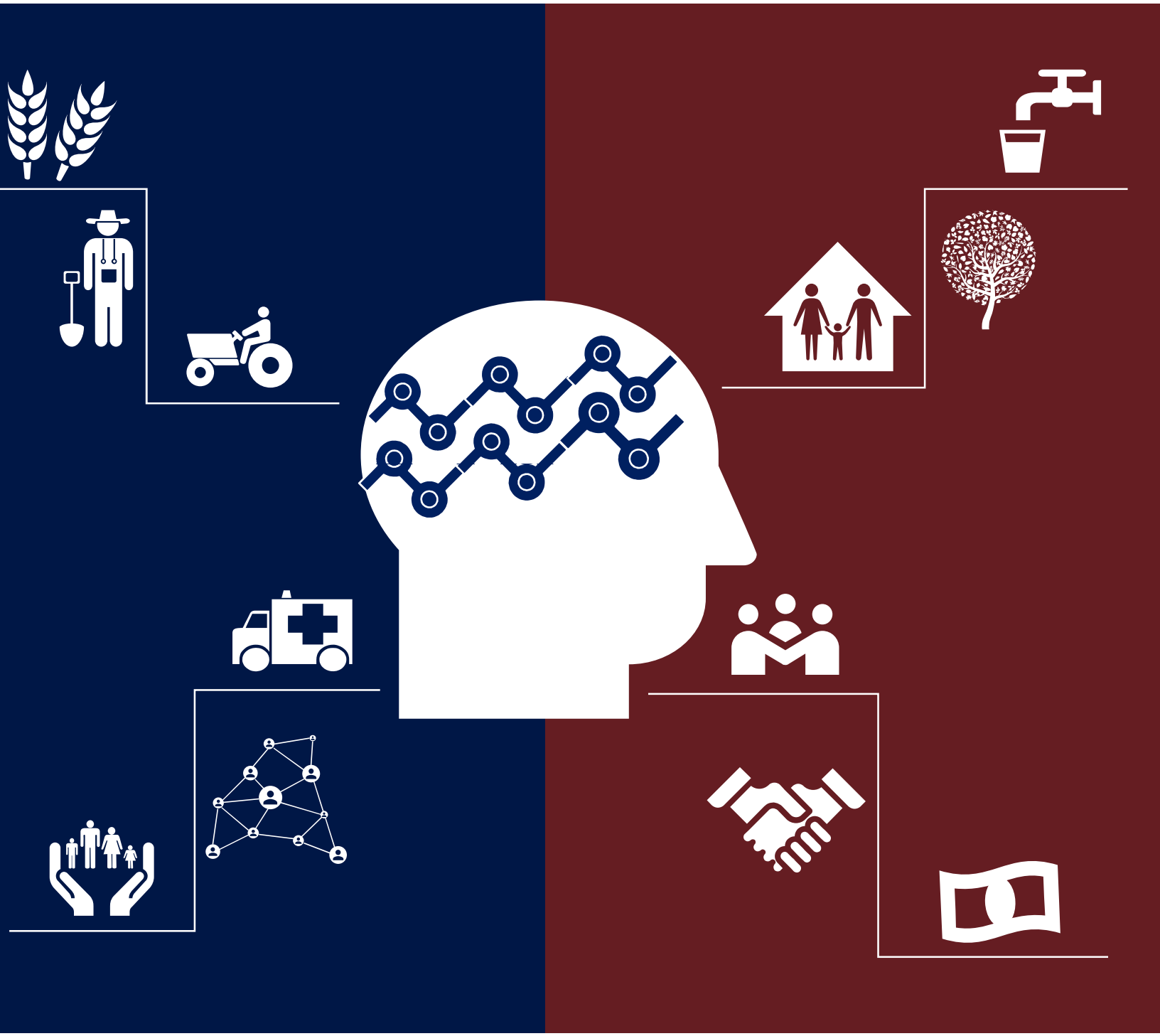
Learning Rural Management

– Cases and Caselets



Ministry of Human Resource Development
Government of India

सत्यमेव जयते

Irrigation Water Availability at Ayee Village, Ladakh

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Challenge

Tesring Angchuk is the newly appointed villagemen of Ayee Village of Nubra Valley, Ladakh. He has been introduced to the decades-old problem of irrigation by farmers of the village. Angchuk is making rounds to the office of District Collector in an attempt to present a government-sponsored watershed development project for irrigation. At the waiting room of the office, he meets Sonam Thardot, Sarpanch of Arano Village who tells him about the Ice Stupa model of Sonam Wangchuk. Angchuk is impressed with the idea; however, he ponders over the feasibility of the plan. He is in a dilemma to apply for a government-sponsored watershed development or go with Ice Stupa model to solve the water crisis of his village.

