ECOLOGY AND DEVELOPMENT
in High Altitude Ladakh:
a Conflicting Paradigm

Harjit Singh
Centre for the Study of Regional Development,
Jawaharlal Nehru University, New Delhi 110067, INDIA

Summary
Ladakh's remoteness and harsh environment resulted in a very distinct culture and economy. The agriculture in particular was highly specialised, while the practice of polyandry assisted in the stabilisation of population and land-holdings. The wars with Pakistan and China and the consequent large military presence and strengthened administration have brought major contacts with outside factors and forces, enhanced by the sudden rise in the number of tourists. The introduction of a cash economy has been accompanied by a dependence on imports of food and manufactures, a devaluation of traditional values, and the rise of new health and environmental hazards. To strike the best compromise between appropriate development and cultural and social conservation will be difficult.

Societies living in high isolated areas ordinarily develop socio-cultural and economic institutions in response to the requirements of the environment. Such regions are generally mountainous where rugged terrain restricts the area suitable for human habitation. Moreover, interaction of such areas with surrounding territories becomes difficult. Such regions, therefore, develop a strong regional identity which is generally different from other environmentally varied regions, but shows a strong imprint of local physical conditions. A serious situation arises when such areas are exposed to outside influences and to modern development. This puts traditional societies in sudden contact with very developed industrial societies. The process leads to major changes in the socio-economic set up. It forces the society to face difficult question of looking at traditional versus modern or indigenous versus exogenous. This also raises the uncomfortable issue as "no matter how attractive a traditional rural society may seem, its people cannot be denied the opportunity to enjoy the benefits of modern development". Leh district of Ladakh is typical of regions where environment is harsh and socio-economic and cultural practices and forms were evolved based on man's harmonious relationship with nature. This relationship faces serious stress today in the light of significant and sudden changes which came about in the region in the recent past. It, therefore, becomes important to understand the following to comprehend the dilemma that the society
in Ladakh is facing today;
   i) The environment and the traditional socio-economic setup reflecting the Man-Nature relations there.
   ii) The factors and the nature of change and its spatial and temporal impact.
   iii) Present day challenges faced by the society and the question of preservation of cultural heritage.

Ladakh, situated in the Trans-Himalayan region of India, is an elevated mountainous region. Nature expresses its harshness in the form of high altitude, rugged terrain and cold arid climate. The physiography and climate not only restrict the habitable area within the region but also put a serious constraint on its interaction with the outside world. Therefore, the society of Ladakh had a very limited interaction with other regions. It is, however, true that Ladakh was not a complete cul-de-sac. In fact, many important overland trade routes passed through this region linking Ladakh with Tibet, Central Asia, Kashmir and North Indian plains. Many of these routes have been used by traders and nomads since early times. This significantly contributed towards the making of the culture of Ladakh. Ladakh gained transit significance where the traders coming from different parts of Asia met and exchanged their commodities and went back to their own places. This enhanced the importance of the region but the culture in no way was adversely affected to any significant level. The local socio-economic setup developed in response to harsh environment, based on pastoral nomadism in the higher parts and subsistence farming in comparatively lower areas.

The higher area located particularly in the eastern part of Ladakh popularly called Changthang is inhabited by the Changpas. The Changpas are pastoral nomads who have been traditionally rearing pashmina goats, sheep and yaks. The main products of the area include wool, meat, hides and yak tails. In fact, Changthang produces some of the finest wool in the world. These local products were partly used for self-consumption and some were exchanged with peasants living in the lower valleys for food grain. The larger part of these products was sold to outside traders in return of consumption items. Wool, hides, yak tails and borax were the main items of trade. The commodities bought in exchange included tea, sugar, utensils, coarse cloth, spices and jewellery etc. A barter system of exchange was prevalent. The traders from Kashmir generally had exclusive rights on the wool trade, particularly pashmina. The Kashmiri artisans had acquired the skill of weaving fine pashmina shawls. The Changpas made intense use of pastures in Changthang which were available during summer months. They traditionally moved to lower valleys.
during winters.

