

The Environmental Impact of Skiing on Mont Lozère



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THE ENVIRONMENTAL IMPACT OF SKIING ON MONT LOZÈRE

TEACHERS' NOTES

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:

Ski season	Total days ski runs operational
1998 / 1999	85
1999 / 2000	5
2000 / 2001	7
2001 / 2002	9
2002 / 2003	91

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.

This unit uses the "Ski Chalet du Mont Lozère" as a case study. On-piste and off-piste transects are used to assess the damage caused by skiing to the physical environment. The visual impact of the ski chalet and the resort infrastructure are assessed, and the attitudes of a cross section of people are included, for example those employed in the industry, tourists, and local people, to assess the impact of the skiing industry on the local economy.

INTRODUCTION

GENERAL INFORMATION

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 Gaulet, 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 currently two hotel/restaurant complexes, Le Refuge and Le Mont-Lo, with a third building (Chalet de Mont Lozere closed). 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 both hotels.

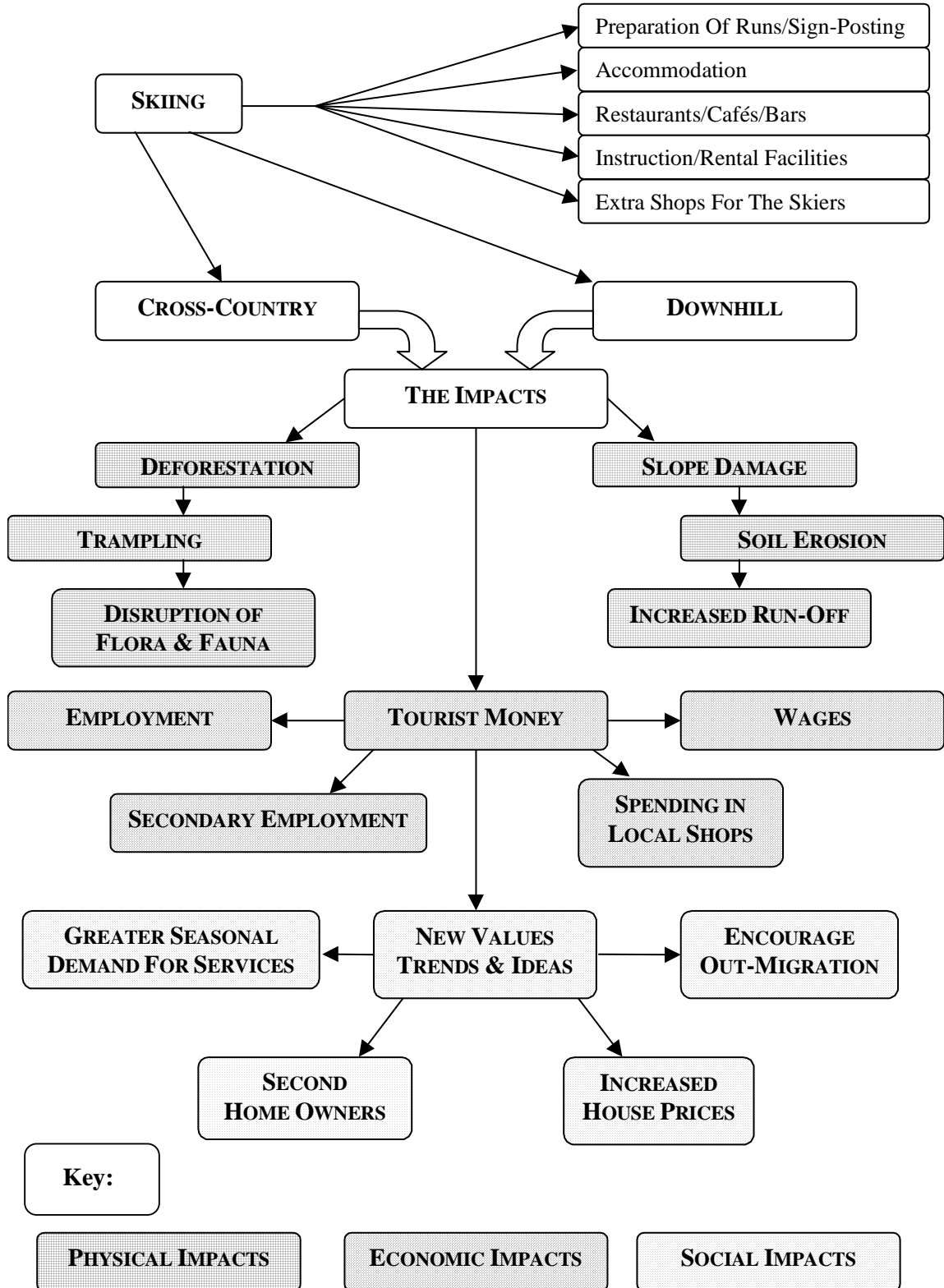
Le Mont-Lo was taken over by a local couple in 2006 when the UCPA closed its centre. The UCPA was set up in 1965 by the French Government to encourage young adult involvement in outdoor activities. Whilst it has little to do with the Government now, UCPA has continued to play an important role in activity holidays for 16-19 year olds. On Mont Lozère, accommodation caters for 65 people sleeping 5 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 used to use the facility. Ten staff were employed during the winter and twelve in the summer. Now Mont-Lo employs only three extra staff.

