World Development Perspectives 6 (2017) 25–31

Contents lists available at ScienceDirect

World Development Perspectives

journal homepage: www.elsevier.com/locate/wdp

# Political ecology of climate change: Shifting orchards and a temporary landscape of opportunity

Aghaghia Rahimzadeh *

*University of California, Berkeley, Department of Environmental Science, Policy, and Management, Mulford Hall, 130 Hilgard Way, Berkeley, CA 94720, USA*

ARTICLE INFO

*Article history:*
Received 28 December 2016
Revised 3 March 2017
Accepted 5 March 2017

*Keywords:*
Climate change
Western Himalaya
Livelihoods
Land use change
Human-environment interaction

ABSTRACT

As the global climate and local weather patterns change, the apple belt of the state of Himachal Pradesh in the Indian Himalaya has been migrating to higher elevations. Kinnaur District has experienced rising affluence over the last two decades driven by its growing apple economy, the rapid expansion of which may not have been possible without climate change. As the climate continues to change, new opportunities and risks are emerging. Forests and pasturelands that were once uncultivable and least accessible are gradually becoming preferred land for orchards, while some older, lower elevation orchards are experiencing lower productivity. This paper observes the role that climate change has played in shifting patterns of agricultural production, driving land use change – both enabling and threatening Kinnaur's current 'Golden Era.' Lessons may be learned from detailed attention to the specific circumstances under which climate change is beneficial or detrimental. The findings of this qualitative ethnographic research suggest that for Kinnaur, climate change has had net favorable consequences thus far. Balanced against these climate-related gains are also emerging risks – increasing pests and diseases, declining productivity of lower elevation orchards, soil depletion, and over-dependence on a single source of livelihood. As the climate and markets continue to change, they may not favor Kinnauri apple growers in the long term. Without thoughtful planning, this current window of opportunity could be squandered. Good land stewardship and livelihood diversification might make the Kinnauri economy more sustainable.



## 1. Introduction

> Earlier, the higher areas were colder and not suitable for the cultivation of certain crops like apples. Now the climate is getting warmer and even the higher areas are no longer as chilly. So people are moving even higher up to cultivate. But the problem is that there is no land. If there is land, then you can go up, if there is no land, where can you go?
>
> [Interview, September 2012]

Since India's Independence in 1947, and especially since the early 1990s, Kinnaur District of Himachal Pradesh has been experiencing profound changes transitioning from a subsistence-based society to a market economy. Warming temperatures have created new land at high elevations suitable for commercial apple plantations, enabling greater economic prosperity and social progress, while some older orchards at lower elevations are declining. This paper illustrates how climate change is shifting the physical and environmental characteristics of the land, and changing patterns of agricultural production and land use. This ethnographic research considers how climate change has created opportunities and risks for the Kinnauri people.

Much of the literature on the impact of climate change examines populations at immediate risk, giving little attention to those who might benefit from climate change, even if only temporarily (O'Brien & Leichenko, 2003). Adger et al. (2007, p. 720) write that, "The poor and marginalized have historically been most at risk, and are most vulnerable to the impacts of climate change." The current Kinnauri encounter with climate change is in contrast to the general experience of the poor and marginalized described commonly in climate change literature. The case of Kinnaur shows that marginalized people may not always immediately suffer from the consequences of climate change. There are circumstances under which climate change may create temporary benefits.

Partap et al. (2012, p. 3) write, "climate change is enhancing opportunities for cash crop farming in high mountain areas that used to be permanent grasslands until a decade ago. Farmers in the high mountain areas of Himachal Pradesh [...] are busy planting apples in their pasture lands." Specifically in Kinnaur, climate change has been an important influence in the expansion of the apple economy, especially in the last two decades, as warming

* Present address: Kentfield, CA 94904, USA.
*E-mail address:* aghaghia108@gmail.com

http://dx.doi.org/10.1016/j.wdp.2017.03.004
2452-2929/

temperatures have increased the area suitable for growing apples.

This paper examines the transformation of the Kinnauri economy into a prosperous apple-producing region – first enabled by broader political and economic changes in India, and later expanded by climate change. This prosperity may be at risk, however, if livelihood diversification or sustainable farming practices are not adopted. There are early indications of trouble in lower elevation orchards and some other sites – reduced productivity, increased pests and diseases, and crop losses due to weather volatility.

### 1.1. Study area

Kinnaur District is located in the remote southeastern corner of the state of Himachal Pradesh in the Indian Himalaya (see Fig. 1). The district is adjacent to the Tibetan border and extends over 6400 km$^2$ of the Western Himalaya. Three roughly parallel mountain ranges, the Zanskar, the Great Himalaya, and the Dhaula Dhar Ranges traverse Kinnaur. Their year-round snow-covered peaks range in altitude from 5180 m to 6770 m. The Sutlej River is the easternmost and longest of the five tributaries of the Indus River and flows out of Tibet into India at Shipki La Pass draining Kinnaur. The district is roughly divided into three zones along the Sutlej River – Lower, Middle, and Upper Kinnaur – that have distinct agro-climatic characteristics corresponding to their differing altitudes. Kinnaur ranges in altitude from 1800 m to above 3000 m, and experiences considerable differences in rainfall between Upper and Lower Kinnaur. The district as a whole is rugged and mountainous. As a result, cultivable agricultural land is limited, land in general has low fertility, and the land that can be cultivated has been heavily terraced (Chandra, 1981; Singh, 2003).