The environment is less harsh in lower parts of Ladakh. Here, the ecology permitted man to settle down and carry out simple farming in a few suitable pockets. Due to rugged terrain and cold arid climate, agricultural activity is possible only in areas which had the following specific features:

i) Relatively lower altitude where temperature is high enough for reasonable duration of time permitting seed to germinate and crops to mature.

ii) Gentler slope which could either be levelled or agricultural terraces could be cut.

iii) Availability of water for irrigation as the climate is arid. Whatever little precipitation (generally less than 10 cm. in a year) falls that mainly occurs during winter months when there is no agricultural activity. Therefore, farming is dependent on irrigation. It is done with the help of kuls (narrow channels) for which water is diverted in the higher reaches and taken to the fields.

iv) Adequate soil cover to sustain plant roots and provide essential nutrients. Large areas in Ladakh occur in the form of bare rocky surfaces.

The above mentioned conditions are met only in a few areas. These are associated with certain geomorphic features such as river terraces, glacio-fluvial fans and valley floor. Therefore, all agricultural settlements are confined to river valleys where the above mentioned geomorphic features are found. It is not surprising that the inhabited area is highly limited. It cover only 394 sq.km, i.e. slightly less than 0.5% of the total geographical area of the region which equals 82,665 sq.kms. The cultivated area is even less and accounts for around 25 percent of the total inhabited land. Man settled down under these constraints and adopted self-subsistence farming (see diagram). Limited agricultural land is owned either by individual farmers or by the Gompas (Buddhist monasteries). Traditionally, it was tilled by the farmers themselves or by tenants particularly the land belonging to the Gompas.

Agricultural inputs have been simple in the form of non-mechanized agricultural tools. Ploughing is done using animal power especially of yak and dzo and irrigation through gravity by kuls. The farming involved intensive use of manual labour. Manure, made mainly of night soil and some animal dung, formed an important input. Part of the produce was kept as seed to be used for the next sowing. It shows very limited use of modern techniques and inputs such as improved varieties of seeds and chemical fertilizers etc.
intensive operations like sowing and harvesting were done with the help of community labour provided on a mutual exchange basis. Major crops grown included grim (naked barley), wheat, peas and oal (alfalfa). Grim, wheat and peas were roasted and ground to make tsampa - the staple diet. Some barley was fermented for making chang - the local light alcoholic drink. Oal is a fodder crop and is dried and preserved for winter use. Natural pastures are available only during summer months and animals have to be stall-fed during winter. All agricultural activity is confined to summer and the growing season extends for about four to five months only in a year. Production, thus, is limited. It is, therefore, natural that most of the produce will be meant for self-consumption with limited agricultural surplus. Whatever surplus the farmers and the Gompas generated it was exchanged with the traders and the nomads.

Social structure was evolved tuned to the economic conditions and environmental compulsions prevalent in Ladakh. Good illustrations of such adaptations are depicted by the polyandry system of marriage and by the Gompa (Buddhist monastery). Traditionally, Ladakhi Buddhists had the practice where only the oldest son in the family would marry. His younger brothers generally not more than two would be the co-husbands of his wife. This system played an important role in this region having fragile eco-system and limited carrying capacity. It controlled the size of population on one hand and checked fragmentation of agricultural land on other. Property passed from the father to the oldest son and the younger sons had no right on the land. Since cultivable land is limited and land holdings small, it would become nonviable to cultivate if fragmented.

Similarly the Gompa, primarily a religious institution, emerged more like a "community centre". They played an all encompassing role in the society of the region. Their significance has been notable in the local economy, cultural activities, local medicine (Amchi system), legal matters, traditional education and also in political spheres. Their role continues to be important in many of these aspects of Ladakhi life even today.