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 285 (2006) 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

1. To determine the extent of visitor facilities at the Mont Lozère ski resort;
2. To investigate the impact of skiing on the physical environment of Mont Lozère;
3. To evaluate the economic and social impact of skiing on Mont Lozère;
4. To consider alternative development plans for winter recreational facilities on Mont Lozère and decide which is the most appropriate scheme.

OBJECTIVES

1. To map the facilities at the ski resort complex on Mont Lozere;
2. To carry out an environmental impact assessment on two contrasting alpine pistes on Mont Lozere;
3. To carry out interviews to determine the economic impact of the skiing industry in the area;
4. To take part in a role play exercise, designed to consider the future development of the resort.

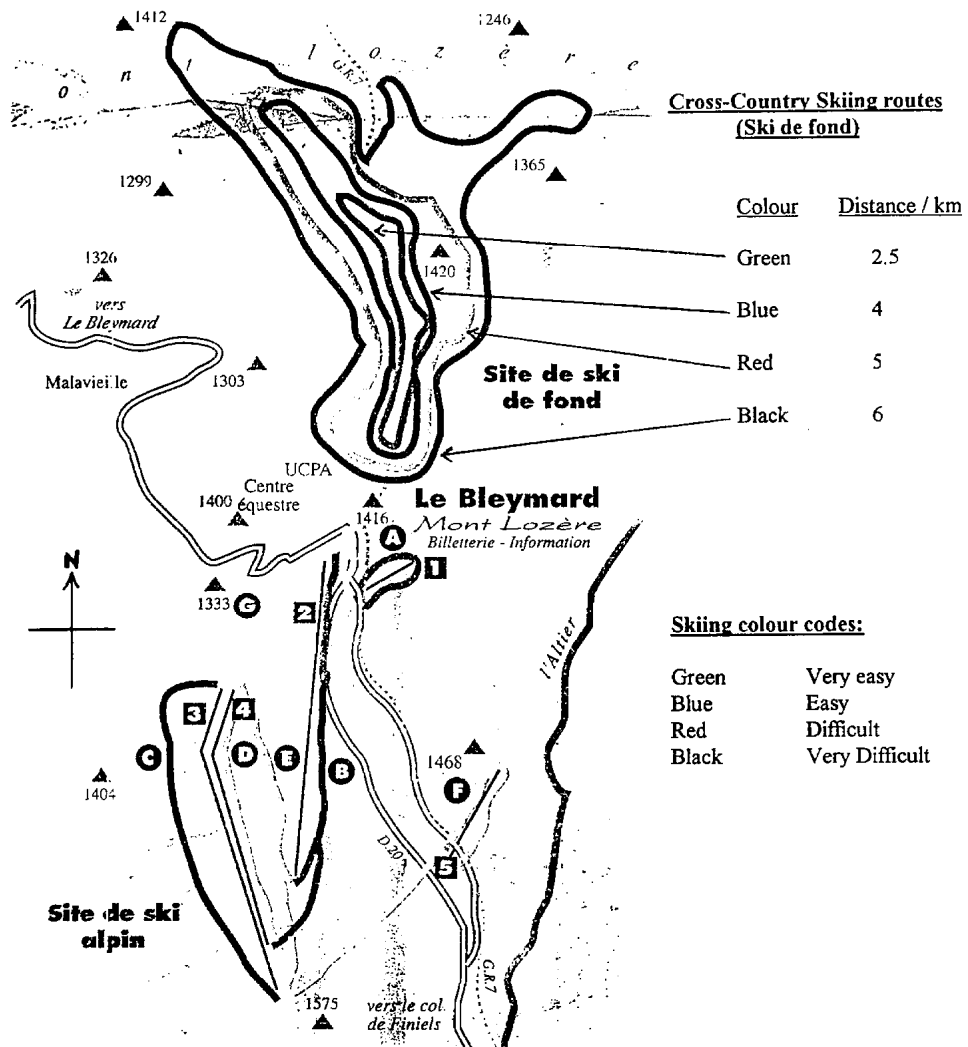
HYPOTHESIS

1. 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;
2. There is a significant difference between landscape perception scores for sample points along the transects;
2. There is a significant difference between downhill and cross-country transects;
4. The skiing industry has an economic impact on the local population.

