

# The Environmental Impact of Skiing on Mont Lozère (IB Diploma Option G)



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# The Environmental Impact Of Skiing On Mont Lozère

## Teachers' Notes

This unit has been designed to help students investigate the environmental and economic impact of the skiing industry on Mont Lozère and its inhabitants. Students carry out an environmental impact assessment (EIA) on existing ski runs to determine the current level of environmental damage, and use the data to inform a decision-making exercise based on the proposed expansion of the current facilities.

Since the 1960's, local and regional authorities have encouraged the development of downhill skiing in the Massif Central in an attempt to bring some of the economic benefits associated with this huge growth industry, to the area. Unfortunately, due to the rather unreliable snow conditions in the southern part of the Massif Central, not all the ski developments have become commercially successful. There are also many environmental issues associated with alpine skiing, such as gullying, deforestation and the positioning of unsightly ski tows in the core zone of the Cevennes National Park. Transects are used to assess the damage caused by skiing to the physical environment.

## Specification Links

### **Option G: Ecology and conservation.**

#### G1 Community Ecology:

G1.1 Outline the factors that affect the distribution of plant species, including temperature, light, water, soil pH, salinity and mineral nutrients;

G1.4 Outline the use of a transect to correlate the distribution of plant and animal species with an abiotic variable.

## Introduction

The effects of the skiing industry on Mont Lozere can be investigated throughout the year. Heavy ski-traffic after good winter snow conditions leaves its mark on the landscape for many years. Skiing on Mont Lozere is at best unpredictable as illustrated by the table below:

<b>Ski season</b>	<b>Total days ski runs operational</b>
1998 / 1999	85
1999 / 2000	5
2000 / 2001	7
2001 / 2002	9
2002 / 2003	91
2003 / 2004	9
2004 / 2005	6
2005 / 2006	9
2006 / 2007	10
2007 / 2008	7

Skiing is a popular winter activity in France. Winter sports form an important growth industry with the number of skiers in France currently rising by 10% each year. Many French children attend weekly and annual 'ski school' from the age of five – as part of their compulsory education. Many of the French are competent skiers and their numbers are supplemented by an influx of visitors from other European nations, particularly the UK. The best-known and most popular ski resorts in France lie to the east, where the high alpine slopes allow summer glacier skiing as well as a three-month winter season from February to April. Less known to foreigners and used by a comparatively small number of the local population are the ski resorts of the Southern Massif Central.

The real growth of snow resorts in the Massif Central dates only from the 1960's. From 1961 resorts were modernised and additional accommodation provided for skiers. Special trains would leave Paris on Friday nights in winter, allowing Parisians to enjoy a weekends skiing in the Massif Central, before returning to the capital in time for work on Monday. Another growth resort has been Super-Besse (near Clermont-Ferrand) where the installation of ski lifts and the building of hotels, chalets and holiday villages, provides accommodation for over 3,000 winter sports enthusiasts. The spa town of Mont Dore that lies nearby has been directly affected by these changes and has responded by diversifying its economic and retail base. Accommodation is now provided for a winter sports clientele and access to the local snowfields has been improved. Other ski resorts have developed on a less spectacular scale with a much more subdued multiplier-effect at work.

SOMIVAL (Societe pour la Mise en Valeur d'Auvergne-Limousin) and its 'Tourist Division' have played an important role in many of these developments. SOMIVAL is a planning corporation that was founded in Clermont-Ferrand in 1962 to undertake research and to prepare and implement integrated schemes for rural management. It is very similar in structure and approach to the Highlands and Islands Development Board of Scotland. In an attempt to encourage winter recreation, SOMIVAL has been involved in the building of holiday villages & chalets, and more recently in the controversial building of second homes for purchase by individual families.

### **Specific Information**

Mont Lozere, Mont Aigoul and the surrounding area has gradually emerged as a favourable destination for cross-country ('ski fond') skiers in particular, since it combines the beauty of middle-mountain landscapes with gentler gradients compared to Alpine areas. Tracks cross moorland and weave through coniferous and deciduous forests passing deserted villages such as L' Hôpital and skirting the edge of picturesque market towns like Florac. For cross-country skiers the physical attractiveness of the area is enhanced by the natural stillness and silence which allows skiers a "unique experience" within the National Park.