After having looked at the traditional socio-economic setup, it will be appropriate to see the nature and the factors of recent changes and their impact on the society and polity of Ladakh. As stated earlier, Ladakh due to its nodal location had been receiving traders from different parts of Asia. These traders bought food and some other local items from Ladakhis. The interaction of Ladakhis with the outside traders had very limited adverse impact on the culture of the region. The trade continued till late 1940s but after 1947 it started facing problems as the boundaries came to be defined more rigorously.
Ecology and Development

With trade becoming weaker, the interaction of Ladakh with Central Asia and Tibet declined. It, however, got enhanced with Kashmir. The boundary question gained a greater importance after the Indo-China border dispute of 1962. It was then, that the strategic significance of Ladakh was realised in a big way. This significance got further enhanced after the conflict with Pakistan in 1965 and 1971. It needs be mentioned that Ladakh is the only region of India which forms international border both with Pakistan and China. The Indian Army moved in a big way into Ladakh after 1962. Strategic consideration also led to the strengthening of local administration. Consequently, a number new offices were established in the region. This resulted in the coming in of many officers and other employees. The Leh-Srinagar highway was put on regular vehicular traffic in 1966. This further enhanced the interaction of Ladakh with Kashmir and through it with various other parts of India. Leh town emerged as an important market town dealing with all modern items of use.

The Indian Army and administrative personnel also generated demand for items like vegetables etc. This had major impact on the self-subsistence farming and on land use. The peasants had been growing food grains mainly for self-consumption. The coming up of market at Leh town made it possible for farmers to change cropping pattern in favour of some market oriented crops like vegetables and fruits etc. The farmers started selling vegetables and fruits to the army and other officials. They could now buy food grains, brought from other parts of the country to the Leh market. However, this kind of change was noticed mainly in villages located near army settlements or close to Leh town. For example, the author observed that Saboo village situated near Leh supplied vegetables worth one hundred thousand rupees in 1972. In fact, vegetable farming was negligible in Ladakh till 1962. Besides, a lot of job opportunities came up for the local people. Army units like the Ladakh Scouts and other paramilitary forces such as Indo-Tibetan Border Police (ITBP) and the Indo-Tibetan Border Force (ITBF) were strengthened. This provided employment to many Ladakhis. The army also hired ponies to carry supplies to remote army posts. All this brought significant changes on the following lines:

i) Many Ladakhis started earning cash. It came from salaries as was the case with employees or by hiring out ponies etc. This changed the largely prevailing barter system to a money economy.
ii) Many of the items of consumption available in the army stores also became available to the locals. This changed their food habits. The consumption of items like rice, sugar, alcoholic drinks like rum etc., increased considerably.
iii) Exposure of Ladakhis significantly increased. It led to changes in their living style. For example pressure cookers, improved metal hearths, factory made clothes, glazed windows, patent leather shoes became common in Ladakhi households.

iv) Enhanced interaction resulted in Ladakhis realizing the importance of modern education and made available to them the allopathic system of medicine.

v) Traditional polyandry system of marriages declined. It may be mentioned here that polyandry system of marriage was banned through legislation in early 1950s in the Jammu and Kashmir State of which Ladakh is a part. The system persisted and started declining only in the 1960s and more importantly during 1970s.

The most important single factor of change in the socio-economic setup of Ladakh is tourism. It began in the region only in 1974. It must be remembered that earlier, Ladakh was a restricted area due to defence considerations. All non-Ladakhis including other Indians had to get a permit to visit the region.

