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Mountain Farming and the Environment: Towards Integration

Perspectives for mountain policies in Central and Eastern Alps

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Preface

European countries have been addressing the problems of mountain areas through specific sectoral policy programmes for several decades. Since the 1970s, the implementation of compensatory allowances schemes has been the most notable measure in this field and has drawn attention to the difficulties and tasks of mountain agriculture. Yet, with growing environmental concern, an heightened awareness of the environmental impact of farm management systems in these regions is called for, and the achievements of agricultural land use with regard to environmental performance under unfavourable conditions should be emphasised.

It has been recognised in this time that agricultural policies in general, and particularly those for less-favoured areas (LFAs) and mountain areas, can no longer be conceived by focusing on the production function alone, but have to take into account a multitude of tasks comprising the provision of resources and services to the regional economy. Hence support for agricultural structures in mountain areas affects biodiversity, environmental development and cultural landscapes. The interrelationship of effects is also reflected by an increased demand for integrated development programmes fostering the involvement of a wide range of different players and the search for local solutions.

However, such actions require an adequate policy framework. Reforms of agrarian and regional policy have already taken up steps in this direction. This report aims at underlining the awareness developed and encouraging action towards the sensitivity of mountain areas. This aspect will have to play a substantial role in the current debate on the reform of EU policies. The work presented draws on a European research project commissioned by the European Commission Directorate-General XI, Environment, Nuclear Safety and Civil Protection.

The study ("Integration of Environmental Concerns into Mountain Agriculture") was co-ordinated by EUROMONTANA, Paris/Brussels and involved participants from 25 study areas all over the European Union, covering the wide variety of EU mountain areas. Six regional groups were established within this research network, one of them covering the "Central and Eastern Alps". The Bundesanstalt für Bergbauernfragen was responsible for the co-ordination of this regional group comprising five different study areas in Austria, Germany, Italy, Slovenia and Switzerland.

As the final report by EUROMONTANA is largely in French and cannot reflect the wealth of information gathered in the research project at the study area level, we decided to provide a specific report for the "Central and Eastern Alps" regional group. As international debate on the issue is expanding, an English publication has been preferred to a German one. The principal aim was to provide condensed survey information illustrating, however, the diversity and common approaches in the area. To this end a series of study-area-specific documents have been used and served as the basis for a focused paper following a standardised presentation structure for each study area of our "Central and Eastern Alps" regional group. The papers concern the regional context and environmental situation, the main impacts of mountain agriculture and driving forces on the environment, an assessment of the most relevant agri-environmental measures and strategies for future environmental specific mountain policy. By way of introduction and summarising the study area results, the report opens with a survey of core findings on the inclusion of environmental concerns into mountain agricultural policies.

The present publication and involvement in the project has been preceded by long experience and a series of studies of the Bundesanstalt für Bergbauernfragen on mountain policies in Austria and Europe. In addition to the ongoing activity of assessment and analyses of the Austrian policy, agrarian structures and regional development on mountain areas and less-favoured areas research proposals have been elaborated and submitted to the EU research programme and the European Parliament. The institute is actually involved in the EU research project on the assessment of Reg. 2078/92 implementation in 10 European countries. It also carried out the case study on the "cultural landscape in mountain areas of Austria" for the OECD Group of the Council on Rural Development.

These research tasks, together with the reflection of the intensifying international debate on mountain issues, have contributed to the understanding of the need for the integration of environmental concerns into mountain policies. The need is felt to be particularly urgent as the irreversibility of changes have to be taken into account in an integrated regional approach in order to prevent undesirable developments in the environment of our mountain areas and degradation of essential resources.

In presenting this book, we would like to express our special thanks to the EUROMONTANA team, in particular the co-ordinator Annie Benarous and her collaborators Gaëlle Marion and Jean Christophe Paoli, who had to elaborate a common research framework by incorporating so many divergent views of different study teams and, consequently, extract conclusions on the common and distinctive findings. It is due to their work and dependability that teams have provided interesting study-area documents. At this point we would also like to thank all the partners in our regional group, who showed such commitment in preparing a wealth of information on the study areas. Likewise our thanks is due to the many experts we visited during our work to research their assessment of the environmental situation and elaborate on possible strategies. In preparing this book it has been a pleasure that all colleagues have contributed repeatedly to refining this publication.

Josef Krammer

Director, Bundesanstalt für Bergbauernfragen

Section I

Environment matters – theoretical concept of the project

1.1 Introduction

European uplands and mountain areas are characterised by a unique and complex but very fragile system, connecting the dynamics of ecosystems with economic development, human settlement, recreational pursuits etc. Although mountain regions are somewhat heterogeneous, when comparing the Central European with some Mediterranean mountain ranges and especially with mountains in Northern Europe like the Scottish Highlands, for example, we find a lot of common features and similarities between them. In any respect, mountains are the location of important resources and assets indispensable for the development of human society and the supply of downstream, flatland and urban areas. In particular, they play an important role in terms of biodiversity, valuable habitats, water towers, energy and fresh-air supply, recreational sites, but also with respect to cultural heritage.

When focusing on land use systems, we can see that farm management methods have developed through a long-term process, and thus have shaped and modified the natural and cultural landscapes, particularly in high mountain regions, according to the specific climatic, historical and socio-economic conditions. Evidently this situation is reflected in a wide range of different traditional land use and management systems. So agriculture has, on the one hand, formed the environment, but the environment has likewise an important influence on the specific forms of agricultural production. In addition, one should not underestimate the impact of the close links between the natural environment and the cultural and lifestyle patterns of the population in mountain regions. In fact, much of the environmental capital makes an outstanding contribution to our cultural capital, valued through its links to distinctive human activities past and present.

European mountain areas are no longer remote and isolated places, excluded from the general development of the modern industrial societies. As a result there is considerable impact on the balance of the mountain ecosystems, which are threatened by different pressures imposed by the human society. In large parts of European mountain areas, drastic changes in the agricultural structure and land use systems can be observed in terms of emigration and land abandon-

ment, forest management, changes in livestock density and animal husbandry systems etc. These changes are frequently accompanied by a considerable decline of biodiversity, loss of natural and cultural landscapes, an increase of natural hazards, forest degradation and forest fires, eutrophication problems, water pollution, soil degradation etc.

However, the recent debate on sustainable mountain development has raised world-wide awareness of mountain issues. It is acknowledged that "their specific geomorphology houses a diversity of climatic conditions, genetic pools, species, habitats, ecosystems and landscapes. Mountains have a major role in, and a large influence on, atmospheric circulation water and nutrient cycling, and biological diversity. Due to their high ecological sensitivity, they often act as early indicators of change" (European Inter-Governmental Consultation on Sustainable Mountain Development 1997, p. 27).

The recent initiatives for the promotion of mountain policies at the regional, national and European levels reflect a continuing concern for the economic and social pressures facing mountain farming. Gradually, it has come to embrace a vision that the sensitivity of mountain ecology should not just be seen as a problem, but possesses a set of options capable of turning their uniqueness into a rural development asset.

1.2 Remit of the Study

Article 130R of the Treaty of Rome aims at the integration of environmental concerns into the conception and implementation of Community policies. One recent example of its application, the Fifth Environmental Action Programme, regards agriculture as one of the target sectors in which the Community has an important role to play because its environmental impact is considerable (KOMMISSION 1996). It encompasses an integrated rural development policy which seeks to increase regional awareness and participation of local players to provide activities on environmentally friendly land use techniques.

The 1992 reform of the Common Agricultural Policy (CAP) has already recognised the great environmental relevance of agricultural methods, as well as the productive and social functions of agriculture in general. Owing to the specific character of mountain areas and their fragile environment, the Commission considered it necessary to analyse the impact of Community instruments that have an influence on agriculture in mountain areas, and to examine options for the development of sustainable agriculture in these areas. In its invitation to tender for the completion of this study (OJ No. S 50 of 12.3.1996, p.22; OJ No C 72 of 12.3.1996, p.21; ref. no.D1/ETU/960026) the European Commission, DG XI,

has called for an assessment of the specific interfaces between agriculture and environment in the mountain areas both in its constraints and assets. Furthermore, the study had to focus on the various impacts of agricultural, forestry, environmental and rural development policy measures and instruments, implemented by the national government or by EU programmes, both on the environment and on mountain farming. Another core objective was to investigate possible options for detailed integration of environmental concerns into agriculture in mountain areas taking account of socio-economic issues as main driving forces for future environmental performance.

This should result in a balanced assessment of the impact of the main instruments currently applied, and point to possible modifications of existing instruments and/or the definition of new instruments. In particular, the elaboration of a wide range of region-specific strategies on how to cope with the issue was bound to allow for an EU-wide evaluation of current policies and future options. Strategies developed were particularly intended to prevent environmental deterioration and, on the other hand, to encourage land use systems that improve the quality of the environment.

The EUROMONTANA proposal selected for the study envisaged the use of existing networks of knowledge and political representation of European mountain areas. Thus, at the outset of this study, a geographical network of six regional European mountain areas and 25 study areas was established, including a wide spectrum of different physical and socio-economic situations. In order to allow for in-depth assessment of many different situations in EU mountain areas, a sufficiently high number of study areas in the EU was selected (with the addition of two non EU member states, Slovenia and Switzerland).

The large number of study areas made it necessary to group them into regional groups representing specific parts of European mountain ranges. These regional groups also served as the main organisational structure in carrying out the study. Besides the coordination in several programme planning meetings which assembled representatives of the six regional groups, the content of study-area work was discussed in specific regional meetings of each geographical network. Their task was to find a common framework for the measures to be analysed, the presentation of study-area reports and comparisons between them.

Their main thrust was to provide a survey on the wide range of agri-environmental problems in different European mountain regions. The establishment of the research network thus had to deal with problems of assembling consistent data sets, assess the environmental impact and translate that assessment to an international level, find comparable evaluation methods and balanced evaluations of different proposals and options for policy strategies.

The huge amount of detailed information on the application of policy use, with specific emphasis on environmental impact and perspectives for strategies has led to two kind of publications by EUROMONTANA:

?? A compilation on study-area results by each of the six regional networks (for the Central and Eastern Alps: Dax/Wiesinger 1997; for Western Alps: Fleury 1998)

?? The final report of the study to the European Commission, DG XI (EUROMONTANA 1998)

The complete list of the six regional networks, the 25 study areas and the respective research centres responsible for study area presentation and analysis is given below.

I. Dry Mediterranean Mountains (Co-ordination: Aristotle University of Thessaloniki, Greece)

   1. Vardousia Mountains, Greece (Aristotle University of Thessaloniki)
   2. Jouchtas and Strubulas Mountains, Island of Crete, Greece (Aristotle University of Thessaloniki)
   3. Mediterranean Pyrenees and Massif Central, France (SIME and INRA ESR, Montpellier)
   4. Abruzzo Inner Mountains, Italy (Italian Farmers' Confederation, Rome)
   5. Basilicata Inner Mountains, Italy (Italian Farmers' Confederation, Rome)
   6. Penibética Andalusia, Spain (Junta de Andalucia, Centro de Investigación y Desarrollo Agrario)
   7. Terra Quente e Alto Douro, Portugal (University of Tras-os-Montes and Alto Douro, Villa Real)

II. Northern Regions (Co-ordination: Macaulay Land Use Research Institute Aberdeen, Scotland)

   8. Cairngorms, Scotland (Macaulay Land Use Research Institute Aberdeen)
   9. Vindeln, Sweden (Umea University, Department of Social and Economic Geography)
   10. North Savo, Finland (University of Helsinki, Department of Economics)

III. Central and Eastern Alps (Co-ordination: Federal Institute for Mountainous and Less-favoured Areas Vienna, Austria)

11. Tyrol Oberland, Austria (Federal Institute for Mountainous and Less-favoured Areas, Vienna)
12. Triglav National Park, Slovenia (Agricultural Institute of Slovenia, Ljubljana and Triglav National Park Administration, Bled)
13. Val di Cembra, Italy (Centro di Ecologia Alpina, Viote del Monte Bondone, Trento)
14. Appenzell – Ausserhoden, Switzerland (SAB, Brugg)
15. Oberallgäu, Germany (Technical University of Munich)

IV. Western Alps (Co-ordination: GIS Alpes du Nord Chambéry, France)

16. Beaufort Savoie, France (GIS Alpes du Nord, Chambery)
17. Aosta Valley, Italy (Institut Agricole Régional, Aosta)
18. Valais Canton, Switzerland (ETH Swiss Federal Institute of Technology, Zurich)
19. Vercors, Isère et Drôme, France (CEMAGREF, Grenoble)
20. Haut-Plateau du Jura, Franche-Comté, France (ASCA, Paris)

V. Oceanic Regions (Co-ordination: IKT Nezkazal Ikerketa Teknologia S.A. Recursos Naturales Vitoria-Gasteiz, Spain)

21. Picos de Europa, Cantabria, Spain (IKT Nezkazal Ikerketa Teknologia S.A. Recursos Naturales, Vitoria-Gasteiz)
22. Basque Mountains, Spain (Basque University, Vitoria-Gasteiz)
23. Basque Mountains, France (INRA, Hydrobiological Station, Saint-Pée sur Nivelles)

VI. Central Pyrenees (Co-ordination: INRA Castanet-Tolosan Toulouse, France)

24. Haut-Couserans, France (INRA Castanet-Tolosan, Toulouse)
25. Haut-Sobrarbe, Spain (IPE Ecological Institute of the Pyrenees)

1.3 Main approaches

Analysis of such a great number of study areas calls for a set of common guidelines and prior listing of the contents and details to work on. As the prime issue of the study was the policy impact between agriculture and environment, a strict limitation might have seemed appropriate at first sight. But, taking account of the interrelationship between the environment in the mountains with sectors other than agriculture, a wider concept had to be adopted. This included the policy impacts on agriculture and the environment in a wider context, considering the different environmental, socio-economic, and cultural dynamics, linkages and interfaces. The following criteria for an assessment of the agri-environmental situation and policy measures in the context of mountain areas aims to reveal the complexity of impacts and points to the multitude of driving forces. However, this enumeration is not intended to detract from the main concern of the study, to investigate analyses specific for mountain agriculture and its environment.

(i) *Systematic approach:* mountain agriculture has to be considered and evaluated in an overall systematic perspective, i.e. in relation to the natural environment, forestry, tourism, general economic development and societal environmental concerns. The impact of measures has to be assessed according to this background.

(ii) *Dynamic approach:* mountain agriculture is embedded in a dynamic process. Agricultural markets, the technological development and new scientific development exert an important influence, which has to be considered when assessing policy measures.

(iii) *Temporal approach:* proposals have to be identified in accordance with their chronological realisation. In particular, the time-frame of measures ranging from short-term to long-term implications should be specified and analysed carefully for hidden side-effects.

(iv) *Institutional levels concerned*: proposals and recommendations have to address the different levels of policy making (EU, national government, region etc.) explicitly.

(v) *Consideration of beneficial effects:* measures supporting and maintaining beneficial effects accomplished by mountain agriculture on the natural environment have to be expressly addressed.

(vi) *Wide range of tools and instruments:* proposals should address both contemporary agricultural and environmental policy measures, restrictions and regulations, as well as measures on a more general

level like those measures concerning the fields of research, extension, training, coaching, consultation and communication.

(vii) *Efficiency of the measures:* all measures should be judged on their efficiency and impact on the relationship between mountain agriculture and environment.

(viii) *Assessment of application:* The impact of agri-environmental measures definitely relies on the participation of the farmers. Hence the specific preconditions and circumstances under which measures are applied are crucial for their efficiency.

One of the main objectives of the study was to sample a wide range of interests to identify divergent viewpoints. The task here was to assemble the relevant information by selected semi-structured in-depth interviews with researchers, farmers and key actors from local NGOs, administration bodies, agricultural departments etc. The interviews were carried out following a general scheme in investigating the interrelationships, causes, pressures and impacts between mountain agriculture and the environment. The core issue was to find illustrative examples of the application of relevant measures and to gather ideas from practitioners on finding ways of tackling the economic, environmental and social problems. With this aim in mind, local and regional experts from various fields and sectors were selected for interviews to represent region-specific and, very often, opposing viewpoints as well (see list of contacted institutions in annex 3). These statements served as valuable basis for the regional assessment of the measures' impact on the environment as observed by different sectors. At the same time they constitute an important element in the formulation of strategies to open up perspectives for the development of mountain policy in the study areas.

1.4 Continuity of management, intensification and land abandonment

Mountain agriculture has always had to strive to adapt to a very particular environment with natural difficulties stemming from its topography, climate and soil conditions. The unique characteristics of altitude, slopes and vegetation features mean that it has preserved a great degree of distinctiveness. In addition to the extremely unfavourable working conditions, mountain farmers are also very often situated in peripheral regions and live in isolated farmhouses.

With the end of traditional farming methods in mountain areas, landscape degradation and a reduction in biodiversity is taking place, and thus the continuation of farming activities in these areas is extremely relevant. Mountain farming,

in particular, is linked to the fulfilment of the double function of agriculture today: to produce agricultural products and to contribute to the preservation of the environment. With the great influence of land use systems on the cultural landscape and the environment, the negative environmental impact of the retreat of agriculture have to be resisted, especially in mountain areas. If farm management is adapted to its environment not only does it improve biodiversity and landscape structure and consolidate soil conditions, it also protects water and air quality. The continuation of farm management in mountain areas thus plays a central role in regional development, as it acts as a prerequisite and basic activity for other sectors, such as tourism, and the maintenance of infrastructure facilities (OECD 1998).

Nevertheless, the tendencies in mountain farming in European mountain areas are somewhat divergent. Whereas farming in countries that are heavily committed to the use and integration of their mountain areas in national economy has tended to stabilise in most areas, other countries are displaying stronger tendencies either to intensification or to land abandonment. In general, these processes are results of a long-term evolution and can hardly be monitored and evaluated over a short time-scale and within a limited geographical area.

Assessment is made even more difficult since abandonment and intensification phenomena often appear simultaneously within one region. Moreover, they can also occur within a local community or even a single farm holding. The divergence within a given area adds to the complexity of processes and makes it difficult to attribute a straightforward positive or negative overall impact.

Given the interrelation of land use and regional economy, the regional context has to be taken into account when assigning value to farming practices and changes in farming practices in mountain areas. What may be regarded as a positive effect for the environment in many southern European countries (e.g. afforestation), might be seen as more negative, causing a reduction in biodiversity and the disappearance of cultural landscapes in some central and northern European countries (with a high forest cover). Another example: “There is a strong case for seeking to limit grazing pressure from subsidised livestock where this is causing environmental damages” (overgrazing), but “there are also areas where habitat value is deteriorating as a result of under-grazing” (Baldock/Mitchell 1995, p. 58). This contextual interpretation is underlined by the variety of experiences made available through the 25 study areas.

The classification into the six regional groups suggests that there are at least some similarities between study areas of the same regional group, but also substantial diversity. The following table is intended to give an overview on the main issues relevant to each of the six regional groups. In addition to underlin-

ing the simultaneous occurrence of land abandonment and intensification tendencies, it also reveals the high significance of non-agricultural sectors as driving forces to the processes analysed. This result should be underlined, since investigation into these issues was not a prime objective of the study.

Table: Main driving forces on environmental performance

	regional networks					
Main themes	1	2	3	4	5	6
land abandonment	*	*	*	*	*	*
land use intensification	*	*	*	*	*	-
changes in husbandry	-	-	-	*	-	*
forestry	-	*	-	-	*	-
non-agricultural pressures	*	*	*	*	*	*

The evolution of extensive farming systems in the mountain areas has attracted our attention because its tendencies could lead to considerable degradation of the environment and the cultural landscapes. These changes are especially serious as they very often involve the irreversible disappearance of valuable elements of our environment. Moreover, the negative impact on the natural environment often induces a further weakening of the socio-economic situation of the region and is thus detrimental to a sustainable regional development.

The core question is to find appropriate measures in agricultural and environmental policies (but also regional policies) that address the specificity of driving forces in mountain areas. At the same time, it is of prime interest to go beyond the prevention of negative impacts and envisage an increased awareness on the utilisation of the uniqueness of mountain areas as an outstanding regional development potential.

1. Dry Mediterranean Mountains

A. Agricultural impacts and pressures:

(i) Land abandonment and land degradation:

Symptoms: soil erosion, destruction of terraces, over-exploitation of pastures, **disappearance of landscapes** and decline in biodiversity (Abruzzo), overgrowing with shrubs, **forest fires** (Trás-o-Montes, Mediterranean Pyrenees)

Causes: There are many socio-economic reasons for land abandonment and degradation i.e. depopulation, over-ageing of the farmers, general lack of profitability, infrastructure facilities, employment, irregular rainfall and climatic changes.

Conclusions and recommendations: A wide range of different measures and instruments is required to cope with these problems. Regulation 2078/92 should be more clearly defined to maintain, for example, traditional horticulture (Trás-o-Montes) or pasturing (Massif Central). Inadequate forest management measures such as afforestation of cereal land or the replacement of native tree species by eucalyptus (Trás-o-Montes) counteract environmental performance. The EU forestry regulation, Reg. 2080/92, should also support smaller projects and encourage farmers towards diversification and forestry activities. Forest fires endanger habitats and natural landscapes (Mediterranean Pyrenees). EU compensatory allowances generally contribute to the maintenance of agricultural cultivation in mountain regions but they are too restrictive for pluriactive farmers and they are not applied for traditional horticulture. Objective 1 and 5b Structural Fund measures should also put the emphasis on quality production, organic farming and co-operation between mountain farmers.

(ii) Land use intensification in favoured regions:

Symptoms: **intensive monocultures in horticulture** (Trás-o-Montes, Crete, Andalusia) and cereal cropping (Basilicata), over-application of fertilisers and pesticides, loss of biodiversity and landscapes, overgrazing, vegetation deterioration, **soil erosion** (Crete)

Causes: These problems mainly derive from intensive fruit growing, lack of knowledge and insufficient information about chemical compounds and too large herds.

Conclusions and recommendations: Reg. 2078/92 is not sufficient for the promotion of substantial extensification in horticulture. On more favoured sites, farmers can use irrigation to increase production and revenue. Many national policy measures favour the intensification of plantations and support investment in environmentally harmful branches like table-olive growing. The compensatory allowances scheme, which is based on livestock numbers, encourages over-grazing. Compensatory allowances should therefore be modified according to the capacity of the pastures.

B. Non-agricultural impacts and pressures:

Symptoms: waste pollution, soil erosion, landscape destruction, biodiversity change, disturbance of wildlife, poaching (Vardousia), settlement and land use conflicts (Mediterranean Pyrenees), drilling rigs, accidental oil spills on the oilfields (Basilicata), water pollution and loss of aquatic habitats (Trás-o-Montes)

Causes: tourism and recreation, traffic, mountain climbing (Vardousia, Crete, Abruzzo, Andalusia), urbanisation and settlement (Mediterranean Pyrenees), economic development and industrialisation on the coast with little impact on the inland mountain areas (Abruzzo), oil drilling (Basilicata), hunting (Vardusia, Andalusia), industrial and domestic sewage from urban centres (Trás-o-Montes)

Conclusions and recommendations: Tourism, particularly agri-tourism, is an important source of income but it can have negative impact on the environment. Sustainable rural development initiatives like LEADER can help to create employment for local people (Crete, Andalusia). Objective 1 and 5b programmes give incentive to economic development, but this process is mainly confined to the coast (Abruzzo). Oil wells have a primary non-agricultural impact on the environment in the Basilicata study area. Land use planning and space management is disorganised, the treatment of solid waste is insufficient, untreated sewage is still flushed into rivers because of the absence or inadequacies of wastewater plants (Trás-o-Montes).

2. Nordic Regions

A. Agricultural impacts and pressures:

(i) Land abandonment and land degradation:

Symptoms: disappearance of traditional landscapes and decline in biodiversity (Vindeln), **expansion of forests** at the expense of agricultural land (North Savo)

Causes: Arable land is reduced and marginal land taken out of cultivation because of depopulation and lack of economic incentive (Vindeln, North Savo).

Conclusions and recommendations: The accession of Sweden and Finland to the EU meant the adoption of the corresponding EU environmental regulation (Reg. 2078/92) which is in general considered to set lower standards than the former scheme (Vindeln). Nevertheless, to some extent Sweden has maintained ist more demanding regulations. But Reg. 2078/92 has succeeded in compensating for loss of income following accession to the EU and the support for organic farming has increased considerably (North Savo). However, the cross compliance aspect of this agri-environmental programme should be further developed, efficient monitoring and equity considerations are indispensable and the payments should focus on more localised targets instead of large areas. Institutional and financial reasons mean that the rate of uptake of the Reg. 2078/92 scheme is low. So the payments and financial ceilings have to be increased to raise incentives (Cairngorms). Objective 6 measures are very important in maintaining open agricultural landscapes in remote and fragile areas (Vindeln, North Savo).

(ii) Agricultural intensification:

Symptoms: **overgrazing**, inhibition of woodland, vegetation change and soil erosion, threat to bird life (Cairngorms), fertiliser leakage, eutrophication and sewage inputs (Vindeln, North Savo),

Causes: Overgrazing problems are linked to increased sheep grazing density owing to business profitability and subsidies as well as a high number of deer and rabbits (Cairngorms). Increasing stocks of elk and reindeer, damaging forests and grazing on cultivated land during winter, cause some conflicts with agriculture, and commercial forestry, lakes and rivers are threatened by manure leakage and sewage outlets (Vindeln, North Savo)

Conclusions and recommendations: Reg. 2078/92 payments can help to slow structural changes and farming decline, but support is too low to encourage extensification. Thus financial ceilings have to be increased to raise incentives and strategies have to be developed to increase environmental awareness among the farmers (Cairngorms). The Swedish environmental protection regulations are stricter than their EU counterparts, so they need to be maintained (Vindeln). The special protection supplement within Reg. 2078/92 should cover more types of habitat, e.g. dry and wet meadows, shoreline meadows, leaf fodder meadows and forest pastures (North Savo). Compensatory allowances paid according to livestock numbers sometimes contradict the extensification objectives of Reg. 2078/92.

(iii) Forestry operation:

Symptoms: loss of moorland biodiversity, **impacts on landscape development**, soil erosion (Cairngorms), loss of farmland, natural forest biodiversity and quality of bogs (Vindeln, North Savo)

Causes: Low profitability and structural change in agriculture can make afforestation a more attractive option (Cairngorms). Commercial forestry has drained bogs to increase growth of the trees. Forest roads fragment the landscape and increase accessibility, which can be a problem for sensitive habitats. Sometimes damage to forests is also caused by elk (Vindeln, North Savo).

Conclusions and recommendations: Higher payments under Reg. 2080/92 for planting native tree species would seem to be a quite prudent measure, since afforestation is a potential for increased environmental benefits. But nearly half of all new planting is coniferous and most plantings largely remain on estate land because the majority of farms are tenanted which effectively prohibit afforestation by the farmer (Cairngorms). Forestry practices have improved, large-scale clear-felling is no longer practised (Vindeln). There is only a modest incentive for afforestation in Finland as 77% of the total land area is already covered by forest. A more important aspect is the improvement of forest management (North Savo).

B. Non-agricultural impacts and pressures:

Symptoms: land use change, disturbance of wildlife, **decline in biodiversity**, soil erosion, waste pollution, water pollution, eutrophication and algae growth, acidification with harmful effects on soil fertility, sensitive upland plant communities and freshwater organisms, fish-stock decline, forest degradation (Cairngorms, Vindeln, North Savo), air pollution, smog, diffusion of heavy metals and soot, radioactive contamination, tropospheric ozone, sewage effluent, noise disturbance by motor vehicles (Vindeln), ammonia emission (North Savo)

Causes: tourism and recreation, skiing, walking, mountain biking, trekking, canoeing, river rafting, snow-mobile driving, draught-dog sledging, fishing, increased traffic, waste creation, atmospheric acidity, air pollution caused by local industries and wood-based heating and international long-range transport (Cairngorms, Vindeln), radioactive fallout from the Chernobyl accident, non-existent, or not properly functioning sewage treatment systems (Vindeln), ammonia deposition due to a high local pig stocks (North Savo)

Conclusions and recommendations: Diversified opportunities for employment, various environmental improvement and education projects in the area of wildlife and the natural environment are positive aspects of tourism (Cairngorms, Vindeln). Tourism and rural development initiatives can provide new markets for farm services. An adequate vetting system is required to prevent negative environmental impact in the application process of development programmes and also in the Local Authority Planning system. The development of cleaner technologies is another objective to prevent environmental damage (Cairngorms, Vindeln). The vegetation, soils and waters of the zone generally have a very low buffering capacity for sulphur and nitrogen. Mountain areas are particularly vulnerable because of high precipitation levels (Cairngorms, Vindeln).

3. Central and Eastern Alps

A. Agricultural impacts and pressures:

(i) Land abandonment:

Symptoms: soil erosion, avalanches, rock falls, landslides, destroyed swards, **disappearance of landscapes** and valued habitats, change and decline in biodiversity, (Appenzell, Oberallgäu, Tyrol Oberland), over-aged forests (Tyrol Oberland), destruction of terraces, **loss of cultural traditions**, forest fires (Val di Cembra)

Causes: Land abandonment is a relevant issue in several regions owing to depopulation and ageing of farm managers. Extensification and transformation in land use systems, e.g. the suspension of the mowing of steep slopes and high mountain meadows, derive mainly from a shift to less labour-intensive farming systems. Forest operations are often impeded by insufficient access roads and unfavourable revenue prospects (Tyrol Oberland). The maintenance of the terraces on the steep slopes requires a great deal of manual labour, which is not available (Val di Cembra). The fragmentation of the plots prevents land use intensification (Val di Cembra, Tyrol Oberland).

Conclusions and recommendations: Compensatory allowances and Reg. 2078/92 (and similar Swiss and Slovenian measures) help to preserve agricultural cultivation and provide protection against natural hazards. The level of allowances is too low to compensate for the increased labour requirements (Tyrol Oberland, Triglav National Park, Appenzell). With regard to the EU compensatory allowances, a wider differentiation between farmers in mountain and less-favoured areas would be required (Tyrol Oberland, Oberallgäu). A particular problem is that very small-scale holdings are not eligible for these allowances. The guidelines of the 1992 CAP reform do not properly take account of the peculiarities of small-scaled farms and part-time farmers. Organic farming, which plays an important role, is a major item of R 2078/92 as well as other measures which promote biodiversity and cultural landscapes. Nevertheless, improved marketing structures for organic produce and special action programmes for organic husbandry are still required.

The agri-forestry regulation 2080/92 facilitates forest management and promotes biodiversity and the protection of human living space. But special emphasis should be put on care measures for protective forests and the marketing of timber. Objective 5b Structural Funds measures and LEADER II programmes promote regional development, strengthen the endogenous forces of the region and improve the position of the farmers. These measures should focus more heavily on quality production, organic farming and pluriactivity. In addition, closer co-operation between all economic sectors of a region, i.e. agriculture, industry, tourism, handicraft etc., will be indispensable to successful regional development.

(ii) Land use intensification:

Symptoms: soil and water pollution, eutrophication of surface waters, nitrate leaching, over-application of pesticides and fertilisers, slurry problems, change and decline in biodiversity (Oberallgäu, Appenzell), waste of spring water (Val di Cembra)

Causes: Intensification in land use is a particular local issue on favoured sites, e.g. within the valleys. Farmers try to raise agricultural profitability by intensive forms of production and high livestock densities. Thus over-application of fertiliser in particular liquid manure and pesticide is frequent (Oberallgäu, Appenzell). Waste of water is caused by improper irrigation methods (Val di Cembra).

