it will badly affect the agriculture.
- Need to adopt the organic cultivation which is environment friendly as compared to conventional agriculture. As it has been observed that conventional agriculture is producing 10-12 per cent of annual global green-house gas emissions.
- Encourage farmers to adopt agroforestry that will keep the surrounding environment green and also provides the other sources to households.
- Less use of synthetic chemicals and fertilizers.
- In order to reduce the soil erosion of agriculture land, conservation till farming method should be used that can cause minimum disturbance to the top soil.
- Mostly Himalayan states have gentle slopes, therefore contour farming would be very useful practice to help hold soil and slow down loss of soil through run-off water.
- Similarly, terracing can control the soil erosion by controlling run-off water.
- Further conversion of agriculture lands into orchards should be banned.
- Efficient use of irrigation methods and other techniques.

## V. Conclusion

This paper tries to understand the different issues and challenges in agriculture sustainability in Himalayan mountainous states particularly in North-West Himalayan region where there is great scope in agriculture sector particularly in commercial crops but at the same time unsustainability issues in agriculture sector poses a great threat to agrobiodiversity and also creates socio-economic challenges for human habitation. This paper also tried to suggest different methods to mitigate the issues and challenges for agricultural sustainability in the region.

## References

- [1] Brundtland Report (n.d.). Retrieved from <https://www.britannica.com/topic/Brundtland-Report>
- [2] Torjman, S. (2000). *The social dimension of sustainable development*. Ottawa: Caledon Institute of Social Policy.
- [3] Reddy, V. R. (1995). Environment and Sustainable Agricultural Development: Conflicts and Contradictions. *Economic and Political Weekly*, 30(12), A21-A29.
- [4] Conway, G. R., & Barbie, E. B. (1988). After the Green Revolution: Sustainable and equitable agricultural development. *Futures*, 20(6), 651-670.
- [5] Shiva, V., & Bedi, G. (ed) (2002). *Sustainable agriculture and food security: The impact of globalisation*. New Delhi: Sage Publications.
- [6] Jodha, N. S. (1991). *Mountain Farming Systems: Coping with Unsustainability Prospects*. Kathmandu: FAO Farm Management Commission for Asia and Pacific.
- [7] Hill, S. B. & MacRae, R.J. (1988). Developing Sustainable Agriculture Education in Canada. *Agriculture and Human Values*, 5(4), 92-95.
- [8] Hansen, J. W. (1996). Is Agricultural Sustainability a Useful Concept? *Agricultural Systems*, 50(2), 117-143.
- [9] Himalayan Resources (2012). Retrieved from <https://chimalaya.org/2012/08/27/himalayan-resources-issues-and-challenges/>
- [10] Government of Himachal Pradesh.(2012). Baseline Survey on Assessment of Existing Knowledge Level, Awareness and Preventive Practices of Disaster Management in Himachal Pradesh.
- [11] Government of India. (2011). State Action Plan on Climate Change: Jammu and Kashmir. Ministry of Environment, Forest and Climate Change. New Delhi.
- [12] Jodha, N. S. (1993). *Indicators of unsustainability: Approaching sustainability through unsustainability*. Kathmandu: International Centre for Integrated Mountain Development.
- [13] Government of J&K. (2014-15). *Economic Survey*. Directorate of Economics and Statistics.
- [14] Government of Himachal Pradesh (2005). *State of Environment Report: Himachal Pradesh*. Department of Environment, Science & Technology.