Setting up the Context

The water crisis in Ladakh is an age-old problem faced by every citizen living in the cold desert. The problem is tackled through Zing, traditional water conservation practices which makes the communities suffer from agriculture most of the time. Majority of the farmers practice organic farming where they refrain from using pesticides and fertilizers in any form. Most of the villages in Ladakh, especially in Nubra Valley, practice subsistence agriculture which also serves as the only option for Livelihood to most of the families. However, with the advent of Ladakh's introduction to the tourism space, the Ladakhi communities have passively subscribed to globalization and have entered the market in several regards. The increase in consumption and demand for organic produce has made the farmers in Ladakhi villages to increase their production, requiring more water for irrigation. The farmers of Ayee village face the same challenge. Tsering Angchuk, the villagemen who himself is a farmer, is concerned with the availability of water for increased production. The village primarily utilizes water from Chamsen, a natural stream which flows from the mountains situated behind the village. The village, however, has no mechanism to store the water. The water flows from the stream through a canal that has been built on one side of the street and ends in the farms. The current mechanism allows each farmer to irrigate land on the alternative day which helps them manage the scarcity whichaffects their overall production. The production as quoted by farmers can increase by nearly 30% (refer to exhibit 1) if they get to irrigate their land in a proper routine.

Moreover, the villagers engage in various other livelihood options like Tourism, MGNREGA and working as porters at the Indian Army (refer to exhibit 6). Hence, they feel deluded to work on improving agriculture and sustaining their livelihoods through other means. The myopic understanding of agriculture and interlinking it with water availability are the only source of sustenance and it has demotivated them in the past decade.

Background

About Ayee Village

Ayee village is one of the Buddhist villages of Nubra Valley. It is situated 70 km from Diskit, the headquarter and 5 Kms from Kobe, the village panchayat. Woven with a population of 181 The Villagers, the village holds 37 households with a demographic age of 37.22 years. The formation of the village holds primitive foundations with a blurred history. The village marked its existence with four families who came to a small land in search of food and shelter. The rural dynamics revolve around subsistence agriculture as a primary occupation. The village has witnessed zero net migration in the past ten decades

with seasonal economic migration as a trend. The villagers engage in agricultural from April to July. They engage in MGNREGA labour work from January to March. The land sees rest in winters from August to February. Dwindling literacy and high school dropout rate also predicts the economic instability of the village. The village entails a sharing economy with non-economic give and take phenomenon. Untapped as a tourist destination, Ayee withholds an ancient meditation cave and famous Juniper tree and related stories.

Moreover, the use of traditional agricultural practices and organic farming makes Ayee stand as the fully organic village of Nubra Valley. As a village in a remote area of Nubra Valley, it has suffered from opportunity crisis concerning government schemes, basic amenities, and proper institutional infrastructure. Exhibit 2 represents the demographic characteristics of the village.

Village Institutions and Facilities

Ling Road is the only street in the village. All the houses are situated in this street. This 3 has 37000 work equipped private dry toilets but no domestic water supply. Nine public taps provide water from a canal flowing from the Glacier, which includes drinking and local water supply to all the houses. Moreover all the houses have television set. While the LPG connections are available to the villagers, all the households have traditional Bukhari (wood powered furnace) on which they cook their daily meals. The reason for the low consumption of LPG is not the awareness but the heat generated from this furnace that keeps the room warm during winters. Moreover, the street displays two non-functional public toilets which are on the outskirts of the village. The village receives electricity for 5 hours from 600 PM to 1100 PM. The availability of electricity has taken a toll on the productivity of the village since the electricity in the households is available only during non-work hours. The time is utilized in charging mobile phones and watching local Ladakhi news which turns out as the mode of entertainment for the villagers. There were two street lights witnessed on the outskirts of the village near the community hall, which also functions for five hours. Overall, the village street has limited resource availability which is publicly shared by all the households of the village.