Table I  Tourist Arrivals at Leh (numbers of individuals)\(^6\)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreign</td>
<td>551</td>
<td>650</td>
<td>4580</td>
<td>7692</td>
<td>9621</td>
<td>9834</td>
<td>13104</td>
</tr>
<tr>
<td>Domestic</td>
<td>27</td>
<td>128</td>
<td>253</td>
<td>265</td>
<td>876</td>
<td>621</td>
<td>1013</td>
</tr>
<tr>
<td>Total</td>
<td>578</td>
<td>778</td>
<td>4833</td>
<td>7957</td>
<td>10497</td>
<td>10455</td>
<td>14117</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreign</td>
<td>13200</td>
<td>12786</td>
<td>12933</td>
<td>11785</td>
<td>12245</td>
<td>12828</td>
<td>13688</td>
</tr>
<tr>
<td>Domestic</td>
<td>1115</td>
<td>2936</td>
<td>2894</td>
<td>3063</td>
<td>3698</td>
<td>3683</td>
<td>4114</td>
</tr>
<tr>
<td>Total</td>
<td>14315</td>
<td>15722</td>
<td>15787</td>
<td>14848</td>
<td>15943</td>
<td>16511</td>
<td>17802</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreign</td>
<td>16256</td>
<td>16074</td>
<td>6342</td>
<td>8014</td>
<td>13580</td>
<td>12918</td>
<td>15369</td>
</tr>
<tr>
<td>Domestic</td>
<td>8608</td>
<td>6664</td>
<td>396</td>
<td>1041</td>
<td>2438</td>
<td>1135</td>
<td>2080</td>
</tr>
<tr>
<td>Total</td>
<td>24864</td>
<td>22748</td>
<td>6738</td>
<td>9055</td>
<td>16018</td>
<td>14053</td>
<td>17449</td>
</tr>
</tbody>
</table>

Parts of Ladakh were opened to tourists in 1974. The rich cultural heritage, exotic land and Tibetan form of Lamaistic Buddhism started attracting tourists in a big way. The above table shows a rising trend in the number of tourists since 1974. Their number reached nearly to 25,000 tourists in 1988. Normally between 15 thousand to 20 thousand tourists visit Ladakh every year. The year 1988 was an exceptional one as Kal-Chakra function was performed by Dalai Lama in Ladakh. This attracted a large number of tourists that year. It may be mentioned that Ladakh also has very high potential for adventure
tourism due to high mountains with snow covered peaks and vast unexplored areas. In fact, a survey conducted by the author in 1989 shows that nearly 12 percent of the total tourists visited Ladakh mainly for adventure tourism. It can be seen from the table that most of the visitors are foreign tourists. This created a more serious impact on the society due to greater economic and cultural distance between the tourists and the hosts. The number of tourists is again likely to go up soon because some of the hitherto restricted areas like Nubra and Changthang have been opened to tourists in 1994. Along with tourism, other infrastructure in the form of roads and schools have also been developed in Ladakh during the last three decades. A lot of tourists infrastructure came up in the form of hotels, restaurants and guest houses. It was observed by the author that Ladakh had no hotel or guest house till 1973. The only place of stay was P.W.D rest house and circuit house in Leh town basically meant for the visiting officials. However, there were thirty registered hotels and thirty - four guest houses in Leh town in 1989. Around eleven hotels belonged to the "A class" and were quite expensive. These hotels and guest houses had the capacity of 1,552 beds. It may be mentioned that tourism in Ladakh was developed suddenly in a haphazard manner, without considering its possible consequences on the local community and the environment. As expected, this kind of highly commercial activity was bound to have implications for the region which had weak economy but strong culture. The main considerations for tourism were to boost the economy and earn foreign exchange. The politico-strategic factor of showing greater links of the region with the rest of the country was another factor for the development.