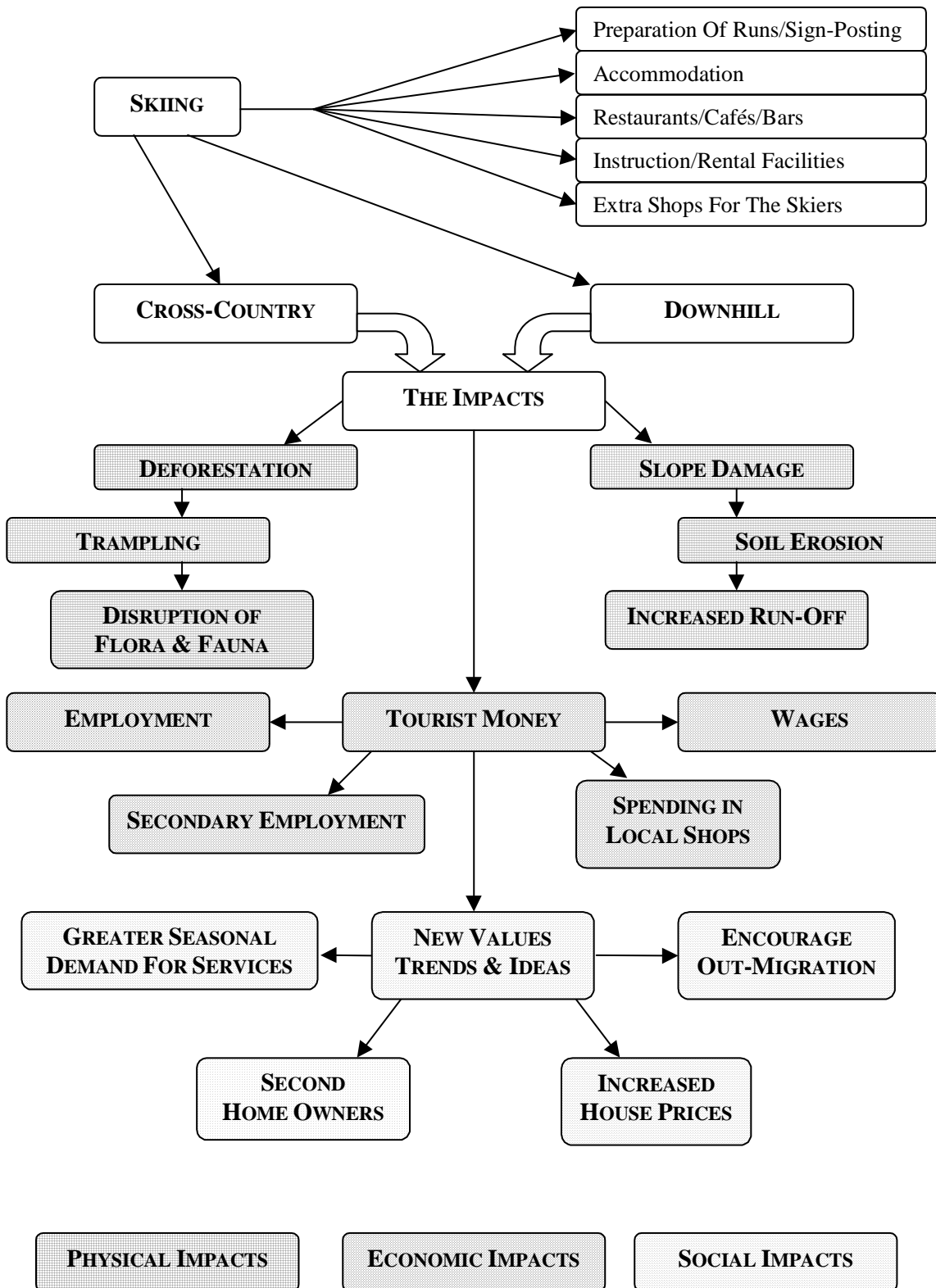
There are also alpine pistes on Mont Lozère. For administrative reasons the mountain is divided into the 'Nord' and 'Sud'. In 'Mont Lozère Nord' there are two major areas: Mont Lozère and Le Gaudet, catering for a variety of standards with a total of 56km of prepared runs. In 'Mont Lozère Sud' there are 7.5km of prepared piste at Col de Finiels with the base at Le Pont de Montvert. On nearby Mont Aigoul there is more extensive downhill skiing with a total of 126km of piste.