The unavailability of other basic amenities like school, Panchayat Ghar and temple makes it difficult for the villagers to mobilize activities during the winters when the valley observes heavy snowfall, and it becomes difficult to move out of the village. The reason being the functioning of important institutions creates a lot of idle non-productive time for villagers. The apartments are made of bricks while the rooftop of every house is covered with leaves which is useful in insulating the room during winters and even during summers. The street also witnesses a school at the endpoint of the village however the school was closed down due to inadequate educational facilities provided by the government.

Agriculture in Ayee Village

Agriculture and livestock are an essential part of the lives of Ayee villagers. People here do not particularly view agriculture as an economic activity; instead, they see it as a part of their lives. Subsistence farming is quite predominant at Ayee. People here own tiny pieces of land. The average landholdings are just a fraction of an acre. Ayee has a net cultivated area of 0.2064 acres. With crops including Carrot, Cabbage, cauliflower, potato, onion, turnip, garlic, tomato, peas, capsicum. Coriander and Radish. When it comes to agricultural equipment, the villagers are mostly conservative. Even today, most of them plough their lands with bulls (yak). The entire village has only two tractors. The tractor is the only mechanized agriculture equipment they use. Chemical fertilizers are non-existent in the village and the Nubra as a whole region. Moreover, the land is equally divided among all the households and no land fragmentation exist in the village. The cropping season is Zaid period from April to June since it

becomes difficult for the villagers to practice agriculture during winters in snowfall. Most of the produce is retained for household consumption, and the surplus is sold in the Leh market during October month of every year.

Climate Change and Ayee Village

Climate change as an issue has been addressed by the villages in terms of rainfall, snowfall, and the water table. Nearly every household surveyed presented their concern to climate change by talking about the decrease in the level of snowfall over the past few years. Moreover, the villagers experience unseasonal rainfall during the agricultural season. It makes the rainfed irrigation ineffective and unreliable alternative to solve irrigation water scarcity. The villagers also discussed increasing the water table, which further affected the agriculture practices of all the households. The reason quoted and too significant as the geographical location of the village is in one of the coldest places of Ladakh resulting in raw oriented perspective to climate change.

Moreover, this is hardly done anything to cope with climate change. As far as green governance is concerned, every household is ready to invest the proposed amount mainly in dealing with the issues of electricity, water and a decent proportion to the waste management system. They are prepared to spend a hundred hours of labour work in building solar farms, water bodies and the incinerators for proper waste disposal. Moreover, it was observed that the female members of the family interested in building water bodies wild the male counterpart interested in installing solar farms to deal with the issue of electricity.

A decent proportion of the population of the village believed in building watershed on the Siachen river to solve the water issues rather than to build water bodies. Every household was excited to venture into the current cult phenomenon of making Ice Stupas and Artificial Glaciers solve the problems related to water. Overall, the villagers proactively participated in promoting initiatives that could help them solve problems directly related to the significant development issues concerning the village.

Water Crisis in Ladakh's Villages

Ladakh, an earthly paradise isolated from the world, is permanently happy. But the problem has started brewing in this paradise. Dry taps and tube wells and a possibility of a prolonged water crisis are casts huge shadows on its present and future. Leh, its largest city, rations water—two hours in the morning and in the evening— from months in summer. Other parts of Ladakh region including villages of Nubra Valley are no better. Ayee village observes the same crisis every year. The village has an abundant water supply till the winter ends, i.e. April. The agriculture season starts in the month of May and ends in June. The crops grown during the season remains the same; however, the production rarely changes every year. The output for the year, the price in the market and the transportation cost for the year 2018 is given in exhibit 3. Water has diminished in these streams, and runs empty on frequent basis throughout the year. The numbers are disturbing. There was half to 80% shortfall in yearly precipitation in Ladakh somewhere in the range of 2013 and 2017, and 2016 witnessed the lowest rainfall of all time.

Ladakh is an arid desert, and its parched atmosphere makes conditions brutal for farming. Practically 90% of farmers in Ladakh are subject to snowmelt water for the water system. Researchers state the water issue around there is basically because of environmental change. There has just been a 3 degree Celsius ascend in the average temperature of Ladakh in the previous four decades. This has caused less snowfall and quicker snowmelt in the higher districts. In the western Himalayas, the ice sheet spread has diminished by practically 20%, and a portion of the icy masses are confronting an existential danger. Specialists state an extensive temperature alteration has influenced the precipitation design antagonistically in these higher locales. In the last couple of years, generation of absolute yield declined

by 30% to half. Harvests, for example, potato, grain, turnip, radish, and peas have endured due to non-accessibility of water.