Conclusions and recommendations: Reg. 2078/92 cannot prevent spatial over-application of fertilisers and pesticides. More consideration should be given to local and temporal peculiarities (Oberallgäu, Appenzell). The cultivation of specific high-quality products like fruit, grappa, chestnuts, flax, cheese, etc, at local level could be a challenge for farmers to improve their agricultural income (Val di Cembra, Appenzell, Tyrol Oberland). Incentives for more efficient irrigation methods should reduce water consumption, particularly from springs, as well preventing leaching, runoff and landslides (Val di Cembra). The storage capacity of the slurry pits should be extended according to the local requirements (Appenzell).

B. Non-agricultural impacts and pressures:

Symptoms: waste and water pollution, soil erosion, vegetation degradation, disturbance of wildlife, delayed snow melting, decline in biodiversity (Oberland, Triglav National Park, Oberallgäu), noise and air pollution (Appenzell, Triglav National Park), landscape degradation, illegal camping, waste tipping and building construction (Triglav National Park), traffic, settlement development and land concurrence (Tyrol Oberland, Oberallgäu), mine tailings (Val di Cembra)

Causes: **mass tourism** in general, which is concentrated on a few resorts (Tyrol Oberland, Oberallgäu, Triglav National Park), winter tourism, skiing (Tyrol Oberland, Oberallgäu, Triglav National Park), summer tourism, hiking (Val di Cembra), local and **through traffic** (Val di Cembra, Oberallgäu, Tyrol Oberland, Triglav National Park), land use conflicts between agriculture, settlement, industry etc. (Tyrol Oberland, Oberallgäu, Appenzell), mining, porphyry quarries (Val di Cembra)

Conclusions and recommendations: The tourist industry causes many environmental problems. On the other hand, tourism and recreation is a motor for the local economy and important source of income for the agricultural population (Tyrol Oberland, Oberallgäu). In any case, mutual understanding and closer co-operation between the individual local players should be improved, research projects on the interrelationship between the environment and different economic sectors are required, and evaluation mechanisms will have to be established (Triglav National Park, Tyrol Oberland).

4. Western Alps

A. Agricultural impacts and pressures:

(i) Land abandonment:

Symptoms: **abandonment of steep slopes**, the mowing of meadows and pasturing, loss of habitats and biodiversity, landscape degradation, acidification, soil erosion, soil compaction, landslide and avalanche risk (Beaufort), abandonment of marginal land and pastures in intermediate altitudes (Aosta, Valais), expansion of forests (Aosta, Vercors), decrease of herding (Aosta, Valais), frequent natural hazards e.g. avalanches, wild fires

Causes: The number of agricultural holdings has declined rapidly, small-scale and pluriactive farms prevail, furthermore there is shortage of agricultural labour, low profitability and poor income prospects (Beaufort, Aosta, Valais). Land abandonment is an important issue in intermediate altitudes, while at the same time production intensification processes are taking place in the more favoured valleys and on high mountain pastures (Aosta, Valais). The cheese production industries have enforced a dichotomy between intensification and destruction of certain meadows (Jura).

Conclusions and recommendations: Compensatory allowances and Structural Funds measures play a crucial role for the maintenance of the agricultural structure, but they should be reshaped in favour of small-scale farms. The application of Reg. 2078/92 supports the maintenance of the agricultural holdings quite well although pluriactive farmers should not be excluded. Several special measures like a premium for herb growing or organic farming could augment agricultural income (Beaufort, Valais). Moreover, there is very little information on the specific effects on biodiversity. The Reg. 2078/92 scheme should put more emphasis on local particularities and dynamics and recognise the subsidiarity principle. In general, a programme period of five years has proved to be too short and the payments should, in particular, give better regard to the specific disadvantages of the holdings. An improvement of local co-ordination, accurately defined programmes with a broader, interdisciplinary approach and dissemination of knowledge about environmentally sound methods is indispensable (Vercors).

(ii) Land use intensification:

Symptoms: over-exploitation on favoured sites within the valleys, decline in biodiversity, increase of weed, acidification, water pollution and soil erosion, **increase in livestock density**, manure problems, uniform landscapes (Beaufort, Valais)

Causes: The main causes are connected with an intensification in agricultural production, in some cases cattle and sheep are sent outside the region during wintertime to reduce dependence on home-grown fodder and to increase the forage basis (Beaufort).

Conclusions and recommendations: Intensification in agricultural production can cause severe environmental problems, particularly water pollution due to over-application of fertiliser and pesticides. Milk quotas and various national market measures secure the agricultural structure and limit the livestock density in more favoured areas (Beaufort). In addition, high prices resulting from these market regulations promote modernisation and intensification. Milk quotas should be maintained and a ceiling for direct payments is required.

The herding premium in the framework of Reg. 2078/92 encourages a tendency to increase livestock herds. Farmers should be trained and provided with information about the carrying capacity of their pastures in order to avoid overgrazing by sheep (Valais, Vercors). Compensatory allowances provide incentives to structural change, modernisation and investment, but these payments should be harmonised with the aims of the structural measures.

(iii) Changes in animal husbandry:

Symptoms: replacement of cattle by sheep, risks of soil erosion and landslides, changes in vegetation and probable decline in biodiversity and extinction of rare species (Valais, Beaufort), **changes in agricultural structure**, changes on mountain pastures (dereliction of utilities and equipment, abandonment of care-measures)

Conclusions and recommendations: Intensification in agricultural production can cause severe environmental problems, particularly water pollution due to over-application of fertiliser and pesticides

Causes: Sheep herding requires less labour and consequently raises agricultural profitability (Beaufort, Valais)

Conclusions and recommendations: Changes in the herding regime, i.e. the replacement of cattle by sheep could in some cases exert a negative impact on the natural environment. Possible threats depend on the local conditions and specific circumstances. Reg. 2078/92 established a monitoring system which has been able to avoid environmental risks (Aosta). The specific environmental objectives should be clearly defined at local level by Reg. 2078/92 or the LIFE programme. Sheep farming without shepherds carries a risk of the transmission of wildlife diseases, for example, from chamois and ibexes (Beaufort).

B. Non-agricultural impacts and pressures:

Symptoms: decline in biodiversity, vegetation degradation, disturbance of wildlife, soil erosion, waste and water pollution (Beaufort, Valais, Jura, Vercors), landscape changes (Valais), disturbance of freshwater communities and aquatic fauna by electric power plants (Beaufort), noise and air pollution (Aosta)

Causes: **tourism**, high-altitude ski-stations, construction of roads and tourist infrastructure (Beaufort, Aosta, Valais, Jura), construction of hydropower plants (Beaufort), population growth and **urbanisation processes** within the main valleys and on slopes exposed to the south, **simultaneous local depopulation** at higher altitudes (Beaufort, Aosta, Jura), through traffic (Aosta), industry (Jura)

Conclusions and recommendations: Intensive skiing tourism can cause severe pollution problems in several winter resorts. The tourist industry plays an important role in local employment and the maintenance of small enterprises. Land use conflicts between agriculture and the tourist industry are frequent (Beaufort, Aosta). The decline and closure of the old industries has been a widespread phenomenon (Beaufort). The traffic and transport volume has increased several times since the construction of trunk roads and tunnels (Aosta). The design of the national parks is out-of-date and inadequate to the requirements of the region, as it merely focuses on nature protection without taking account of the local economy and human interests (Aosta). Regional development needs to put the emphasis on a balanced economy and population in considering environmental objectives. Special attention has to be drawn to the traditional and historical role of agriculture and other industrial sectors. Efficient development programmes and an effective legislation is required to achieve these goals. Furthermore, the different rural development measures have to be co-ordinated and harmonised at local level.

5. Oceanic Regions

A. Agricultural impacts and pressures:

(i) Land abandonment and decline in agricultural activities:

Symptoms: natural hazards, forest and wild fires, soil erosion (Basque Province Spain), decline in biodiversity, **disappearance of landscapes**, overgrowing by shrubs (Picos de Europa)

Causes: Employment in the primary sector has decreased considerably because of the growth of urban industrial centres and difficult living conditions. The education level of the rural population is very low (Spanish Basque province). The construction of hydropower plants has led to the obstruction or loss of aquatic fauna (Picos de Europa).

Conclusions and recommendations: The programmes in the framework of the EU agri-environmental Reg. 2078/92 are proving as inadequate to maintain agricultural structure and land use, encouraging the clearing of shrubs and the French herding premium. The clearing of shrubs is especially important in preventing wild fires. Other sub-programmes like the measure for the promotion of organic farming have failed since farmers have not been able to obtain sufficient revenue and the organisation structure has been too feeble (Picos de Europa). Furthermore the payment rates for the keeping and rearing of endangered breeds were too small, thus meanwhile several domestic animal breeds have become extinct. Reg. 2078/92 payment rates should be increased and also extended for the benefit of pluriactive farmers. Special sub-programmes for training of farmers and for pasturing are also required. Pasturing is important for the maintenance of the landscape. Special aid is thus required to support transhumance (seasonal movement of livestock) and high-altitude herding. The consideration of high quality products and the specific local conditions should also receive more attention (French Basque province). Farm associations and agricultural cooperation could strengthen the market position.

The EU compensatory allowances for mountainous and less-favoured regions are crucial to the maintenance of farm management. The level of the compensatory allowances has to be guaranteed but there should be a stronger environmental bias in their application. Objective 5b programmes have in most cases had an indirect influence on the agricultural structure and the environment. For instance they support production and marketing of local agricultural and non-agricultural products, promote diversification and agri-tourism. Objective 5b programmes should focus more directly on environmental concerns e.g. by addressing nature conservation areas in the delimitation. Special efforts have to be made, particularly through LEADER programmes, to counteract depopulation.

(ii) Land use intensification on favoured sites:

Symptoms: **loss of valuable shrubs and hedges**, decline in biodiversity, soil erosion and compaction, over-application of organic fertilisers and pesticides, **threat to wildlife** (Spanish Basque province, Picos de Europa), increased number of herded ewes, cattle and horses, intensified dairy farming (French Basque province), water pollution, eutrophication and nitrate leaching, atmospheric pollution (French and Spanish Basque province)

Causes: The main cause is the effort to increase agricultural profitability. Land consolidation measures lead to the uprooting of shrubs and hedges on the better favoured sites in the valleys. The use of heavy machinery leads to soil compaction. Partridges are seriously endangered by the disappearance of refuges, i.e. shrubs (Picos de Europa).

Conclusions and recommendations: Reg. 2078/92 has little effect on agricultural extensification. The creation of environmental awareness and the training of stock breeders is a key issue in preventing improper application of fertilisers and pesticides. Market measures do not take account of environmental concerns. On the contrary, the corn silage premium encourages intensification (French Basque province). Collective agricultural initiatives should be promoted. The grazing capacity of lands should be determined by local studies and based on the principle of sustainability. Livestock density must be reduced to accord with grazing capacity. A more localised targeting of the payments and an efficient control mechanism is required.

(iii) Forestry operation:

Symptoms: soil erosion, decline in flora and fauna biodiversity, negative impact on the landscape, water-course regulation, **conflict between agriculture and forestry** (Spanish Basque province)

Causes: The plantation of fast growing foreign tree species, i.e. American conifers, endangers native species, uniform plantations in terms of tree species and age structure cause severe changes to habitats and biodiversity. Clear-felling is still quite common (Spanish Basque province).

Conclusions and recommendations: The application of the EU agri-forestry regulation, Reg. 2080/92, is not encouraging environmentally sound changes in forest management. Certain environmentally important sites are still excluded from Reg. 2080/92 measures (Spanish Basque province). The Reg. 2080/92 programmes should be modified and redrafted in order to improve the impact on biodiversity or soil erosion. Agro-silvo pasturing is still a widespread phenomenon and a frequent cause of conflict between farmers and forest managers. The impact on the environment is negative since it damages new plantations and destroys natural vegetation. Sometimes these conflicting interests cause forest fires, as farmers deliberately burn down woodland. Stricter controls by the authorities are called for.

B. Non-agricultural impacts and pressures:

Symptoms: Abandonment of high altitude pastures, flooding and destruction of valued habitats, barriers blocking wildlife corridors (Picos de Europa), disturbance of wildlife, water pollution and eutrophication, disappearance of landscapes, land fragmentation, decline in biodiversity, vegetation degradation, soil erosion (Spanish Basque province)

Causes: Hydroelectric power plants and dam construction (Picos de Europa), tourism and recreation, hunting, construction of tourist infrastructure, traffic (Picos de Europa, Spanish Basque province), settlement development, **urbanisation and industrialisation** (Spanish Basque province)

Conclusions and recommendations: Dams have been built for energy generation and irrigation purposes. Dam construction can be an important source of income and employment opportunities for the local population (Picos de Europa). Tourism is concentrated in a few resorts and tourists are particularly attracted by the publicity of a national park. The peak period for the tourist industry is in spring. Sometimes the load exceeds capacity (Picos de Europa). On the other hand, tourism is an important source of income for farmers and the local population in general. Weekend homes disturb the environment (Spanish Basque province). Illegal building and camping are frequent, so efficient measures are essential to preventing environmental damage (Picos de Europa).

6. Central Pyrenees

A. Agricultural impacts and pressures:

(i) Land abandonment:

Symptoms: abandonment of steep slopes, overgrowth by shrubs; forest fires and soil erosion (Haut Sobrabe), decline in biodiversity, disappearance of landscapes, destruction of common pastures (Haut Couserans)

Causes: **Depopulation and decline in agricultural activities** are key issues for land abandonment. Most environmental problems not only derive from agricultural land use but must also be considered as problems of the rural economy and society as a whole.

Conclusions and recommendations: In general, Reg. 2078/92 has a positive impact on the maintenance of agricultural structure in upland regions. But ,on the other hand, it sometimes stimulates the enlargement and intensification of the holdings, which can have negative environmental effects. Payments for the cultivation of steep slopes are too low and the five-year period of the programmes too short for a successful programme of action. In addition, it often takes too long to put the programmes into practice (Haut Sobrabe). There is a need for improved co-ordination and simplification of the programmes. The Reg. 2078/92 payments should be graduated according to the distinctive disadvantages of the agricultural holdings, and financial ceilings will be indispensable to prevent farm expansion and intensification. An efficient herding premium should safeguard pasturing. The development of the farm holdings is not predominantly a sectoral problem but an issue for the whole rural region. So a wide range of different structural and market measures will be needed to facilitate agricultural investments, promote diversification and high-quality products at local and regional level. Objective 5b programmes encourage the development of agri-tourism and thus create employment for the local people. Unfortunately, the impact of these programmes on agriculture remains weak. With regard to land consolidation, it will be necessary to establish sustainable land use planning and spatial management of resources.

(ii) Intensification of land use in valleys and flatland areas:

Symptoms: decline in biodiversity (Haut Sobrabe), substitution of native plant species and domestic animal breeds by high-productivity species and breeds

Causes: The main aim of intensification is to increase agricultural profitability. But land use intensification remains a localised phenomenon on more favoured sites in flatland areas and within the valleys.

Conclusions and recommendations: The main proposal focuses on the implementation of a LIFE programme on sites with high degree of biodiversity.

B. Non-agricultural impacts and pressures:

Symptoms: waste generation, vegetation damage, wildfires and forest fires

Causes: **tourism** and recreation, traffic (Haut Sobrabe, Haut Couserans)

Conclusions and recommendations: The creation of national parks is a key issue for the development of tourism industry and vice versa. Thus it is indispensable to adopt the policy measures applied in the region to the special requirements of both sides. In particular, it reveals the importance of intensifying the surveillance and control mechanisms in terms of wildfire and forest fire prevention (Haut Sobrabe, Haut Couserans).

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Section II

Comparative Analysis of Mountain Farming Policies in Central and Eastern Alps

2.1 Scope of analysis

The "Central and Eastern Alps" regional network comprises five study groups located in five different Alpine countries. As regional co-ordinator, the Federal Institute of Mountainous and Less-Favoured Areas in Vienna has played the role of an interface between the whole project network and the study areas within this geographic region. The following description of key findings of the analyses have been made possible primarily by the enthusiasm, eagerness and diligence of the team members in the five study areas concerned.

The study attempted to take an interdisciplinary approach which was made possible by the different disciplines, experiences, backgrounds and qualifications of the scientists and researchers involved in the different teams. Agricultural engineers collaborated with sociologists, regional planners and economists. Thus it was possible to discuss various aspects of one and the same problem from different viewpoints. This is why joint strategies and recommendations for mountain policy measures could be addressed even though team members occasionally had different attitudes. In any case, some of the proposals seem somewhat contradictory, and one could argue that this is not a practicable way of presenting results and discussing future options for mountain policies. However, it should be acknowledged that different assessments arise from the specific conditions and requirements of different regional contexts. Consequently, strategies for achieving sustainable development in mountain areas call for increased sensitivity on the part of local players and population and increased participation in order to arrive at balanced decisions appropriate to players and interests at different levels. Hence the occurrence of contradiction should not be seen as a slur on the attitude of decision-makers, but as a major challenge to find compromises to the benefit of the ecosystems, natural and cultural landscapes and heritages as well as for the socio-economic prospects of our regions.

The Central and Eastern Alps regional network was formed by the institutes and persons given in annex 2. The Central and Eastern Alps network held two regional meetings. The first, in Vienna on 24 January 1997, aimed at finding the

setting for the study and conceptualising the theoretical background and survey method, while the emphasis of the second meeting, from 16 to 17 May 1997 in Trenta, Slovenia, was to discuss the core findings of study area analysis, compare similar and different problem situations and to propose criteria and a framework for the formulation of strategies and recommendations.

2.2 Environmental impact of mountain farming

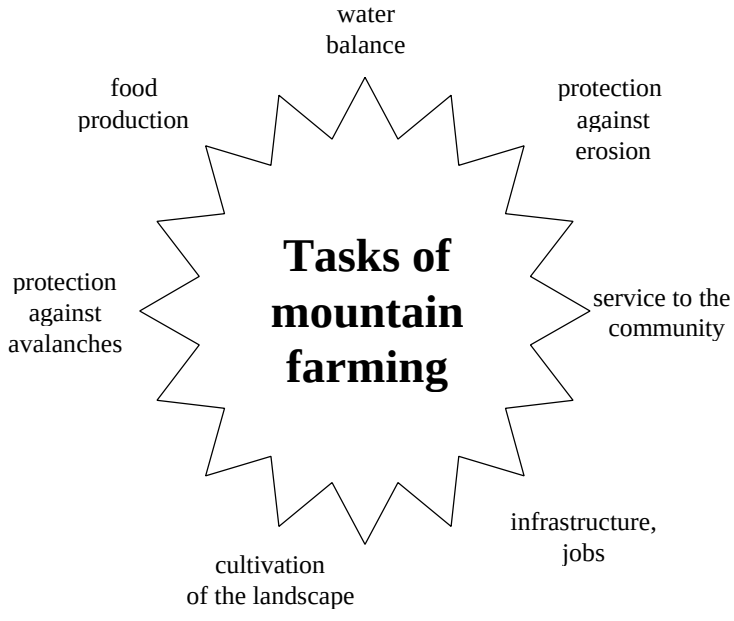
2.2.1 Different Tasks of Mountain Farming

It is a matter of fact that most farmers in these regions no longer consider the production of foodstuffs to be the main purpose of their activities. In general, this statement is the result of the long discourse on the broadening of functions of agriculture as a sector, and of mountain farming in the Alpine area in particular. As such, it is still contested by some sections of our societies that adhere to romantic images of earlier agricultural production patterns. But increasing international competition on the agricultural markets, and the deregulation and decline of commodity and output prices has forced all players to revise their attitudes and personal views of mountain farming, since mountain farming is confined to a wide range of natural topographic and climatic conditions that limit structural changes or the profitability of the holdings. Hence a new paradigm has evolved linking the role of mountain farming to sustainable rural development.

Mountain agriculture fulfils many more functions than just the production of organic material. The natural and cultural landscapes have been shaped and modified over centuries, sometimes over thousands of years. Even numerous semi-natural habitats and an increased flora and fauna biodiversity are a result of human farming activity. There is also a strong interrelationship between animal husbandry, pasturing, soil tillage and the social and cultural sphere. Settlement patterns, the form of buildings and farmyards and the behavioural attitudes of the residents have also developed according to the specific topographic, climatic and environmental circumstance of specific mountain areas. Moreover, the cultivation of high mountain areas protects the valleys and downstream regions against avalanches, landslides, soil erosion or flooding. Thus, appropriate mountain policies are needed as part of rural development schemes to safeguard natural and cultural landscapes and heritages and to counteract emigration, depopulation, socio-economic decline, loss of cultural identity, land abandonment and decline in biodiversity. This object cannot be achieved by focusing on agriculture alone; a wide range of different inter-sectoral measures will also be necessary.

The broad perception of mountain farming tasks in particular is acknowledged in the emergence of the subject as part of the process of establishing an Alpine-wide (legally binding) network to enhance regional sustainable development within this area (see various documents of Alpine Convention and s series of Alpine-wide initiatives, CIPRA etc.). The presentation of memoranda on mountain agriculture and forestry to the European Union Agricultural Council (Council Memorandum 1996a, 1996b, 1996c) also reflects the increased concern with the general socio-economic context of mountain farming. This viewpoint has been taken even more systematically in some recent studies on the evaluation of mountain policies at different institutional levels (e.g. Bazin/Roux 1992, Instance d'Évaluation de la Politique de la Montagne 1996, Frisio 1997, OECD 1998, Parlement Européen 1997). The different dimensions and predominant interrelations in this field are shown in the following diagram.

Figure 1: Tasks of mountain farming



Source: Köbler, 1997

2.2.2 Cause-Effect Relationship of Environmental Problems

As mentioned above, mountain agriculture fulfils a wide range of very important and highly appreciated tasks. This evaluation has specifically evolved in those countries with strong connections with tourist and recreational use of mountain areas and integration of local population. One should also consider, on the other hand, that mountain farming can in some respect also lead to environmental problems. The cause-effect relationships between agriculture and the environment can be illustrated from the examples of specific nitrate pollution problems, which have been responsible for a decline in biodiversity in the Oberallgäu study area. It should be noted that such harmful processes and detrimental mechanisms are present in many European mountain areas, although to quite a different extent. In the case of the *Oberallgäu* we can trace the following relationships and interfaces:

(i) Many environmental problems derive from too intensive forms of farming, which are unsuited to the local conditions and what the environment will bear.

(ii) Obligatory directives that would regulate the intensity of farming according to the different local conditions do not exist. In addition, the observation, control and monitoring of existing agri-environmental measures is insufficient.

(iii) In general, environmental programmes like Reg. 2078/92 can help maintain environmentally sound mountain farming (via the income effect), but they are hardly suited to mitigating negative impacts on sites where over-intensive cultivation or the over-application of fertilisers and pesticides have produced environmental problems. This is why farmers with a high livestock density or intensity of production are unlikely to participate in these programmes out of economic considerations alone.

(iv) Structural policy, income policy and environmental policy are not sufficiently linked to each other. Subsidies targeted on income support, for example, which have been implemented to cope with structural problems, can entail a substantial price increase for the leasing of grassland. Hence, for many farmers, from the point of view of profitability, intensification of their own grassland is cheaper than leasing additional farmland.

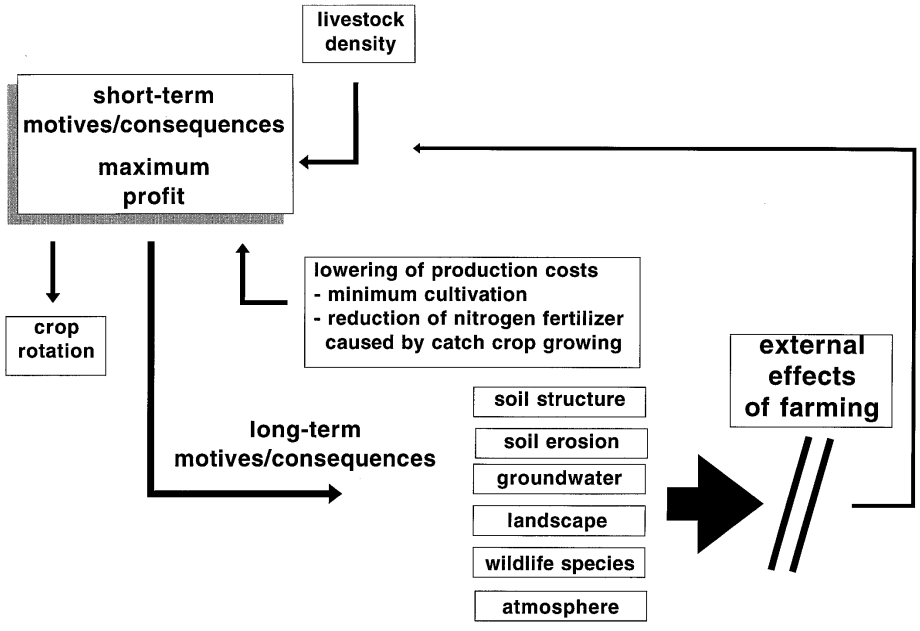
(v) Since long-term policy targets for future farm management regulations are non-existent or rather vague, modifications to the CAP become

rather difficult. There are few signs of a move towards, and acceptance of environmental preconditions for farm subsidies.

2.2.3 Positive and negative external effects

Nevertheless, under certain favourable local conditions it is possible to achieve a high production intensity without major negative external effects. But on less-favoured sites the same level of intensity may actually be too high in terms of environmental performance. Such individual farm intensification might be relevant, and in particular in mountain areas, since the main goal of the individual farmer remains improvement of farming efficiency. However, the consequences of alternative farm management on farm income and the labour input have to be discussed as key elements of decision-making for household behaviour. Moreover, linkages and opportunities on off-farm labour markets in many respects represent the main driving force on young farm household members (Dax et al. 1995).

Figure 2: Economic aims of the farmers and resulting environmental damage

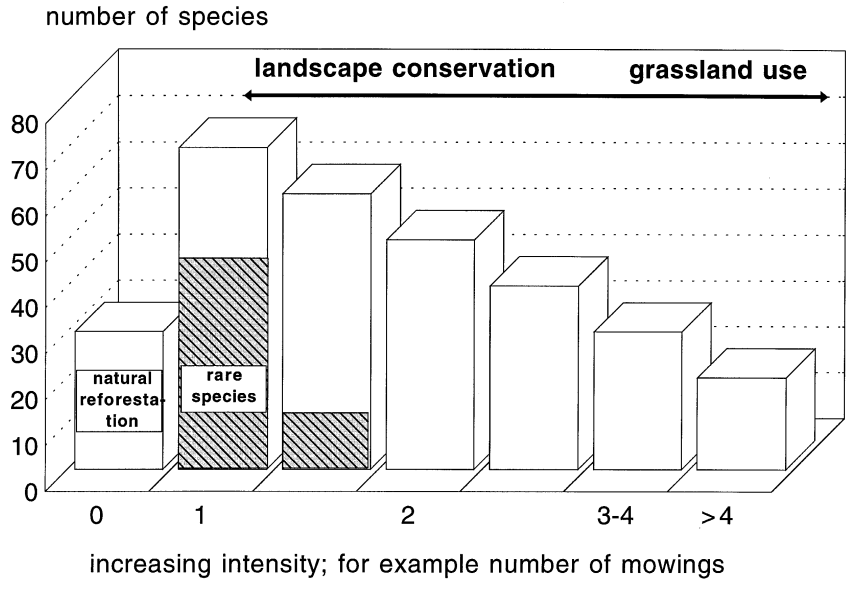


Source: Köbler, 1997

The diagram indicates that with regard to short-term decisions farmers usually do not consider the threat of environmental damage caused by depositions or inputs (e.g. manure, fertilisers, pesticides etc.). Up to a certain point, the inputs will be partly absorbed. Whenever the current input rate is higher than the absorbency limit, the inputs will accumulate. Beyond a certain level, the accumulated inputs will bring about irreversible damage, e.g. detrimental effects on soil conditions, loss of biodiversity and extinction of wildlife species etc. However, it is difficult to demonstrate the close connection and interrelationship between the beginning of an input deposition and the appearance of environmental degradation with regard to time and place. Unfortunately, these negative externalities are not usually accounted for in agricultural economics. Hence, the economic and legal conditions have to be revised and amended in order to internalise negative externalities (Lowe et al. 1997).

But mountain farming, in particular, offers a lot of positive externalities. Thus the understanding has to be communicated that support for mountain farming is a bonus for the society as a whole (Beaufoy et al. 1995). At present it seems that the negative external effects are subject to costly investigations, but the positive externalities and the interaction between mountain farming and the environment are largely ignored. Financial subsidies to preserve certain types of mountain farming can lead to so-called dead-weight losses. This happens when farmers are not encouraged to change their forms of farm management. Thus subsidies supplement income rather than having structural effects. However, financial support is necessary to ensure that farmers adhere to their traditional agricultural patterns, otherwise certain types of agricultural practice will disappear. This will not only have direct implications for cultural landscapes but will also lead to the extinction of many species (see figure 3). The negative effect on the environment will not take long to extend to regional economy and would reduce the capacity for sustainable regional development.

Figure 3: Intensity of grassland use and the number of species



Source: own figure; see also BRIEMLE, 1991

Source: Köbler, 1997

2.3 Interregional Comparison

The size of the study areas varies considerably, from 149 square km for Val di Cembra (Italy), to 243 square km Appenzell – Ausserrhoden (Switzerland), 840 square km Triglav National Park (Slovenia), 1,527 square km Oberallgäu (Germany) and 3,352 square km for Tyrol Oberland (Austria).

Tyrol Oberland is characterised by extreme disadvantages for agricultural cultivation, such as steep slopes and natural hazards. The region rises to a maximum altitude of 3,700 m. But despite the high mountain nature, the population is increasing. The tourist industry plays an important role, accounting for about 30 per cent of employment (including tourism-related sectors) in the region. Most farm holdings are small, the proportion of part-time farmers and commuters is extremely high. Agricultural production relies mainly on self-supply and non-market benefits.

The *Triglav National Park* is the largest and most important national heritage in Slovenia. The maximum altitude is 2,800 m. The region has suffered severe depopulation and land abandonment in recent decades, and the population is now extremely low. Most agricultural holdings are small-scale, extensive forms of land use prevail and the farm population is ageing. Tourism and recreation are important income resources for the region.

The living conditions in the *Val di Cembra* are harsh owing to its marginality and the constraining effect of steep slopes and ravines. The average altitude is between 600 and 1,000 m, while the highest summit is 2,400 m. Agricultural production is predominantly small-scale, it basically aims only at supplementing household income. Emigration, land abandonment and an ageing population are important issues. The population is still comparatively high, but in continuous decline. Porphyry quarries play an important role for the region's social and economic development.

Switzerland's *Appenzell – Ausserrhoden* canton is characterised by a wide range of different habitats and landscapes. In this pre-alpine region the altitude ranges between 450 m and 2,500 m. Population density is high, but the average age of the inhabitants is increasing due to an on-going emigration process. The principal sources of income for the local population derive from electronic and electrochemical industries, construction, tourism, social services, banking and insurance companies. Intensive forms of animal husbandry, i.e. cattle breeding, dairy farming and cheese production, are the main causes of local environmental problems.

The northern part of *Oberallgäu* district is dominated by hilly grassland, while the southern part displays (high) mountain characteristics. The region lies between 900 m and 2,600 m maximum. The principal sources of income are trade and commerce, followed by tourism, agriculture and forestry. The population is quite large and increasing rapidly. Intensive animal husbandry, particularly dairy farming, is characteristic of the lowlands and valleys while extensive forms of farm management are prevalent in the higher mountain regions.

Though the study areas show considerable similarities, it has to be stressed that, in general, they do not represent homogenous regions. As with large parts of mountain areas, significant differences occur, very often at lower regional/local levels and draw our attention to the need to capture those peculiarities when dealing with regional analysis. However, these local patterns also show some degree of consistency, and variations are mainly due to historical, cultural condi-

tions and the difficulties of establishing broad participation and involvement of local players.

With regard to the economic situation, a number of identical features could be found in all five study areas of the Central and Eastern Alps regional network.

(i) In all areas, general economic development seems to be comparatively stable. There are no major dynamics either in direction of abandonment or growth.