Winter sports on Mont Lozère play an important role in the local economy and, through the operation of the multiplier effect, have provided additional income for rural populations. This has helped to stem the tide of desertion from these highland villages and provided an important stimulus for the revival of local craft industries and services. In Le Pont de Montvert, the arrival of skiers is viewed as an important source of income by shop, bar and hotel owners. At the Mont Lozère ski station, there are two hotel/restaurant complexes, together with a “youth hotel”, the UCPA. These are the highest permanent residents in the Cévennes National Park at 1420m. There are also offices for ski passes and equipment hire. The majority of skiers are family groups with additional youth groups and school parties catered for by UCPA. The UCPA was set up in 1965 by the French Government to encourage young adult involvement in outdoor activities. Whilst it has little to do with the Government now, UCPA has continued to play an important role in activity holidays for 16-19 year olds. On Mont Lozère, accommodation caters for 65 people sleeping 6 to a room. In summer the capacity increases to 80. During the winter season (mid December to early April) a total of around 400 people will use the facility. UCPA have recently offered multi-activity holidays with the emphasis on 'keep-fit'. Ten staff are employed during the winter and twelve in the summer.

The majority of visitor's come from regional cities as it is difficult to guarantee when there will be adequate snow to operate the facilities. Mont Lozère is considered to be a marginal area for winter snow in comparison to the Alps. On a daily basis during the winter, there may be as many as 150 children with their parents visiting the site (data is held on computer at the Eagle's Nest). In Le Pont de Montvert, the population of 298 swells by as many again during the weekend. If snow conditions are good there are usually 500 weekly visitors during the ski-season. Cross-country and downhill skiers usually stay for a day or a weekend at most, returning again when the conditions next allow. The number of winter visitors has gradually increased due to the popularity “active leisure”.

Skiing has a recognisable impact on the landscape of Mont Lozère. During summer the extent of the pistes is evident and the slope damage from skiing and trampling produces 'scars' on Mont Lozère. Road side verges are damaged during snow ploughing and to an extent the preparation of pistes is reflected in the widespread growth of rosebay willowherb, a plant which seeks out soils which have been recently disturbed. In addition, the arrival of cars using snow chains, and walker's wearing heavy footwear creates pressure at specific sites. Less noticeable are the cross-country ski tracks where the skiers appear to have less impact. The environmental, economic and social impacts of skiing are summarised in Figure 1.

