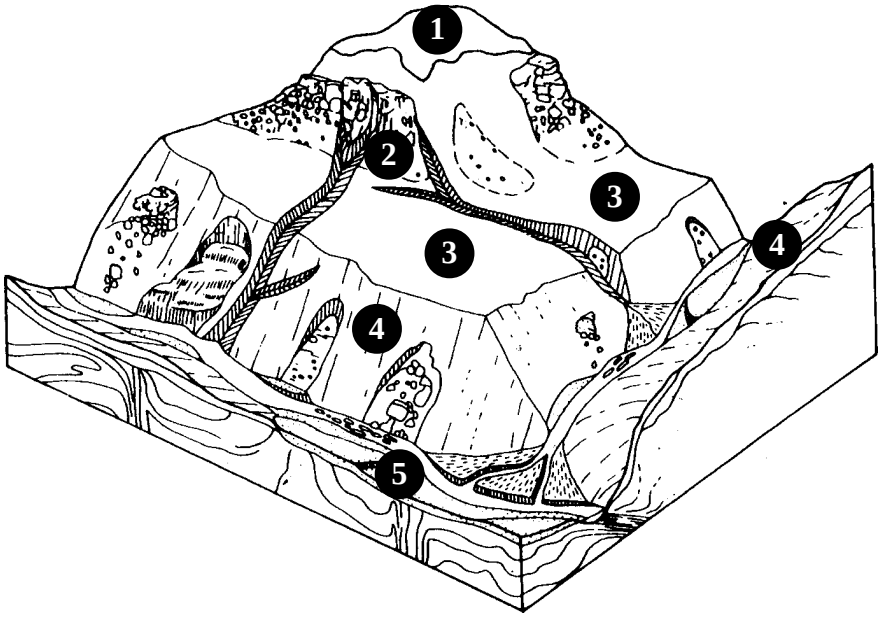
Geo Factsheet

Number 15

Social And Economic Geography Of Mountains

Mountains and highlands constitute 30% of the land area of the world but are difficult places in which to live; steep, unstable slopes, harsh climate, thin soils and low agricultural productivity make them very challenging environments. This Factsheet illustrates, through a number of case studies, some of these problems and the ways in which mountain people have tried to overcome them.

Fig 1. Composite diagram of a mountain landscape.



1. **High altitude glacial and periglacial-** glacial/periglacial conditions, glacial erosion, mechanical weathering and solifluction. Landforms include cirques, angular ridges, peaks, U shaped valleys.
2. **Free rock face and associated debris slopes-** steep rock slopes and cliffs with intense weathering and active mass movement. Avalanches and rock slides may be frequent. Scree slopes weather to provide talluvium.
3. **Degraded middle slopes and ancient valley floors-** gentler slopes, deeper soils, river terrace sediments and fan deposits. Extensive soil creep and soil wash.
4. **Active valley slopes-** high rates of chemical and mechanical weathering and mass movement. Debris slides, rock slides and mud slides.
5. **Valley floors-** valley flows of alluvium deposited by main rivers or tributaries.

The overriding problems which humans still face in trying to live in high mountain areas are caused by slope length and steepness. There are still many mountain regions that are simply inaccessible by road, rail, cable cars or lifts. This vertical dimension brings several environmental hazards; avalanches, rock slides, mudflows, rockfalls, all of which have natural causes but human activity such as deforestation and cultivation has often increased the likelihood of such events.

Mountain climates span extremes of both temperature and moisture and great spatial and temporal variations may occur. Altitude and aspect give rise to clear zonation of mountain environments; such zonation is based upon unique combinations of processes and landforms (Fig.1).

The altitudinal extent and type of agriculture which is possible in mountains is dramatically affected by slope angle, annual and diurnal temperatures, the availability of moisture and soil depth. The greater the slope, the greater the energy input required to sustain agriculture but because of the interaction of other factors, productivity rapidly declines. This immediately puts mountain farmers at a disadvantage relative to their counterparts in the lowlands and in developed countries this has been addressed by the use of special payments or subsidies to mountain farmers.

The highest belt of agricultural land is always the high pastures located above the timber line. In tropical areas such as the South American Andes between Peru and Columbia, this allows year-round grazing but in non-tropical areas, grazing is restricted to the summer months only. In the Swiss Alps, for example, cattle are still moved in September from the high alpine pastures (1800-2700m) to pastures at or around 1600m for the winter months.

Underpopulation and overpopulation

It is often assumed that all mountain environments are underpopulated but there are many examples where this is not the case e.g. the **Central African Highlands** which are cooler and drier than the tsetse and malaria-infested lowlands and the slopes of **Kilimanjaro, Tanzania** which have attracted settlements because of their highly fertile soils.