(ii) However, general economic development within the study areas is heavily dependent on externalities and is thus prone to crises.

(iii) There is a close interrelationship and interdependence between the various economic sectors of the regions.

(iv) Tourism and recreation already plays an important role in the regional economy or, at least, the emphasis is placed on tourist development.

(v) Land use conflicts between agriculture, industry, tourism, settlement and road construction are frequent in favoured locations (e.g. in the main valleys or on south-facing slopes).

In agriculture, the following common characteristics could be found:

(i) Small-scale agricultural holdings are prevalent. Structural changes are limited by a wide range of natural disadvantages (e.g. climate, steep slopes). The scale ranges from extremely small holdings with low market integration if any (Tyrol Oberland, Val di Cembra), to medium-sized, semi-intensive farms (Appenzell-Ausserrhoden, Oberallgäu).

(ii) In all of the regions, mountain farming cannot compete with agricultural enterprises in more favoured downstream and lowland areas. Consequently, quality production, direct marketing and organic farming are important in bringing in sufficient income and for future structural development.

(iii) Animal husbandry, particularly cattle breeding and dairy farming, are the most important sources of agricultural income in all the regions.

(iv) There is a great and still rising proportion of part-time farming or pluriactivity in all five study areas.

(v) Agricultural development can be characterised by a dichotomy. Cultivation is becoming increasingly intensive in more favoured areas (i.e.

valleys, lowlands) while land abandonment and land use changes are frequent on less-favoured, high mountain pastures and meadows.

(vi) The utilised agricultural area (UAA) is steadily decreasing in all five study areas.

(vii) Many mountain habitats and farming systems of great natural value are threatened by changes in agricultural land use.

Common environmental features can be listed as follows:

(i) All study areas contain ecosystems of great value, with high biological diversity. These ecosystems are also important for the population outside the mountain areas.

(ii) The regions' mountain ecosystems are fragile and threatened by external factors.

(iii) Forestry is of crucial importance to all these mountain regions. Improper practices and management, uneven-aged stock and agro-silvopasturing threaten the functions of forestry.

(iv) Most harmful effects only become visible in some smaller areas or at local level.

(v) Eutrophication problems derive mainly from the local over-application of fertilisers or manure.

(vi) In some areas, long-range air pollution caused by industry, traffic and transport has a serious impact on the environmental quality, even in the high mountains.

The principle agri-environmental pressures and impacts are also sketched out in an overview (see Annex 3).

Water pollution and eutrophication problems resulting from high livestock density and farm intensification measures are the most important agricultural pressures and impacts on the environment in *Appenzell – Ausserrhoden* and *Oberallgäu.* The main environmental concerns in *Val di Cembra* and in the *Triglav National Park* are land abandonment, depopulation and the disappearance and destruction of landscapes. The shortage of agricultural labour means that *Tyrol Oberland* is facing land use changes, particularly the transformation of high mountain meadows into pastures.

For *Tyrol Oberland*, *Oberallgäu* and the *Triglav National Park*, tourism and recreation are the main non-agricultural factors that impact on the environment. Tourist industry development can have both positive and negative aspects. On the one hand, it can provide employment and income for the local population, especially for farmers (agri-tourism); on the other hand, it can have harmful environmental effects, particularly when the number of visitors exceeds the carrying capacity. This usually happens only in a few peak periods and on a limited number of sites. *Appenzell – Ausserrhoden* is a highly industrialised and densely populated region which also suffers from the problems of air-pollution. Furthermore, land use conflicts between agriculture, industry, tourism and settlement, traffic and transport problems are common features for all densely populated areas within the mountains. Mining activity, i.e. the open-cast excavation of porphyry, is a specific environmental concern for *Val di Cembra*.

2.4 Perspectives and strategies

The analysis of (agricultural) mountain policies, their implications on, and the driving forces for environmental development were central to this study. Though emphasis was laid on the interrelation between agriculture and environmental performance in mountain areas, the research was to be set within a broader context, including effects exercised by other regional sectors and from outside the region. As this economic and policy framework ranges far beyond the issues addressed directly by the study, the following proposals do not go as far as to discuss such general socio-economic conditions. They are incorporated in the considerations only insofar as shifts in perception and motivation are necessary to increasing awareness and the environmental orientation of activities. The perspectives outlined centre on the conviction that the connection of basic environmental conditions to agricultural support policies must become a guiding principle. Farmers in mountain areas are in a position that is particularly well-suited achieving this. In addition, the wide range of influencing factors and the key role of mountain farming in this cause-effect relationship suggests that future strategies should be conceived in a way that makes extensive use of the mountain environment as a rural development asset. Whereas the potential negative impacts will have to be tackled by extending the scope of environmental regulations, the incorporation of the positive aspects that mountain farming has for biodiversity and the landscape will promote the acceptance of future policies and show synergies for the regional economy.

2.4.1 Non-market benefits

The importance of non-market benefits for the preservation of the mountain environment and stable social systems has increasingly to be incorporated in future considerations. The main function of mountain agriculture basically relies on non-market objectives. In the Alps (and in northern Europe, too) the mountain farming structure is closely linked with forestry, and both of these dominate land use in the region. Their practice and appearance provide the basis for many location oriented economic activities, in particular tourism, while also determining large parts of the environmental situation, such as biodiversity, soil quality and water provision and water quality. Mountain agriculture has no chance of competing with the agricultural structure and productivity in better-favoured lowland areas. Its structural growth and competitiveness is limited by a wide range of natural limitations (i.e. climate, remoteness, inaccessibility, small plots, natural hazards, short growing season). Consequently, many farms are only minimally integrated in the market process.

In fact, it is not the question of whether most farmers are moving to leave their villages. In many places, living in mountain areas has become part of the quality of life. However, in order to maintain settlement in the long-term and in peripheral regions, the provision of a proper living for the farmers and the population as a whole will become a crucial issue. Various different measures and subsidies for agricultural production, or just as deficiency payments for the maintenance of the holding, will be indispensable to combat emigration. In addition, proper infrastructure development, schools and educational facilities, road construction, cultural events and other forms of utilities will be needed to make it possible for mountain dwellers in remote areas to participate in the amenities of present-day society.

One could argue that the preservation of extreme mountain farming will become too costly. Nature could reconquer regions formerly settled by human beings, etc. There are different attitudes towards this assumption of whether or not a pristine state of the environment could be regained in a landscape that has been formed by human beings. It seems quite logical to call into question the appropriateness of subsidies in a period of general financial austerity, but this would only allow a short-term perspective of financial savings, not taking account of the wider tasks and positive impacts of mountain farming for society. The state of the environment could be classified either as positive or negative, the maintenance of settlement in mountain areas, natural and cultural heritage values could be discussed, but one should never underestimate the interrelationship of the effects and the impact on society as a whole. With increasing social problems in urban areas, particularly in the face of high unemployment rates, central-

European mountain farming issues will become of key interest even for northern European lowland areas.

The current system of payments and subsidies put its emphasis on compensating for natural difficulty. But because payments are too low, it excludes or disadvantages some groups because it has thus far failed to differentiate sufficiently according to criteria of farm management difficulties. There is scope to modify the measures and widen the support system. Such a new emphasis could be addressed in revision of CAP and Structural Funds policy, in particular integrating the notion of payment for services rendered by mountain farming.

2.4.2 Targeting environmentally sound farm practices

Direct marketing, high quality production, organic farming, regional and eco-labelling schemes represent a challenge for an environmentally sound and sustainable mountain farming to improve its future income situation.

Organic farming:

(i) Agri-environmental attitudes in general, and organic farming in particular, are gaining increasing importance and respect both from farmers and society as a whole. Because of the highly sensitive environment, mountain agriculture will have to pay special attention to environmental performance and environmentally sound production methods.

Concentration on quality production:

(i) By making use of and returning to traditional region-specific skills, quality products can be created and processed on the farm.

(ii) Markets aimed at should, in the first instance, generally be at regional level, and labels have to make the regional specificity and standards of the products clear.

Organisation of direct-marketing:

(i) Direct-marketing can partly help to overcome structural problems, but adapted processing and marketing facilities are essential.

Fostering co-operation among farmers:

(i) Forms of mutual cooperation, e.g. machinery rings and relief services, are specifically necessary in mountain areas, and can contribute to guaranteeing social security for the farming population.

2.4.3 Differentiation in mountain farmers support

Compensatory payments for farmers

Agriculture plays a multiple role, and turning it into a constituent part of development programmes is of special importance to rural areas. The functions of agriculture are not limited solely to production and economic purposes. Agriculture plays an important role with regard to settlement, cultural and nature-conservation issues. Such specific conditions call for the introduction of appropriate compensatory payments, which could compensate for the loss of agricultural income.

Special support for the maintenance of mountain pastures

The preservation and development of mountain grazing on alpine pastures and other high mountain grassland has always been a constituent part of mountain and hill farming. In more favourable areas agriculture has become increasingly intensive, while in remote and poorly accessible sites, in particular, abandonment and overgrowing of pastures has become more and more frequent. Grazing is of great importance to farms but, this apart, it is also of great environmental and social value, since it is the only appropriate way to preserve the alpine cultural landscape, which, in turn, is a key issue in the development of tourism. Highland grazing faces many problems. The most serious are the acute shortage of labour to work on the pastures, dairy-farmers in particular, and additional expenses arising from the maintenance of dairies and other buildings, machines and access roads to the pastures.

2.4.4 Integrated regional development

The main principle for improving policies has to be oriented on the integration of different aspects of regional development. This includes activities involving collaboration in local communities, international co-operation, development of information systems for European mountains, sustainable transport and energy networks, the role of environmentally fragile and protected areas, cultural landscape, biodiversity and human activities.

Local and regional concepts have to target actual policy programmes. Hence support by national bodies and adapted consultancy is widely needed. The objectives of agriculture in mountain areas have to take the regional context into account and must be defined according to the role it has evolved in society. Agricultural practices have to be considered in more integral and dynamic terms of

marketing and technology, above all, from the standpoint of socio-economic development, seen globally and including all the components of the natural environment.

Pluriactivity as an opportunity for rural areas and for mountain areas in particular:

(i) Pluriactivity is the overwhelming feature in most Alpine regions. However, the productive function and utilisation of quality concepts must not be neglected as a part of those farm concepts. The objective is to improve the linkage between and use of farming resources, local culture, industries, tourism and trade.

(ii) An integrated approach is needed in order to create new jobs and improve the relationship with non-agricultural sectors, like e.g. gastronomy, tourism and craftsmanship. Models of partnerships between farmers and other industries have to be explored and adapted to the regional situation.

Education and Training:

(i) The establishment of a rural training and enterprise foundation specifically designed for farmers would be an important starting-point and support for young farmers. Such a foundation would, in particular, address the local need for practical training, the process for the development of integrated programmes and accompanying counselling.

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Section III

Presentation of study areas

3.1 Tyrol Oberland – Austria

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This study area was selected for its extreme natural conditions, the prevalence of small-scale farm holdings, a high proportion of pluriactivity or part-time farmers, land use conflicts in the densely populated main valleys, the outstanding importance of tourism and environmental problems in connection with through traffic and tourist influx. The region contains impressive and relatively primeval landscapes with a high degree of biodiversity particularly in the high-lying mountain regions and many precious natural resources. In general, various problems are pertinent for huge parts of the Austrian Alps (especially in West Austria) and, in particular, underline the tight mutual relationship between agriculture, environment and tourism.

3.1.1 Introduction

A. Geography

The study area comprises the two districts of Imst and Landeck, situated in the far western part of the Austrian province of Tyrol. The total size of the area is 335,200 ha. But only 7.1% of the total area or 23,900 ha is suitable for permanent settlement. The basin of the Inn river course and its tributaries functions as a site for the principal economic activities and as main residential area. The lowest altitude, 700 m above sea level, is found in the main Inn Valley. The study area is enclosed by huge mountain ranges: the Lechtaler Alps (highest summit: Paseierspitze 3,036 m), Silvretta (Piz Buin 3,312m) and Verwall (Hoher Riffler 3,148 m) in the north and west, the Stubaier Alps (Zuckerhütl 3,507 m) and the Ötztaler Alps (Wildspitze 3,768 m) in the south and east of the region. The whole study area is classified as a mountainous region according to EU directive 75/268.

Climatic conditions are marked by a transition zone between a temperate continental and a maritime climate. The precipitation gradually increases from south to north. While the annual precipitation in some southern parts of the region (Ötztaler Alps and Stubaier Alps) is just 600 to 800 mm, in the northern and

western parts (Lechtaler Alps, Verwall) the total annual precipitation can exceed 1,000 mm and is sometimes more than 1,250 mm on exposed sites. The long-term average air temperature (1961-1990) in the Inn Valley basin is +8.9°C, varying between +19.4° C in July and –1.3° C in December.

On the whole, the infrastructure facilities (water and energy supply, sewage networks) are well established even in the remoter areas. But in winter there is occasionally poor access to some smaller valleys, remote villages and hamlets.

Two interregional trunk roads traverse the region, one across the Arlberg pass to Vorarlberg following the Inn Valley from east to west, the other from north to south across the Reschen Pass to Switzerland and Italy. Along these routes, traffic emissions and noise exposure cause significant environmental problems. But the ecosystem of the region is rich in various precious habitats and relatively unspoiled anthropogenic landscapes. The principal natural resources and amenities of the study area can be said to be the high-mountain meadows and alpine pastures, fresh-water reservoirs and cultural heritage.

The prevalent land use forms indicate the characteristic of a high mountain region and the great importance of grassland (1990): 39.0% of the total area is utilised agricultural area (UAA). Out of the total area 23.6% are alpine pastures, 11.9% permanent meadows, 1.6% permanent pastures, and only 1.4% arable land, fruit plantations etc., while forests and wooded land amount to 41.9% and bare land to 19.1%.

B. Socio-economic characteristics

Demographics

With a total population of about 88,000 (1991), the region's population density, about 26 inhabitants per square km, is relatively low (the corresponding figure for Austria is 93) with respect to the total area. As most of the land in mountains cannot be used for permanent settlement, Austria has developed a method to measure population density in relation to the permanently settled area. That density figure rises to 367 per square km, which is well above the national average of 243. The population in the study area increased by +9.0% in the period between 1981 and 1991. This is approximately three times the national average of +3.2%. This increase is mainly due to a high birth rate which outweighs the traditional migration process out of the region. The proportion of young people under 15 is higher (22.6%) than in the national average of 17.4% (1991).

The rate of college and university graduates is far below the national level. 30.7% of all males and 47.5% of all females in the study area obtained elemen-

tary education, 8.3% of all males and 5.7% of all females attended college or university. By comparison, the number of college and university graduates in Tyrol as a whole is 13.0% for male and 9.6% for female.

Economy

The percentage of working people, i.e. the economically active population, is 83.2% for males and 49.2% for females (1991). The principal sources of income are tourism, energy and the construction industry. In the study area, 3.9% of the working population is employed in the primary sector (agriculture and mining), 31.9% in the secondary sector (manufacturing industries) and 64.2% in the tertiary sector (services). The tertiary sector is dominant because of the importance of tourism. Tyrol is the most important tourist region in Austria with one third of all overnight stays. The study area itself attracts 24.2% of all tourists visiting Tyrol. The region is dominated by winter tourism. 64.4% of all tourists are winter visitors. In addition, energy generation plays a major role due to the great number of hydro electric power plants. The many small sawmills and construction companies are important for the local labour market.

The prevalence of out-commuting leads to a negative ratio of jobs in the region in relation to employed residents (84%). Unemployment rates depend on seasonal fluctuations of tourism and the construction industry. The basic unemployment rate in summer is comparatively low (about 3%), but in winter it usually exceeds 10% (1994). The annual average unemployment rate in the region was 8% compared to 6% in Austria as a whole.

Most industrial and trade enterprises are small or medium sized. They produce mainly for the local market. The traditional textile industry is jeopardised by increasing international competition and therefore suffers from various structural problems. Recently there has been decrease, or at least a stagnation in tourism because of the economic problems in Germany, the main country of origin of the tourists. The lack of skilled jobs is aggravating the employment situation in the region.

C. Agriculture

Historical Context

Throughout history, agriculture has never been able to supply the local population, or even the farm households themselves, with sufficient means of subsistence. The main reason for this is linked to the traditional gavel-kind system (land was equally divided among the children) and natural impediments such as harsh climate or extremely steep slopes. Thus, at least up to the turn of the century, the farmers were forced to send their children to Germany in summer, where they worked as shepherds or parlour-maids. So the traditional and general perception of farming focuses on subsistence, i.e. providing one's own household with food, not serving the market other than in the case of a few surplus commodities like lambs, flax, linen or wild berries, which were exchanged against non-agricultural products or items that could not be produced in the region.

In recent decades we can observe a permanent, steady although rather slow change in the agricultural production system. Obviously these changes have not been very drastic or visible, but they take place as follows:

(i) Nowadays grassland dominates the landscape and has become almost the only type of agricultural land use.

(ii) In recent decades, the number of cattle in the region has in general declined. Between 1964 and 1995 the average rate of decline in the number of cattle was 0.8% p.a., in comparison to the province of Tyrol as a whole and all Austria where no significant alteration of cattle numbers occurred over this period. In the same period we can observe a shift of cattle from the remote and narrow valleys into the central and more accessible main valleys.

(iii) Some mountain hay meadows have been converted into pastures and there is a slight tendency towards afforestation (1980-1990: +0.2% p.a.).

(iv) Less labour intensive production systems have become prevalent. Cattle is replaced by sheep, on high mountain pastures dairy cattle have been substituted by young stock or suckler cows.

(v) The cultivation of mountain cereals declined substantially. Land use statistics indicate an increase of meadows and pastures (1970-1990: +0.9% p.a.) due to a decrease of cropland (1970-1990: -2.4% p.a.)

(vi) Potatoes are only grown in flat plots in the valleys, which can be easily mechanised, instead on the slopes as in former days.

(vii) The traditional cultivation of flax has already disappeared.

Structure

About 3.9% (1991) of the working population is employed in the agricultural and forestry sector. Farm structure is characterised by rather small farms, especially what concerns the individual plots in the valleys. As agricultural holdings have considerable shares in joint ownership on high mountain pastures and forests the size structure does not show this small economical potential of farms. 17.5% of the farm holdings cultivate less than 10 ha (Tyrol: 27.7%, Austria: 50.0%), 43.7% between 10 and 30 ha and 38.8% more than 30 ha. 89.7% of all farm holdings own forests or wooded land (17.4 ha on average). The farm income per agricultural worker is the lowest in Austria, at just 46% of the EU level.

The total number of farm holdings is 4,331, of which just 15.5% are full-time farmers. The region is thus one of the areas with highest percentage of pluriactivity in Austria (and in Europe as well). Many holdings suffer from a lack of available labour, particularly during the harvest season.

Land use is mostly rather extensive. The majority of farm holdings suffer from difficult natural conditions like high altitude, steep slopes or harsh climate. Steep slopes particularly restrict mechanisation and require a large amount of manual work. The variety of agricultural products and farming systems is very limited. The dominant production sectors are cattle-breeding and dairy farming. Owing to the small economic size of the farm holdings, the milk quotas and cattle herds are rather small. Sheep are important for the use of extreme pastures in the higher mountains. The output per farm is low, both in terms of production and financial turnover.

Forestry contributes a large proportion to the farmers' income. About two thirds of all forest and wooded land is owned jointly by private or public institutions, and private ownership of more than 200 ha comprises in addition about 20% of all wooded area. Poor access, the permanent threat of natural hazards (avalanches, landslides, rock falls) and steep slopes aggravate the conditions for profitable forest management. Only one third of the forests can be managed profitably. The remainder comprises protective forests and forests under protection, which require intensive treatment, especially since about 40% of the forests are over-aged.

In spite of this difficult situation there is neither a significant land abandonment nor an important migration out of the region. Most farmers continue to live on a subsistence basis without significant integration into the market process. But there is a tendency towards extensification resulting from the increasing lack of labour in peak periods. The consequence is that some mountain hay meadows are converted into pasture land or afforested.

Policy measures and subsidies contribute to the rigid and persistent cultural and behavioural patterns within the agricultural population. Owing to the different forms of natural and economic restrictions, the basic function of mountain farming in this region lies more in maintaining and sustaining the landscape and local culture than in productivity.

D. State of the environment

The environmental situation in the study area can be considered as relatively favourable. In general, agriculture does not have a significant negative impact, though on some smaller sites there are some eutrophication problems caused by fertiliser and manure. Furthermore, many plots in the valleys or close to the holdings have been formerly transformed into more intensive grassland by destroying precious habitats like marshland, dry grassland, shrubs and hedges etc. Some alpine pastures have been abandoned because of the decrease in available agricultural labour. This desertion has led to increasing coverage by weeds and bushes and the increased dangers of erosion on steep slopes.

The balance between environment and agriculture is quite precarious. It is easily disturbed by difficult terrain and climatic conditions or the fragility of socio-economic, demographic and agricultural structures. At the moment, the environmental balance is still maintained by the activity of the farmers. Consequently, if farmers withdrew there would be impacts on:

(i) the balance of the alpine water system in connection with the safeguarding of fresh water supply and human living space in general

(ii) the stability of the terrain, particularly on steep slopes

(iii) biodiversity and landscape

(iv) equilibrium of natural circulatory systems

(v) insecurity over the stability of biological chains.

Since energetic processes advance slowly in high mountain regions, distortions remain visible for a long time. Some measures may have considerable immediate consequences (e.g. changes in the flora), while their reversal would take a

long time. Hence it is indispensable to take the environmental situation in mountain areas and its linkages to, and dependencies on regional activities as well as the issue of irreversibility into account in order to avoid and counteract major damage to the environment.

The most important environmental problems in the region arise from non-agricultural activities. In the more accessible central areas like the Inn Valley, we can recognise major land use conflicts between agricultural, industrial and residential purposes. The process of conurbation in the central region i.e. the expansion of settlements and industry is jeopardising fauna and flora.

Acid rain caused by long-range cross-border air pollution is a major threat to acidophilic silicate soils. Conifers, in particular, are affected by degradation in some exposed regions. Airborne pollution (industry, traffic) increases the hazardous tropospheric ozone concentration during hot summers. Surveys indicate double the levels of concentration of harmful ozone in the higher mountain regions than in lowland valleys. To a certain degree we can foresee the pollution of smaller water courses and brooks near agricultural holdings (fertiliser and manure), settlements (untreated sewage) and industrial plants (effluents).

Tourism and traffic play a crucial role for environmental considerations. Traffic and transport cause serious problems particularly in the main valleys. The tourist industry is a serious environmental concern in the region. However, tourist activities are concentrated in a relatively small number of resorts and the effects on the ecosystem are confined to a few sites. There is rarely large scale degradation nor the sort of drastic deleterious effects seen in other alpine regions.

In discussing environmental concerns, we have to consider the dichotomy between under- and over-exploitation of natural resources. While a few high-intensity tourist resorts and the densely-populated central valleys are suffering from severe land use conflicts, many precious alpine pastures and meadows in the high-lying mountain regions are threatened with abandonment or afforestation.

Regional development programmes and appropriate legislation are attempting to counteract the threat of the ongoing degradation by tourism and land use conflicts. There are still projects for road construction or the extension of tourist facilities into hitherto pristine areas.

E. Policy measures

There are a large number of different agricultural, environmental and rural development policy measures relevant to the study area, which are either applied at European Community level, on national or regional level. The regulatory system is based on coercive and accompanying measures in addition to mere policy recommendations and national guidelines. The principal measures are analysed and commented on in the next chapter in greater detail.

The most important European Community measures applied in the regions are:

a. Agricultural, forestry and rural development measures:
R 2078/92: specified as Austrian national agri-environmental programme "ÖPUL"
R 2080/92 agricultural land afforestation
Objective 5a: compensatory allowance for mountain farmers, structural measures such as investment aids for individual enterprises and collective investments, interest subsidies on credits and transport facilities.
Objective 5b: the whole study area is classified as objective 5b zone.

b. Market measures:
Degressive Transition Payments (DTP) are fixed for a four-year transitional period to moderate the cut of agricultural prices after Austria's accession to the EU
Allowances based on the Common Agricultural Policy (CAP): e.g. premium for male cattle, suckler cows and store lambs.

c. Environmental measures:
"BIRD" directive: Ötztaler Alps

d. Community initiatives:
LEADER II rural development: one programme in the study area
- Ötztaler Alps: on agriculture, handicraft, tourism, sheep market development
INTERREG II co-operation between countries: three programmes
- Austria-Italy (Tyrol/Carinthia-Veneto-Southern Tyrol): economy, agriculture and the protection of environment
- Austria-Germany (Upper Austria/Salzburg/Tyrol/Vorarlberg-Bavaria): local co-operation
- Austria-Switzerland (Tyrol - Graubünden): "Rätia Nova" regional development

The principal goals of national environmental regulation are defined in the Tyrolean Environmental Protection Law no. 29/1991 on the protection of natural resources, environment, landscapes, lakes, rivers, aquifers, marshes, wetlands and glaciers, the protection of endangered wildlife, plants, esp. orchids, bird life and reptiles, shrubs, hedgerows, trees, natural caves.

In addition to this determination and the EU directive 92/43, a number of protected areas have been established:

Mieminger Plateau (landscape protection zone)
*Mieminger und Rietzer Inn Floodplain (*nature protection area)
Stubaier Alps (part of the European Network of Biogenetic Reservations and Repose Areas)
Ötztaler Alps (area of silence)
*Antelsberg bei Tarrenz (*nature protection area)
*Serles-Habicht-Zuckerhütl (*landscape protection zone)
Milser Floodplain (landscape protection zone)

In addition, the region contains numerous important bogs, fen and marshland, e.g. near Obtarrenz, Bärenbad, Schwarzer See, Tiefwald, Amberger See and Nachtberg, Gurgltal and in the Upper Inn Valley.

3.1.2 Analysis of the pressures and impacts on environment

Principal agricultural pressures and impacts

A.1. Extensification and transformation of high mountain meadows into pastures and forests

The prevalence of part-time farming causes a shortage of agricultural labour and consequently farmers tend to turn to more extensive types of land use (e.g. steep slopes, balks and boundary strips between plots). Mountain hay meadows, in particular, are no more longer mown, but are turned into pastures or afforested. Although this is not a widespread phenomenon at the moment, we can observe certain tendencies in this direction.

In assessing the ecological consequences of the transformation of mountain hay meadows, there is some indication that a hypothesis formulated in the ECOMONT Project may be confirmed. The hypothesis claims a serious threat to the environment when steep mountain slopes are neither mown nor grazed. The mulch layer forms a compound aggregate with the over-lying snow when the old grass is not removed from the slopes. As a result of this compound aggregate, snow-slides and avalanches destroy the sward. During heavy rainfall in summer,

these same spots without vegetation, where the sward has been destroyed, are susceptible to further landslides and mudflows.

Furthermore, once the high mountain meadows have been turned into pastures the process seems to be irreversible, because the grazing cattle cause tracks on the steep slopes, impeding mowing. Traditionally cultivated meadows show a variety of species. Ceasing mowing can likewise result in a decrease in biodiversity and the quality of the fodder.

A specific promotion measure within the framework of R 2078/92 (national programme "ÖPUL") granted for the mowing of steep slopes and high mountain meadows alleviates this process of abandonment.

A.2. Conflict between agriculture and nature protection

There is little mutual understanding between agriculture and nature protection at local, administrative and legal levels. Agriculture is excluded from nature protection legislation apart from a few items such as road construction, land consolidation or when precious habitats are affected. Every one of these measures has imposed severe limitations and restrictions on land use by farmers. Thus most farmers have acquired a rather reluctant attitude towards nature protection as they are primarily confronted with specific requirements of nature conservation and are not given the chance to develop a positive approach.

In consequence, there is a lack of awareness of ecological concerns and nature protection services among farmers, mainly due to insufficient communication between agriculture and nature protection boards at administrative level and a deficit of information exchange and data networks.

This can do great harm to the local environment, the water system, the stability of the terrain, biodiversity and a wide set of amenities of the landscape and the balance of material and energy cycles.

A.3. Joint land ownership

The region is characterised by an extremely high degree of joint land ownership. In general, these areas are common mountain pastures and forests. Most mountain pastures and forests are owned either by a community of farmers or by the municipalities. There are various strict rules and regulations for each farmer, based on ancient customs and the use of resources (e.g. for the use of a specific plot of forest or the permission to graze a certain number of animals on the pastures).

The various forms of joint land use affect the farmers differently, and can have both positive and negative characteristics. On the one hand, joint property makes forest management more difficult. In some cases farmers do not even know the exact location of the numerous forest plots and, because of the cost involved, they have no incentive to remove wood. On the other hand, the rules prevent over-intensive cultivation, particularly when there is a limitation on the number of animals allowed to be grazed on one site. Hence, the overall result seems to point to a more sustainable form of land utilisation.

A.4. Problems relating to forestry

The difficulties in the economic exploitation of forests result from a rather low proportion of woodland and a limited percentage, only 32 %, of the forests that can be utilised economically. The remainder consists of protective forests and forests under protection. So the main function of the forests is to protect the region from natural hazards, yet timber is an important source of income for the farmers. About 40 % of the forests is over-aged. There are various reasons for this.

(i) The prospects for revenue are rather poor, especially when compared with the necessary outlay of cost and effort.

(ii) The difficult access to some regions, despite the fact that many forest roads have been built during the last decades.

(iii) Many farmers are reluctant to harvest timber on a regular basis as they consider their forests as a kind of investment which they intend to keep for future use.

(iv) Many forests are even-aged, owing to large clearances in earlier centuries when the timber was used in mining.

Even-aged forests increase the risk of natural hazards, particularly storms, avalanches and rock falls. After a big wind throw in 1990, rotten wood provided an ideal breeding ground for bark beetles. The lack of facilities and the reluctance of the farmers impeded the extraction of the shattered trunks. Another concern is linked with long-range cross-border air pollution and harmful tropospheric ozone which reduce the trees' growth rates. The environmental importance of forests is underlined by the fact that 90% of all potable water in Tyrol derives from water towers located in forests.

A.5. Farm and forest road construction

Scattered farmsteads are rare and most settlements and villages are very compact, which means that the road access is generally sufficient. Moreover, the construction of farm roads, forest tracks and roads to the high mountain meadows and pastures is a subject of serious discussion between prime road users and nature protection authorities.

Representatives of the nature protection authorities argue that farm and forest road construction can threaten the environment for a number of substantially different reasons:

(i) Roads attract mass tourism and hence destroy the fragile ecosystems of the high mountains.

(ii) This will also bring about changes within the agricultural land use and tendencies towards less sustainable systems; e.g. milk will be shipped into the valley instead processed on site, increased construction of livestock buildings and tourist facilities, supplementary transportation of hay and foodstuffs onto high mountain meadows, ensuing eutrophication problems. One can observe this development in a few municipalities, though the problems are not severe at the moment.

On the other hand, members of the agricultural and forestry branch claim that:

(i) The environmental damage is outweighed by the benefits: many high mountain pastures will be abandoned unless there is an effort to improve access and transport. Failure to do this would also have a drastic negative impact on the high mountain ecosystems.

(ii) They also argue that nature protection councils and effective laws are in place to prevent inappropriate measures and oppose dangerous tendencies.

(iii) Farmers in this region rely on tourism income, so they can improve their situation if they attract more tourists. Otherwise the whole region will be threatened if farmers are forced to abandon their holdings as a result of a poor income prospects.

A.6. Common Agricultural Policy

The market measures of the CAP are not in general directed to or diversified for mountain farming, and the impact on agriculture and environment in the study area can thus be considered to be predominantly negative. The existing small-scale farming structure cannot compete with European agriculture. Since the preconditions do not fit the guidelines, and as the CAP does not take sufficient account of the peculiarities of mountain agriculture, the total allowance obtained by the farms in the framework of these measures is low.