**FIGURE 1: ENVIRONMENTAL IMPACT OF SKIING**



## Aims

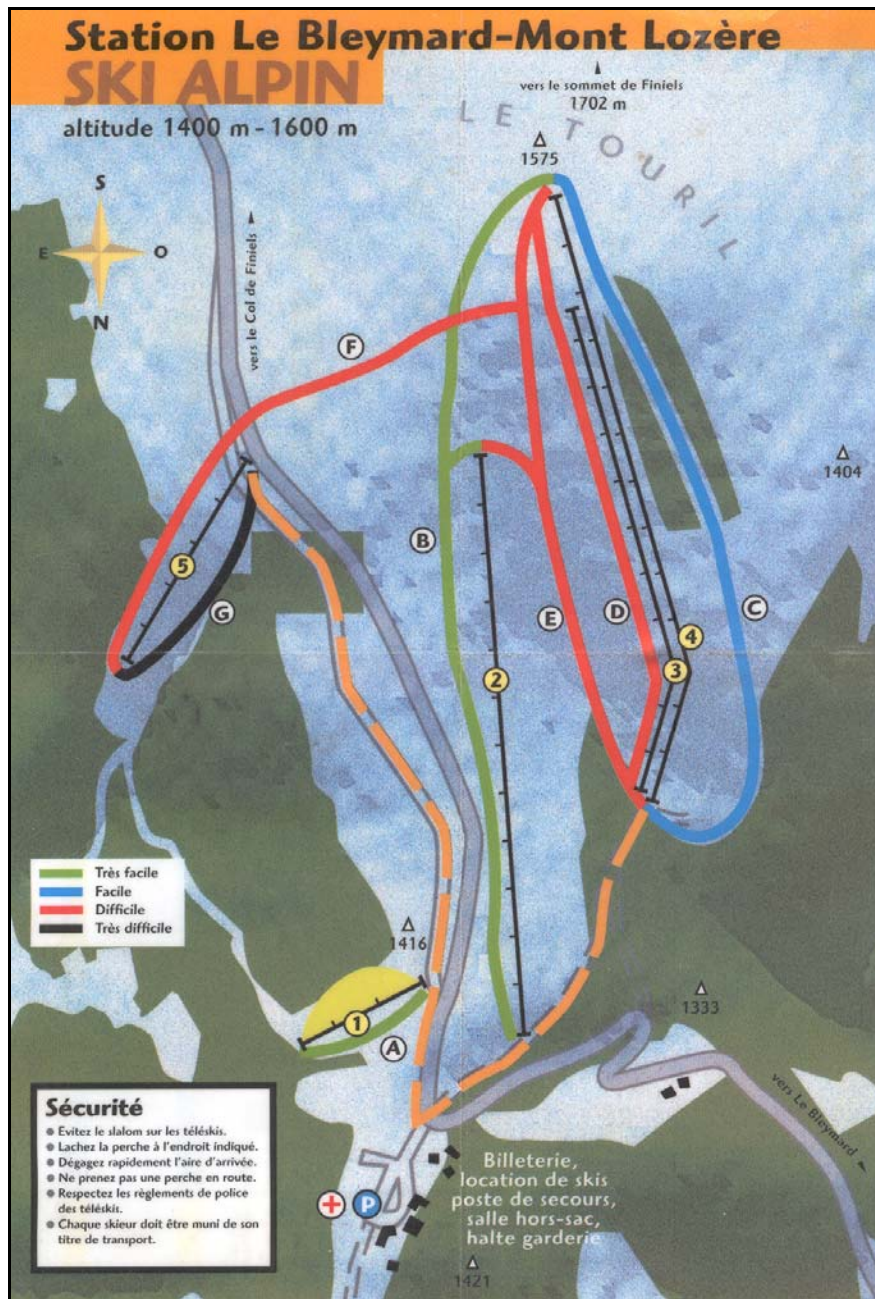
- To investigate the impact of skiing on the physical environment of Mont Lozère;

## Hypothesis

Soil temperature, pH, soil moisture, soil depth and infiltration rate on ski runs will be affected by skiing. This will in turn influence vegetation cover – there will be a reduction in overall vegetation height, species diversity and a change in species composition on the pistes compared to off piste;

## Data Collection Sites

This study focuses on the green piste shown in the map below:



### *Equipment*

2 Ranging poles  
Clinometer  
20m Tape measure  
Open frame quadrat  
Compass  
Small ruler (for plant height)  
Skewer (for soil depth)  
pH kit and trowel  
Soil moisture meter  
Digital soil thermometer  
Infiltration can and water  
Map - Mont Lozère (scale 1:25,000)  
Plant identification sheets  
Recording sheet 1

### *Method*

Transect survey.

Each group of students runs a 20m tape across the ski piste or cross-country route. Ensure that the transect lines run from an untrampled area, through the middle of the piste, back into an untrampled area again. These untrampled areas represent the control sites. Place the quadrat at 2m intervals along the transect line, and assess:

- ✓ % cover of each species present;
- ✓ % bare ground;
- ✓ Height of the tallest vegetation;
- ✓ Species diversity;
- ✓ Soil depth – repeat x3;
- ✓ Soil temperature;
- ✓ Infiltration rate (students could split this between the groups);
- ✓ Soil pH.

Each group should then stretch the tape measure tightly across the piste and measure depth of erosion – seen by the depth below the taut tape measure – at 50cm intervals. Finally, measure the gradient of the slope using the clinometer and two ranging poles. Recording sheet 1. Sample transects across pistes with different gradients – is there any difference in the damage caused on a green run and a black run? Is there any difference between cross-country tracks and alpine pistes?