Ice Stupa in Ladakh

Ice stupas are artificial glaciers is considered as an answer to the water crisis in Ladakh. Ice stupas shares a similar physical outlook as that of a Buddhist Stupas. The person behind the concept of ice stupa is Sonam Wangchuk, associate degree engineer from Ladakh. The idea has smitten him once he saw ice hanging to a lower place a bridge in summer. The Ice Stupa retain its shape till the end of the winter season. The melting speed of artificial glaciers will increase rapidly when it is exposed to daylight and wind. Hence, it has to be utilized quickly and efficiently. Sonam Wangchuk started engaging on ice stupas by capturing and freezing water. The water occupied sometimes keeps flowing away into the rivers throughout the winter. The essential plan behind ice stupas is to obtain water, sprinkle it, and freeze it for an extended time. Construction of ice stupas typically starts in winters. This system wants no pump or power. The water piped from upstream will rise to the peak of the supply. The water speeding out of the pipe starts to freeze in cold winter nights (at -30 to -50°C). The water 1st freezes at the bottom level then mount higher increasing the peak of ice stupa. Because the height of the stupa will increase, it naturally takes the form of a cone. To support the structure, ropes and willow branches are used. Because of the cone structure, the stupa will escape melting. As these ice cones extend vertically upwards towards the sun, they receive less quantity of direct daylight. It helps the ice stupa to flee melting and last longer until summer. With easy and economical construction (refer to exhibit 4 for cost estimation), ice stupas will positively solve farmers and villager's drawback. It may also facilitate in establishing an inexperienced tract on the brown desert.

Storyline

Tesring Angchuk is concerned about the issue on multiple fronts. Firstly, agriculture provides for 95% of the total food requirements of all the families of the village throughout the year. Aversion from agriculture will lead to food crisis during harsh times in winters as the distribution and storage of food will be severely affected. In order to ensure a continuous supply of vegetables and grains, agriculture is necessary for subsistence. Secondly, lucrative propositions like tourism, MGNREGA and porter work has limited availability and cannot promise stable employment to all the working members of the village. A slight instability in the market or economy will leave them unemployed, leading to poverty and deprivation. Thirdly, in order to combat with the water scarcity, the farmers will resort to inorganic practices which will help them yield crops at a faster rate, losing the essence of organic practices and ending up harming their own family. Angchuk though faced with complex sets of problems, is determined to propose a solution that can solve the water crisis of the village.

Meeting with District Collector

Angchuk has reached the district collector multiple numbers of times but still faces to get funding or a better proposition for solving the issues associated with irrigation. He has presented three proposals of building a watershed model for preserving the natural stream water of Chamshen, building a watershed to divert and utilize the water of Siachen river and bringing water supply through pipes sponsored by the government. The collector has shown no expression on building a watershed for Chamshen, however, has ignored the proposition of Siachin river and water supply through pipes. She has quoted political conflicts with respect to Siachin river as the reason for impotency to establish a watershed project. While she has denied the proposal for water supply as Ayee village is situated in the remotest part of Nubra Valley which makes it expensive and infeasible to establish a water channel to fulfil their irrigation requirements.

Meeting with an Ice Stupa Engineer

Angchuk, after receiving a non-cooperative expression from the government, decided to visit a young Ice Stupa Engineer working at SECMOL to understand the feasibility of building Ice Stupas. He discovered that the stupas require a lot of skilled and trained personnel than unskilled labour, unlike a watershed development project. Moreover, the villagers will have to continuously monitor the progress of an Ice Stupa and will have to ensure that the structure is kept away from any leakage and improper construction. However, the overall cost requirement of building an Ice Stupa is grounded as compared to a watershed. Another exciting aspect of Ice Stupa is the time of maintenance. Though it requires consistent monitoring, the relative months of support are less than the watershed management. The Ice Stupa needs proper planning with respect to its place of construction and further channels for distributing the water in the required field. After gathering information and knowledge of alternative available, Angchuk returns to the village with the hope of seeking a solution to the water scarcity along with the fellow members of the village.

Response

After returning to the village, Angchuk calls for a village meeting where he presents all the available solution to the villagers and Sarpanch. They listen to him carefully and gets confused with what alternative to choose. Moreover, the meeting evolves with the formation of three groups who propagates different ideas for solving the irrigation problem. One group proposes to follow the watershed development for conserving the Chamsen water as the stream is going to provide the pool irrespective of any climate change. The other group offers the construction of Ice Stupa as it requires less maintenance and hence could save a lot of time of the villagers where they can engage in other activities during winters. The third group proposes to approach a higher authority in the government and initiate the construction of watershed on Siachin river as the lands are situated near the river. The fourth group emerges with a different idea but with an old debate of shifting from agriculture and focus on Tourism. Angchuk soon discovers different thoughts between groups and suggests everyone look every alternative from a practical angle to seek the best solution for the water crisis.