High mountains have often proved valuable **refuge** areas, offering protection from invaders or oppressive regimes. Mountain communities which are physically separated from each other have developed quite separate linguistic, religious and ethnic identities which then effectively prevent mixing. In such areas out-migration is unlikely and, in developing countries, populations are likely to be growing. Consequently, areas such as the **Caucusus** and **Dardistan** - traversing the Himalayas, Karakoram and Hindukush in Pakistan - have experienced overpopulation and show great ethnic diversity. Whether as a result of physical or cultural seclusion, overpopulation has usually led to overcultivation, deforestation and soil erosion, which effectively combine to reduce the agricultural carrying capacity of the area. In turn, this had led to the development of craft industries, tourism or has stimulated seasonal labour migration as, for example, in parts of the Pontic Mountains in northern Turkey, the Himalayas and in parts of the Eastern Tyrol, Austria.

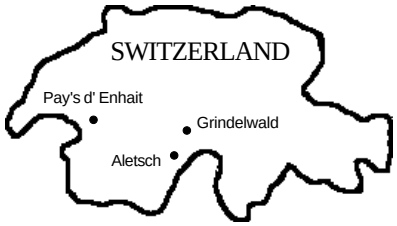
Case Study
The Swiss Alps

In many areas of the Swiss Alps there are few real alternatives to tourism as a source of employment; 200,000 jobs out of a total of just over 500,000 are currently provided by tourism and demand for tourist development continues to increase as leisure time increases and as a result of changing employment practices.

Tourism grew rapidly throughout the 1960s and 1970s as demand for winter sports increased. Until then, transport had represented a serious limiting factor but the potential of tourism stimulated rapid investment and led to the creation, in several areas, of an ***employment monostructure****. Although the growth of tourism is positively correlated with growing populations and rejuvenation of the age structure, native young people are not attracted to jobs within the industry, often preferring migration or jobs within the construction industry, which, given escalating demand for hotels and second-homes, has also expanded. However, stimulation of the construction industry in this way has generated new problems (Fig.2).*

Faced with 'overload' of several existing centres, decentralisation has threatened to cause inappropriate development in what are presently pristine areas. There is also a clear conflict between the needs and expectations of summer and winter visitors; the former demand classical alpine landscapes of extensive agriculture and forested higher slopes and, in survey after survey, serious concerns have been expressed about any further development of winter tourism facilities. Meanwhile, winter skiers remain oblivious to the ecological damage which their tourism infrastructure causes.

Mountain agriculture in the Alps is under great pressure to ***rationalise*** *i.e. to decrease farm numbers and increase livestock densities. Besides the potentially harmful environmental consequences of such a development, it is also likely that total agricultural employment would fall since, at present, there is a pattern of many small farms providing a wide range of different products. Within the Alps there are, of course, areas which represent both ends of the agriculture - tourism spectrum (Table.1)*



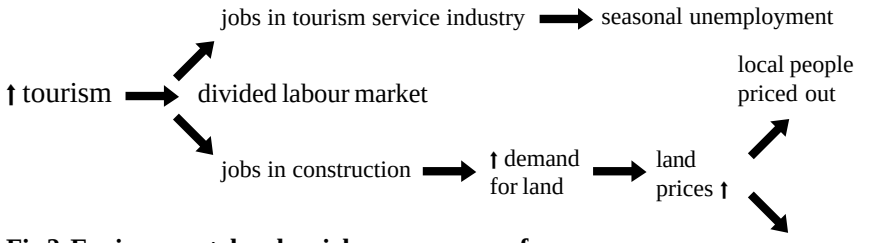


Fig 2. Environmental and social consequences of uncontrolled growth of tourism

Table 1. The agro-tourism spectrum in the Swiss Alps

	Pay's d' Enhait	**Aletsch**	**Grindelwald**
Regional type	Agro-tourist periphery. Rural villages based upon extensive farming. Small number of hotels, usually owned by non-residents.	Development of cable-cars in 1950s led to huge expansion of tourist beds. Agricultural employment in decline.	High, steep-sided mountains, broad valleys. Large tourist resort. Rapid development during 1960s and 1970s of **'parahotellerie'** - a group term for condominiums, second homes and their infrastructure.
Population dependent upon tourism	30%	80%	90%
Population	Declining	Increasing	Increasing
Seasonality	Winter > Summer	Winter >> Summer	Winter < Summer
Problems	Increasing pressure to develop tourist facilities and for agriculture to rationalise.	Ecological and landscape damage from winter sports. Loss of native young people. Pressure on farmers to sell land for further hotel etc. development.	Seasonal unemployment. Conflict between expectations of summer and winter tourists. Serious traffic congestion at peak periods.
Strategies	Financial support offered to farmers for non-tourist based diversification.	Premium payments by participating hotels to farmers to stabilze agriculture. Protection of remaining agricultural areas. Zonation of visitors. Traffic restrictions through villages.	