The competitive disadvantages and the recent substantial fall in agricultural prices in Austria as well as in the European Common Market is endangering sustainable production systems in mountainous area. Moreover, regional representatives consider the location of the study area between the dynamic industrial centres in Northern Italy and South Germany to be a threat, and think that this is exercising a negative influence, causing difficulties for retail services on the regional market, and consequently for agriculture too.

Principal non-agricultural impacts

B.1. Tourism, recreation and labour market

Tourism is of exceptional importance for the whole region and in some municipalities it plays the principal economic role. Activities are concentrated in a few major resorts (e.g., St. Anton am Arlberg, Sölden, Ischgl), where there are serious environmental problems resulting from mass tourism. Apart from these few resorts, the state of the environment is quite favourable.

The position of agriculture and nature protection in the intensive resorts is quite weak, as they are subject to the necessities of tourism, which is the decisive factor in the region's prosperity. Nevertheless, five years ago the authorities came to a joint decision to suspend the construction of new tourist facilities.

The use of pastures and meadows for skiing leads to a delayed spring snow-melt due to the compaction of snow on the pistes. Thus there is a specific need for greater care on the part of the farmers. But in fact the quantity of fodder is often higher on ski pistes because of the application of artificial snow by cannons. Artificial snow and snow stabilisers work as fertiliser and have a negative effect on biodiversity.

Tourism is of major importance for the income potential of part-time farmers, providing them at least with seasonal employment. So agriculture depends on

the development of tourism and leisure industry. On the other hand, employment in tourism produces a labour shortage on the agricultural holdings, leading to:

(i) extensification, with various ecological consequences (see above)

(ii) difficulties in co-operation between farmers; farmers' relief services and "machinery rings", in particular, are less developed than in other parts of the country

Within the last few years it has been possible to observe a substantial decline in the number of tourist arrivals. In several host communities, particularly in those with intensive tourist centres, the figures have dropped by 30% to 40%. The reason lies in the adverse economic situation in Germany, the tourists' main country of origin. Part-time farmers are the first to be dismissed from tourist employment, creating serious economic problems and unemployment. The current unemployment rate in the study area is markedly higher than the national average.

Furthermore, the economic crisis in other fields, such as the construction industry, is aggravating the problems and weakening the position for the part-time farmers. As a result, farmers are developing different strategies, with a combination of the following prototypes also being possible:

(i) Farmers try to carry on farm management as long as possible because they are aware of the considerable amenities of their holdings, e.g. self-supply and production of healthy food, reduction in food costs in the household budget, ownership of their own land etc. These amenities and values acquire even more importance under worsening economic circumstances. Moreover, emigrating from the region and land abandonment rarely comes into question, because of the traditional behavioural attitudes of the farmers and their close ties with the region;

(ii) Farmers are seeking to improve their non-agricultural education and skills to improve their prospects at the labour market. Non-agricultural educational standards are comparatively high in the region, among young farmers in particular.

(iii) Another strategy is the extensification of the farm and commuting to destinations outside the region. Farm buildings are then predominantly used as places of residence. An excellent road network facilitates transport.

(iv) A few farmers attempt to transform their holdings into full-time farms. But this proves very difficult because of the natural and economic

limitations. Sometimes, farmers even restrict themselves to a mere subsistence level.

(v) Diversification of produce, direct marketing, organic farming and quality production are gaining increasing importance and relevance on the national (and export) market.

B.2. Settlement and land use conflicts

Only 7.1% of the total area is suitable for permanent settlement. This is extremely low by comparison with other alpine regions. Apart from the adjacent district of Bludenz in Vorarlberg, the study area is the most endangered region in Austria for avalanches, rock fall and land-slides. This necessitates the construction of extensive and costly security equipment.

Over the last 30 years, primarily mass-tourism, industrial plants and population increase have created a building boom, mainly in the big valleys and in several resorts. In previous decades, many buildings were constructed without regard to natural hazard risk zones. Now these buildings are under a permanent threat and need costly protection measures.

Land use conflicts between farming, settlement and tourism have finally led to the gradual retreat of agriculture over a longer period. There is some evidence that many precious habitats have been destroyed in valleys where the competitive situation between the different land use types is most severe, whereas there has been less destruction on the slopes.

B.3. Trough traffic and transport

One of the most severe impacts on the environment is caused by tourism, commuting and international through traffic.

Integration through the establishment of the Single European Market has contributed to increased traffic on the main traffic route over the Brenner Pass, which has now almost reached the limit of its carrying capacity at peak periods. The increasing cross-border traffic also affects the two other north-south transit routes in Tyrol – the Reschen-Pass and the Timmelsjoch. Traffic volumes have reached such levels in many parts of Tyrol that any further increase would be strongly opposed by local population. The Upper Inn Valley, the main link with Switzerland, and the Arlberg-Pass, the most important east-west axis western Austria, face similar problems.

B.4. Lack of data, knowledge and information

Information on environmental concerns is somewhat disparate and information structures on the inter-relationship between different sectors and the consequences of imposed or continuing changes are poorly developed.

Generally, the data pool is poor because of lack of co-operation and the divisions between the different disciplines (agriculture, nature protection, science, administration). The influence of policy on the environmental situation and the various impacts of measures applied can hardly be assessed in advance, because of the low level of information on the possible environment effects. The lack of ex-ante screening may sometimes lead to unexpected negative consequences, which could be avoided if co-operation and information on measures and their impact on ecological dimensions were to be provided earlier.

3.1.3 Instruments and Measures

The following chapter gives an overview of instruments and measures concerning environmental performance in mountain areas. The description starts with those measures programmed under EU regulations and goes as far as to give some hints on proposals for supplementary measures relating to the need for in-depth research on the effects of policy measures and especially on their environmental impact assessment.

The "ÖPUL" (Regulation 2078/92) national programme

Since Austria's accession to the EU, agri-environmental measures in the framework of R2078/92 have generally been important in providing significant incentives for the maintenance of agricultural land use, particularly in case of the mowing of high-mountain meadows. This programme enhances the broadly applied extensive production methods, and could curb the tendency towards intensification on more favourable land. Moreover, the Austrian programme, with its high complexity of different measures and a horizontal approach, addresses a great number of agri-environmental concerns. These characteristics have also led to the high take-up of the programme by farmers in all regions of Austria, and particularly in mountain areas.

As the "ÖPUL" programme consists of 27 individual measures, those measures most relevant for the mountain agriculture are discussed separately in the following:

a. Support for organic farming methods according to Reg 2092/91

Altogether "ÖPUL" provides a generally positive incentive for organic farming and thus supports the Austrian efforts for an environmentally sound agriculture. But farmers switching to organic farming could have problems with the restrictions on stable and yard operations, the level of subsidies and the marketing of organic produce, particularly of meat.

(i) An action programme to improve husbandry for organic farmers should be implemented.

(ii) Marketing structures to improve the co-operative provision of organic farm produce and a sufficiently developed range and quantity of products as well as a better co-ordination of the marketing of organic products are required.

(iii) The specific restrictions on stable and yard operations for organic farmers should be addressed by an increase of "ÖPUL" payments.

b. Mowing of slopes and mountain meadows

This is one of the core measures to maintain the cultivation of high mountain meadows. However, the premiums cannot cope with the extraordinarily high demand for manual labour required for the utilisation of grassland. The mowing of steep slopes and mountain meadows is also important with regard to protection against natural hazards like avalanches, rock-falls or landslides. The quality of mountain hay is very high because of the great biodiversity of the mountain flora. One can observe a significant positive effect on the health of the animals which is a principal precondition for organic husbandry.

(i) Since the great biodiversity of high mountain meadows can only be obtained by mowing, it is of priority concern to maintain and extend this measure.

(ii) It will be necessary to preserve small-scale production, which is the only form to safeguard diversified landscape elements and precious cultural landscapes within the mountain areas.

c. Alpine pasturing premium and herding supplement

The combination of alpine pasturing premium, the herding supplement and the payment for domestic grazing area in the valley added up to a decent support for pasture systems in the mountain areas.

(i) Problems derive from the appropriate choice of the categorisation of LU between cattle and sheep. Efforts for care measures are realised differently by cattle and sheep raisers. From the viewpoint of the study area, the payments favour LU for sheep over the LU for cattle.

d. Keeping and rearing endangered breeds

This measure promotes and safeguards the survival of the rare "Tyrolean Grey Cattle" breed, which has its main concentration in the region. "Tyrolean Grey Cattle" are traditionally kept on the least accessible and less favourable sites. This rather small and lightweight breed is well adjusted to the specific environmental conditions and could contribute to a sustainable land use in the region.

(i) The recognition of "Tyrolean Grey Cattle" as an endangered breed and the foundation of a breeders' association could maintain the agricultural structure and the environmental amenities of the region. Efforts to breed this rare species are to be extended.

(ii) "Tyrolean Grey Cattle" also live in a few neighbouring valleys of Italy and Switzerland (Schnals Valley and Passai Valley). Cross-border co-operation, through an INTERREG project, for example, would be a quite reasonable prospect.

e. Recommendations for additional R 2078/92 measures

(i) Specific (local) measures to promote the cultivation of high quality mountain cereals may be of interest in some mountain areas where a valuation and demand for such products is developing.

(ii) Specific measures to support dry and rough grassland meadows and pastures are needed to safeguard these ecologically important areas.

However, several specific problems arise in the study area as follows:

(i) Orientation towards extensification or intensification has to be checked carefully for environmental impact. For example, the degree of biodiversity may depend on a certain level of intensive land use.

(ii) The implementation of "ÖPUL" has occasionally caused difficulties concerning agreement with nature protection schemes in some areas, as restrictions under these schemes are often more severe and subsidies lower than under the "ÖPUL" scheme. Consequently this situation can

bring about unintended changes in direction of intensification of these rather sensitive agricultural areas.

(iii) In addition, there are few initiatives for transformation into arable land, i.e. the cultivation of mountain cereals or flax, both of which have a long tradition in the region.

(iv) Though they may be sensible, some environmental measures could create conflicts if their impact on the ecosystem is too abrupt.

(v) Restrictions within the "ÖPUL" scheme should take more account of local particularities. The somewhat heterogeneous situation in the study area should be taken into account to encourage farmers to preserve precious environmental elements.

Compensatory Allowance

In Austria, the EU Compensatory Allowance for mountain and less-favoured areas has a predecessor in the previous national scheme for mountain farmers' grant. The change in the support system from this, previously, at least, the most important direct payment in mountain areas, calls for a thorough assessment of the different effects of the two systems. The former national mountain farmers' grant was better able to deal with the specific problems of small-scale part-time farming and directly addressed the needs of the agricultural structure in Austrian mountain areas as well as the objectives of the maintenance of cultural heritage, landscape and settlement in these regions. Given the difficulties in adapting to the new system, and the far reaching Austrian mountain policy, a national payment to provide support for those farmers who would have lost out as a result of the EU system was approved. This national scheme is relevant to the majority of Austrian mountain farmers, and particularly addresses the specific situation of small holdings and farmers classified as mountain farmers who are not located in one of the categories of less-favoured areas, and hence are not eligible for the EU compensatory allowance scheme.

(i) The allowances should take more account of the needs of farms with extreme difficulties such as high altitude or steep slopes. A better graduation between the minimum and maximum premiums available for one holding would provide a wider range and give scope to address those difficult situations.

(ii) The assessment of natural disadvantages in farming should be based on low-level information about individual farm difficulties – at best on data provided by cadastral registration – and allow for individually designed attribution of support. The often raised argument of excessive

administrative cost can be disproved by the experience of countries already using such an approach.

(iii) A basic subsidy calculated for each holding without reference to the actual number of hectares or livestock units would better cope with the specific requirements of small-scale structures and would accord with the environmental, social and economic concerns of the mountain regions.

(iv) Holdings with less than 3 ha UAA should not be excluded from the scheme.

Regulation 2080/92

The implementation of this regulation has not substantially changed the previous national scheme, and hence seems to be of minor relevance to the area. An extension of the regulation or of general forest policy on the needs of protective forests would have the greatest impact on mountain areas.

(i) The implementation of specific measures for protective forests and forests under protection is essential. Forestry care measures should be supported more effectively.

(ii) The marketing of timber should be improved by co-operative marketing structures and local sawmills. Programmes to provide incentives for the use of domestic timber for the construction of buildings could be developed. Extended use of wood could also create labour and give further impetus to forestry care measures.

(iii) The use of wood as a renewable organic fuel should be supported to substitute fossil energy and to reduce emissions from domestic sources. At the moment, wood cannot compete with fossil fuel as the price of wood is too high.

(iv) Conflicts with the nature protection board, which usually occur e.g. in connection with the construction of forestry roads, could better be solved by looking at common targets rather than individual measures. This would involve better co-ordination and co-operation.

CAP (Common Agricultural Policy)

The prevalent small-scale, part-time mountain farming in the study area cannot compete with European agriculture in terms of profitability. CAP does not take account of peculiarities and addresses mountain areas in only a very limited way. Compensatory allowances, in fact, make no significant differentiation between mountain farmers and farmers in other less-favoured areas. The main beneficiaries of CAP, with regard to total of payments, are outside the mountain areas.

(i) Special treatment for milk production from mountain pastures and meadows under the milk quota regime, established in 1978, has hitherto been an effective instrument in safeguarding the cultivation of high mountain meadows and pastures. Consideration of the reform of the milk quota system in the EU after the year 2000 should reflect the positive experiences of milk quotas in mountain areas.

(ii) Small-scale mountain farmers and part-time farmers should also be eligible for benefits from measures to encourage the setting-up of farms managed by young farmers and from investment measures under the same conditions as full-time farmers.

Objective 5b programme and Community Initiatives (LEADER, INTERREG)

The concept and philosophy of Objective 5b programming can be assessed as a positive step towards integration and broadening of this policy concept. The Objective 5b programmes generally aim at a wide participation of regional representatives and recall the endogenous development approach. Like the Tyrol Oberland study area, many but not all mountain regions are affected by Objective 5b programmes in Austria. Most measures focus on the adjustment need of the agricultural sector, support for industries and specifically for tourism. Measures directly related to the environment are rare. Despite the general requirement and intention of taking account of environmental concerns, there is not enough commitment in this field to develop environmental projects. The main reason is that public authorities are not allowed to act as aid applicants.

Specific common problems in implementing the programmes:

(i) One of the main preconditions for Objective 5b and LEADER measures is an agreed common goal. This is the clear distinction from Objective 5a measures, which aim to support individual agricultural hold-

ings. Many part-time farmers are not prepared to take part in these kinds of initiatives and projects. So they are unable to participate in the programmes in an appropriate manner. Objective 5b-measures require a high degree of individual commitment which should be strengthened by accompanying regional activities.

(ii) An other obstacle is the lack of the minimum amount of private financial resources necessary to launch a project.

(iii) The widespread joint ownership of forests and mountain pastures is a major obstacle when implementing the 5b programmes. In this regard the national guidelines are often too inflexible and hence impede many innovations, for example, municipalities and other local authorities are not accepted as aid-applicants. The national guidelines and regulations should take better account of this specific ownership structure.

(iv) In addition, administration and bureaucracy takes up a great deal of time. The long lasting procedures are probably the factor that most restricts participation. This also has a negative effect on the motivation of the local population.

(v) Although an integrated programme philosophy has been developed, many projects still depend on a sectoral approach and remain within the strict form of the three Structural Funds. This procedure for EAGGF-oriented projects limits participation by and the links with people engaged in non-agricultural activities. Hence, an advanced integration in the framework of rural development programmes (currently Objective 5b and LEADER programmes) is required to foster co-operation between different economic sectors at local level.

(vi) The LEADER programme plays an important role in promoting regional development via high quality projects. Since the projects are rather small, personnel costs for the regional managers are proportionally high. But, as national experience already has shown, regional managers and local animators are the key people in the development process, bearing a high level of responsibility for the running and thus the success of the initiatives. The priority of investing in the regional management structure, and thus raising the financial share of personnel costs in the programmes, should be increased if the long-term aspect of these processes is to be taken into account.

(vii) The specificity of mountain areas should be addressed explicitly as a primary concern of the programmes, in particular reflecting the ex-

tremely fragile environmental conditions of these areas and proposing measures directly related to the mountain environment.

Supplementary activities in research and environmental impact assessment

Information on environmental concerns in mountain regions is rather dispersed, and information structures on the inter-relationship between different sectors and the consequences of on-going changes are weakly developed. Consolidated data and assessment is generally poorly developed due to the lack of co-operation and the segregation of the different disciplines (agriculture, nature protection, science, administration).

(i) There is a great need for fundamental research and accompanying studies to reveal and interpret the inter-relationship between mountain farming and the environment, as well as the linkages and inter-dependencies to the socio-economic performance and regional driving forces of economic development.

(ii) Knowledge about the actual environmental impacts of specific measures is insufficient both on a regional and local scale. In some cases information is not available, in others it is too dispersed for a clear evaluation to be made.

(iii) Studies on the environment and nature protection should adopt an overall point of view rather than focusing on restricted issues of natural conservation.

Sometimes the lack of ex-ante screening may lead to unexpected negative consequences, which could be avoided if there was earlier co-operation and information on the measures and their ecological dimensions.

(i) Obligatory ex-ante screening taking account of the specific local environmental and socio-economic circumstances should be a precondition for implementation of programmes and projects.

(ii) Monitoring schemes and periodic assessment of the results and consequences of the measures and programmes after implementation have to be established.

(iii) These tasks should be executed at different geographical and administrative levels, i.e. on a national, regional and local scale to provide basic data and benchmarks for the evaluation of programme performance and environmental considerations.

3.1.4 Conclusions and recommendations

The environmental situation in the study area has to be considered in the light of a multitude of influences from different industrial sectors. The impact of agricultural activity in mountain areas is not just positive or negative but very much related to the overall economy of the whole region.

Objectives developed within regional programmes are always the result of diverse and conflicting systems of objectives reflecting the interests of different stakeholders in local society and of groups from outside the region. In developing strategies to balance the needs of mountain agriculture and the environment, it is essential to stimulate discourse in local/regional society and politics at different levels. At a later stage the hierarchy of goals will have to be discussed and the expected effects of strategies chosen have to be explicitly defined.

3.1.4.1 Integrated concepts to preserve resources

The core performance of mountain agriculture is the maintenance of the cultural landscape rather than agricultural production itself. This notion leads to the requirement of maintaining land use in those areas. As most of the agricultural area has been turned into grassland, cattle raising and milk production have thus far seemed inextricably linked to agriculture and landscape protection. As these targets go far beyond the agriculture sector, support by agrarian policy alone cannot be sufficient. Thus an integrated approach utilising the possibilities of other sectors is called for. In this respect the following aspects are of particular importance:

(i) The creation of cultural landscapes through agricultural activity should be acknowledged as a prime asset of the cultural heritage. The dynamics of landscape development require integrated concepts reflecting different types of utilisation and interrelations of areas. However, direct-marketing and organic farming are crucial activities to make use of the special value placed on for products from mountain areas.

(ii) Owing to the difficult situation of mountain agriculture, there are limitations on farm adjustment. Nevertheless, small-scale agriculture possesses many advantages: because it is largely subsistence production, it is not so heavily dependent on market forces and can better display an element of stability. Management of steep slopes in particular is predominantly carried out by small-scale farmers.

(iii) Structural and regional policy measures should be conceived in close co-operation with tourist development. This process needs to be adapted to the local/regional needs and must be able to rely on a suffi-

ciently flexible set of instruments. Work on the concepts should be guided predominantly by regional representatives.

(iv) The fostering of quality concepts in different sectors, like high-quality tourism, to take advantage of local traditions in high-quality handicrafts etc., will have positive repercussions on agriculture in the area. Hence, an integrated approach will build on related synergy of the various sectors in the region.

3.1.4.2 Towards an environmentally sound agriculture

Agri-environmental attitudes in general and organic farming in particular are gaining increasing importance and reputation both among farmers and in society as a whole. Because of the extremely sensitive environment, mountain agriculture will have to pay special attention to environmental performance and environmentally sound production methods. There are some points we have to take into consideration.

(i) Environmentally friendly agriculture has to be tackled at an appropriate geographical level: Whereas in some regions less intensive land use systems would appear necessary to achieve favourable environmental conditions, in other mountain regions extensification is only necessary at some smaller sites.

(ii) Conversely, over-extensive land use systems may occasionally create environmental problems.

(iii) Because alpine grassland in the study area, as in many mountain regions, is still close to environmentally sound production schemes, the shift to organic farming poses an interesting challenge and would be a bonus for many mountain farmers. About 30% of the farmers in the study area have so far switched to organic farming, making use of this specific asset. The continuing ecological trend can be used to reintroduce regional labels and to launch increased marketing efforts for organic produce.

(iv) Support for organic farming in general will have to address the "good practice" of mountain agriculture in environmental terms and take account of the existing methods of safeguarding the environment and biodiversity of mountain areas. Agri-environmental schemes will have to find ways to maintain these production schemes by emphasising the relevance of environmentally friendly agricultural cultivation to the flora, fauna and the natural environment as a whole.

3.1.4.3 Expanding farm activities and income

As already mentioned, agricultural holdings in the study area are mostly operated by part-time farmers. On the experience of recent decades, there is a widespread range of possibilities for off-farm labour as well as on-farm non-agricultural work which can be combined with farm labour by different household members. The term "pluriactivity" reflects this multitude of possible relations exemplified in mountain areas especially.

As competition between mountain areas and more favoured agricultural production zones, together with adverse production possibilities, quite substantially limits the range of products mountain farmers can produce, household income strategies again have to draw on their specific assets. Three main fields can be discerned:

Concentration on quality production:

(i) By making use of and going back to traditional, region-specific skills, quality products can be created and processed on the farm.

(ii) In the study area we can find particularly favourable conditions for the development of quality production in the sheep market, and to some extent for the local "Grey Cattle" breed, and a renaissance of niche-products of mountain crops.

(iii) Marketing should generally be confined to the regional level and labels have to communicate the regional specificity and standards of the products.

Organisation of direct marketing:

(i) Insufficiently developed marketing structures in the study areas lead to problems for the beef market in particular. Direct marketing can help to overcome these structural problems to some extent, but the adaptation of processing and marketing facilities is a prerequisite.

(ii) Improved marketing of products requires co-operation among farmers. This is in particular important for small-scale cheese production and the processing of milk on alpine pastures.

(iii) An integrated approach is required in order to enhance the relationship with non-agricultural sectors, e.g. gastronomy, tourism and craftsmanship. Models of partnerships between farmers and other industries have to be explored and adapted to the regional situation.

Pluriactivity as an opportunity for rural areas and in particular for mountain areas:

(i) As mentioned above, pluriactivity is of crucial importance for most alpine regions. However, the productive function and utilisation of quality concepts must not be neglected as a part of those farm concepts. The objective is to work on an improved interface between farm resources, local culture, industries, tourism and trade.

(ii) The installation of a rural training and enterprise foundation specifically designed for farmers would be an important starting-point and support for young farmers. That foundation would give particular attention to local need for practical training, the process of the development of concepts and accompanying counselling.

3.1.4.4 Regional adapted concepts and modulation of schemes

The mountain ecosystems are often characterised by rather small-scale situations and great diversity. Nonetheless, there is an overall consensus in society that specific policy measures for mountain areas are indispensable to compensate for the competitive disadvantages and to safeguard the various functions of mountain farming that are not covered by agricultural product prices. Hence, balanced concepts between general policies and local/regional programmes should be developed. There are some major aspects which have to be considered.

(i) Direct payment schemes are best suited to providing incentives for the survival of small-scale mountain farmers and for sustaining the environment in mountain areas. Small-scale, part-time farmers make up the great majority in the study area as well as in many other mountain regions.
In Austria, the debate on the effects of EU accession and the requirement to continue support for farmers who have lost by the transformation of the subsidy system underlines the relevance of the issue. As a result of the negotiations with the EU, the national payment system for mountain farmers can be maintained for 10 years after the EU accession in cases where farmers would receive lower grants.

(ii) The modulation of payments to farmers according to their individual farming difficulties, the Austrian base for attributing the compensatory allowances, is of outstanding importance in order to make payments acceptable to farmers. However, a thorough assessment of the difficulties and impacts of measures is required to give details for the reshaping of payments levels etc.

(iii) Nevertheless, complementary schemes for marketing, training and counselling in order to enhance present strengths of mountain agriculture should be investigated.

(iv) Support schemes have to acknowledge regional peculiarities and very different environmental compartments.

(v) Elements of existing policies for mountain agriculture have to be preserved, developed and extended to mountain forestry.

3.1.4.5 Nurture understanding of ecological systems

Mountain ecosystems are very diversified and processes of land use point to different directions at different places. While there is over-exploitation and intensification on one site, on another we find extensification and afforestation. The "protection" of landscape and nature is a more dynamic process than mere conservation of the status-quo. Nature protection cannot be conceived of only as the protection of just a few smaller sites of outstanding ecological value, but also has to address the environmental considerations of the whole area.

With their essentially traditional attitudes, many farmers are opposed to prescriptions on production methods. Thus their prejudices against proposals and the implementation of nature protection schemes have to be overcome in order to win farmers as partners. Environmentalism has so far not been recognised as an opportunity for the region but is seen as a danger to habitual and traditional production methods.

A lot of long-term initiatives will have to be taken to respond to this lack of mutual understanding:

(i) Research into agricultural impacts on the mountain environment, and, vice versa, on the environmental regulation of agriculture, is only partly available and not widely disseminated in the regions concerned.

(ii) Extension services and on-going training facilities should continue this discourse and prepare farmers for the essential adaptations as well as opening up fields for alternative household strategies.

(iii) Those processes would not only improve the capability for co-operation but would also have a direct impact on personal motivation.

3.1.4.6 Participatory approach

The on-going discussion on reform of agricultural and regional EU policies will lead to significant modification in relation to mountain policy measures. The continuation of somewhat rigid programmes without much call for personal initiative is being called into question, and it will become increasingly important for people in the region to develop concepts and routes to the future for themselves. Hence, what is known as the "bottom-up" concept seems to be an inevitable element of future mountain policy as well. However, it should be clear from previous strategic considerations that it is not intended to leave responsibility to local people alone. The "bottom-up" concept is one, and in the end the determining element, but needs a surrounding policy framework:

(i) Local/regional concepts have to make best use of actual policy programmes. To this end, support by national bodies and adapted consultancy is largely needed.

(ii) The integration of the local population provides advantages in the long-run but also difficulties when starting the development process: different interests have to be balanced and consensus has to be established. But it should be made explicit that there is no way all the interests in a community or region can be accommodated in a development concept. However, in-depth discussions should provide a sound base for the broad acceptance of measures, increased participation and better utilisation of the creative potential of the local population.

(iii) Forms of mutual co-operation are specifically required in mountain areas, e.g. machinery rings and relief services, and can contribute to social security among the farming population.

This complex involvement of various partners, and fundamentally of the local population, should also make it possible for the regions themselves to find meaningful answers to the challenges for mountain areas, and turn them to "actors" in their own development process.

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3.2 Triglav National Park – Slovenia

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The Triglav National Park was selected as a study area for the variety of its natural and regional characteristics, which are not only part of the local natural and cultural heritage but also important for Europe as a whole. Location-specific communities of flora and fauna, rare, indigenous and endangered habitats, delicate ecosystems, important water resources, aquifer systems and different types of agricultural land use are the priority concerns of the region. The key task and the core issue for ensuring regional development is to form a synthesis combining the specific goals of nature protection and biodiversity with sustainable use of natural resources. Regional development will have to meet the particular needs of the inhabitants and the villages. Within this framework, particular measures to support the specific concerns of mountain agriculture with regard to the environment will acquire particular importance. Mountain farming inside the Triglav National Park shares the fate of mountain farming in the rest of Slovenia, as there are no special regulations or requirements for agriculture within Triglav National Park. For this reason it could be said Triglav National Park area also represents a good example in relation to problems facing other mountain and Karst areas in Slovenia.

There were several good reasons for Slovenia participating in this study project. Slovenia is not an EU member but it is located right in the centre of Europe and more than 60% of its territory is in mountain regions. Since the political changes there has been a particular need for new policies and concepts of nature protection and regional and agricultural measures for mountain areas. The Triglav National Park study area could play the part of a laboratory and assume a pilot role for all other mountain regions in Slovenia. Finally, Slovenia is likely to become an EU member state in the near future. So it would seem essential to accumulate the necessary information on the state of the environment and agriculture with regard to adapting and harmonising mountain policies in advance, in order to facilitate the membership negotiations.

3.2.1 Introduction

A. Geography

The study area is located in north-west Slovenia, stretching over the six municipalities of Kranska Gora, Kobarid, Tolmin, Bled, Bohinj and Bovec. The total area of the region is about 84,000 ha. The central region of the Triglav National Park consists of the mountain chain of Triglav, Bohinj, Trenta, Kot, Vrata, Krma, Tamar and Pišnica. The periphery contains the Radovna, Pokljuka, Log pod Mangartom, Soèa, Èadrg, Zadlaz, Stara Fu ina and Gornja Savska dolina sublocations. The altitude of the study area varies between 200 m and 2,800 m (Mount Triglav) above sea level.

Two climatic zones can be distinguished. The western part of the study area has a temperate climate somewhat influenced by the Mediterranean, while the climate in the more eastern part has more continental influences. The long-term maximum air temperature in July is between 19.6 °C in Tolmin and 5.6 °C in Kredarica, the minimum temperature varies between 0.7 °C in Tolmin (January) and –8.8 °C in Kredarica (February). Long-term average annual precipitation in the region is 1,500 mm.

Just 12% of the total area is utilised agricultural area (UAA). Most of the area is forest and woodland or bare land. The main agricultural land use is animal husbandry, particularly cattle breeding, followed by sheep farming. Forestry is a very important economic branch although the management of forests and woodlands is often restricted by protective regulations.

B. Socio-economic characteristics

Demographics

According to the last census, in 1991, the total population was 2,194, which indicates a rather low density of just 2.6 inhabitants per square km. Demographic tendencies have historically been very negative. Between 1951 and 1991 in the Triglav National Park there was an average annual decrease of 1.34%. In the decade between 1981 and 1991, the population dropped by about 11%.

Economy

The economically active population is about 42% of the total population. The main income resources derive from tourism, agriculture and industry. 44% of the working population is employed in the manufacturing industries, 25% in agriculture and forestry, 10% in tourism, recreation and handicraft, the rest in

services. 90% of all employees have long-term employment, 10% are in seasonal jobs.

The unemployment rate in the study area (10%) is somewhat lower than the national average of 14%. The principal economic problems in the region are connected with the breakdown of old industrial centres, a high emigration rate and an unfavourable agricultural structure.

C. Agriculture

The principal agricultural land use in the Triglav National Park is animal husbandry. Cattle breeding is the most important branch although sheep farming has recently been regaining importance. Most of the agricultural area is utilised for extensive herding, more intensive forms of cultivation exist only in the valleys. High mountain pastures play an important role in this study area. About 60 alpine pastures are still managed. Different forms of agricultural co-operation are widespread in high mountain pasture management. Farmers are also organised in joint co-operatives processing milk and dairy products.

The percentage of the working population employed in the agricultural and forestry sector (over 20%) is comparatively high. Among the total of about 400 agricultural holdings in the Triglav National Park barely 10% belong to full-time farmers with an average of more than 8 ha of land, of which only a small part can actually be cultivated. 34% of agricultural holdings have supplementary income either from off-farm activities or from agri-tourism or cheese production. The remainder of the holdings had no official agricultural income according to the 1991 census. A fifth of the agricultural population is over 65, and in only 40% of all cases is there an heir who is expected to continue farm management.

D. State of the environment

In general the environmental situation of the study area is quite favourable and there is no indication that this will change dramatically within the near future. The principal natural resource and the major environmental concerns of the region can be characterised as follows:

(i) There is a large number of rare, endangered and indigenous species, flora and fauna habitats.