DATA COLLECTION SITES

Any area on Mont Lozère where skiing occurs can be used for data collection, the map below shows where the skiing areas are found. Remember that the “control sites” should have similar physical variables (e.g. slope angle, altitude, aspect etc.) as the skied sites.

A MAP OF DOWNHILL AND CROSS COUNTRY SKI RUNS ON MONT LOZÈRE



Downhill skiing (Ski Alpin)

Mechanical teleski lifts

No. on plan	Distance / m
1	192
2	908
3	950
4	1050
5	400

Downhill skiing Pistes

Letter on plan	Colour	Distance / m
A	Green	200
B	Green	1300
C	Blue	1350
D	Red	1200
E	Red	1200
F	Red	600

EQUIPMENT

PER GROUP:

- 2 Ranging poles
- Clinometer
- Tape measure (minimum 30 metres)
- 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
- Blank paper for field sketches
- Recording sheet 1
- Map of ski resort for annotating

METHODS

1. *Transect survey.*

Each group of students runs a 30m 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 moisture (0 – 10 on scale) repeat x3;
- 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?

2. *Mapping visitor facilities at Mont Lozere ski resort.*

Visit the Ski Station and Ski Chalet on Mont Lozère. Annotate the sketch map/diagram in appendix 1, indicating the facilities available for visitors, and areas of possible impact.

3. *Landscape evaluation.*

Carry out the simple landscape evaluation assessing the visual impact of skiing on the Mont Lozere landscape, on page 11.

4. *Interviews with local restaurateur and ski-operator.*

Interview the proprietor of one of the restaurants and the operator of the ski equipment building using the questionnaire in Appendices 2A and 2B.

RECORDING SHEET 1 – INTERRUPTED BELT TRANSECT ACROSS SKI PISTE

SITE.....

Species	% cover for each plant species – distance across transect															
	0m	2m	4m	6m	8m	10m	12m	14m	16m	18m	20m	22m	24m	26m	28m	30m
Heather																
Fine leaved grass																
Sedges																
Broadleaved grass																
Petty whin																
Alpine hawkweed																
Species diversity																
Max plant height (cm)																
Soil depth (cm)																
Soil temperature (°C)																
Soil pH		x	x	x	x			x	x	x	x		x	x	x	x
Infiltration rate (cm/min)		x	x	x	x			x	x	x	x		x	x	x	x

DEPTH OF EROSION (CM) AT DISTANCE ALONG TRANSECT																		
0m		0.5m		1m		1.5m		2m		2.5m		3m		3.5m		4m		4.5m
5m		5.5m		6m		6.5m		7m		7.5m		8m		8.5m		9m		9.5m
10m		10.5m		11m		11.5m		12m		12.5m		13m		13.5m		14m		14.5m
15m		15.5m		16m		16.5m		17m		17.5m		18m		18.5m		19m		19.5m
20m		20.5m		21m		21.5m		22m		22.5m		23m		23.5m		24m		24.5m
25m		25.5m		26m		26.5m		27m		27.5m		28m		28.5m		29m		29.5m
30m																		

THE EAGLES NEST
IMPACT OF SKIING - LANDSCAPE EVALUATION

The Impact that skiing makes on the landscape can be assessed in a numerical or a descriptive way.

1. Numerical System

Assess each individual component in the landscape:

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			
		<u>TOTAL SCORE</u>	

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

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

(See worked example of results presentation kept in the resources room).

- Analyse the results using the Mann Whitney U-Test, which confirms whether the difference between factors observed at two sites is significant or not.
- Collate and tabulate the interview results. Write a short passage outlining the economic and social impact of skiing on Mont Lozère.

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.