Mountain agriculture

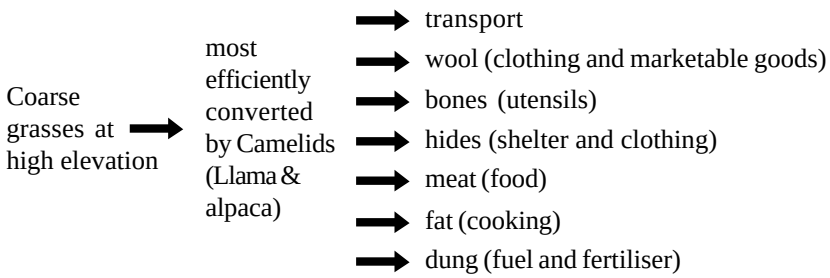
Environmental conditions on mountains invariably make agriculture difficult. In tropical mountain environments large diurnal temperature ranges may exist, making frost damage a year-round risk. In non-equatorial mountain regions great seasonal variations in temperature may make crop selection difficult. Slope aspect and season interact to control insolation which, in turn, affects the length of the growing season, potential evapotranspiration and photosynthetic rates. The development of sustainable agriculture in mountain environments has been a case of trial and error. People have learned to exploit the natural adaptations of indigenous species which have evolved to fit in with their environment e.g. **yaks** in the cold high mountains of **inner Asia**, the annual tuber crops such as **potato** and **oxalis** in the **Andes**. Use has also been made of cold-tolerant crops e.g. **sorghum** in the **Ethiopian Highlands** and of hardy livestock and crops which show either early or late maturity, depending upon the length of the growing season. Vertical or regional movements of farmers and livestock to take advantage of longer growing seasons or extended pasturing are still common in many parts of the world e.g. the **Gujars** in **Kashmir**, the movement of **sheep** and **cattle** in parts of **Central Europe** and cattle in the **Middle Hills** of **Nepal**. Modification of the environment through drainage, irrigation and terracing has gone hand-in-hand with the use of shelterbelts and companion planting.

Case Study
Increasing food production in the Andes

*Rapidly rising populations (3% annually in Bolivia, Peru and Ecuador) have increased pressure for improved housing, food, fuels, clothing and jobs. The governments of most Andean countries are in agreement that reducing population growth is likely to be the most effective way of reducing environmental degradation and that the most effective strategy to achieve this will involve raising individual's standard of living. Priority has been given to the **intensification** of farming rather than the opening up of new areas. However, as the Green Revolution showed, the introduction of improved crop and livestock varieties, more efficient crop combinations and the introduction of soil and water conservation techniques must build upon the farmers existing knowledge, customs and practices.*

***Camelids** (llamas and alpaca) play a central and irreplaceable role in human life in the high Andes and this, coupled with development aid to encourage the farmer s to market their products, is where the beneficial aspects of modern agriculture can best be focused (Fig.3)*

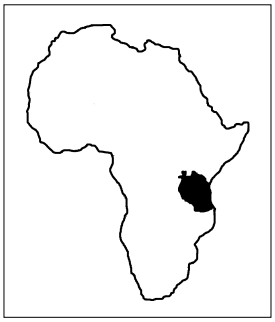
Fig 3. Camelids in Andean agriculture



Case Study
Uluguru mountains, Tanzania

The settlement of the Uluguru mountains, 200km inland of Dar es Salaam have suffered from out-migration of young males. Most migrants head for Dar es Salaam district or city, a trend which first began in the 1960s when population in the Uluguru mountains began to rise rapidly. Between 1960 and 1980 population in the Uluguru doubled, land shortage increased and, as a result of overcultivation, so did land degradation.

At the same time, improved transport links to the cities stimulated cultivation of market vegetables which quickly resulted in Uluguru villages losing, for the first time, self sufficiency in the staple crops of maize and beans. In many villages, total populations are now falling and social and economic decline appears likely.



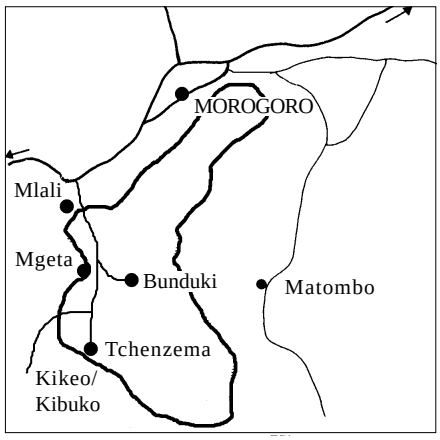
Location of Tanzania in Africa

Table 2. % of population in each age category

Age category	Tanzania	Mgeta
0-14	46	45
15-44	39	31
45-	15	24

M:F ratio <16yrs = 0.98
M:F ratio 16yrs + = 0.7

Fig 4. Uluguru mountains , Tanzania



Case Study
Nepal

Nepal is one of the world's poorest countries with an economy based very largely on agriculture. Irrigable land is in short supply (only 2.6 million hectares of the 14.7 million total is cultivable) and this, combined with the harsh climate, results in a population density of only 25 people/km^2. Population density in the Terai, the main centre for agriculture, is much higher (193/km^2).