(ii) The protection of the delicate mountain, surface, aquatic and subterranean ecosystems is of principal importance.

(iii) The region is characterised by a large number of waterfalls, springs, high mountain lakes and rivers. Water tower protection is a major concern particularly for the supply of potable water for large areas of the country. The Triglav National Park possesses an extremely important and extraordinarily rich water reserve.

(iv) The agricultural structure varies considerably, not only according to the economic and natural preconditions and circumstances, e.g. soil type, mountains and valleys, size of UAA, forests, terraces, but also in relation to cultural patterns, the attitudes of the land-owners, and the architecture of the buildings, hamlets and villages.

(v) The region is an important corridor and rest area for the alpine fauna and migratory animals like the brown bear, lynx, eagle, vulture, ibex and chamois.

(vi) Some forms of land use are seriously endangered, like the use of terraces or cultivation of mountain cereals.

(vii) Numerous land, aquatic and wetland ecosystems, such as water courses, bogs, fens and high mountain lakes, high mountain pastures or pastures on calcareous soils, are under threat.

(viii) Important genetic resources will be lost if rare domesticated livestock becomes extinct. The region is the residence of the two indigenous sheep breeds, the "Bovec" and "Jezersko-Solèava" and the "Bohinj" cattle.

The principal threat of environmental degradation in the region derives from alpinism, tourism and recreation. The large number of tourists have a harmful impact on the relief and terrain. Noise pollution caused by road traffic, excessive waste and sewage production pose major threats to the environment. Skiing and fashionable new sporting pursuits like mountain biking, canoeing or swimming in high mountain lakes pose additional dangers.

In several cases, though to a minor extent and restricted to some few sites, harmful impacts on the environment caused by agriculture and forestry can be found. Overstocking on pastures (despite regulations) and forest pasture grazing, improper or excessive application of fertilisers and inadequate restoration methods can produce significant environmental hazards for forests and bodies of water. The construction of a dense forest road network, logging and wood harvesting can cause soil degradation, erosion, water, air and noise pollution. Damming, river course regulation, modification, culverting and torrent regulation can disturb precious aquatic and wetland habitats as well as the whole water reserve.

Traffic and transport exert a direct influence on the environment through air and noise pollution and the construction of the road network. Air traffic, particularly by light aircraft and helicopters, is steadily increasing. Aircraft emission, noise and air pollution are the negative impacts. In addition, there are some other particular environmental problems linked with the construction of roads, sports centres or illegal weekend houses, which can also have a negative impact on agricultural land and vegetation. Many problems apparently derive from the fact that many existing laws and regulations are not applied effectively, or the authorities are too reluctant to stop negative processes.

E. Policy measures

The Triglav National Park has been at least partly protected by special laws and agreements for more than 70 years. The area was gradually extended to its present size until 1981. A special Triglav National Park law was established, including certain prohibitions and restrictions to safeguard and protect the natural and cultural environment and to regulate the construction of buildings in the specified area. The principal aim is to foster the development of the Triglav National Park. In addition to nature protection the emphasis is put on following issues.

(i) Employment for the local population should be created by different programmes, administrative and accompanying measures.

(ii) Special forms of agricultural cultivation should be introduced and supported, such as alternative production schemes and organic farming.

(iii) Environmentally friendly tourism should be developed, along with the essential infrastructure in former peripheral zones outside the major traditional tourist centres.

(iv) Agricultural high quality produce and traditional local handicraft commodities should strengthen the market position of the region and enhance the income prospects of the population. Special regional trademarks will have to be introduced for this purpose.

(v) One precondition is the establishment of co-operatives at community level to provide incentives for realising the programmes covering various issues like forestry measures, the processing of wood and timber, tourism, energy production, infrastructure, handicraft or organic farming. In particular, the Slovenian government is making some effort to support the position of organic farming as the only sustainable form of farm management in the Triglav National Park.

Apart from the Triglav National Park law, no specific agri-environmental measures are implemented in the study area. The only exception is a premium that was paid only for 1995 and 1996 to compensate for the difficulty in mowing steep slopes. There are several relevant agri-environmental policy measures in Slovenia, but not specifically established for the study area.

a. *Agricultural and forestry measures*:
Compensatory allowances for manual mowing of rough and steep meadows,
Decree on the funding or co-funding of forest investments from the budget of the Republic of Slovenia (to some extent comparable with Reg. 2080/92, but wider in scope),
Subsidies for milk production, meat production, animals on mountain pasture and for the introduction of alternative methods in livestock-breeding, (to a certain extent comparable with Objective 5a measures)

b. *Regional development measures*:
Financial Intervention in Agriculture, Food Production and Supply Act,
Development Encouragement in Areas under Demographic Transition in the Republic of Slovenia Act – comparable to EU Obj. 1 regions,
CRPOV - programme: Programmes for integral development of rural areas and village revival (implemented by the Ministry of Agriculture, Forestry and Food and comparable with EU objective 5b areas),
Less-Favoured Agricultural Areas in the Republic of Slovenia (comparable to Reg. 268/75 or 950/97)

c. *Environmental measures*:

Triglav National Park Act (1981) (see above),
Endangered Animal Species Protection Act (1993)

d. *Market measures:*
Measures with a direct impact on the market price do not exist.

3.2.2 Analysis of the pressures and impacts on environment

Principal agricultural pressures and impacts

If we first focus on the identification of problems resulting from agricultural and forestry utilisation in this area, then we have to point out that problems related to the environment frequently take the form of environmental intervention, e.g. agricultural improvement practises, path and road construction. Consequently it can be said that in the case of the Triglav National Park individual problems seem to be caused mainly by attempts to improve land use conditions, while constant overburdening resulting from overstocking and excessive application of pesticides have so far had no lasting environmental impact.

Other important factors influencing the environmental situation in the area result from demographic and social changes in the period after World War II. The steady decrease in population, deterioration of age structure and abandonment of farming are the most obvious results of the process. These can be observed in the overgrowing of land and changes of utilisation category of agricultural land and farm buildings. Some other problems have recently been noticed, brought about by the modification and re-regulation of ownership laws. In some areas these changes have resulted in uncontrolled illegal grazing and forest grazing.

A.1. Agricultural improvement practises

Most agricultural improvement practises were carried out in the mid 80s. As a result of nature conservationists' protests it has become less common since then. Agricultural improvement practises were usually carried out on primarily sandy soils with exceptionally shallow soil layers. Inconsistency at the application of technical measures caused even more problems later on.

In consequence, even now, more than a decade later, the land that was subject to these measures suffers from yield reduction caused by surface stones, weeds and the predominance of certain less valuable grasses.

A.2. Land abandonment and overgrowing

One of the most obvious indicators of a partial disintegration of cultural landscape is the abandonment of agricultural production and overgrowing of agricultural land. Owing to some natural, though more often economic factors, this land has been overgrown by less valuable trees and shrubs. Although the Triglav National Park as such already counts as one of the most densely wooded parts of

Slovenia, the proportion of woodland has increased further, at the expense of the limited agricultural area.

Judging from aerial photographs, which later served as the basis for a land use map, more than 12,000 ha of agricultural land was subject to overgrowing at the end of the 80s. More than nine tenths of this area is forest stands where, judging from the plant species and the vegetation density, dense tree species predominate. According to forest management plans and the defined tree line, more than 10% of this territory is also officially classified as forest. On the land where agricultural production has been abandoned over the last ten or twenty years, i.e. the remaining one tenth, overgrowing is less intensive, and shrub species and forest undergrowth predominate. Periodical agricultural use is characteristic of such areas.

According to the classification on the possibilities of utilising agricultural land exposed to overgrowing, more than a quarter of all land that has lost its productive function could now be categorised as forest. Only a slightly higher percentage has been able to recover its agricultural function, most of it serving as grassland. From a legal point of view, the majority of the remaining land must be classified as potentially agricultural, though in most ecologically acceptable protective function.

A.3. Road construction for agricultural and forestry purpose

The number of roads currently being built in forests is decreasing as most roads have already been built. However, some problems with financing such projects are occurring, and are particularly relevant to the necessary improvement of access to highland pastures.

A.4. Agricultural land use changes and transformation of agricultural buildings

In the 70s the construction of holiday homes became quite popular in Slovenia. This trend was more or less simultaneous with the process of farm abandonment. As a result, quite a number of agricultural buildings came to be owned by non-farmers. The issue became even more problematic in the highland-pasture area, where, apart from raising environmental problems in connection with sewage, waste production and noise pollution, it has also led to conflict between different interests.

A.5. Uncontrolled grazing and forest grazing

Uncontrolled grazing, particularly forest grazing, has become increasingly evident. The problem, however, does not stem mostly from local farmers but from new settlers. This issue has been prominent for several years, but inspection authorities have so far not been able to restrain the process.

Principal non-agricultural impacts

The natural environment of the study area is exposed not so much to negative impacts of agriculture as to the unfavourable consequences of other, non-agricultural activities. To a visitor, the Triglav National Park presents a very attractive recreation area. In addition, Mount Triglav holds symbolic importance for all Slovenes. Thus it is by no means unusual that mountaineering is one of the most popular forms of relaxation and leisure-time activities for a substantial number of Slovenes. All this, however, necessarily involves tourism and traffic, both having an important impact on the environment.

Illegal construction of holiday buildings, especially the so called "weekend homes" is a particular problem area. In the highlands, especially, buildings that were quite often previously used as farmhouses are now utilised as holiday homes.

B.1. Tourism and recreation

The tourism and leisure industry is the most important pressure on the environment in the area. The Triglav National Park is one of the most intensive tourist regions of Slovenia. Environmental degradation is caused by sewage and waste production, noise production, road construction, different kinds of sporting activities, mountaineering, camping and illegal swimming in high mountain lakes etc.

B.2. Traffic and transport

As a consequence of intensive tourism, there are problems arising from the increasing traffic volumes. Through traffic, access roads to mountain huts, and parking areas are other important issues in this context. The increasing air traffic in connection with recreational facilities has a particularly negative influence on air quality. Nowadays, aircraft emissions, noise and air pollution are quite common concerns in mountain areas.

B.3. Construction of buildings

The natural and cultural heritage is further endangered by the construction of illegal weekend homes. This situation is a result of inadequate legislation and deficiencies in the monitoring and control system.

B.4. Waste management

Uncontrolled and poorly managed waste disposal is still quite an important concern in the study area. Waste dumping, landfills and spoil tips disfigure the landscape and can cause environmental problems, e.g. groundwater contamination. Building environmental community awareness seems to be an important precondition for improving this situation.

3.2.3 Instruments and Measures

The Slovenian government has classified mountain and upland areas as specifically disadvantaged areas. According to two documents, "Development Encouragement in Areas under Demographic Transition Act" and "Strategy of Agricultural Development in the Republic of Slovenia", mountain and upland areas are assigned the status of areas with special development needs and requirements. In our opinion, however, the fragmentation of measures and absence of broader development programmes mean that these two documents do not provide a sufficient basis for solving development dilemmas in the areas in question.

The document on the "Strategy of Agricultural Development in the Republic of Slovenia", currently the central agricultural policy document, is also the first document to stress the "non-agricultural" functions of agriculture. According to this document, the main aim of agricultural policy is to maintain population levels, maintain cultural landscapes and the soil fertility of agricultural land, protect waters and soil from pollution, maintain the production of high quality and reasonably-priced food, increase competitiveness of agriculture and to ensure income compensation for specific groups of farmers.

Such rural regions have been classified (Juvanũiũ 1996) according to EU criteria for development of rural areas (Objective 5b areas), and preparative studies on areas meeting criteria for mountainous areas (altitude, inclination, high proportion of grassland in the agricultural land, small farms) and less-favoured areas (low population density, dwindling population, ageing, high proportion of agricultural workers in the total number of active population) have also been carried out (Markeš 1996). Both studies show that about 60% of Slovenia can be re-

garded as being areas requiring state intervention in the sense of implementation of special measures for the encouragement and orientation of rural development.

Although Slovenia's agriculture and forestry measures are not identical with those of EU states, they are broadly comparable.

Agri-environmental and agro-forestry measures
(comparable to R 2078/92 and R 2080/92)

Some Slovenian agri-environmental measures that are comparable with the EU regulations R 2078/92 and R 2080/92 should be mentioned briefly.

a. Partial cost compensation for manual mowing of rough and steep meadows

Two years ago, partial cost compensation for manual mowing was introduced for the area of the Triglav National Park. The main purpose of this measure is to maintain land use of less favourable agricultural areas. The allowance reaches SIT 20,000/ha and is duly paid to farmers who mow rough or steep meadows on Triglav National Park land. In 1996, 154 farmers applied for compensation for a total area of 245 ha.

b. Forestry measures

Forestry in Slovenia since the World War II is considered as having been well organised and oriented towards so called co-natural forest management, which has only increased the productive and ecological value of the forests. In the Triglav National Park area, special value is put on forests with special protective functions and on some habitats, e.g. heathland. Generally speaking, nature protection directives are observed in planning the use and exploitation of forests. The state co-finances all the above measures, its contributions differing according to the importance of the forest functions.

It should be stated that in comparison with R 2080/92 Slovenia is not backward in relation to individual support measures. In other words, all the measures encompassed in the directive are present here too. The only difference is that reforestation measures are not necessary in Slovenia as on the contrary, there is a tendency for forests to predominate at the expense of agricultural land.

c. Livestock and herding premium

Mountain farmers – and almost every farmer in the region is classified as mountain farmer – obtain a special payment for their livestock and a herding premium from the national government based on the head of cattle, sheep and goats. But the total annual sum payable per animal (8,000 to 12,000 SIT) is very low.

d. Recommendations for additional measures

As for organic farming and its encouragement, Slovenia still does not have proper regulatory legislation or directives, which constitutes a considerably problem, especially for the Triglav National Park.

Nature conservation measures

In addition to the categorisation national park land, some plant and animal species and some parts of the natural and cultural heritage with special value are protected by additional laws. In this sense, the following elements are worth mentioning:

(i) ecosystems: aquatic, wetlands, surface and subterranean, in particular forests and alpine grasslands

(ii) bodies of water: there is an exceptional abundance of natural waters, e.g. waterfalls, springs, mountain lakes and rivers

(iii) landscapes: various types of cultural and natural landscapes: valleys, cultivated agricultural land, forests, terraces, mountain settlements with typical architecture, highland areas with typical Karst landformations

(iv) important habitats of seriously endangered species: brown bear, lynx, otter, golden eagle, white-headed hawk, indigenous trout, frogs, snails, snakes, hedgehogs

(v) important connecting corridors for the brown bear, lynx, mountain eagle, white-headed hawk and some other species moving from Slovenia to the countries the alpine arc

(vi) important European connecting corridors for some migratory animal species between Slovenia and the countries of the alpine arc (Austria, Germany, Italy): brown bear, lynx, white-headed hawk, mountain eagle, ibex, chamois

(vii) endangered landscape formations: rough meadows, terraces

(viii) endangered ecosystems: wetlands and high-altitude bogs, embanked water courses, highland lakes, highland grasslands, grasslands on silicate ground

(ix) genetic resources: the Bovec sheep, the Bohinj "cika" cattle

Slovenia is currently trying to adapt its legislation on national parks to international criteria and to enact IUCN standards, especially in economic utilisation of land, hunting and fishing.

Regional development measures

Government regional policy remains within the frame of classic regional policy. Criteria for the classification of eligible areas are laid down in the "Development Encouragement in Areas under Demographic Transition Act". The support is provided to areas in which long-term population growth does not exceed 25% of the national average growth since 1981 and the index of the age structure of population is at least 25% less favourable than the national average, or to settlements situated in high-altitude areas according to agricultural criteria. Areas conforming to these criteria are normally rural. Simultaneously, though only partly in a co-ordinated way, the Ministry of Agriculture, Forestry and Food is implementing programmes for the integral development of rural areas and for village revival (CRPOV) which are either limited to the area of one village or cover only smaller rural areas.

Slovenia is contributing to the support of areas undergoing demographic transition, and other rural areas, by co-funding the formulation of development plans and initial development plans, by providing part funding for the development of local economic infrastructure, by reducing investments in economy, by introducing tax allowances, by primary-education measures, staff training, scholarship policy, culture, body culture and fundamental health care, by social security measures and through the promotion of local projects.

Projects are partly funded from the national budget, in the form of grants primarily for the drawing up of development plans and initial development plans, or by long-term investment loans at favourable interest rates. Projects are typically subject to a sectoral approach, yet broader regional programmes are not required to obtain funding for individual measures, which is the biggest disadvantage of the process. Because further funding is not guaranteed even for programmes that have already been approved, activities quite often lapse even though the initial preparation of the programme has already been carried out, which constitutes a significant problem for the continuity of development initiatives.

In this regard, Slovenia has integrated programmes involving many sectors and guaranteeing long-term funding of measures and investments anticipated in development programmes. Development programmes as such are vetted and approved by government institutions. However, this does not guarantee further implementation of the programme according to a determined time plan – more often implementation is random: "When the money comes in, you might get it!"

Agri-structural measures

On the current categorisation, which divides Slovene agricultural land into five different territories according to the land use conditions, all Triglav National Park land is in the least favourable high-altitude zone, because of its specific natural and economic characteristics. This situation is reflected in agricultural policy aims, in greater diversity of agri-political measures and in greater funding for the implementation of these measures. The fundamental aims of the promotion of agricultural development, as they affect the implementation of individual measures, are as follows:

(i) to improve agricultural production in areas where natural conditions are less favourable to agriculture and on steep slopes and pastures

(ii) to maintain population and agricultural land use in these areas

(iii) to reintroduce and utilise alpine grazing and community pastures in a more efficient way

(iv) to support departmentalisation of agricultural production

(v) to increase the economic attraction of agricultural production in these areas

Comparability with structural measures in EU

As far as overall aims of agricultural policy are concerned, there are no marked differences between Slovenia and the EU. In both cases mountainous areas are handicapped in comparison with lowland areas. Structural policy, which is meant to reduce the differences caused by different economic conditions, is adapted to the situation such areas find themselves in.

However, there are substantial differences in the forms of support that the EU and Slovenia provide for mountain farmers. In the EU, practically all forms of support are effected through two compensatory payment methods (per animal head or per hectare of agricultural land). Slovenia, on the other hand, has a wider scope of compensatory payments, which, however, are strictly limited to livestock-breeding. Compensatory allowances in the EU are mostly non-production related direct payments. Although in Slovenia, except for subsidies for meat production, all compensatory payments are also calculated per animal, they are still largely production-oriented.

In addition, some differences can also be observed with regard to restrictions on the implementation of measures. Farm size limitations and stocking-rate limitations are treated differently. While the EU law defines the minimum size of agricultural land a farm is required to have in order to be able to obtain direct payment (3 ha), in Slovenia such restrictions do not exist except when applying

for a subsidy regarding introduction of alternative livestock-breeding techniques. Nor do Slovenian regulations define the highest number of animals per farm. The highest stocking rate (2.5 head/ha) defined in the EU legislation is lower than Slovenian's (3 head/ha).

The impact of structural measures on the environment

Agricultural structural measures are regarded as having had a positive as well as a negative impact on the environment. The proportion of these impacts depends largely on the type of the measure, the restrictions on its implementation and on the level of funds allocated to it.

Through the improvement of farmers' economic status, practically all agricultural structural measures can be said to have had a positive influence on maintaining population levels in mountain areas. Their contribution to the preservation of land management is important, but the widespread continued overgrowing of land means that their influence is still not sufficient. It is obvious that subsidies are still too production-oriented, particularly meat and milk production. The directives fail to regulate the allowed herd size or to define obligatory production technologies and therefore do not successfully motivate farmers to employ more extensive farming methods.

The introduction of alternative production schemes has had an important influence on the preservation of animal genetic resources. The raising of regional indigenous species, especially horses, sheep and goats, has been greatly encouraged.

Since the subsidies have included restrictions on the maximum stocking rate of agricultural land, their impact on the environment should be altogether more positive. The government is trying to improve the motivation of farmers for environmentally friendly farming by increasing the subsidy as the stocking rate decreases (if the stocking rate is lower than 1.5 head/ha, milk production subsidy increases by 10%). In spite of this effort, the viability of this measure remains doubtful, mainly due to lack of control.

Agri-structural policy measures aimed at compensating for higher production costs in less favourable cultivation conditions can be divided into two groups. In high-altitude areas, natural conditions mean that the land is mainly utilised as grassland. So the measures of both groups are entirely stockbreeding-oriented. As regards the purpose and form of compensatory payments, they belong either in the group of direct payments independent of production (per animal) or in the production premiums group (per kilogram of produce).

A. Structural measures, exclusively less favoured areas

a. Subsidies for milk production

These subsidies were introduced in 1996 and are intended for breeders of dairy cows, milk sheep and milk goats. The support is granted to farmers who:

(i) promise to cultivate all the area they own or rent at least once a year

(ii) have all their animals registered

(iii) submit proof that they have kept the number of animals they reported for at least 3 months and they will continue to do so for at least 9 months after receiving the grant

(iv) sell milk to dairies, at their home or process it into dairy products

(v) do not exceed the stocking rate of 3 head/ha of agricultural land, even when the total number of grazing animals is taken into consideration

In the Triglav National Park, breeders who have applied for the grant receive SIT 12,000 (ECU 50) per dairy cow or SIT 1,800 (ECU 7.5) per milk sheep or goat. The farmer can be granted 5% more, provided the animals spend at least 80 days grazing on his own or common pastures. The increased allowance is not granted for highland grazing.

b. Subsidy for meat production

Together with the premiums for milk production, subsidies for meat production have been regarded as being the most important instrument for improving the economic position of mountain farmers. The subsidy is intended for breeders of cattle, horses, sheep and goats who are orientated towards meat production and granted to mountain farmers:

(i) whose livestock is part of the national selection programme and marked in accordance with current regulations

(ii) who keep the livestock on which subsidy is obtained for at least 6 months before slaughtering, if the animals have been raised on the farm, and who keep imported animals for at least 12 months

(iii) who raise livestock until they reach the defined weight

(iv) who can prove the slaughtering value of an animal and the irreproachable quality of meat, which is important when meat is consumed at home or is sold directly, e.g. to tourists

The form of payment differs from species to species. For cattle, the premium depends on the yield of the animal's life weight and reaches SIT 2,000 (ECU

8.1) per 100 kg of yield. For horses and sheep the premium is calculated per head, at ECU 6.1 per horse and ECU 5.7 per sheep or goat.

c. Subsidy for animals on highland grazing

This measure is intended to encourage the very specific, characteristic highland form of agricultural land use and preserve, or occasionally also to revive pastures as one of the most important elements of natural and cultural heritage of the Triglav National Park.

The subsidy is granted to farmers whose livestock spends at least 80 days a year grazing on highland pastures. In addition to the above-mentioned time restrictions, applicants have to conform to the following requirements:

(i) a highland pasture is defined as a meadow that is also officially classified as a pasture (planina) and included in the list confirmed and published by the Ministry of Agriculture

(ii) a record of the duration of grazing and the number of livestock is to be kept and later verified by the agricultural consultancy service and the manager of the pasture

(iii) grazing animals are to be marked in accordance with the regulations

(iv) the highest stocking rate allowed for pasture is 2.5 head/ha including all grazing animals

All livestock breeds are available for this subsidy – i.e. cattle raised for meat and milk, horses, sheep and goats raised for meat and milk. It is paid per head and the grant is SIT 1,000 (ECU 4) per milk goat or milk sheep and SIT 8,000 (ECU 33.6) per dairy cow.

B. Structural measures, granting special treatment to areas with less favourable conditions

Measures in this group also relate exclusively to the livestock breeding sector. Because Slovenian livestock breeding has experienced serious discrepancies between milk and meat production, and consequentially the market has become overburdened with milk, the principal aim of this subsidy is to increase the meat-oriented production of cattle, horses, sheep and goats on the expense of milk production. In order to achieve this, the measures attempt to encourage branches of production that are less economically and labour-intensive. These are

(a.) *the raising of suckler cows,*
(b.) *the raising of suckler goats and sheep* and
(c.) *the raising of suckler mares.*

Besides these schemes, the adoption of certain other alternative forms of production (slaughterhouses, fattening calves) is encouraged under the authority of such measures, though mountain farmers do not receive any higher subsidies for the latter.

In order to receive funds from any of the above measures, farmers have to keep a "cowshed book" and provide a written record of the use of calves, lambs and stallions. A farm is obliged to have a minimum number of animals (at least three suckler cows and a defined number of sheep) and is not allowed to give milk to dairies nor to sell it at home or process it.

The level of subsidy depends on production orientation and is paid per head. In Triglav National Park, farmers get SIT 2,000 (ECU 81.2) per suckler cow, SIT 8,000 (ECU 32.5) per mare and SIT 2,000 (ECU 8.1) per sheep or suckler sheep. Applications for all listed forms of subsidy are filed once a year.

3.2.4 Conclusions and Recommendations

The successful development of rural areas in general can only be achieved if the local inhabitants are provided with an attractive environment to live and work in. Satisfying income and suitable job positions are of key importance. The core strategies and recommendations can be outlined as follows. It is necessary to:

(i) provide and maintain appropriate jobs in rural areas in agriculture and forestry (on the farms and in the surrounding areas) and by the development of accompanying and supplementary activities (processing, tourism, crafts, catering) and additional labour provision in the rural countryside (organising the sales of agricultural crops and produce, service activities, guiding etc.)

(ii) encourage environmentally sound methods of agricultural production and processing, e.g. organic farming

(iii) introduce ecologically, economically and socially motivated direct payments, as a means of providing a satisfactory total income

(iv) develop trademarks for mountain areas, and regional trademarks (e.g. a Triglav National Park trademark)

(v) consider the socio-cultural diversity and ecological potential of the area together with the quality of life as important elements of integral

and permanent development, and to encourage and preserve local and regional self-confidence

In developing strategies for this study area, one should consider the following general assumptions:

(i) there is a requirement for a transition from sector-oriented development programmes to integrated programmes

(ii) agriculture and farms are becoming a part of the regional economy. This process calls for better co-operation with other economic sectors, especially tourism

(iii) awareness of the multitude of functions of agricultural performance is the only suitable way to preserve the cultural landscapes

(iv) an awareness that farms are economic and social units is necessary

(v) giving credit to the work of farmers on mountain and hill farms

The following paragraphs should explain the most important strategies and recommendations in more detail.

3.2.4.1 Integrated concepts and co-operation

In Slovenia, co-operation between individual sectors is usually limited and measures rarely complement one another. This is, in fact, one of the main problems and suggests that regional policy is not managing to fulfil its primary task of co-ordinating interests within a specific area. Development issues are not treated from an integral approach. Development policies are limited to individual sectors, which conduct their specific policy regardless of the other sectors. Co-operation and co-ordination between sectors is rarely at a sufficient level.

The successful development of municipalities within the Triglav National Park and the Park itself is inseparable from the conscious choice of an integral approach, presenting the principle of human actions in relation both to development issues and to nature. This can only be achieved by an integral concept establishing a connection between different environmental interests and activities – economic, cultural, social, and those relating to nature protection. The underlying principle of development activities should therefore be the search for models of efficient, premeditated and environmentally sound use of regional, natural and economic resources, in which concern for the environment is the primary motivation. Preservation and the permanent value of natural resources are thus the core and the essential element of development.

3.2.4.2 Regional policy and development programmes

In future, Slovenia will have to change its attitude towards regional policy. Greater integration of programmes is needed. Slovenia has not so far managed the transition from classical regional policy, which is mostly concerned with the problems of infrastructure. Problem management has thus far largely been dependent on a sectoral approach, which considers the use and development of local resources and the environmental assets as its primary goals.

In the period of political transformation and in the first years of independence, a certain amount of centralisation was justified, mainly for political reasons. Now, when the situation has improved, centralisation is increasingly proving a hindrance to progress, especially in the rural areas. The problem is that regional policy often appears to be uncontrolled and short-termist where the environment is at stake and, in addition, investment in agriculture and in other branches of economy is not sufficiently secure, which again holds back the development of economically sound projects.

Long-term policy measures for rural areas are crucial if development strategies are to succeed. A suitable legal basis to ensure a long-term security for people living and working in rural areas would also help increase peoples acceptance of development decisions and related risks. Furthermore, development programmes should concentrate on the needs of the local people so that they can identify with and benefit from the development programmes. It should be noted that development in mountain areas can only be successful if it takes all aspects of life and work into account, and if the programmes are based on nature protection principles and use the advantages (while not forgetting the disadvantages) of individual areas – development which, in short, finds specific solutions for specific problems.

3.2.4.3 Compensatory payments for farmers

Agriculture plays a multiple role, and its incorporation into development programmes is of particular importance to rural areas. The functions of agriculture are not limited to production and economic purposes. Quite the opposite, agriculture is also highly important because of its social value and its impact on settlement, culture and nature conservation.

In addition, the Triglav National Park should undoubtedly be granted a special status because of the unfavourable economic conditions (more difficult working conditions and higher costs owing to climatic and topographic conditions), functions related to nature protection and environment, and structural conditions (great distance to the markets and from the cultural and administrative centres,

small-scale farms etc.). Such specific conditions call for the introduction of appropriate compensatory payments, which could compensate for the loss of agricultural income.

3.2.4.4 High-quality produce, fostering organic farming, processing and direct marketing

Individual systems in mountain areas are highly interdependent. We therefore need to stress the need for special development incentives, which would further motivate the production of high-quality food, produced with environmentally appropriate farming methods. Organic production is of major importance for mountain areas in the Triglav National Park, as it is the best way of implementing assumptions regarding income, quality of food and ecology. Higher prices for agricultural produce can only be justified if the products are high quality and produced in the specified way.

Organic production should run in parallel with activities which involve the continuation of crop growing, i.e., with crop processing. On the one hand, processing has historical weaknesses, on the other, the activity is traditional in these areas. It should be noted that the development of food processing is also of key importance for the introduction of organic farming, for marketing region-related high-quality produce, and for the introduction of trademarks. Since not all supplementary activities are suitable for every farm, attention has to be paid to the problem of how to direct farms towards appropriate supplementary activities (previous experience, education, age, financial resources, size of farm).

Previously, a serious problem has also been the absence of any legislation regulating organic farming and supplementary activities, which, together with the selling of these products and produce, could offer Triglav National Park farmers an alternative way of making a living.

3.2.4.5 Support to mountain pastures

Another item of importance is the preservation and development of mountain grazing, which has always been a constituent part of mountain farming. Since World War II, agriculture in more favourable areas has become more and more intensive, while, on peripheral sites in particular, abandonment and overgrowing of pastures has become increasingly frequent. Grazing is of major importance to farms, but is also of great environmental and social value too, as it is the only appropriate way of preserving the alpine cultural landscape, which, in turn, is a key issue in the development of tourism. Highland grazing faces many problems. The most serious are the acute shortage of labour to work on pastures; for dairy-farmers in particular, the additional expenses arising from the maintenance of dairies, other buildings, machines and access roads to the pastures; and, last but not least, a seasonal surplus of produce, usually coming on the market when prices are relatively low.

3.2.4.6 Policy commitment to mountain problems

In the light of the above, it becomes clear that state support is needed if the objectives are to be achieved. By "state support" we are not referring solely to financial aspects of the programmes (direct payments, subsidies etc.), but also to the fact that the state, having the casting vote in determining agricultural and regional policies, plays a crucial role in managing the development of rural areas, which should then provide income for local people and preserve natural resources.

To achieve the above objectives, it is necessary to:

(i) decentralise regional and agrarian policy, devolving specific measures onto the level of smaller regional units, especially at the municipal level

(ii) enact regional and agrarian legislation that will allow for an integral approach to handling development issues, and will consequently ensure co-ordinated operation of a number of sectors (e.g. agriculture, forestry, tourism, environmental science, water management, transport, welfare, healthcare, education), thus making possible a dialogue of different interests in the environment

(iii) provide the legal basis for organic farming and supplementary activities on farms, e.g. agri-tourism, crafts, processing, direct marketing, catering

(iv) introduce measures to support the competitiveness of rural areas, particularly investment in education and information infrastructure, improvement of advisory service and the market itself etc.