However, Angchuk seeks no typical response and participation from all the members of the village. The Sarpanch gives him a week time to find a solution for the issues existing in the village. Angchuk needs help in discovering the answers to the following problems at hand

- What is the best proposition to solve the irrigation problem?
- What can be done to imbibe a sense of collective action among the villagers of Ayee village?
- How to strike a balance between the aspirations of villagers to pursue non-farm activities and agriculture at the same time?

Questions for Discussion

1. Watershed project or Ice Stupa, which is a feasible proposition for Ayee Village?
2. Should transgressing from agriculture and focusing on alternative livelihoods a better option for the villagers?
3. How should Tsering Angchuk engage with the farmers in promoting better water management practices to control water scarcity in future?
4. What should be the alternative way of preserving the Chamsen water if not building a Watershed or Ice Stupa?
5. How should government as an essential stakeholder plan rural development to solve the water crisis of Ayee Village and that of Ladakh?

Annexures

Exhibit 1

Vegetable Production		Proper Irrigation (30% Increase)
Carrot	70	91
Cabbage	69	89.7
Cauliflower	71	92.3
Potato	93	120.9
Onion	91	118.3
Turnip	105	136.5
Tomato	104	135.2
Peas	81	105.3
Raddish	95	123.5

Exhibit 2

Age Group		**Occupational Distribution**		**Skilled/Unskilled**	
0 to 5	10	Farming and Livestock Rearing	79	Working Population (18-60)	50
6 to 12	18	Livestock Rearing	1	Skilled Labour	10
13 to 17	11	Govt. Service	24	Unskilled Labour	30
18 to 30	55	Business	1	Engaged in Agriculture	50
31 to 45	31	Private Service	9	Skilled Labour (Seasonal Migration)	5
45 to 60	40	Student	45	Unskilled Labour (Female)	25
60+	14	Unemployed	8		

Exhibit 3

Vegetable Prices		**Transportation Cost**
Carrot	35	The cost of transporting the vegetables from Ayee to the nearest market is Rs. 40 per Kg of the bag. All the vegetables are collected together, weighed and then sent to the market once in any year through a minibus.
Cabbage	40	
Cauliflower	40	
Potato	15	
Onion	18	
Turnip	45	
Tomato	42	
Peas	60	
Raddish	25	

Exhibit 4

Ice Stupa	Particulars	Cost
Materials	PVC Pipes	20000
	Lights	2000
	Tools	1000
	Transportation	10000
	Motor	2000
Labour	Particulars	Time/Numbers
	Labour Hours	1100 Hours
	No. of Unskilled Labours	20
	No. of Skilled Labour	30
	Time Required to train a Labour	20 Hours
	Overall Maintenance Time	6 months

Exhibit 5

Watershed	Particulars	Cost
Materials	Cement	20000
	Iron	15000
	PVC Pipes	7000
	Tools	4000
	Transportation	28000
	Machinery	9000
Labour	Particulars	Time/Numbers
	Labour Hours	1100 Hours
	No. of Unskilled Labours	40
	No. of Skilled Labour	10
	Overall Maintenance Time	3 months

Exhibit 6

Sector	Annual Income Earned (Average Per Household)
Pension and Salary (Indian Army)	180000
Tourism (Taxi, Shops and Home Stay)	20000
Agriculture	5000
Livestock	2000
Private Service	12000
Porter (Indian Army)	10000
Government Service (Other than Indian Army)	50000

Note The income mentioned above is an average of income calculated from the data collected from the census conducted for Ayee village in 2018.

About the Authors

Avi Jain and Sujaya Kumara are pursuing Post Graduate Diploma in Rural Management at Institute of Rural Management Anand. They came across the problem during their fieldwork at Ayee village in Ladakh. The case is prepared for class discussion and does not intend to provide the real situation faced by the villagers of Ayee village. Moreover, the data represented in the case is collected from the primary sources in October 2018. Furthermore, the authors would like to thank the Ladakh Ecological Development Group and Tsering Angchuk for hosting them during the fieldwork.