Tourism and other developments which occurred in Ladakh during the last three decades significantly influenced the socio-economic structure. Some of these changes were positive in nature while other had negative impact. The major impacts can be seen in the economic and social spheres and also on environment. As mentioned earlier, Ladakh had a self-subsistence economy based on traditional agriculture and pastoralism largely following the barter system. The tourist and other outsiders generated demand for many local products such as vegetables, fruits, handicrafts and curios etc. Several shops selling these items were established especially in Leh Town. It may be known that many of these shops in Leh Town are run and owned by non-Ladakhis. Besides, the demand of local handicrafts did not lead to any significant rise in their production. In fact, a lot of items sold as local handicrafts are made in other places like Punjab and Delhi etc. The businessmen get a larger margin of profit in selling these rather than producing them locally. The demand of agricultural products led
to changes in land use. The region which was producing mainly food grains for self-consumption also started raising crops meant for market. Ladakh is highly suitable for vegetable farming but as stated earlier, vegetable farming was negligible. It was because there was no market on the one hand and the first requirement of the peasants was food grains on the other. However, Leh Town became a market centre and other facilities developed in Ladakh. Now the locals could buy food grain from the market and sell vegetables there. This led to shift in the cropping pattern. An increase in area under vegetables to the tune of 34 per cent was registered during 1973-74 to 1985-86. In order to raise production, the farmers also started making use of some modern agricultural inputs in a big way. The use of chemical fertilizers, insecticides and pesticides was nearly unknown in the region. Traditionally, Ladakhi farmers made excellent use of night soil and animal dung as manure. A survey, conducted in 1988 of Saboo and Stok villages situated near Leh town, showed that more than 70 per cent farmers had started using chemical fertilizers. Many of them were also using improved varieties of seeds and other modern inputs. However, this made farming more resource intensive and some of the smaller farmers are finding cultivation to be unviable. A few cases of small farmers being marginalised in villages around Leh were noticed. They are either giving up farming in favour of jobs related to tourism or some have even started working as agricultural labourers. It is interesting to note that the Ladakhi society traditionally rested on cooperation. All labour intensive works like sowing, harvesting and house construction etc. were done on the basis of mutual exchange of labour. Most households owned some agricultural land. The category of agricultural labourer was nearly non-existent. Now, there is an increase in their number and agricultural labourers rose by 225 per cent during 1971-1981.

A decline is also noticed in the traditional arts and crafts. Now, these are produced mainly for selling purposes. Thus, these lack religious fervour and commitment as seen traditionally. Therefore, the quality of the products is quite poor. As stated earlier, many of these items sold as local products are imported from other places where these are mass produced. Recent changes, however, did provide a boost to the economy. A large number of jobs have been created in the recent past in hotels, offices, schools and in the army. Job opportunities also became available to the Ladakhi youths to work as tourist or trekking guides. All this raised the importance of modern education. Only 10.3 per cent people were literate in Leh district in 1961. The figure increased to 15.8 per cent in 1971 and again to 25.16 per cent in 1981. The growth in literacy, as expected, was
much higher during 1971-81. In fact, the number of young boys and girls going for higher education to areas outside Ladakh also increased substantially in the recent times.

As mentioned above, Ladakh had a largely barter system but tourism brought commercialisation in a very sudden and quick way. This brought a lot of inflow of cash. It has been estimated "about Rs.8 million accounting for 17 percent of total tourist expenditure was incurred on food by the tourists in Leh in 1988".7 These factors introduced various distortions in the Ladakhi society. In fact, in certain cases, Ladakhis were exposed more to foreign currencies like Deutsch mark, French frank, British pound, American dollar, Italian lira and Japanese yen than to the Indian rupee. This happened more during the initial stages of tourism when heaps of these currency notes could be seen on altars of the Gompas. The local people were seen to be comprehending prices and rates more in exchange rates of foreign currencies rather than in Indian rupee. In fact, some roadside beggars started flying to Leh from Chandigarh during tourist season. They found it more lucrative to beg from the foreign tourists.

Along with economy, the socio-cultural set up also underwent significant changes. One significant change was the sudden rise in population. The decadal growth rate of population in Ladakh has been less than 10 percent during 1901-61. It rose to 19.1 percent during 1961-71 and phenomenally to 30.5 percent during 1971-81. The rise was mainly because many outsiders migrated to Ladakh to cater to the tourist needs and to man offices and provide services to the army. Along with it, the out-migration from Ladakh in search of jobs got checked in the light of opening up of new employment avenues there. Besides, local culture also got commercialised where traditional dances and drama came to be performed more in response to tourist demand on payment. These started losing their seasonal and occasional significance. The significance of the Gompas changed from that of a "community centre" playing role in all walks of Ladakhi life to that of a place of tourist attraction. Here tourist went by buying entry tickets and admired these more as "the relics of earlier culture". Fewer and fewer families started sending their young children to these monasteries to be ordained as monks. Some Lamas also began to get attracted to material comforts. However, those arts and crafts which have found new commercial values are progressing well under the changed situation. These include traditional dances, music and crafts of thangka (scroll) painting, mask making and the weaving of shawls and pattus (woven woollen strips).