Landscape evaluation.

Carry out the simple landscape evaluation assessing the visual impact of skiing on the Mont Lozere landscape.

**Recording Sheet 1 – Interrupted belt transect across ski piste**

Species	% cover for each plant species – distance across transect										
	0m	2m	4m	6m	8m	10m	12m	14m	16m	18m	20m
Heather											
Fine leaved grass											
Sedges											
Spanish Broom											
Petty whin											
Alpine hawkweed											
Species diversity											
Max plant height (cm)											
Soil depth (cm)											
Soil temperature (oC)											
Soil pH		x	x	x	x		x	x	x	x	
Infiltration rate (cm/min)		x	x	x	x		x	x	x	x	

Depth of erosion (measure below tape measure across eroded section(s)) (cm)																
0m		2.5m		5m		7.5m		10m		12.5 m		15m		17.5 m		20m
0.5m		3m		5.5m		8m		10.5 m		13m		15.5 m		18m		
1m		3.5m		6m		8.5m		11m		13.5		16m		18.5		

									m				m		
1.5m		4m		6.5m		9m		11.5 m		14m		16.5 m		19m	
2m		4.5m		7m		9.5m		12m		14.5 m		17m		19.5 m	

## The Eagles Nest

### Environmental Impact of Skiing - Landscape Evaluation

#### 1. Numerical System

Impact on the landscape (a)	Score	Visual Appeal (b)	Score
Stands out clearly	+2	Attractive	+2
Stands out	+1	Good	+1
Little impact or invisible	0	Poor	-1
		Unattractive	-2

Landscape Component	(a) Impact on landscape	(b) Visual Appeal	Final score (a x b)
Vegetation Woodland Moorland Fields			
Physical features Hills Valleys Cliffs			
Skiing features Roads Ski lifts and pistes Ski Station			
<b>TOTAL SCORE</b>			

For this technique both objective and subjective measurements are used. The scores given by different people for the impact on the landscape of various components will probably be similar. However the visual appeal is much more of an opinion.

#### 2. Descriptive System

Evaluate the landscape by drawing a circle around the word that you feel gives the best description.

SIZE:	tiny	small	large	vast
AREA:	restrictive	enclosed	open	exposed
BEAUTY:	ugly	plain	attractive	stunning
HUMAN IMPACT:	spoilt	artificial	natural	wild

### *Data presentation and analysis*

- On A3 graph paper, present the vegetation data as kite diagrams - line up all the remaining results with the vegetation data;
- Plot maximum plant height below the kites as single scale lines, above the line;
- Record the species diversity as a figure on the line beneath the maximum plant height;
- Calculate the mean soil moisture and soil depth in each quadrat;
- Present soil moisture data as a bar chart below the vegetation data;
- Present pH figures on the line below;
- Present depth of erosion data as a line graph below the line. Join to represent the soil surface;
- Plot soil depth as single scale lines below the soil surface line;
- Present infiltration data as bars – height of bar represents amount of water (cm) which infiltrates per minute.

Analyse the results using the Spearman's Rank correlation co-efficient, looking for correlations between abiotic and biotic factors.

### *Discussion points*

Critical appraisal:

The methodology should be considered, paying attention to errors which may have occurred due to:

- Human error;
- Equipment error;
- Problems inherent in the techniques used.

### *Evaluation of data:*

- What is the environmental impact of skiing on Mont Lozere? Does this vary according to the steepness of the piste? Is there any difference between the impact seen on cross-country tracks compared to that on the alpine pistes?
- How is the vegetation affected by the skiing – is there a change in species composition? Why do you think this is? What adaptations characterise plants tolerant of trampling?

### *Follow up activity:*

Do you think the complex should be expanded? How would the environmental impact of skiing affect the planning of a new piste? In your group, allocate specific roles and carry out the role-play exercise. Remember that you are a planning committee and must agree on the future development of the winter recreational facilities on Mont Lozère. Additional information is held at the Eagle's Nest regarding the sphere of influence of the ski facilities and the number of visitors on certain days.