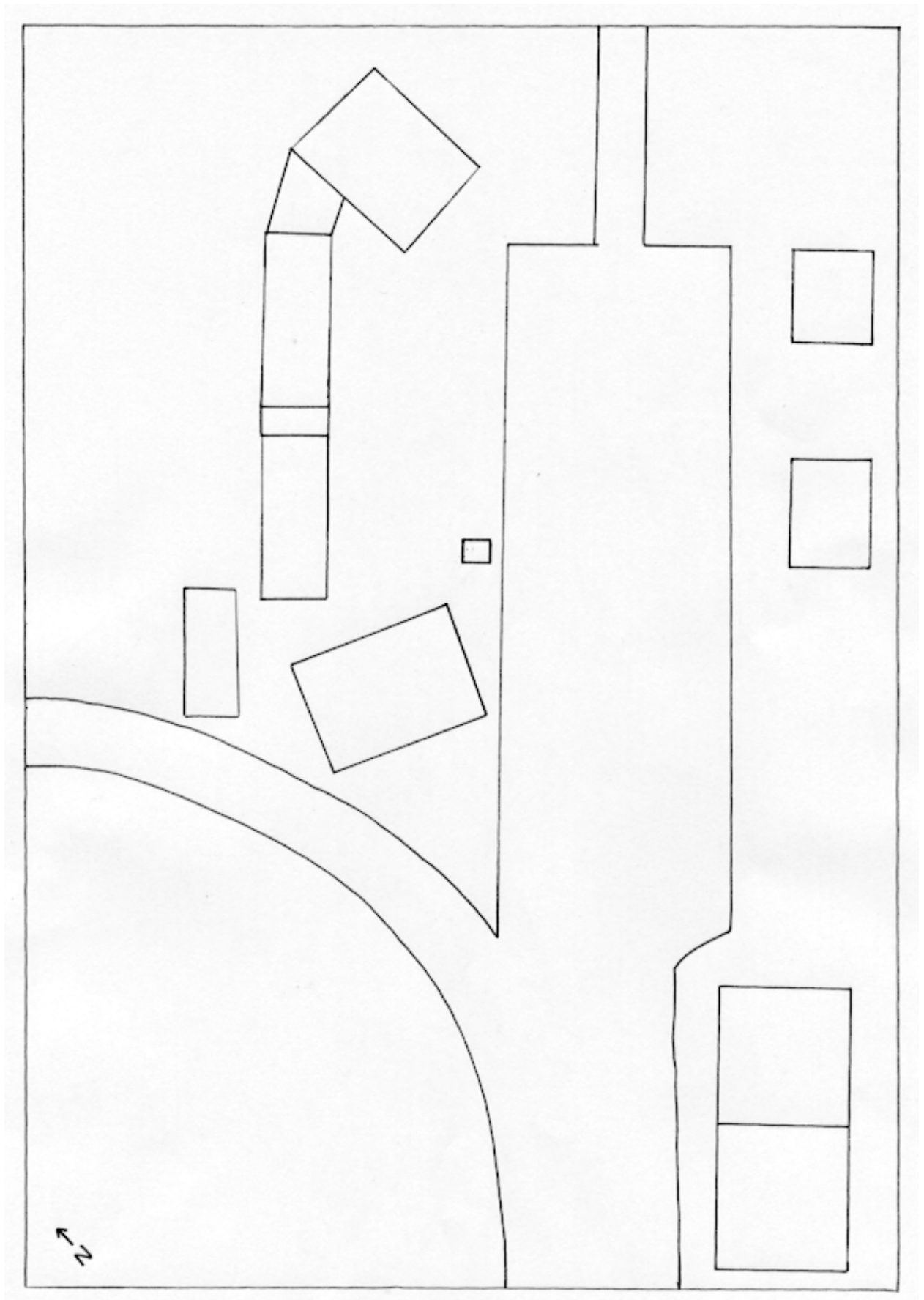
Evaluation of data:

- 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?
- Is tourist provision at the ski resort adequate given the number of visitors to the site (500 per week during the winter season, when there is snow)? Do you think there is more business at other times of the year? Why else may people want to come to this area - is there evidence of recreational provision other than that associated with the skiing industry?
- **EVENING 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* (APPENDIX 3). 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.**

SUGGESTED PROJECT TITLES.

- How does the skiing industry affect the physical and economic environment of Mont Lozere?
- What is the sphere of influence of the skiing industry on Mont Lozere?
- Is the provision of facilities at the ski resort on Mont Lozere adequate for its visitors?
- Is there potential for the expansion of facilities at the ski resort on Mont Lozere?
- How successful has the skiing industry been on Mont Lozere?
- What would be the environmental impact of a new ski run at the ski resort on Mont Lozere?
- What factors should be taken into consideration when designing and positioning a new ski run?
- Has the skiing industry had a negative impact on the Cevennes National Park?
- Is the gradient of ski runs the most important factor when considering its impact on vegetation?
- Does the skiing industry have a year-round impact on Mont Lozere?

APPENDIX 1. MAP OF RESORT FACILITIES ON MONT LOZERE.



APPENDIX 2A - INTERVIEW FOR PROPRIETOR (SKI FACILITIES).