(v) gradually introduce direct payments for farmers to improve their socio-economic situation, and at the same time taking environmental performance into account

(vi) improve the education and training of the local population towards an advanced understanding of mountain and upland areas' multifunctional concerns together with the awareness that environmental quality is not in contradiction to economic development

(vii) introduce and fund five-year programmes for farms on the basis of contracts that are binding on both the state and the farmers

The long-term character of policy for country areas is crucial if development is to work. A suitable legal basis to ensure long-term security for people living and working in country areas would also contribute to a greater readiness on their part to agree to development decisions and related risks.

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Endangered Animal Species Protection Act 1993.

Financial Interventions in Agriculture, Food Production and Supply Act (Uradni list 5/91) Uredba o uvedbi financnih intervencij za ohranjanje in razvoj kmetijstva ter proizvodnjo hrane

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3.3 Val di Cembra – Italy

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Although the study area covers all important environmental concerns specific to mountain areas within the district, it occupies a peculiar position within Trento province. In addition it provides a good example of the socio-economic and environmental conditions and the potentiality for a sustainable mountain development. It shows that future policies have to be oriented on the promotion of collaboration between local communities, international co-operation, development of information networks for European mountains, sustainable transport and energy policies, the role of ecologically sensitive and protected areas and the enhancement of cultural landscapes, biodiversity and human activities aimed at multiple use management.

The Val di Cembra region can be considered as a case of marginality which has maintained the characteristics of an area on the periphery. This situation has a long history. The natural conditions are harsh. Steep gorges and ravines cut up the natural landscape. People have survived thanks to their thrift and readiness to bear hardship. They have always attempted to make use of and exploit every piece of land and hence developed only a subsistence economy. Land abandonment is an important issue. During recent decades there has been a continuous migration process out of the region, exacerbating problems with the demographic structure. Recently, the growing demand for porphyry has made it possible gradually to halt this process of land abandonment. Porphyry quarries play an important role in the social and economic development of the region.

3.3.1 Introduction

A. Geography

The Val di Cembra study area is located in the north-eastern part of District 5 of the Adige Valley, with a surface of 149.1 square km and eleven villages of about 10,350 inhabitants. In comparison, Trento province covers 6,207 square km, 223 villages and 450,000 inhabitants. This study area borders on the province of Bolzano, the Fiemme and Fassa Valleys, the Adige Basin and Val Sugana. The altitude of the area ranges between 200 m above sea level on the estuary of the Avisio river into the Adige near Lavis and 2,400 m (highest summit Monte Fregasoga). The average altitude of the permanently settled area varies between 600

and 1000 m. The geography of the region is influenced by the Avisio river with a total length of 88 km, which flows through the whole valley.

The climatic conditions can be characterised as a transitional situation between a typical continental and a moderate Mediterranean climate, which is specific for the southern parts of the region. The mean annual precipitation is 930 mm and the mean temperature is 9 °C.

Along the central valley there is one main road causing a high traffic pressure owing to long-distance transboundary commerce and goods transport. The road transport volume is very high in relation to the small residential population,. The main reason for this is that many people who work and live in adjacent areas pass through the valley.

With regard to the land use management, 34% of the whole area is utilised agricultural area (UAA - 11% of the total area for grazing), and 48% is covered by forests and woodland. The remaining 18% is unproductive bare land or quarries for porphyry exploitation. The terrain was primarily formed by the activity of glaciers. So there is a sequence of slopes following alluvium or altopianos along the valley. The steepness of the slopes usually ranges between 10% and 45%.

The study area holds a great variety of floral and faunal communities and species, and many unique and precious habitats can be identified. In agricultural cultivation, the specific soils are responsible for the production of typical and famous wines. Furthermore, all over the Avisio basin there are porphyry deposits, which are important for the economy of the area. Finally, it is remarkable that handicrafts and tourism are only poorly developed.

B. Socio-economic characteristics

Demographics

The total population of the study area is about 10,350, which gives a population density of about 69 inhabitants per square km (the corresponding figure for District 5 is 228 inhabitants per square km, and for Trento province 72 inhabitants per square km). Although the population is still comparatively high, it is showing a tendency to a decline. During the last ten years demographic figures in the study area have shown a decrease, while the population has increased slightly in District. 5 as a whole (+1%). People probably prefer to move to areas with better environmental conditions than remain and try to improve more difficult locations.

Economy

The economic development in the region is constrained by the difficult geomorphology, the unsuitable road network, the lack of industrial companies, the limitations on trade, the lack of tourism facilities and, hence, in the resultant phenomena of land abandonment and depopulation. All these aspect can be conceived as environmental pressures and impacts.

The percentage of working people in the region, i.e. the economically active population, is 78%. The unemployment rate in the study area is about 12%, i.e., far higher than the unemployment rate in District 5 as a whole (6%), or in Trento province (7%). Increasing difficulties in providing sufficient employment opportunities and income for the people living in these mountain communities are also responsible for an increasing migration process out of the region.

Porphyry quarrying, forestry and the agriculture can be considered to be the principal income sources for the population in Val di Cembra. In this respect the porphyry deposits are of outstanding importance as a source of employment, while agriculture and forestry suffer from competition with the neighbouring valleys. In the adjacent regions, tourism, services and industry are the main employment sectors.

Because people are moving out of the region to look for better income opportunities, land abandonment and devastation of local activities are widespread phenomena. This can undermine the identity of mountain people and communities as regards their traditions, culture, environmental sensitivity and the importance of mountain ecosystems, as well as their essential roles in managing environmental resources sustainably.

These specific difficulties and limitations are the main reasons that the region cannot compete successfully with the richer, more accessible neighbouring valleys with their flourishing tourism, service and industrial sectors unless appropriate financial aid compensates for the disadvantages.

The economic sectors suffering most from the unfavourable circumstances are mainly agriculture and quarrying. Agriculture had to win cultivable land from the slopes, to obtain soil with earth carried on their backs by farmers, and safeguarded with walls (terracing). Quarrying is weakened by the competition with neighbouring areas and the insufficient road network, unsuitable for heavy trucks, which furthermore are considered a major cause of atmospheric pollution. Moreover, physical and climatic peculiarities are not insignificant factors in understanding the century-old depopulation.

Economically, the area is non homogeneous, since different interests exist between the higher and lower parts of the valley and between the right and left slopes, creating an imbalance in the distribution of the activities. In the lower part of the valley, principally on the right slope, specialised agriculture is predominant (mainly vines, apples and plums); on the left slope the industrial aspect is emphasised because of the numerous, wide porphyry quarries. Otherwise, the higher part of the valley is characterised by an ongoing and general abandonment of agriculture and forest management and in spite of the recent development of the cultivation of berries and chestnuts, people are occupied in activities which bring about commuting to the big industrial centres outside the valley.

The high percentage of people engaged in industry (mainly quarrying) and services, in comparison with those employed in agriculture, points to a shift in employment. This creates a distorted view of the real situation, because the valley does not have an industrial structure, and accents the idiosyncrasy of the territory which paradoxically contains families of workers.

The industrial rush to the neighbouring areas has widened the gap between the area examined and more favoured territories. The valley shows characteristics of a marginalised territory unable to keep pace with the general economic development of Trento province. Thus many people are leaving agriculture and trying to find work outside the region.

C. Agriculture

About 12% of the population is employed in agriculture. The farmers' average age is about 50, and many farms are run by retired farmers. This seems rather high, especially when compared with other areas of District 5 where agricultural income is higher. In the Val di Cembra area, the average farm is small, and the holdings are generally managed only by family members. The prospects for pluriactivity and daily commuting are not very good, so many people take up a full-time job and stay outside the study area for a longer period.

The predominant agricultural land use is fruit growing, e.g. apples and grapes, wine production and potato growing. Most of the agricultural activities are based on individual private holdings, common property or co-operation is not an important feature in the region.

In this context, agriculture has never been considered as a sufficient source of income and hence it does not play a main role in the improvement of social and environmental conditions. However, agriculture could constitute an important resource for the area, in spite of the geomorphological factors and other obsta-

cles which reduce and restrain activities and agricultural exploitation. The agricultural sector is hindered by steep slopes, by areas of high altitude and by land being taken up for other activities.

Agriculture in the valley is considered to be at subsistence level, but it is also a traditional activity, the cultivation of vines and fruit orchards (walnuts, chestnuts, pears and apples) having been a rural occupation for the elderly since the last century. The spread of large forested areas (especially in the upper part of the valley) might make wood industries, commerce and handicrafts possible.

D. State of the environment

The environmental situation of the study area can be considered to show high degree of biodiversity. In general the region is relatively pristine, with little human influence. In most cases, environmental problems occur only at a limited, local level. The landscapes throughout the Avisio basin territory are characterised by a peculiar beauty and wildness. Air and fresh water quality are excellent and contribute to the most precious assets of the Val di Cembra territory. Among other assets of the region, the great biodiversity of flora and fauna, the varying and beautiful landscapes and certain specialised and promising activities based on natural resources (apiculture, medicinal plants, eco-tourism, etc.) can be pointed out as the principal riches.

The principal environmental degradation is land erosion caused by brooks and rivers and the abandonment of old agricultural mountain areas. Outworked and not yet reforested quarries, and the localised high traffic pressure are contributing to the worsening of the environmental situation in the examined area. Supplementary environmental degradation is caused by the presence of industries and high population density in District 5 and its neighbouring valleys.

Land abandonment and under-exploitation of agricultural areas and pastures, particularly in the high mountains, on the one hand, and over-exploitation and intensification in the flat valleys and other favourable areas, on the other, are characteristics of District 5 as a whole, while porphyry quarries are a specific matter of environmental concern for the study area. Accidental forest fires, particularly during summer, are another environmental danger deriving from insufficient control and lack of understanding by people in general.

Another disadvantage is the difficult water supply, as water resources in the valley are sparse, with the threat of a lowering of the ground water table. Other handicaps are caused by the structure of the valley and the road network, which influences the economy and quality of life. The fragile links inside and outside

the valley complicate communications and hinder cultural and socio-economic development.

The prospects for an improvement in the social and environmental condition of the communities are mainly in the hands of the public authorities. In fact, we can observe different and sometimes controversial policy approaches. One, nowadays a minority position, is in favour of forcing the exploitation of the porphyry deposits, disregarding all other sources of income. Another attempts to put the emphasis solely on the local resources and high quality mountain products. A third position aims for a balance between the preservation of natural environment and landscapes, essential resources for agricultural activities, i.e. for grazing, porphyry excavation and pluriactivity. This last approach would allow empowerment of mountain communities, the creation of new livelihood opportunities and could assure the recognition of the role played by mountain people for the benefit of society as a whole.

E. Policy measures

Different political agri-environmental and socio-economic policy measures applied in the study area aim to support agriculture, forestry and the environment of the region. Particular emphasis is put on concerns connected with the porphyry quarries. The application of European Community measures is very weakly developed in the area.

a. Agricultural, forestry and rural development measures:
   R 2078/92: has little relevance in Val di Cembra
   R 2080/92: concerning agricultural land afforestation is not yet operative but it will be applied in the near future.
   Objective 5b-programme: Although the region is part of the Trento Objective 5b-area, there are hardly any projects supporting the socio-economical development within the study area.

b. Environmental measures:
   "BIRD" directive: specific research on birds. A specific report deals with the population dynamics, bird migration and protection of a rare bird population living exclusively in the examined area (Report 2 of Centro di Ecologia Alpina).
   Scientific research on habitats and protected area

c. Community initiatives:
   no INTERREG programmes relevant for the region.
   LEADER programmes which could support the socio-economic and environmental development of the region have not thus far been put into practice.

3.3.2 Analysis of the pressures and impacts on environment

Because of the degree of mutual interaction between environmental pressures and causes and their effects on the territory, it is difficult to prove a direct cause-effect relationship of one principal pressure on the environment or a hierarchical order of pressures. In this way, one form of pressure can be considered as being the cause of others; furthermore, agricultural or non-agricultural pressures may share the same causes and effects, and some causes might create effects which can themselves be considered to be pressures. However, all these factors as a whole contribute to strengthening the general marginality of the study area.

Principal agricultural pressures and impacts

A.1. Natural environment and land abandonment

The principal agricultural pressure derives from the harsh natural environment and geomorphology, in particular the sheer slopes of the agricultural and non agricultural territories. The slopes of the valley are steep, characterised by irregularities on the territory and by a deep and frequent erosion which is mainly due to the valley structure, to the water presence and to the rhythm of ice and thawing.

The origin of this pressure is solely geological, owing to the relief of the land and the type of the bedrock. Farmers have long been used to dealing with this situation in building terraces and trying to recover and fix the soil that has been eroded. This situation does not permit mechanised agriculture, and until now only the effort of family labour has been able to preserve the agricultural land and the whole valley from falling into a state of neglect. In the past, the agricultural activity was sufficient for the social and economic needs of the valley, but now it is not competitive with the adjacent territories with better conditions and opportunities with regard to the natural environment and agricultural cultivation, i.e. chemical, biological, mechanical inputs to raise productivity.

The geomorphologic situation of the valley gives rise to frequent erosion and natural hazards. These phenomena and the immense requirement of manual labour (in maintaining the terraces) are responsible for gradual land abandonment,

particularly on the steep slopes and high-lying mountain regions. Once land abandoned, shrubs and herbs become dominant within a few years. Precious habitats like mountain meadows and beautiful landscapes can disappear, and the valley will lose its traditional and cultural characteristics. Furthermore, as a consequence of land abandonment, the growing presence of unused land and the destruction of the old terraces, wild fires and landslides (also leading to serious damages on the road network and to the landscape) are becoming more frequent.

Another aspect leading to agricultural land abandonment is that young people prefer to work in the porphyry quarries, where they can earn higher incomes, or to commute to the neighbouring valleys.

A.2. Demographic structure

The population in the study area is declining steadily as a result of continuous migration to the neighbouring valleys. Thus the average age of the remaining population is quite high. This phenomenon is occurring because of the difficulties in developing activities appropriate to the needs of a modern society. The traditional way of living is no longer satisfactory, for younger people in particular. These tendencies will be reinforced if new perspectives and motivation cannot be provided, especially for the young population in the valley.

In terms of socio-economic living patterns it is noticeable that many people still reside in the region while commuting and working outside. Many residential buildings are only seasonally occupied, e.g. during summer or other periods of the year for holiday purposes or to assist relatives working in the agricultural sector.

The unfavourable age structure and falling population are catalysts for land abandonment, the loss of tradition and socio-economic values and power, local tradition and culture.

A.3. Agricultural property fragmentation

The average size of the agricultural holdings is rather small and the whole valley is characterised by a high degree of land fragmentation. The land use systems and the crops are very different and many famous local products grow on small plots.

The majority of farms are characterised by a family management system and agricultural production is largely self-reliant, with only little co-operation and partnership. Land fragmentation is also exacerbated by commuting and by the prospect of finding work in other nearby provincial districts or in other economic sectors, which also hinders structural change in agriculture.

Furthermore, pluriactivity is already the prevailing feature in the region. The consequence is a shortage of labour. Many important, sometimes indispensable activities in a competitive sense or from an environmental or aesthetic point of view can no longer be carried out.

This situation also hampers the implementation of programmes to improve the agricultural structure on a broad scale by integrated action. The economy will remain at subsistence level and there is little incentive towards production changes and market integration. As a result, the farmers are not getting high enough profits from farm management and many of them prefer abandonment.

A.4. Production of typical products

Agricultural high qualitative products are famous for a few specific areas in the study area. Unfortunately, we can observe that many of these products are being lost because of heavy competition from cheaper commodities of the neighbouring territories. These typical regional products are, for example, wine, aromatic *grappa*, chestnuts, and different kind of berries like strawberries, blueberries, etc.

The climatic conditions are quite favourable for the production of these high-quality niche products. There are good opportunities for increased production, particularly if local farmers were to try marketing their own produce, e.g. via direct selling on a local and small scale. It might be possible to boost local alternatives and to create trademarks. Other positive aspects in this context are the preservation of the local, social and cultural traditions, tourism promotion and the prevention of the land abandonment by the revaluation of the whole territory.

A.5. Reforestation of worked out porphyry quarries

It is possible to recover worked out quarries with vegetation, through reforestation programmes and bio-engineering techniques. Worked out porphyry quarries have to be retrieved to avoid open red excavations ruining the environment and natural landscape. In this regard, reforestation programmes and bio-engineering techniques need to be implemented. Thus it is possible to restore the environment, to avoid erosion and natural hazards. Land could also be regained for forestry or agricultural use, with positive effects on the landscape and the local labour market.

Principal non-agricultural impacts

B.1. Porphyry quarries

The abundance of porphyry quarries is responsible for the principal non-agricultural impact on the environment in the region. Porphyry quarries bring about marked landscape and environmental changes. Although the landscape is drastically reshaped by the quarries, they also represent an important income resource for the whole valley, at least for a small number of land owners, which leads to marked conflicts of interest within the region.

Porphyry, known as 'red gold', is quarried from the mountains. This traditional activity is well known and appreciated, and porphyry is exported all over the world. Throughout history, porphyry has always played the role of the principal economic resource of the region, even tending to combat agricultural poverty.

These mineral resources have influenced the economy and culture of the valley, but the quarries also take away territory, 'eating' the mountain and opening deep red scars in it, and sometimes also endangering the security of the nearby villages. Furthermore, the mine tailings and spoil heaps change environmental conditions, causing erosion, open pits and land degradation. Heavy traffic due to the comings and goings of trucks and vans on the only main road through the valley is another important negative environmental pressure in this context.

As a consequence of the porphyry quarries, many traditional forms of agricultural cultivation e.g. chestnut and blueberries have been halted and abandoned. It is very interesting that mining has produced a fall in educational standards because young people find it more convenient to work in the quarries for a short time to make good money rather than improving their educational abilities. This decision is mostly taken without regard to their personal futures.

Furthermore, there are some health-related problems for people working in the quarries. Nevertheless these dangers seem to carry less importance in people's attitudes. The offer of a nearby job, even for a limited time, outweighs all other considerations. It should in any case be mentioned that this sector also carries certain crisis risks, because it presents the same problems as a 'single crop system', without diversification processes.

B.2. External competitiveness and land use conflicts

The Val di Cembra occupies a very weak position within the District No. 5 of the Trento Province in terms of agriculture, tourism, industries and services. It cannot compete with the neighbouring regions, which are favoured in every

respect. Additionally, there are some land use conflicts within the study area, particularly between the porphyry quarries and agriculture.

External competition intensifies land abandonment. Nowadays many villages are being reduced to mere dormitories for people whose main working activities are outside the region. This phenomenon adds to the marginality of the whole valley and consequently weakens the position of the agricultural and forestry sector, with many negative environmental consequences like the loss of natural resources, land abandonment or inappropriate land use schemes.

B.3. Tourism

The study area possesses a unique natural environment and many places of historical and cultural interest. Tourism can be considered a precious asset and important income resource for the local people and for the whole region.

Despite these favourable circumstances, tourism is rather poorly developed. The causes are various. There is lack of promotion, tourism facilities and tourist infrastructure like hotels, bed capacity, access roads etc. Environmentally sound and sustainable tourism could attract visitors, particularly in spring and autumn. A moderate climate, peaceful locations, miscellaneous natural and cultural landscapes invite for hiking, cultural events and other attractions.

Adequate and environmentally sound tourism development could counteract the marginality of the territory and the land abandonment, especially if connected with agricultural and forestry activities. This close integration could also promote a mutual increase in value, by constituting a tool for the promotion of the quality of typical agricultural products and for the diffusion of information regarding these specific agricultural or non-agricultural issues.

3.3.3 Instruments and Measures

Objective 5b programme (Regulation 2081/93)

The study area is part of the Trento Objective 5b region. The programme implemented in this objective 5b region is structured in sub-programmes and defined in intervention measures.

The agricultural measures carried out within the programme aim mainly at improving the quality of the produce and preserving the link between man and the land. There are also measures intended to protect the natural landscape and environment. The principle aspect springs from the need to market a product that is different, from a health and organoleptic point of view, to those coming from other valleys. This requirement originates in the awareness that the specific mountain characteristics of the study area force the farm workers to sustain high production costs in relation to others operating in more favoured areas. Together with this aspect, the limited size of the agricultural holdings has to be considered, i.e. a phenomenon which creates a considerable increase in the fixed costs.

The second objective is the maintenance of the natural environment in the broader context. The Val di Cembra is part of a wider territory which is famous for the beautiful landscape and environment. The main goal in this context is to promote appropriate actions to protect the territory from degradation.

These two objectives are interdependent and the farmers work is the key to maintain the natural and cultural environment. In this sense, it is indispensable to guarantee farmers a sufficient income. The main programme measures (only marginally relevant to the study area) are:

a. Quality production

horticulture and fruit production, particularly viniculture
recovery of old plantations and introduction of new varieties more suitable for commercial marketing or modern cultivation methods

b. Niche products

cultivation of berries, flowers and vegetables
and marketing of these products

c. Negotiable delivery note

promotion of the transfer and the consolidation of the productive ‘negotiable delivery notes’ to facilitate diversification and niche production

d. Irrigation

more efficient irrigation methods to reduce the water use particularly from springs, as well limit or avoid leaching, runoff and landslides;
suitable irrigation technology and water pipes against faulty application on heterogeneous territories;
construction of retention basins

e. Agri-tourism

typical summer location for farmers and shepherds in mountain areas, known as *malghe*, are currently abandoned;
Collective agri-tourism activities, mountain tracks, restoration and the reclamation of some rural buildings for community use

f. Infrastructure

appropriate infrastructure facilities,
rearrangement of rural buildings to enhance tourism capacity

Summing up, it can be noticed that these measures are related to the strengthening of the productive forces and economic diversification, while the last measure concerns the necessary basic infrastructures for the economic development. All measures together aim to improve the situation of the rural environment.

Regulation R 2078/92

Although agri-environmental measures in the framework of R 2078/92 are principally valid for the Val di Cembra study area as a part of a larger territorial unit, the individual programmes do not have any relevance for this study area, because the measures neither suit the agricultural cultivation systems of the area or the payment does not contribute a significant amount.

Further regulations and measures

The environmental forestry measure R 2080/92 is not applied in Trento province, because this regulation does not tackle the specific situation of the region.

In addition, there are no other measures and programmes with agri-environmental concerns like ‘Bird’, ‘Habitat’ and ‘Nitrates’ currently applied in the study area and there is no special support for organic farming. Furthermore, EU measures to create trademarks are not applied in the valley, but there are some provincial laws to encourage typical production methods through public associations. A community initiative LEADER II project has been proposed.

3.3.4 Conclusions and Recommendations

The basic information for recommendations and strategies has been gathered from oral interviews with key personnel from the local NGOs, the local administration, agricultural departments, researchers, farmers and other people chosen at random.

In general, recommendations for this study area put the emphasis on the inverse situation in respect to the geographic and territorial dynamics, whereby the lower part of a valley is less favoured than the upper part. Because of this distinction, the lower parts of the valley should develop primarily on the basis of productive activities. In comparison with the more advanced and dynamic, locations in the upper mountainous part of the Avisio basin, the lower part of the valley even displays characteristics associated with marginality and isolation.

Some general indications can be drawn from the previous considerations and the following themes, mutually related, can be considered to define purposes and strategies that would permit sustainable development in the mountain area:

(i) Quality production considering environmental criteria, trade marks, agri-tourism and direct marketing of typical specialised products are a challenge. In the study area there would be good opportunity for the development of quality production, e.g. berries and the specialisation of vine cultivation.

(ii) The conservation, improvement and protection of landscape through agricultural and forestry activities and the recovery of the worked-out porphyry quarries is to be encouraged.

(iii) Sustainable and environmentally sound tourist development could provide and maintain rural structures, foster collaboration between local people and preserve landscape and natural resources.

(iv) New jobs in different economic sectors within the region and in the whereabouts should be created by regional development programmes.

(v) The objectives of agriculture in mountain areas should be reassessed. Agricultural activities should be considered more integral and dynamic in terms of marketing and technology, over-all socio-economic development, in global relation and taking all components of the natural environment into account.

3.3.4.1 Impacts of the porphyry quarries

People recognise that the porphyry quarries are the primary cause of environmental and social blight. Nevertheless, they recognise that these quarries are very important for the benefit of the community of the Val di Cembra, providing the main source of income. They are convinced that the excavations can be reclaimed and their environmental impact limited. Nonetheless, the quarry owners generally do not respond to such concerns. A revival of porphyry quarrying during recent years can been observed. This is considered as an important economic point of interest.

The recovery of the worked out quarries, the consequent consolidation of the slopes, reforestation and improvement of the landscape is considered of great importance. But people complain that in many cases this work has not been well executed. There should be investment incentives to restore open excavations. This could also provide additional jobs for the local people.

3.3.4.2 Damming and river regulation

Further environmental concerns arise from the building of dams and the shortage of water. Attitudes towards the construction of big dams vary. While for some it represents another cause of environmental problems, others consider it a solution to the periodic drought and even an architectural attraction. However, dam construction projects are changing a relatively pristine area of the valley and affecting the local climate because of the formation of fogs and the modification of the specific conditions for cultivation.

3.3.4.3 Regional development

The local people have different attitudes towards the principal goals of regional development of their area. Some complain about the marginality of the valley in respect to the condition of agriculture, tourist facilities and services, especially when compared with the neighbouring territories, while others think that the valley should try to sustain a low level of self-sufficiency and refrain from over-intensive development programmes.

In addition, some think the region is not marginal at all, even as far as tourism is concerned, because there are plenty initiatives for rambling and agri-tourism. This opinion is supported by the fact that many abandoned houses within the valley have been rented and renovated. Another argument is that the Val di Cembra is quite close to the big industrial conurbation, so it is likely that many people from the cities will move to the villages to live or to spend their leisure

time and holidays. The phenomenon of daily or weekly commuting is widespread.

On the other hand, the study area is perceived as marginal because agriculture has no prospect of improvement with regard to the natural restrictions or the potential cultivation methods. Tourism attraction is too weak compared to neighbouring regions, so tourists prefer to cross the valley and do not stay. Generally, tourism in the Val di Cembra focuses on middle-aged people who are fond of nature. The peak periods for tourism are spring and autumn and the main attraction is walking the forest paths. Up to now hiking on high mountain tracks has been of only limited significance.

There is little awareness of European political and economic measures concerning agriculture in mountainous areas. Some argue that mountain agriculture does not deserve financial aid but think, however, that this sector should be strengthened by the creation of part-time activities. Others believe that agricultural cultivation has to be maintained by support measures to sustain the landscape and environment. In fact, a few farmers of permanent property do still have the prospect of sufficient agricultural income, but the majority regard their farms as an hobby. People should probably be more aware of the benefits from co-operatives and associations.

Concerns about marginality are usually expressed in relation to the resources of the neighbouring territories e.g. competition in agriculture, tourism, natural landscape, education, roads and infrastructure. Marginality can be overcome by involving people (local or otherwise) in the cultivation of typical agricultural products or by tourist development. In this way it might be possible to create new local jobs and to reinforce the local economy. Another proposal is to improve the links between territories, the road connections in particular. This might help the tourist sector in the Val di Cembra.

The main orientation for improving policies is on the promotion of the collaboration among local communities, international co-operation, development of information systems for European mountains, sustainable transport and energy networks, the role of environmentally sensitive and protected areas, cultural landscape, biodiversity and human activities.

3.3.4.4 Agricultural diversification

The position of the agricultural sector should be improved by strengthening links between (agri-) tourism, environment, protection of natural landscape and heritage, preservation of the social structure and cultural tradition. Agriculture in marginal mountain areas can only survive if the regional and rural policy

measures are entirely accepted by the local people, including the non-farming population.

In this way, agriculture plays a multiple role and retains a constituent part of the development programmes. In fact, the functions of mountain agriculture are not limited merely to production and economic purposes but extend to environmental, social and cultural categories, like settlement, tradition and nature conservation.

Agriculture is central to environment development, confirming the primary role of agriculture in mountainous areas, and to the use of renewable and non-renewable resources. All these factors are interrelated and their realisation facilitates the efficacy of others. Thus steps have to be taken against land abandonment, which is a main threat to the natural environment, cultural, socio-economic traditions and all aspects which can coexist within successful development. It has to be underlined that one precondition is an efficient communication system and the opportunity to intervene and influence the direction of policy measures.

The balance between environment and agriculture is quite precarious and easily disturbed with regard to the difficult climatic and terrestrial conditions as well as socio-economic, demographic and cultural structure. At the moment, the balance is still being maintained by farming activity. Consequently, there would be a number of drastic impacts, if farmers were to withdraw: The stability of the terrain in particular of steep slopes; biodiversity and landscape; the equilibrium of the natural circulation systems and the stability of biological chains would be seriously endangered.

Regional and agricultural policy measures have to take account of these considerations because dynamic structural changes both disorient the farmers and raise production costs. Farmers have to rise to the new requirements in order to guarantee their survival and competitiveness. In realising these strategies, attention will have to be paid to psychological aspects. Time and patience is indispensable to change the management and mentality of the people, who also have to be gradually educated and sensitised. Communication between the individual players has to be improved, as does collaboration and information exchange. A global feeling for the need to regenerate and improve the environment should be encouraged.

The following aspects are important to the fulfilment of these strategies in the study area:

(i) Regulation 2078/92 (e.g. alpine pasturing premium, mowing of slopes and mountain meadows)

(ii) Regulation 2080/92 (increasing forested area, possibility of improving the worked-out quarries, timber marketing, nature protection)

(iii) measures to promote and strengthen the role of agricultural co-operation and the structures for land improvement

(iv) the possibility of incorporating some strategies in local legislation, to safeguard the importance of mountain agriculture as a tool for land conservation and the promotion of local products

(v) to stabilise farm incomes by direct payments

(vi) training and education of farmers to better cope with the new situation of agriculture in mountain areas

It is necessary to favour initiatives allowing agriculture to play a central role in the economy of the study area. For this it seems to be necessary to ensure sufficient income for the farmers appropriate to sustaining their livelihood in the mountain areas, further to support young people who would like to take up agricultural activities, to avoid the land abandonment process and ageing of the rural population, and to support part-time farming and agricultural diversification.

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3.4 Appenzell - Ausserrhoden – Switzerland

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The typical natural landscape, the specific and characteristic architecture of the buildings and villages and the particularities of the social and cultural life of the people provide the Appenzell – Ausserrhoden Canton with its strong identity and individuality. Moreover, the great number of different habitats and landscapes and a somewhat intensive animal husbandry in the pre-alpine region are the most important characteristics of this area.

There are no real agri-environmental problems characteristic of, or unique to this region. The Appenzell – Ausserrhoden Canton displays a strong identity and possesses both many assets and problems typical for mountain regions. So, in considering the environmental situation, it seems appropriate to replace the term "problems" by "pressures". In addition, there are many interfaces between environment and agriculture, such as industry, tourism etc. Many conflicts derive from this complex network, and the human aspect should not be forgotten in regard to this.

3.4.1 Introduction

A. Geography

This case study area comprises the political administration unit of the Appenzell-Ausserrhoden Canton, which is situated in the north-eastern part of Switzerland. The total area is 242.86 square km, with altitudes ranging from 450 m to 2,502 m (highest summit Mount Säntis). The temperate and very humid climate of the region offers ideal conditions for field forage growing, dairy farming and cattle breeding.

On the whole, traffic and transport do not have a significant impact on the environmental situation in the region. The area is traversed neither by major train links nor by trunk roads. The city of Saint Gallen (population 135,000), which is the nearest large town, just 5 km outside the region, is responsible for a certain amount of air pollution.