Organising the debate:

This role-play simulates a local public enquiry based upon the impacts of the expansion of the tourist facilities already on Mont Lozère. The roles to be allocated to the group are given below:

Each person or pair should expect to talk for 2-3 minutes about their proposal/views. After all views have been expressed the Chairperson should allow cross-questioning. The Chairperson and staff should then retire to make decision in favour of one scheme (reasons must be given). Finally conduct 2 votes - one with roles assumed and one with roles dropped.

#### Background Information:

The Cévennes region was designated as a French National Park on 2 September 1970 and the Lozère area became an important "core zone" within the Park's overall structure plan. The Park needs to be conserved for future generations, whilst allowing for small developments that do not harm the character of the Park.

The physical attractiveness of the area, its ecological diversity and its peculiar mystique have drawn a wide range of visitor creating problems for this particular Central Zone. In the long term all these changes affect recreational quality within the ecosystem. The structure of an ecosystem must be understood if appropriate management policies are to be developed and it must be realised that an ecosystem at any one site is a function of many interacting variables. These include climate, soil, topography (shape of the landscape) that provide the ecological niche for specific species.

The Proposals: The development of the current tourist facilities has been proposed. Three proposals have been put forward by SOMIVAL for the improvement and development of skiing facilities. There are also two local proposals, one put forward by a consortium in Le Pont de Montvert and one by two family owned businesses on Mont Lozère.

#### SOMIVAL Proposal 1

1. This involves the building of a large hotel on land adjacent to the main car park and which the UCPA site currently occupies. This would either have to be moved elsewhere or demolished. New hotel would cater for 200 guests and employ 25 people (but most employees would need hotel/ski experience and will not be drawn from the local area).
2. Building of swimming pool with orange bubble cover for winter use.
3. Increase the number of pistes by ten. Pistes are now extended onto previously unused area to the west of Mont Lozère, stretching towards the Eagle's Nest.
4. Two new chair-lifts will be installed to the summit of Pic Finiels. One will run from the existing ski chalet and one from the chalet to the west towards Pic Finiels. In addition, there will be ten new button lifts and two drag lifts.
5. Expansion of the ski-staff accommodation. The number of ski instructors will be 15 in winter season. The new piste operation (maintenance and supervision) will employ another 40 people (mostly locals).
6. Cost 1.5 million euros. Development time: 2 years.

#### SOMIVAL Proposal 2

1. Building of chalet type accommodation. Fifteen units are planned using local materials. The UCPA will remain.
2. One new chair lift to the summit and one new piste.

3. Building of 'activity centre' to include covered ice-rink and indoor swimming pool, saunas and solariums and bowling alley.
4. Will employ 20 people (50% locals).
5. Cost 2.5 million euros. Development time: 1 year.

### SOMIVAL Proposal 3

1. Grants provided for development of village accommodation in Finiels, Prat Souteyran and Le Pont and Le Bleygard.
2. Building of new dual carriageway from Clermont-Ferrand to Mont Lozère and road improvements (widening, bridges, straightening) of road from Florac to Mont Lozère.
3. Will employ around 200 people for 2 years but none after this time.
4. Cost 45 million euros. Development time: 5 years.

### Le Pont Consortium Proposal

This involves a group of businessmen in Le Pont.

1. Advertising campaign in major French cities designed to raise awareness of Mont Lozère as a ski resort.
2. New sign-posting on roads to and from Florac and Clermont Ferrand.
3. Introduction of a new 'Mercedes-Bus' link, which will run a regular service from Le Pont - Ski Station - Le Bleygard.
4. Use of the Eagle's Nest for accommodation. Improvements internally so that can take 60 guests during winter season.
5. Incentives for local farmers to rent out rooms.
6. Purchase of UCPA and family businesses on Mont Lozère. Complete modernisation and re-fitting with aim of attracting an up-market clientele.
7. Cost 350 thousand euros. Employment opportunities: 80 locally. Development time: 2 years.

### Family Hotel Proposal

Proposed by the two family businesses currently operating.

1. Buy the UCPA building and use this as guest accommodation.
2. Expansion of both existing establishments so can cater for twice numbers.
3. Building of ten 'holiday homes' by a local builder from Le Pont. To be sold by agents in Paris and Lyon.
4. Cost 700 thousand euros. Employment: 10 jobs for locals (20 during building time). Development time 1 year.