Type of facility/operation/establishment.

1. How long have you run this establishment?

--

2. How many visitors do you receive during:

Summer?		Winter?	
---------	--	---------	--

3. Where do your visitors come from?

--

What is their average length of stay?

--

4. Do local people use your facilities off-season?

--

5. What attracted you to this area?

--

6. Would you like to see an expansion of the skiing facilities on Mont Lozère?

--

7. How strongly do you agree or disagree with the following statements:

	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
Skiers are noisy and disruptive					
Skiers are an important source of income					
Skiing facilities should not be expanded					
Skiing damages the environment					

APPENDIX 2B - INTERVIEW FOR PROPRIETOR (SKI FACILITIES).

Type of facility/operation/establishment:

1. Depuis quand avez-vous ce commerce?

--

2. Combien des visiteurs avez-vous pendant:

été?		hiver?	
------	--	--------	--

3. Les visiteurs viennent d'ou?

--

Combien durent les sejours?

--

4. Est-ce-que les residents locaux utilisent vos facilities?

--

5. Quelles sont les attractions pour vous ou cette region?

--

6. Pensez vous qu'il y a plus de facilities du ski sur le Mont Lozère?

--

7. Qu pensez - vous des questions suivant:

	Convaincu	D'accord	Par sur	Contre	Totalement Contre
Skieurs sont beaucoup bruyant et derangent					
Skieurs sont tres importants pour argent					
Les facilities de ski doivent rester les memes					
Le ski est mauvais pour l'environnement					

APPENDIX 3: ROLE - PLAY EXERCISE : The Impact of Development on Mont Lozère

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:

- | | |
|---|--|
| 1) Chairperson | 3) Cross-country Skier |
| 2) Representatives from each of the schemes: <ol style="list-style-type: none">1. SOMIVAL Proposal 12. SOMIVAL Proposal 23. SOMIVAL Proposal 34. Le Pont Consortium5. Family Hotel Plan | 4) Alpine Skier |
| | 5) Ecologist |
| | 6) Local Farmer |
| | 7) Hotel Manager - Le Pont de Montvert |

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 an extension to the current Mont-Lo complex.. This would involve a new building to the rear of the existing building and renovation of the current building to 4* standard. The hotel would now cater for 200 guests and employ 30 people (but most employees would need hotel/ski experience and will not be drawn from the local area).
2. Conversion of the gym into a swimming pool and fitness area.
3. Increase the number of pistes by ten. Pistes are now extended onto previously unused area to the east of Col du Finiels.
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 Col du Finiels towards Pic Finiels. In addition, there will be a number of new drag lifts.
5. Introduction of new snow making infrastructure to ensure adequate snow each year.
6. 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 20 people (mostly locals).
7. Cost 22 million euros. Development time: 2 years.

SOMIVAL Proposal 2

1. Building of chalet type accommodation around the site of the Chalet du Mont Lozere. Fifteen units are planned using wood construction with accommodation for up to 8 people per chalet. The existing building would be converted into a reception and entertainment area, with new restaurant, sauna and gym area.
2. One new chair lift to the summit and one new piste.
3. Will employ 20 people (50% locals).
4. Cost 3 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 Bleymard.
2. Advance the improvements of the RN 88 to a dual carriageway from A-75 to Mende and Langoyne. Also road improvements (widening, bridges, straightening) of road from RN 88 to Mont Lozère.
3. Will employ around 200 people for 4 years but none after this time.
4. Cost 515 million euros, but 25% from EU and 45% from state funds. Development time: 5 years.

Le Pont Consortium

This involves a Chamber of Commerce in Le Pont de Montvert and Le Bleymard.

1. Advertising campaign in major French cities designed to raise awareness of Mont Lozère as a ski and summer resort.
2. New sign-posting on roads to and from Florac and Clermont Ferrand.
3. Introduction of a new 'Low Carbon-Bus' link, which will run a regular service from Le Pont - Ski Station - Le Bleymard.
4. Redevelopment of the vacant Chalet du Mont Lozere as 3* accommodation. .
5. Incentives for local farmers to rent out rooms.
6. Cost 2.2 million euros. Employment opportunities: 80 locally. Development time: 2 years.

Family Hotel Plan

Proposed by the two family businesses currently operating.

1. Buy the Chalet du Mont Lozere building and renovate to current standards for guest accommodation.
2. Building of ten wooden 'holiday homes' by Polish company. To be sold by agents in Paris and Lyon.
3. Cost 1.5 million euros . Employment: 5 jobs for locals (20 Polish workers during building time). Development: 1 year.