As regards agricultural land use systems, the whole utilised agricultural area (UAA) is 14,112 ha, or 58.1% of the total region. 38,1% of the total area is arable land and another 11.1% pasture, 7.3% alpine pasture, 1.5% orchards and 0.1% high alpine meadows. 33.8% of the total area, is covered by forests and woodland, 6.9% of the area is sealed by buildings, roads and infrastructure facilities and 1.2% has to be considered as unproductive, barren land.

Slopes up to a 40% gradient are generally used for agricultural cultivation. In the case study are there are about 200 ha of slopes steeper than 40% i.e. unsuited to agricultural land use.

The principal natural assets of the study area besides landscape, agriculture and environment are important reservoirs of potable water and thermal springs.

B. Socio-economic characteristics

Demographics

The total population of the case-study region is 54,500 (1994). The population density of 224 inhabitants per square km is extremely high, even higher than the national average for Switzerland (171 inhabitants per square km). Despite considerable growth in population between 1980 and 1994, from 47,600 to 54,500 (+14.5%), emigration from the region is the dominant trend, and thus the average age of the inhabitants increasing.

Economy

The economically active population in the region is 48.9% of the total. The principal sources of income for the local population derive from electronic and electrochemical industries, construction, tourism, social services, banking and insurance companies. About 51.8% of all employees in the study area work in the tertiary economic sector (services). Most construction industry jobs are seasonal. In addition, there are several important chemical, textile, rubber and agri-product processing industries and factories in the surrounding regions of this study area.

The unemployment rate in the Appenzell - Ausserrhoden Canton is extremely low (1995: only 1.9%). This is much lower than the national average for Switzerland (1995: 4.2%). However many economic problems are caused by a mono-specific industrial structure. The actual structural crisis of the textile industry, in particular, is responsible for a vicious circle of mutually exacerbating negative impacts. The crisis is causing job losses and consequently lower tax revenue, reduced availability of funding for public authorities, lower competitiveness with regard to neighbouring areas, infrastructure and transport problems, fewer

jobs for the local population, emigration from the region and, finally, the impossibility creating or regenerating large-scale industry.

C. Agriculture

In 1990, about 8.5% of all working people were employed in agriculture. There were 1,246 agricultural holdings. Of all farm managers, 30 were aged under 25, 380 between 26 and 40, 436 between 41 and 55, 259 between 56 and 65 and 141 over 65. Part-time farming or pluriactivity is less important than in other regions of Switzerland. About 65% of all farmers in the study area are full-time farmers (compared to 58% in Switzerland as a whole). The average size of full-time farms is 13.4 ha, part-time farms 10.3 ha. About 75% of all holdings raise cattle, and 38% raise pigs.

The predominant agricultural cultivation systems are dairy farming, particularly the production of a famous local cheese (fromage d'Appenzell – Appenzeller Käse) and cattle breeding. Since 1990, the number of agricultural holdings has declined by 6,4%. Many farmers have turned to direct marketing and organic farming to tackle the economic problems and increase farm income. The current structural problems in agriculture may lead to land abandonment and to a transformation of the landscape unless there are appropriate measures to encourage and maintain cultivation.

Animal husbandry is comparatively intensive. The mean livestock density in the region (1.7 LU/ha) is above the national average (1.35 LU/ha). However, there has been a tendency towards extensification in recent years as a result of the agri-environmental measures and regulations to reduce livestock numbers and herd size (art.31 lit. b of Swiss Farm Act), the growing importance of organic farming and integrated production systems. In general, management of alpine pastures and meadows is extensive. Transhumance, i.e. the seasonal migration of livestock (especially cattle and dairy cows), has a long tradition and is still vigorous in this region. Collective agricultural operation practices are quite common. Many alpine pastures and meadows are managed by a collective of farmers or land owners. The majority of agricultural holdings in the region also possess a considerable area of forests and woodlands.

D. State of the environment

As mentioned, the population density is very high. A comparatively large part of this study area is thus built-up area, i.e. used for residential, industrial and infrastructure purposes. Currently, there is the intention and some effort being made to reduce the size of the built-up area. In any case, the state of the environment and the natural landscape can be considered as fairly favourable. There is a great variety of different very precious habitats and natural landscapes with a high degree of biodiversity. Almost every site suitable for agricultural production is in use (predominantly in a traditional way), so there is practically no land abandonment.

The official classification of the air pollution in the region varies between very low and considerably high, depending on the specific geographic conditions and the proximity to the main generator, the city of Saint Gallen. Normally, the critical NO_2 load will be surpassed on 85 days a year, affecting 25% of the population in the whole canton. An anticipated annual reduction of 4% of the NO_2 load seems to be insufficient to realise the targets laid down in environmental legislation. The main sources responsible for air pollution are stratospheric ozone, volatile organic compounds (VOC) and NO_x compounds.

Water-tower protection is an important feature in the region. Appenzell – Ausserrhoden possesses a large freshwater catchment area, essential for the water supply not only to this canton. The official classification of the water quality varies between excellent and moderate. All main residential areas in the region are supplied by public water pipes and linked to sewage treatment plants, so nitrogen and phosphorus eutrophication is only an occasional and site-specific problem.

To some extent, acidification, nitrate leaching and vegetation damage (NH_3) caused by improper use or over-application of manure and fertilisers are negative environmental impacts threatening the soil texture and quality.

Fortunately, forest damage and degradation is almost negligible in the region. Less than 3% of all pines and between 7% and 28% of all firs suffer from degradation. The annual natural regrowth rate is 2%. Further, it can be said that forest fires are not an important issue for this region. Forests are an integral component of the natural and cultural landscapes of the region and forests play an important role not only in an economic and productive sense but also for environmental protection and various social functions.

Summing up, pollution and environmental problems are an evident though spatially restricted feature in the region. Over-intensive animal husbandry is certainly the most important concern. Several policy measures have recently been

developed to combat this harmful situation. The principal causes for environmental degradation can be listed as follows.

(i) local over-exploitation of pastures

(ii) eutrophication caused by pig raisers, who purchase fodder and work almost independently from their own agricultural area

(iii) spatially improper application of pesticides and fertilisers

(iv) a too high livestock density (LU/ha) in connection with forage purchasing (maize, pig fodder)

(v) NO_x and VOC caused by traffic and transport (generating 71% NO_x/22% VOC of the total load), industry (19%/58%), household (10%/20%)

(vi) stratospheric ozone

(vii) increase in the individual car traffic (6% between 1980 and 1985)

(viii) natural hazards, e.g. rock falls and landslides

(ix) soil acidification

E. Policy measures

The principal objectives of the agri-environmental policy measures relevant for this study area are extensification of the agricultural production systems, landscape conservation and the protection of precious and vulnerable habitats.

The Swiss Federal Law on Investment in Mountain Areas provides a political framework for a number of different and very specific measures. The single measures applied in this study area concern the protection of water towers, air quality, the utilisation of biogas, fertiliser application, livestock density reduction, building of environmental awareness and ecological networks, and hunting.

Although Switzerland is not a member of the European Union, most agri-environmental policy measures applied in the country are similar to those in the EU.

a. Agricultural, forestry and rural development measures:
There are national measures similar to the EU regulations and programmes
R 2078/92 (agri-environmental measures);
R 2080/92 (forestry measures),
Objective 5a and 5b programmes applied in Appenzell - Ausserrhoden

b. Environmental measures:
   There is legislation limiting livestock density (LU/ha) in order to protect water towers from pollution and eutrophication.

c. Community initiatives:
   The Appenzell-Ausserrhoden Canton participates in an EU transboundary INTERREG programme

3.4.2 Analysis of the pressures and impacts on environment

The Appenzell - Ausserrhoden Canton is not specifically affected by specific regional agri-environmental problems. With a strong identity, this mountain-region canton benefits from many local assets. So we may also see the following pressures and impacts also in a positive sense. Mountain agriculture is in close contact with other economic sectors like tourism and industry. This complex interaction can cause many conflicts and we also have to take human aspects into account in this respect. This is why it seems very problematic to press a region into a rigid pattern. The most promising way of tackling environmental problems and pressures is to find a global approach but to act at local level.

Principal agricultural pressures and impacts

A.1. Structural changes in agriculture

The decrease in the number of agricultural holdings is the most important agricultural pressure and impact on the environment. The number of agricultural holdings in the Appenzell – Ausserrhoden Canton has declined by 6.4% between 1985 and 1990 (9.6% in Switzerland as a whole). This process is accelerating. Between 1993 and 1996 there was a considerable loss of a further 8.4% of farms in this study area.

There are various reasons for this development. Many holdings are too small and unprofitable. Average farm size is only 14.2 ha. The limitations of natural and topographic conditions do not permit economic improvements. At the same time, we also have to take the psychological factors into account. Many farmers feel reluctant to co-operate or to adopt new improvement measures. Furthermore, there has been a substantial cut in national subsidies for the agricultural market, which has led to a decline in product prices, particularly for meat, with a resulting fall in farm revenue. Finally, there is an imbalance in supply and consumer demand for agricultural produce. The supply is both too great and not suited to existing demand.

The recently implemented agricultural policy measures are proving – at least to a certain extent – inconsistent and unsettling for farmers, who for their part have been used to the convenience of a stable situation with regard to the public subsidies and payments. For the farmers, numerous recently established restrictions and limitations offend their sense of pride as independent farmers and restrict their entrepreneurial activities. Some restrictions, particularly those concerning water-tower protection and livestock farming, place more severe burdens on small and medium farmers than on big holdings. In addition, the location of the agricultural property and the high proportion of tenanted land (52.2% of all land) aggravates the decision-making process and increases the individual risks for the farmers, especially as there are no specific financial aids for farm-improvement measures in this context.

The accession of Switzerland to the GATT agreement led to a significant reduction in agricultural product prices, while the domestic factor input costs remained at nearly the same level. Hence the competitiveness of the Swiss farmers as a whole (as well as the farmers of the study region) has worsened considerably.

The main negative environmental impacts result from an increased use of machinery, the absence of co-operation, e.g. machinery rings or machinery sharing schemes, and on the other hand from road construction, which enables access to scattered farmsteads and facilitates commuting. The process of the continuing loss of agricultural labour is likely to endanger the traditional sheep-herding on the mountain pastures. The use of heavy machinery can lead to soil compaction, land consolidation and farm improvement measures bring about a drastic decline of biodiversity and the loss of shrubs. It is possible that land abandonment and the ceasing of agricultural cultivation could change the typical natural and cultural landscape and produce natural hazards like landslides and erosion. The region would thus probably also become less attractive for tourism.

A.2. Environmental problems in connection with manure application

Excessive manure application on favourable sites, particularly in the lower parts of the valleys can cause a serious environmental danger. As already mentioned, livestock density is rather high in the study area (1.6 MLU/ha, compared with 1.35 MLU/ha in Switzerland as a whole – MLU – Manure Livestock Unit, which is a Swiss measure standard defining the relation between livestock density and manure generation). The high incidence of bogs and fens in the region leads to more intensive exploitation of the good land.

Nowadays many farmers apply liquid slurry instead of solid manure. The main reason is that slurry is more manageable and requires less labour, though this

method can have harmful effects on the vegetation. Unfortunately farmers used to spread slurry on every possible site, even in higher altitudes. Despite slurry spreading, a positive change in environmental awareness is noticeable, as until 1987 the legal limit for livestock density was 4 MLU/ha.

Intensive forage production for cattle breeding and dairy farming, particularly on southern slopes, has a long tradition owing to the specific topographic and climatic situation. The purchase of supplementary feed concentrate and fodder is also quite common, though sometimes illegal. Slurry pits are sometimes too small, so there is a need for frequent spreading, even in unsuitable weather conditions. Many part-time farms and hobby farms, in particular, tend to show inadequacies in farm management and are inclined to over-application of manure.

Many legal regulations are inadequate because they draw on rigid and inflexible data (e.g., the vegetative rest is fixed as being between 15 November and 15 February) and do not take the specific natural circumstances into account.

Harmful environmental consequences caused by improper or excessive manure application can be listed as follows.

(i) water pollution with organic matter, particularly eutrophication; about half of the total nitrate and phosphorus load in flowing water after rainfall stems from agriculture

(ii) frequent imbalance of soil nutrients; the exact cause-effect relationship is unknown

(iii) nutrient-rich meadows with thin non-lignified roots are vulnerable to trampling and erosion

(iv) soil acidification caused by air-born ammonia

(v) many side-effects like fish kill, decline of flora biodiversity and wildlife habitat destruction, long-term yield reduction etc.

The construction of access roads facilitates manure application on high mountain meadows and pastures, which can cause vegetation changes and environmentally harmful effects.

Principal non-agricultural impacts

B.1. Air pollution

Transport movement and traffic volume is increasing at about 4% per year, mainly due to commuting and day-trippers. About 71% of the total atmospheric NO_x deposition is generated by traffic and transport, 19% by industrial and 10% by domestic sources.

Industry and trade generate 57% of all VOC emission, 22% stems from traffic and transport and finally 20% from domestic sources. Agriculture is the principal generator of ammonia and methane. Other sources of these polluting gases are sewage production, waste dumps and gas pipes.

The main environmental impacts of air pollution are as follows.

(i) generation of harmful stratospheric ozone from the precursor substances NO_x and VOC

(ii) soil acidification and disruption of the soil equilibrium

(iii) aggravation of the greenhouse effect

(iv) forest degradation

(v) mucous membrane irritation and respiratory tract diseases

(vi) side-effects like degeneration of the vegetation cover, reduction of soil fertility, damage to human health and the protection function of forests

The impacts of air pollution on the environment are generally less evident in the short term than those of other pollutants. In most cases we have to consider the simultaneous interrelation of various air emission factors at the same time. So it seems to be somewhat difficult to implement effective air pollution abatement measures.

3.4.3 Instruments and Measures

A. Specific Agriculture related measures

Federal law on agricultural land ownership

This law aims

(i) to support agricultural land ownership; family farms in particular, are considered to be the basis of a sustainable agricultural structure and cultivation

(ii) to improve the position of farmers and tenants when purchasing agricultural land or performing agricultural activities

(iii) to combat excessive prices for agricultural land

This federal law, passed in 1992, plays an important role in consolidating agricultural land property, since about 50% of the agricultural area in the region is tenanted. Art. 1 lit. b of the law defines the objectives, which are to facilitate the purchase of agricultural land and not just to support the position of the proprietors but to empower the tenants, since every tenant possesses a so-called priority purchase right. Art. 1 lit a focuses on a special support of family farming and thus aims to encourage and safeguard the livings of numerous young farming families.

At the moment it seems rather difficult to assess the actual effect of how far agricultural activities can be sustained by the consolidation of land property. With regard to the situation of the tenants, there should be enhanced support for farm improvement measures, which is still a major problem.

Land improvement law

The Appenzell – Ausserrhoden Canton provides financial support for agricultural land-improvement measures. Farmers can obtain aid for voluntary land consolidation to create viable agricultural enterprises, to improve the agricultural structure, exchange plots and consolidate land boundaries. These contributions are eligible without regard to allowances paid by the federal government.

Agricultural policy 2002

"Agricultural policy 2002" is the title of the second stage of the agricultural reform currently being carried out by the federal government. The seventh report on the situation of Swiss agriculture declared that agricultural reform measures had to be carried out in stages over a longer period. The first stage of this programme started at the end of 1992, when the two new articles 31a and 31b were

introduced into the Swiss Farm Act. The new direct payment schemes permit a reduction in the total amount of allowances paid year by year, while nevertheless securing the viability of the agricultural holdings. The second stage of "Agricultural policy 2002" includes the entire food sector. The basic objective is to improve competitiveness and to develop successive concepts for agricultural sustainability.

The programme shows the federal government's clear intention of supporting agricultural structural changes and creating bigger and more competitive agricultural holdings. But at the same time this will pose a serious threat to the comparatively small full-time farms (average size 1996: 14.2 ha UAA) in the Appenzell – Ausserrhoden Canton. The (sometimes compulsory) farm consolidations are particularly hard to understand for those who are proud of their position, at least their view, as independent farmers.

As a matter of fact the average daily farm income in Appenzell - Ausserrhoden has declined from 180 SF (1989) to 107 SF (1996), which helps explain why farmers are seriously worried about their futures.

Milk quotas

Milk quotas represent an important agricultural policy instrument to regulate the domestic supply. The quota scheme restricts the quantity of milk coming onto the market. The quotas are individually distributed by farm, and secure a guaranteed price up to the maximum level of the quota. If farmers deliver surplus milk, the price will be reduced accordingly.

Milk is one of the most important commodities produced by farmers in mountain regions and for farmers in the Appenzell - Ausserrhoden Canton too. Since direct payments are limited, there is unanimous support for maintaining dairy farming and hence supplementing the income of the agricultural holdings. Milk quotas are an appropriate tool to balance supply and demand and protect the farmers from the vagaries of market forces. Without milk quotas to safeguard farmers' income, substantial price reductions would presumably have severe negative structural and social impacts. About 50% of dairy farming is situated in mountainous areas, so this measure is also appropriate to sustaining the productive capacity of disadvantaged regions.

AS milk quotas restrict production quantities and entrepreneurial freedom of decision, they are in contradiction with the objectives of the "Agricultural policy 2002" concept. Today an agricultural holding can only increase its quota by expanding the UAA. This system is too inflexible and hinders technological progress and structural change.

Land-improvement payments, investment loans and support for housing renovation

These various measures are carried out by the cantons under legislation passed by the federal government. Land improvement payments, investment loans and support for housing renovation have had a very positive impact on the farmers in the study area, because they facilitate agricultural activities, reduce costs and improve the income situation, which seems to be crucial in enabling farmers and their families to enjoy the benefits of the present-day society. In 1996, about SF 1.1m, or 0.38% of the total budget, was spent on these measures in the Appenzell – Ausserrhoden Canton.

Compensatory allowances *(according to art. 31a Swiss Farm Act)*

The basic feature of compensatory allowances is to constitute a separation between price and income policies. This payment is granted for public services performed by the farmers and aims to supplement to the agricultural income achieved from the market.

Compensatory allowances are eligible to all farms fulfilling a number preconditions, such as a minimum 3 ha UAA farm size, environmental compensation on at least 5% of the whole utilised agricultural land (valid since 1997), a maximum number of non-family workers, maximum income and age limit for the farm manager. In addition, farmers have to comply with various regulations, particularly the Swiss water protection law, nature, homeland, landscape and animal protection laws etc. Article 14 of this law has particularly important impacts on manure management issues. As a consequence, it has been possible to reduce livestock density and adapt slurry pit capacity to the legislation, i.e. requiring a storage capacity of at least 5 to 6 months.

Table 1: Distribution in livestock density LU/ha

Year	Pre-alpine upland regions	Mountain zone I	Mountain zone II	LU/ha
1993	1.80	1.61	1.45	1.50
1994	1.71	1.56	1.43	1.57
1995	1.68	1.56	1.44	1.56
1996	1.60	1.54	1.42	1.52

The compensatory allowances consist of two different parts. Firstly an amount granted to every farm holding (as a guaranteed standard sum graduated only according to the size of the holdings between 3 ha and 9 ha) and a second amount in relation to the actual number of hectares, which seems to be the more important part with regard to the total amount of the payment. The compensatory allowances are due to promote a sustainable cultivation of agricultural land and guarantee the survival of many small and medium scaled family farms. On the other hand, they counteract the structural development of the holdings. The special amount granted for every holding supports the creation of "phantom farms" and, seen critically, many farmers prefer to optimise their subsidies rather than the cost structure of their farms. A minimum requirement of 3 ha farm size is intended to exclude hobby farmers from compensatory allowances.

The obligation of environmental compensation areas to cultivate renewable energy sources on at least 5% of the whole utilised agricultural land has had a quite positive impact on the integration of environmental concerns in mountain agriculture. On the other hand, many farmers in the study area have a negative attitude towards dependence on governmental support measures. So many of them feel uneasy about the future of their holdings even though farm succession is not a problematic issue in the region.

The high level of compensatory allowances have had a significant positive impact on agricultural income and play an important role in the maintenance of agricultural activities. Together with the environmentally sound direct payments, they may mitigate the serious manure management problems in the Appenzell – Ausserrhoden Canton.

The Swiss Federal Council has agreed to grant additional payments under Art. 31a of the Swiss Farm Act, since the agricultural income situation has worsened unexpectedly. These additional payments are also available to those farmers (about 40% of the total) who do not take part in an agri-environmental programme. These payments are limited to a period of three years (1996-1998).

It has to be noted that the separation between price and income policy has another positive influence on mountainous and upland regions because this situation is better suited to compensating for natural disadvantages. In 1996 the Appenzell – Ausserrhoden Canton spent SF 12.1m in compensatory allowances (1995: SF 10.6m), about 4.14% of the canton’s total budget.

The accession of Switzerland to the GATT agreements and consequently the promotion of free trade and the substantial decrease of commodity prices has also affected agriculture in Appenzell – Ausserrhoden. The implementation of direct payments could not wholly compensate for the loss of income, which produced widespread uncertainty among the farmers.

Direct payments to promote environmentally sound practices

The main goal of this agri-environmental legislation is to sustain biodiversity, to reduce the nitrate and phosphorus load and especially to promote appropriate animal husbandry methods. This kind of direct payment was implemented to support environmentally sound forms of cultivation, e.g. integrated production, organic farming, animal-friendly husbandry, controlled open stable systems and environmental compensation areas (comprising, for example, less intensively, more extensively utilised grassland, litter meadows, and traditional standard orchards). The payments are intended to compensate for extra costs and yield reduction connected with these cultivation methods.

Table 2: Integrated Production (IP), Organic Farming and Controlled Open Stable Systems (COSS)

Year	IP-holdings (in % of all art. 31a holdings*)	Organic Farming-holdings (in % of all art. 31a holdings)	COSS-holdings (in % of all art. 31a holdings)
1993	3.0	2.6	8.4
1994	5.9	4.9	13.8
1995	10.1	6.4	17.5
1996	41.5	10.3	27.8

* art. 31a holdings obtain contributions according to art. 31a Swiss Farm Bill

This table indicates the distribution of direct payments for environmentally sound farm management in the Appenzell – Ausserrhoden Canton. In 1995, about 2.9% of all Swiss agricultural holdings received direct payments for organic farming. This figure was more than three times higher in the study area (6.4%), 29.1% were IP-holdings (10.1% in Appenzell – Ausserrhoden) and 14.9% COSS holdings (17.5%). About 73% of all agricultural holdings in Appenzell – Ausserrhoden participate in one or other of these direct payment programmes. The canton has established an advisory service for farmers who intend to change their production methods.

Farmers who participate in this agri-environmental programme are obliged to operate a balanced nutrient cycle. In most cases they will have to reduce their livestock density and change their feeding systems, i.e. less (phosphate- and nitrate-rich) feed concentrate, more basic ration and forage. In assessing the results of these policy measures we can state that it has been possible to achieve a substantial reduction of the manure problem. We can estimate that the manure

problem will be resolved as soon as all farmers are participating in this programme and the capacity of the slurry pits is sufficient.

This policy measure also counteracts land abandonment. Farmers have the opportunity to increase their income by receiving direct payments and by marketing high-quality label products (e.g. "Appenzellerland rundum gesund"). An IP-holding can already achieve an higher (direct-cost-free) profit than a traditional farm holding. In the near future, organic farming will presumably be the most profitable form of farm management, if support further increases and product prices decline.

Another impact of direct payments for environmentally sound farming practices is that, although the number of agricultural holdings is declining (-8.4%), there is little threat of high incidence of fallow land, because extensive production methods call for more farm land. At the same time, this coincides with the objectives of "Agricultural policy 2002" (see above), namely to promote structural changes in agriculture. On the other hand, the use of machinery can be reduced, with a beneficial effect against soil compaction.

Loose housing stables, which are particularly supported in the "animal-friendly husbandry and controlled open stable systems" programme cause increased ammonia generation. There are the same requirements as for the compensatory allowances according to art. 31a of the Swiss Farm Act, except for the income and age limits.

The overall expenses for this agri-environmental measure in the Appenzell – Ausserrhoden Canton amount to SF 5.2m (1996), which is about 1.78% of the whole budget of the canton. This is a substantial increase compared with 1995 (SF 1.2m).

a. Environmental compensation

There are several different programmes in this context, but only a few of them are relevant for the study area.

(i) The application of fertilisers and pesticides is prohibited on extensively utilised grassland, litter meadows, hedges and shrubs. In addition, there are mowing restrictions on extensively utilised grassland and litter meadows depending on the different sites and zones.

(ii) The application of pesticides is prohibited on less intensively utilised meadows. The only nitrate application allowed is manure produced on the farmstead itself.

(iii) The payment for traditional standard orchards is granted only on between 20 and 300 trees per farm holding. Trunk height must be at least 1.2m for stone fruit trees and 1.6m for all other fruit trees.

The nature and landscape protection service, which is part of the environmental protection office of the Appenzell – Ausserrhoden Canton, holds a register of all environmental compensation areas (map scale 1:5.000) contracted with farmers for a six-years period with the farmers. The agricultural secretariat of the canton is responsible for these areas. The contributions amount to between SF 4.50 and SF 7 per *are* (100 square meter) depending on the special programme and SF 10 per standard fruit tree.

b. Integrated Production (IP)

The Integrated Production (IP) scheme demands adherence to all restrictions laid down in the various national water, nature and animal protection laws. The nitrate and phosphorus budget has to be balanced and the nutrient loading calculated. Environmental compensation has to be applied on at least 5% of all utilised agricultural land. Whenever a farmer signs an "integrated production contract" at the Board of Agriculture of the canton or at the farmers' association he is obliged to participate in a special council of all farmers taking part in this programme. Finally, every farmer has to keep a log of his activities. Integrated Production (IP) subsidies are granted for a whole production branch and not for single crops.

c. Organic farming

The beneficiaries have to comply with all regulations laid down in the various national water, nature and animal protection laws. The application of chemical synthetic pesticides and nitrate fertilisers and easily soluble mineral fertilisers is prohibited. In addition, the same requirements apply as for Integrated Production (IP).

d. Animal Friendly Husbandry (AFH) and Controlled Open Stable Systems (COSS)

The federal government grants subsidies to farmers using Animal Friendly Husbandry (AFH) and Controlled Open Stable Systems (COSS). All livestock has to be reared in compliance with the regulations of the animal protection law.

Compensatory allowances for difficult production conditions

These allowances are intended to compensate for natural disadvantages causing increased production costs and to improve the farmers' income in difficult climatic and topographic conditions. The payments are granted to livestock farmers in mountainous areas and as a contribution for the maintenance of cultivation.

a. Contributions to livestock farmers in mountainous areas and pre-alpine upland regions

This kind of direct payment is the oldest and most important allowance supporting mountain regions. The payments are intended to compensate for the difficult production conditions and excessive production costs faced by the livestock farmers in mountain areas and pre-alpine upland regions. The allowances are granted up to maximum 15 LU per holding, their main goal being to improve farmers' income and reduce the gap between mountain farmers and farmers in the more favourable lowland areas. All regulations in the Swiss water protection and animal protection law have to be adhered to and the animals must be fed a sufficient quantity of roughage.

b. Contributions for the cultivation of slopes and summer pasturing

The law on payments to agricultural holdings with natural disadvantages to support the cultivation of slopes and summer pasturing comprises three measures.

(i) acreage-linked payments, supporting the cultivation of agricultural areas (at least 3 ha UAA) with natural disadvantages (slopes)

(ii) payments to promote summer pasturing

(iii) toleration of fallow-land cultivation (toleration obligation)

The payments to livestock farmers in mountainous areas and pre-alpine hilly regions and the payments for the cultivation of slopes and summer pasturing are the two most important direct payments for mountain farmers. Since farmers have to comply with the regulations of water-tower protection to receive these allowances, there is also a positive impact on manure and fertiliser application. At the same time, the precondition of an adequate roughage base cuts the amount of fodder that has to be bought.

The payments to livestock farmers in mountainous areas and pre-alpine hilly regions allowances amounted to SF 6.5m (1996), about 2.23% of Appenzell – Ausserrhoden Canton's total budget, and the payments for the cultivation of slopes and summer pasturing were SF 3.4m (1996), 1.16% of the budget.

Production-guiding direct payments

Production-guiding direct payments are particularly implemented to direct production and to guarantee the disposal of farm produce. This group of measures, which are also relevant for the study area, includes, for example, payments granted to dairy farmers with no milk quotas, premiums supporting the cultivation of coarse grain and grain legumes, payments promoting livestock export, financial compensation for the non-utilisation of silage fodder, and allowances for cheese milk. Most of these are quantitative measures, which preserve agricultural structures rather than promote structural change. Many of them are thus limited for a certain period or will be replaced.

Payments to dairy farmers with no milk quota

This measure was implemented by the federal government in 1970 to support the utilisation of unskimmed milk for the rearing and fattening of calves and suckling cows with the intention of extensifying grassland and relieving the milk market. This contribution now aims to compensate for the disadvantages of dairy farmers without milk quota and to realise income parity in considering the reduced labour demand. This measure is extremely important for farm holdings in mountainous areas and remote regions. Furthermore, this kind of payment is an appropriate tool to sustain the cultivation of poor soils and remote areas.

All kinds of production steering measures have a significantly positive impact on the maintenance of agricultural cultivation. In particular, the payments to dairy farmers with no milk quota and the premiums for renewable resources help combat against alternative products prejudice in Appenzell – Ausserrhoden. Payments to dairy farmers with no milk quota promote an extensive utilisation of grassland, so problems with manure and fertiliser over-application are likely to be reduced. In 1996 the payments to dairy farmers with no milk quota were SF 2.3m, or 0.78% of the canton’s budget. By comparison, the total for premiums supporting the cultivation of coarse grain was just SF 6,000, or 0.002% of the budget.

Direct social-security payments

These direct payments comprise different allowances for children and households and rely on the federal social insurance legislation. The principal goal is to support small-scale, low income farmers and farm labourers.

B. Nature conservation and environmental policy measures with important agriculture-related significance

Water protection law

In 1971, when water pollution had become priority environmental concern for public opinion, a special law to protect water towers was introduced. This Swiss water protection law contains a number of regulations concerning agricultural activities. As early as 1979, a guideline – the "directive on water protection in agriculture" – was published to facilitate a uniform execution of the law in the individual cantons.

The water protection law was then revised and reissued in 1991. Art. 14, the so-called "slurry article", concerns the management of slurry and contains the following points.

(i) Every agricultural holding must undertake efforts towards balanced manure production.

(ii) Farmstead manure must be produced in an environmentally friendly way and used only for agricultural purposes.

(iii) Every holding must have at least three months' manure storage capacity.

(iv) The maximum livestock density is 3 LU/ha. Every farm must hold sufficient utilised agricultural area (irrespective of the type of property ownership, tenancy or leasing). At least half of the farmstead manure must be spread on the farmer's own or tenancy land and must not exceed the limit of 3 MLU/ha manure.

(v) All manure purchase contracts must be written and approved by the canton authorities.

(vi) The authorities of the cantons are free to reduce the allowed MLU/ha if special soil conditions, altitude and topography makes this necessary.

Of course, the regulations of the water protection law are, in addition, a precondition for the direct payments under Art. 31a of the Swiss Farm Act.

Appenzell – Ausserrhoden is the only Swiss canton that clearly lays down a vegetative rest between 15 November and 15 February, when the application of slurry is prohibited. The capacity of the slurry pits must be extended to a minimum storage capacity of 5 to 6 months by 1999 to achieve a balanced nutrient

cycle. Agricultural holdings intending to improve their slurry pits can obtain financial aid from the regional water-tower protection office if they get no, or only insufficient support from other sources. This measure only exists in a few Swiss cantons.
There are specific limits for the maximum allowable livestock density, which is a particularly important feature for the receipt of direct payments.