### 1.2. Historical factors leading to Kinnaur's economic transition

Many of the conditions faced by Kinnaur today originated with India's Independence in 1947. The coalescing of various political, economic, and social events as described below initiated the transformation of Kinnaur from a pre-capitalist economic system based solely on subsistence agro-pastoralism and trade, and propelled it towards a market economy dependent on horticulture. The state's vision of development engendered a fundamental conversion of the 'hilly' areas of HP including Kinnaur.

State interest in horticulture began in the late 1950s and early 1960s when a newly independent India was in the process of state building and economic development. The country's Western Himalayan region was targeted for horticultural development. Commercial horticulture programs were initiated as a means of improving the livelihood of the area's majority rural and mountainous population. The district of Kinnaur was encouraged to grow temperate fruits such as apples, cherries, apricots, pears, almonds and walnuts.

Transportation infrastructure has been crucial in the development of Kinnaur. The 1962 Indo-China war that was fought along the border of India and Tibet led to significant infrastructure development, beginning with the construction of National Highway 22 through Kinnaur, enabling the population greater access to distant markets. National Highway 22, supplemented by a series of link roads, joined formerly isolated areas to Kinnaur's centre, and connected the district to the Indian plains, accelerating the adoption of commercial horticulture and spurring economic change.

The concept of cash is relatively new in Kinnaur. Prior to India's Independence in 1947, Kinnauris traded with their Tibetan neighbours and participated in regional barter fairs. In the 1970s and 1980s, with a better road system, the commercialization of apple cultivation spread and cash started to become available to average

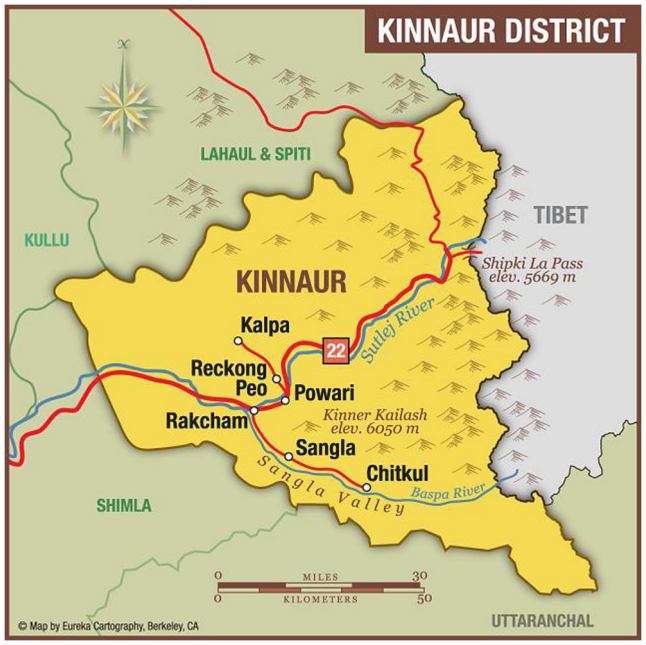


**Fig. 1.** Kinnaur District.

Kinnauris. Simultaneously, state land reforms gradually provided small plots of land to Kinnauris, enabling the slow adoption of apple production and a transition from trade and subsistence agro-pastoralism to cash crops.

Kinnaur's economic transformation began to take hold in the late 1980s. In 1988, about 70 percent of cultivable land in Kinnaur was still under traditional crops such as buckwheat (*Fagopyrum esculentum*), an important dietary staple of the local people (Sharma & Minhas, 1993). By the mid-1990s, apples had become a significant source of livelihood, and were rapidly becoming the dominant source. In 2011–2012 total horticulture area under fruit production was 12,868 hectares, of which 10,102 hectares were under apple production (Government of HP Department of Economics & Statistics Kinnaur, 2013). This was a big jump from 1961 and again in 1991, when only 300 and 4431 hectares respectively were under apple production (Government of HP, 1991). According to field data, almost every household, regardless of caste and socio-economic background, has a small piece of land and, at the very least, a handful of apple trees. Of the 127 individual Kinnauris interviewed for this research, all (100 percent) owned land and profited from apple orchards. Field observations and interviews revealed that subsistence practices are declining as most cultivable land has been converted to apple orchards. Increasingly, higher elevation forests and pastures are also being placed under apples.

### 1.3. Various factors enabling the development of formerly marginal lands

While this paper focuses on the influence of climate change on the development of high elevation apple orchards in Kinnaur, it is necessary to recognize that there are a number of economic and demographic factors in this development.

Apples have been among the most expensive domestic fruit in India. Due to their relatively high price, consumption has been limited to middle and higher income sectors of society. As India's economy grows, however, and the Indian middle class expands, more people are diversifying their food consumption and including what was once considered a luxury food item (Deodhar, Landes, &