Nepal is now infamous for the environmental degradation taking place in the Himalayas and although recent research has placed doubt on some of the supposed causative links, the basic connection between widespread deforestation, soil erosion and declining productivity is clear.

Measurements of suspended sediment in Himalayan rivers suggest that the landscape is being lowered at 1-2mm annually. However, even without human intervention, Himalayan degradation seems inevitable as a consequence of mass wasting, which itself is a consequence of the undercutting and oversteepening of slopes caused by down-cutting streams in the uplifting mountains.

It has been argued that because of the intrinsic instability of mountain environments, overpopulation inevitably leads to rapid environmental degradation (Fig 5).

Location of Nepal

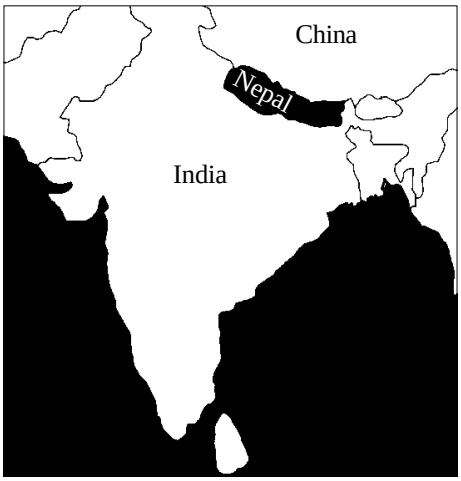


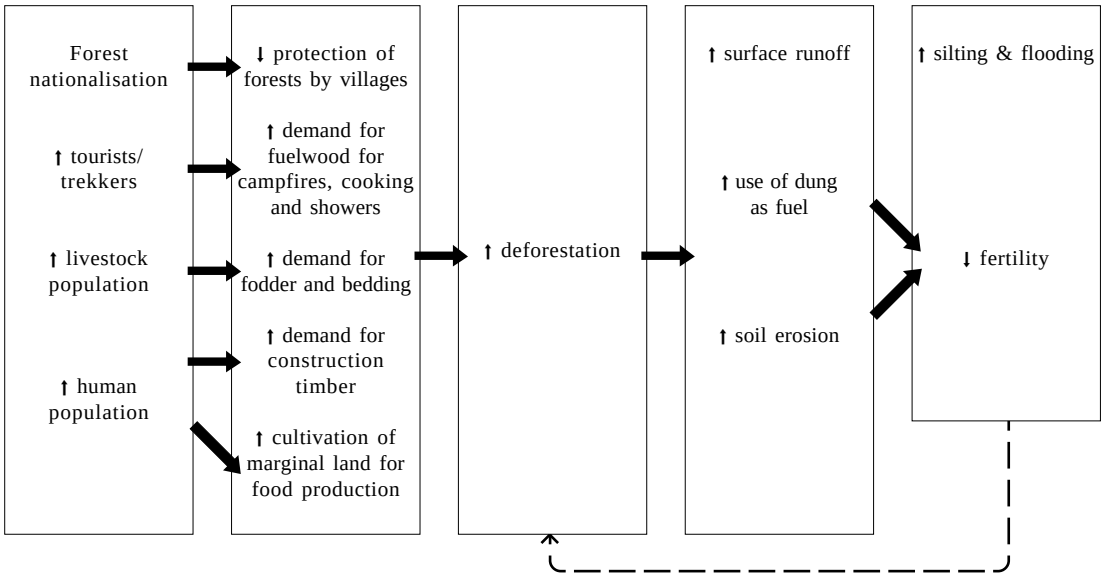
Table 3. Population growth in Nepal

Year	Population (m)	Annual growth rate
1750	3.06	
1911	5.63	
1920	5.57	-0.13
1930	5.53	-0.07
1941	6.28	1.16
1952	8.37	2.20
1961	9.47	1.78
1971	11.56	2.10
1981	15.02	2.6
1991	20.56	2.5

Population increase owes more to declining death rates than changes in birth rates. However, high birth rates are encouraged because:

- *Children are major contributors to tasks such as fodder and fuelwood collection.*
- *Exchanges of goods, labour and money are organised through kinship*
- *Large numbers of children allow some to find work in Kathmandu or India, in order to return cash for land purchase or housebuilding.*

Fig 5. Environmental degradation in Nepal



Exam Hint *- Detailed exemplification is essential on this kind of topic. However, the strongest candidates will show that they can adapt material and make thoughtful comments about topics which they have not necessarily learnt off by heart.*

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