As expected, with increasing exposure and rising awareness of locals their aspirations also rose. Surveys conducted at household
level by the author in the villages show that most of the people wanted better transport facilities, electricity, loans, modern inputs for agriculture, food and fuel at subsidized rate. Moreover, most of them aspired for government jobs for their children. However, they were not very clear about the type of job they wanted. Many of them especially younger people were found to be overwhelmed by the glamorous life style of the tourists. This has brought about many disturbances in the social fabric of this region. The system which relied heavily on mutual cooperation without being conscious of religious or cultural differences has started facing serious stresses and strains due to limited opportunities and economic backwardness or lack of access to modern material comforts. In fact, the differences and identity on religious lines were in the foreground in the recent political disturbances. Such intolerance or differences were hitherto unknown in the region. Moreover, some economic prosperity which Ladakh witnessed in the recent past added to economic disparities because the distribution of benefits was highly uneven. Large share of these benefits accrued to the non-Ladakhis.

The development also affected the physical environment. Pressure on land and water resources increased especially in Leh town and areas visited by the tourists. Garbage disposal has become a serious problem. Contamination of water and soil can be seen in Leh town and also some air pollution is noticed due to heavy vehicular traffic. Water-borne diseases have now become quite common. It is, however, true that a large number of trees have been planted by the government, the army and the local people which have led to greening of certain areas. Somehow this afforestation which is normally taken as a panacea for the environmental conservation is viewed adversely by some people; many believe that the planting of trees have led to occurrence of rainfall during summer months which damages the buildings built in traditional style suitable for arid areas.

It may be mentioned that most of the developments discussed above have spatially varied influence. Mostly the impact is seen in and around Leh town, near army, administrative or tourist centres and along the Leh-Srinagar highway.

It can be concluded from the above discussion that the change during the last few decades has been quite dramatic and have significantly influenced the society and the environment of Ladakh. Some of the influences are perceived to be having positive role while others have negative impact. This raises the basic question of preservation of culture and a host of issues linked with it. It is true that many of us living in the oriental world are quite fond of glorifying the past and even referring to earlier times as golden era. However, it
is also seen that no culture, however remote, remains static and there are always elements of dynamism in it. The importance and relevance of culture needs to be viewed with reference to the stage of development and in a particular time context. Besides, no culture is monolithic and invariably is made up of various elements, many of which outlive their relevance with the passage of time. Thus, the efforts need to be to strengthen the positive aspects of socio-economic setup. For every development or change a price has to be paid due to some of its adverse side effects. But, certainly going back into the past and recreate the earlier basis of society is neither possible nor feasible because the overall socio-economic situation undergoes a change and the context becomes different. The main role of a social scientist, therefore, is to sensitize the society about these changes and suggest ways of maximizing positive aspects of development and minimizing its harmful side effects. It is true that some societies, after attaining a very high level of material culture and of consumption, are genuinely propagating simpler living. But Ladakhis have a long way to reach that level. What are the good aspects of culture which need to be preserved on traditional lines? This is a big question mark. The decision needs to be left to the Ladakhis themselves. But the choice should be made in the presence of options of modern development and not under compulsion when these facilities are inaccessible to them.

REFERENCES

2. For details see HARJIT SINGH "Evolution of space relations in a semi closed system - A Case Study of Ladakh", in Our Cultural Fabric - Cultural Heritage of Ladakh, Ministry of Education and Social Welfare, New Delhi, 1978 P.P. 85-100
4. The figure includes the area under the illegal occupation of China.