Table 3: Livestock density limits
(valid since 1.11.1997 and proposals for after the year 2006)

Zone	Livestock density limits (valid since 1.11.1997 in MLU/ha)	Proposals for livestock density limits (after the year 2006 in LU/ha)
Pre-alpine hilly regions	2.5	2.1
Mountain zone I	2.1	1.8
Mountain zone II	1.8	1.4

Farmers who exceed these limits must present their nutrient balance at the water tower protection office, which can force them to reduce their livestock density. Leaflets have been published and distributed to farmers to give baseline information and to show the severe environmental impacts deriving from over-application of manure and fertiliser. If farmers do not comply with the instructions, they either lose their payments or receive a reduced amount. There are similar regulations concerning the slurry pit capacity. Whenever farmers have to spread slurry during the vegetative rest (because of unforeseen events, weather conditions etc.), they are obliged to consult the water tower protection office in advance. This procedure is intended to prevent illegal application and promote co-operation between farmers (i.e. sharing of slurry pits).

The "slurry article" plays an important role in the reduction of manure and fertiliser application. Thus the eutrophication and leaching problem has improved substantially in the region apart from a few cases of inappropriate application. Soil recovery will, in any case, take a long time once there has been over-application.

It is possible to criticise the regulations of this law as being too rigidly linked to data and indexes, and not taking the natural circumstances properly into account. This is why spatial and temporary over-application still occurs, especially in February, when the slurry pits are emptied (probably onto snow cover), while sometimes an application in December would have no harmful effects. In 1996 Appenzell- Ausserrhoden Canton spent SF 300,000 on the improvement of slurry pits (1995, SF 342,000).

Nature protection law

The principal goals of the nature protection law are defined in Article 1. This law aims to protect human beings, animal and plant communities, habitats and soil fertility against damage and nuisance. Cause of damage and nuisance must be dealt with promptly. A number of ordinances drawn up within the framework of the nature protection law relate directly to agriculture.

(i) Air pollution: an ordinance on atmospheric emissions

(ii) Soil protection: Art. 31 of the nature protection law regulates the protection and recovery of multiple soil functions.

(iii) Environmental performance: an environmental impact assessment is obligatory for larger agricultural projects in compliance with a special ordinance.

(iv) Water-tower protection: see above.

(v) Nutrient balance: a balanced nutrient cycle as required for the integrated production (IP) scheme is an important issue for agricultural holdings and nature protection. The introduction of nutrient balance in agriculture should take better account of atmospheric nutrient deposition, water-tower protection, soil contamination etc. Nutrient balances are also important components for an integral nature-protection approach.

Animal welfare law

The animal protection law, was drawn up in 1978, provides the context for animal husbandry. The principal goal of this law is to achieve appropriate animal husbandry methods in the way of numerous and detailed instructions and restrictions, e.g. the prohibition of battery farming of laying hens. At the same time, these strict regulations have caused increased production costs in comparison with other countries.

Agricultural holdings with old and small stables fare worse under these provisions. New stables usually comply with the restrictions imposed by the animal protection law, while the adaptation of old stables is either very expensive or simply impossible. Animal-friendly husbandry methods like loose housing stables call for bigger livestock numbers in order to achieve sufficient profitability. Simultaneously, more agricultural land is needed for open stable systems, which is a restricting factor for smaller farms. In this regard, the animal protection law encourages agricultural structural changes and environmentally sound production schemes but also reduces labour.

The animal protection law regulations frequently lead to (sometimes compulsory) consolidation of agricultural holdings in Appenzell – Ausserrhoden rather than land abandonment. The impact of this ongoing consolidation process on a landscape characterised by traditionally scattered farmsteads will be evident in the near future. The Appenzell – Ausserrhoden Canton only applies the animal protection law on stables that are in use all year round. Alpine stables intended to support mountain pasturing are not affected.

Nature and landscape protection

The federal government has established the general legislation but the individual cantons are in charge of the implementation of nature-, landscape- and habitat-protection issues. Another important law that should be mentioned concerns habitat protection, land use and spatial planning. Here, the federal government, cantons and communities are obliged to ensure the sustainable utilisation of the soils and safeguard the natural resource bases of the soils, air, water, forests and landscapes.

Habitat protection is to apply to all utilised agricultural area but also acknowledge the special interests of agricultural production. Basically these objectives are to be achieved by spatial planning measures and private contracts. The agricultural holdings are entitled to obtain appropriate allowances for the restrictions imposed or for special contributions they make without receiving economic reward for them, which seems to be extremely important in maintaining cultivation. Maps indicating all protected zones and available to every canton offer useful baseline information on the implementation of nature and landscape protection.

Since 1991 it has been possible to incorporate areas of high environmental value into Appenzell – Ausserrhoden Canton's protected zone plan. Under the environmental payment ordinance of April 1993 farmers have a second way of obtaining financial aid, by signing a six year contract on cultivation of areas of high environmental value (i.e. environmental compensation). This additional possibility encourages co-operation with the recently created nature and landscape protection service, which seems to be very satisfactory for all interested parties.

The protected zones are in the custody of the public authorities. Farmers can receive between SF 2 and SF 12 per *are* (depending on the degree of extensification) for the maintenance of sustainable cultivation. The nature and landscape protection service is responsible for these areas. Both the protected zones and the environmental compensation areas are controlled by the field services of the agricultural secretariat, which is also in charge of the administration (e.g. sup-

port payments) of the areas of high environmental value. The close co-operation between the farms and the nature and landscape protection services not only makes possible an excellent survey on, and the efficient control of the environmentally appropriately cultivated areas in Appenzell – Ausserrhoden, but also facilitates the transformation of single measures into joint concepts for a whole agricultural holding. This measure is well suited to raising the agricultural incomes while reducing environmental problems connected with manure and fertiliser over-application.

Total nature protection payments in 1986 were SF 170,000 SF, which is 0.06% of the Appenzell – Ausserrhoden Canton's budget. Furthermore, the canton's nature and landscape protection service is currently conducting a survey on prospects for an appropriate information and action network of habitats.

Register of emissions

This register provides an excellent survey of the most important emission sources of a region and provides baseline information for the implementation of air pollution abatement measures. The register is intended to promote emission reduction indirectly. Costs are estimated at between SF 40,000 and SF 80,000.

More than 50 % of all methane emissions and the major part of the ammonia emissions are nowadays generated by agriculture. Thus the federal council of Switzerland has promoted a survey to evaluate prospects for emission reduction, e.g. bio-gas and air-filter facilities, appropriate fertiliser application, MLU/ha reduction etc.

C. Other types of policy measures

Land use planning and space management

Every canton must establish overall planning for spatial development of the communities, regions and the canton itself. Spatial planning by the federal government and the neighbouring cantons has also to be taken into account. The main function of this measure is co-ordinate all activities affecting the human living space. There must be sufficient road access for new construction sites, the spatial relationship between residential and industrial areas has to be balanced and further environmental considerations have to be addressed.

Public relations in agriculture and forestry

Agricultural extension and advisory services should not only focus on quantitative aspects, particularly when considering plant production and fertilisers, but also, for example be aware of the harmful aspects of air pollution. Public relations is also an important feature for forestry and water-tower protection. An information campaign is aiming to develop new strategies and a high degree of public acceptance for water-tower protection measures, a special leaflet recently published aims to inform farmers about the negative environmental implications of wintertime slurry spreading.

Regio Plus

The "Regio Plus" development programme, comparable with LEADER programmes in the EU, has been in force since 1 August 1997. The programme also supports projects aimed at improving the marketing of agricultural label and niche products. It is financed by the federal government and scheduled for the next five years. The whole budget for this period amounts to SF 10m.

D. Specific cantonal policy measures

Although agricultural and environmental policies are mainly introduced under federal law, the Swiss cantons may also implement specific measures like the "*Schwägalp*" *cheese dairy demonstration project*. This project was launched by the Appenzell – Ausserrhoden Canton and demonstrates the production of the "Schwägalp" cheese. This kind of public relations exercise is also intended to contribute to the maintenance of mountain farms and natural landscapes. Total project costs are SF 1.5m.

3.4.4 Conclusions and Recommendations

The agri-environmental measures applied for mountain agriculture have in any case to correspond to the specific needs of a region. Consequently the main theme of the Appenzell – Ausserrhoden development programme is "that mountain agriculture can only survive if overall agricultural policy is supplemented by an appropriate regional agricultural policy". Agricultural policy measures can only be efficient if they also change people's traditional attitudes and build a new environmental awareness. These measures have to emphasise both environmental sustainability and free enterprise and the market. This is the only long-term solution to agri-environmental problems. Simultaneously, it seems to be indispensable that all these various should be implemented in a harmonious interaction concept to ensure environmental and economic success. In this regard, milk quotas and the GATT agreements disrupt this interaction, with resulting consequences for environmental concerns. On the other hand, direct payments granted under Art. 31b of the Swiss Farm Act have an environmental impact and should influence other measures.

On the whole there is unanimous agreement that mountain agriculture in the Appenzell – Ausserrhoden Canton can only survive if national agricultural policies promoting the free enterprise of the farmers are supplemented by local and regional policy measures.

Not every farmer is inclined to take up all strategies suggested at the same time. Thus it seems important to develop a basic concept integrating all the different levels and strategies as well as emphasising the key issues: environmentally sound production, diversification and farm improvement.

The following criteria are indispensable for an accurate assessment of the agri-environmental situation and the policy measures.

(i) *Systematic approach:* mountain agriculture has to be considered and evaluated in an overall systematic perspective, i.e. in relation to the natural environment, forestry, tourism, general economic development and societal environmental concerns. Each individual measure has to be assessed against this background.

(ii) *Dynamic approach:* mountain agriculture is part of a dynamic process. Agricultural markets, the technological development and new scientific discoveries exert an important influence, which has to be considered when assessing policy measures.

(iii) *Temporal approach:* all proposals have to be identified in compliance with their chronological realisation.

(iv) *Directions and recipients*: all proposals and recommendations have explicitly to address the different levels of policy-making (EU, national government, region etc.).

(v) *Consideration of beneficial effects:* measures supporting and maintaining beneficial effects of mountain agriculture on the natural environment have to be addressed expressly.

(vi) *Wide range of tools and instruments:* contemporary agricultural and environmental policy measures, restrictions and regulations, measures concerning the fields of research, extension, training, coaching, consultation and communication must also be considered.

(vii) *Efficiency of the measures:* all measures should be judged according to their efficiency and impact on the relationship between mountain agriculture and environment.

(viii) *Measure application:* The impact of agri-environmental measures definitely relies on the participation of the farmers. Hence the specific preconditions and circumstances surrounding the application of measures are crucial to their efficiency.

3.4.4.1 Environmentally sound production

Environmentally sound production is a core issue for the maintenance and promotion of sustainable development. In fact, direct payments implemented in compliance with Article 31b of the Swiss Farm Act are proving to be too weak, indeterminate and inefficient. Thus, there is no clear perspective for the farmers. Social implications and the environmental costs and benefits of agricultural activities should be internalised and, all in all, the total amount of direct payments will have to increase.

Article 14 of the water protection law is too rigidly linked to data sources and indexes and does not properly take natural circumstances into account. Thus the application of slurry, solid and liquid manure as well as the capacity of the slurry pits should pay more regard to the specific economic and environmental circumstances.

3.4.4.2 Improvement of the market position

The extension and diversification of agricultural production, high quality and niche products, the invention of new services, on and off-farm activities (i.e. pluriactivity) providing employment for the farming population and, finally, processing of produce and direct marketing on regional/local markets will be a

big challenge and simultaneously offer new prospects and income resources for the agricultural sector.

Incidental environmental concerns should not be neglected in this creative investigation process. The still "intact environment of Appenzell" is a precious asset, thus diversification should focus more on traditional values. The establishment of a nature park could be a main objective in this context.

Milk quotas restrict production quantities and entrepreneurial decision-making. Although this measure is of crucial importance to the safeguarding of dairy farming in mountainous and less-favoured areas, this scheme should be more flexible and allow purchase and leasing.

3.4.4.3 Farm improvement measures and agricultural co-operation

A wide range of (sometimes contradictory) agri-environmental regulations hinders farm improvement measures, or at least aggravates the conditions under which they take place. This is the main reason why many farmers do not apply to environmental programmes. In the present period of agricultural deregulation, all programmes should be based on a voluntary participation by farmers.

Close co-operation between agricultural holdings and – at a higher level – an interdisciplinary collaboration between all inhabitants and decision makers of the cantons and regions seem to be indispensable to deal with the various problems of this study area, particularly with regard to the topographic limitations hindering farm consolidation measures.

Agricultural reform measures have to be coherent, since permanent changes in the plan produce increased cost as well as unsettling and irritating the farmers. The legislation has to take better account of the ability of the agricultural enterprises to adjust to a new situation, particularly in the field of water towers and food production. The competitiveness and survival of the farm holdings will be seriously threatened if the restructuring and reshaping of agricultural production does not succeed.

3.4.4.4 Fostering mutual understanding and expansion of consultation in non-traditional sectors

Psychological aspects must be considered to be of crucial importance when implementing certain policy measures. Time and patience are needed to create environmental awareness and understanding among the farmers. The communication and circulation of information between the different offices has to be improved. A global approach has to be promoted in order to facilitate an understanding of other sectors.

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3.5 Oberallgäu – Germany

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The choice of this study area was conditioned by need to describe the close economic and environmental interrelationship between a mountainous region and the big industrial urban areas of southern Germany. The district of Oberallgäu is, furthermore, the only objective 5b and LEADER II region in the mountainous area of southern Bavaria. The northern part of the study area is dominated by hilly grassland, while the southern part belongs to the Allgäu Alps.

A relatively stable farm management system has developed in the Oberallgäu district, characterised on the one hand by very intensive grassland farming in the lowlands and valleys, and on the other by a comparatively extensive mountain agriculture. At present there is no danger of farms falling derelict, because the situation of the labour market is unfavourable and the milk-quota scheme guarantees a declining but still secure income. Several subsidies, based on acreage, are helping stabilise the financial situation of the holdings. Many farmers improve their situation by a dual income structure combining farming and tourism activities.

The study area can be characterised by two main processes: on the one hand there is no threat of dereliction and land abandonment as in other mountain regions, but on the other hand the CAP is delaying structural changes in agriculture and causing a shortage of farmland, which in turn leads to problems in the over-application of semi-liquid manure and intensification, endangering environmentally important areas in particular.

3.5.1 Introduction

A. Geography

The study area, the political district of Oberallgäu covering 1527 square km, is situated in south western Bavaria. The altitude varies between a minimum of 900 m and 2,600 m (highest summit: Mädelegabel).

Average annual precipitation is about 1300 mm, characterised by a rather dry winter (75 mm/month) and a comparatively wet summer (150 mm/month). The mean annual temperature is 7.2 °C and the vegetation period usually lasts 197 days.

The Oberallgäu district has excellent traffic links to the centre and north of Bavaria, while the traffic and transport routes to the south (Austria and further to Switzerland) are not so well established, especially for large trucks.

The utilised agricultural area (UAA) of the region amounts to 73,001 ha or 47.8% of the total surface, 72,864 ha of which is grassland and just 82 ha arable land. The grassland consists of 16,674 ha meadows and 33,191 ha pastures. The prevailing form of agricultural production is dairy farming.

The principal natural assets of this study area can be assumed to be the cultural and natural heritages and landscapes, important freshwater resources and protective forests.

B. Socio-economic characteristics

Demographics

In 1994, the total population of the district was 144,017, giving a population density of 94 per square km. The population has been rising steadily, from 119,625 (1970) to 128,665 (1987) and 144,017 (1994). So population growth between 1970 and 1994 was considerable (+20.4%).

The age structure of the population is as follows: 21% under 18; 17.2% between 18 and 30; 15.8% between 30 and 40; 12.5% between 40 and 50; 18% between 50 and 65, and 15.5% over 65.

Economy

The economically active population in the district (as percentage of the total population) is about 39.6%. About 10% of all employees work in the agricultural sector, another 37% in business, 14% in merchandising and 38% in the service sector. The principal sources of income derive from employment in non-agricultural sectors (e.g. business and trade) followed by tourism and finally agriculture and forestry. Part-time employment is an important feature. There are about 28,000 seasonal jobs in the district, 7,000 of which are in tourism and recreation. But this is not unusual. A similar situation can be found in the neighbouring regions.

The unemployment rate in Oberallgäu district is about 6.1%, which is somewhat lower than the unemployment rate of Bavaria (7.5%). The principal economic problems of the region are connected with its peripheral position within Germany. This geographic position makes it difficult to keep companies in the district. Average prices in the mountainous regions of Germany are usually higher than in the more central, lowland regions. This causes problems for the tourism

industry in particular. Structural changes within the agricultural sector are also producing a lot of economic and environmental problems. This may become particularly serious if the dairy production subsidy system changes significantly.

C. Agriculture

Employment in the agricultural sector in the district is about 10.3 % and there are 4,821 agricultural holdings. Average farm size is 16 ha. The average agricultural income is about DM 2,000 /ha, or DM 26,000 /labour unit.

The predominant agricultural cultivation system of the study area is dairy farming. An average farmer holds 19 dairy cows and there are 67 cows reared on 100 ha farmland. The average milk performance is 4,815 kg milk per cow. Moreover the mean livestock density of 1.31 LU/ha indicates a rather extensive form of animal husbandry.

Transhumance, i.e. the seasonal migratory herding of livestock, is not significant in the region. Intensive sheep herding is - at least for the moment - not common in the Bavarian Alps. Some collective agricultural operation practices can be found, though individual farm management is prevalent.

D. State of the environment

On the whole, the state of the environment and the natural landscape can be considered favourable. The nitrate load of the fresh water reservoirs is quite low and there is a high degree of biodiversity in the high mountain pastures in particular. The wide range of subsidies granted to the farmers is a precondition for the maintenance of the use of extensive mountain grassland. A drastic reduction of grassland subsidies would lead to land abandonment and extensive areas of fallow land.

Some problems can occur in connection with an intensive agricultural use of grassland especially in the valleys and flat areas, which induces a decline in biodiversity. The main reasons for this damage are overgrazing and over-application of fertiliser. In fact there is some problem, but it has been possible to reduce the nitrate input significantly in recent years. Occasionally there is a demand to optimise the use of liquid manure, i.e. application time, quantity and techniques.

Alpine forests in the region are endangered by long-range, cross-border air pollution. Forest degradation is leading to loss of the protective function of the forests, which will become more susceptible to natural hazards, e.g. avalanches.

E. Policy measures

The most important national and EU policy measures applied in this study area are:

a. Agricultural, forestry and rural development measures:
   R 2078/92: specified in the Bavarian agri-environmental programme "KULAP" for the upkeep of land; this scheme is of crucial importance for the region
   R 2080/92 agricultural land afforestation; of only little importance for the region
   Objective 5b: the study area is classified as an Objective 5b zone, but there are relatively few measures with an impact on the environment and the allowances are very low.
   Objective 5a: compensatory allowances and structural measures for mountain farmers.
   Regional Planning system

b. Environmental measures:
   Bavarian Nature Protection Programme
   Compensation for more difficult farming methods in wetlands
   "BIRD", "Habitats" and "Nitrates" directives are more or less insignificant for the region

c. Community initiatives:
   LEADER II rural development: despite implementation of this programme in the region, the amount of money is too little to effect a significant improvement of the agricultural situation.
   INTERREG II co-operation between countries: although an interregional programme between Austria and Bavaria exists, it is of minimal importance for the Oberallgäu study area.

d. Market measures:
   There are efforts to improve the co-operation between farmers and with other industrial sectors in order to improve local habitats. Local authorities support farmers' efforts to sell their produce on the local markets.

3.5.2 Analysis of the pressures and impacts on environment

Principal agricultural pressures and impacts

A.1. Over-application of manure

The principal agricultural pressure on the environment in Oberallgäu district is the pollution of surface water by semi-liquid manure. This is caused by the shortage of pastures and meadows suited to the spreading of liquid manure. Since slurry tankers are basically constructed for flat pastures and meadows, liquid manure cannot be spread on many sloping pastures and meadows.

Livestock density is 1.3 LU per hectare, which is above the Bavarian average. This causes problems in so far as some of the grassland (particularly alpine pastures, steep slopes and litter meadows) is unsuitable for the spreading of liquid manure. This implies a high livestock density on the remaining grassland. Because of the shortage of grassland, farmers often do not observe the necessary minimum distance to surface water.

Moreover, the high precipitation in the region frequently induces a leaching of semi-liquid manure to the surface water. The consequence is an increased nitrate load and the eutrophication of river flows and lakes. Many lakes that are important for the leisure time activities and tourism are particularly affected in addition, in several individual cases there have also been problems connected with pollution of drinking water by *Escherichia coli*.

An improvement of this situation cannot be expected under present conditions because the demand for grassland is high and the area available is limited. Because of the current poor employment situation in Germany, a large number of farmers are carrying on farming even when it does not pay. Thus, the farm abandonment rate is only between 2% and 3% per year. The only farmers giving up are those without an heir or successor, those deeply in debt or those who have over invested.

A.2. Loss of environmentally important areas

Another pressure arises from the loss of natural and environmentally important areas, especially raised and blanket bogs, litter meadows and oligotrophic grassland communities. The main causes are drainage, intensification of farming and over-application of manure. These environmentally sensitive areas are characterised by a high degree of biodiversity and often provide a habitat for rare species. The loss of these precious habitats is connected with the loss of refuges for en-

dangered species. At the same time, this also leads to a degradation of cultural landscapes.

This development, predominantly caused by the shortage of grassland, takes place so gradually that it is not recognised in time and the authorities are not able to take appropriate measures.

Many of the pressures relevant for other regions, such as afforestation, overgrazing and land erosion caused by cattle are of little or no relevance to this study area. Land afforestation is usually between 5 and 20 ha per annum, and local land erosion problems due to overstocking occur only exceptionally.

Principal non-agricultural pressures and impacts

B.1. Tourism and recreation

The increasing number of daily visitors is the principal problem among the non-agricultural pressures and impacts in this study area. In addition, the main causes of this development are linked to increasing leisure time and mobility as well as the discovery of the Alps for (fashionable) sports like hang-gliding, mountain-biking and skiing. Day-trip tourism (Kempten can be reached from Munich in about two hours by car) is also causing increased traffic volumes and more waste. Land erosion caused by hikers who do not keep on the tracks can be observed around the funicular railways and mountain tracks. The upper reaches are particularly affected by waste dumping and sewage problems but the situation has improved in recent years because almost all mountain shelters in the district now have sewage treatment plants.

B.2. Settlement and road construction

Another important non-agricultural pressure is the expansion of settlement and road construction. The expansion of settlement is a big problem in the south of the district, the central tourism area, which is characterised by a high immigration rate. Both road construction and the expansion of settlement mar the landscape and lead to pressure on the ecosystem through the sealing of land with roads and estates and an increasing volume of waste and sewage. Some communities have already started to prohibit the building of holiday homes.

B.3. Land erosion

Land erosion, which mainly has geological and climatic causes, is another important pressure in the district. The steep slopes, with flysch as primary rock and with little or no vegetation in combination with a high precipitation, are naturally endangered by land erosion.

3.5.3 Instruments and Measures

Regulation 2078/92

The Bavarian aid scheme for the upkeep of land "KULAP" is by far the most important agri-environmental measure. This scheme is the application of EU regulation R 2078/92 and is divided into three different parts, two sections of which have major agri-environmental concerns. Part A concerns to agricultural extensification and environmentally sound production in general, while part B puts particular emphasis on grazing management and mountain farming.

a. R 2078/92 : Bavarian aid scheme for the upkeep of land (KULAP), part A

About 1,600 farmers in the Oberallgäu district (or about 50% of all farmers) with an area of 30,000 ha (i.e. 41% of the total farmland) participate in this programme, which accounts for DM 6.6 m. For the most part, the funds are for non use of pesticides and mineral fertilisers, often in combination with restrictions on mowing times. At present, it is not possible to quantify to what extent part A of the programme has had a direct impact on the environment. The Chair of Agrarian Politics and the Chair of Landscape Ecology at the Technical University of Munich are carrying out the interim evaluation of the KULAP. This research project aims to ascertain to what extent the objectives formulated in KULAP have been achieved and whether the scheme has been effective. Undoubtedly, for many farmers the positive effects on income are the main motive for participating in this programme. They do not have to change their established practices or the intensity of farming in order to fulfil the programme regulations, because mineral fertilisers have never been that important compared with organic fertilisers, and pesticides are also only of limited importance in grassland farming.

An investigation of late mowing times in the neighbouring district of Unterallgäu showed that there is even a tendency towards a decline of biodiversity on programme areas because the high grass has negative influence on the living conditions of small species (Hübner 1994). The ecological success of late mowing times, especially a standardised mowing time in all districts of Bavaria is questionable, at least in the medium term. The financial support for the mowing of steep slopes, however, could be characterised as positive because it helps to maintain the use of these meadows and their characteristic species.

b. R 2078/92 : Bavarian aid scheme for the upkeep of land (KULAP), part B : aid for the grazing management and the alpine farming

In 1996, a total of 220 activities received support worth about DM 2m. Two-thirds of this sum was spent on the building or repair of alpine shelters, a quarter on the construction of access roads to such shelters. Part B of the Bavarian aid scheme for the upkeep of land is, together with the compensatory allowances, an essential support for the maintenance of alpine farming. Without this aid, the development of alpine farming would have been different because alpine farming was seriously endangered for some time. As a consequence of the limitation of milk production, the cattle stock was reduced by 14% between 1986 and 1991, so the stock on the alpine pastures dropped because forage use was concentrated on the valleys. Since 1991, the stock has remained constant and, because of the support in part B and the premiums for herding in part A of the Bavarian aid scheme for the upkeep of land, alpine farming seems now better supported than farming in the valleys. The maintenance of alpine farming is not endangered at present. There are currently about 600 certificated alpine farms with an area of 19,500 ha of alpine pastures, showing a slight tendency to increase.

Besides the aid measures for alpine farming, there are other factors of great importance, such as hunting or tourism, which also should be supported. The maintenance of the alpine farming has several positive impacts on the environment. On the one hand it conserves the characteristic landscape of the Allgäu, with its recreational value, which is the basis for tourism in the district, and on the other hand it preserves the biodiversity of the alpine pastures, especially the oligotrophic and xeric grassland communities with their partly endangered species. Moreover, alpine farming is of great importance for protection against erosion and avalanches.

Table 1: Individual farm subsidies in the district of Oberallgäu 1995 (payments per hectare)

Individual farm subsidies	Number of farms	Subsidy (in 1 000 DM)
1. regulation of cultivated plants	14	32
a) small farms	14	32
b) general regulation		
2. compensation allowance in less favoured areas (5a measures)	2 920	14 245
3. socio-structural income compensation	3 057	3 366
4. aid scheme for the upkeep of land (KULAP part A)	1 579	6 722
5. cheapening of Diesel 1994	2 993	2 124
6. payment for environmentally compatible land management methods	3 245	2 611
7. extensification scheme	257	1 904
8. KULAP part B	172	1 727
9. KULAP part C	14	402

Table 2: Animal premium

Animal premium	Number of farms	Subsidy (in 1 000 DM)
1. special beef premium	345	254
2. suckling cow premium	102	215
3. ewe premium	57	59

Bavarian Nature Protection Programme

In 1996, about 2,600 ha in the Oberallgäu district (3.5% of all farmland) were under contract of the Bavarian Nature Protection Programme. About 90% of the funds from this programme, about DM 800,000, were spent on extensive grazing and pasture cultivation in the district. This programme helps to maintain grazing on pastures which are not certificated as alpine pastures.

Compensation of the more difficult farming in moist areas

Compensation for more difficult farming in wetland habitats is part of the Bavarian Law on Nature Protection. In 1996 about 800 ha (1.1% of the whole farmland) were under contract and supported to the value of DM 545,000. The payment is fixed for each individual area and dependent on ecological value, increased expenditure of labour and machines and on the value of the forage. The average payment per hectare is DM 700. This programme supports the natural use of wetlands, especially the use of litter meadows to conserve their biodiversity and function in the landscape.

Objective 5b programme (Regulation 2081/93)

There are relatively few Objective 5b-measures in the study area that have an impact on the environment. In agriculture, the purchase of special machinery for landscape management is supported in order to maintain habitats and to preserve biodiversity. The total subsidy was DM 43,500 (1996). Other agricultural measures concern the launching of two cheese factories in order to increase the income of smaller dairy farms in the district of Oberallgäu and also to maintain farming in more remote regions of the district. This measure received a DM 350,000 subsidy (1996).

Regarding forestry measures, the utilisation of wood from the alpine forest is supported through two heating systems based on wood shavings. The subsidy was DM 3m (1996).

Priorities in land use regulation

Regional planning is an instrument of the land use planning and space-management of the province. The regional plan contains areas which give priority, for example, to farming, settlement or nature protection. It also includes areas where a desirable form or intensity of use (in terms of sustainability) is documented.

The region around the Niedersonthofener lake, for example, is classified as a "nature preservation area". This particularly valuable protected area is docu-

mented in the regional plan maps. Local measures, for example settlement activities, have to be analysed, whether there might be a conflict with the desirable use of this area. "Nature preservation area" status is not to be confused with a nature reserve or national park. The nature preservation area demonstrates only that this is a precious, protected area. There is no legal basis for restricting land management, but the documentation of such areas could be one step towards the adaptation of agricultural or nature protection programmes to the specific conditions of a location.

Agri-structural measures - Objective 5a: compensatory allowances

About 85% of the farms in the Oberallgäu district receive compensatory allowances. The compensatory allowances total more than DM 14 m, thus representing the most important agriculture-related subsidy in the district. Together with other subsidies, it helps maintain land use management and to preserve the landscape.

Table 3: Investment subsidies in the Oberallgäu district, 1995

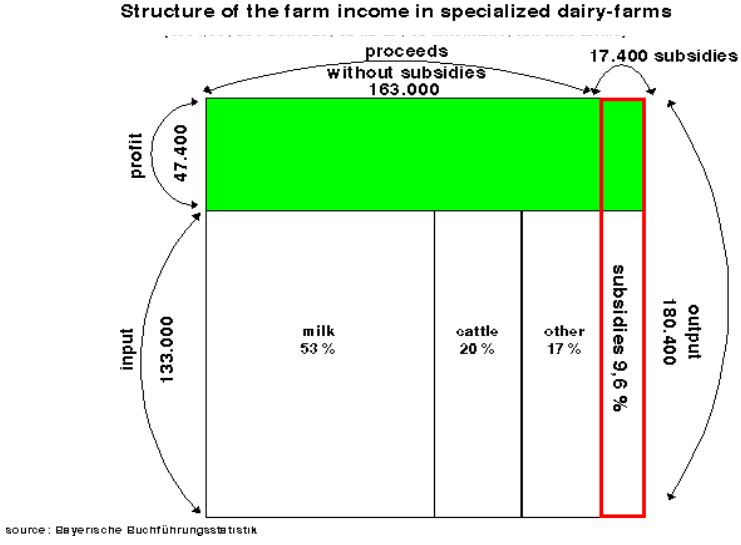
Investment subsidies	type of subsidy	number of appropriations	amount (in 1000 DM)
1. Individual farm investment programme			
Part A: investment in farm buildings		41	---
	contribution	---	1 888
	public loan	---	4 225
	low interest loan	---	6 666
Part B: investment in energy saving	contribution	58	285
Part C: start-up aid to young farmers	contribution	43	1 010
2. Bavarian agricultural credit scheme		64	---
	contribution	---	
	low interest loan	---	3 668
3. Bavarian farmhouse-building scheme	low interest loan	9	690
4. Bavarian village renewal scheme	contribution	17	137
5. Bavarian scheme for semi-liquid manure	contribution	8	81

Market regulation – Milk-market organisation

Compensatory allowances and the Bavarian aid scheme for the upkeep of land (parts A and B) help to improve the farm income and therefore to maintain farming, particularly mountain agriculture. But of the wide range of political measures the milk market organisation has unquestionably had the greatest influence. Dairy farming has a long tradition in the Allgäu, and despite the low milk price it is still the most important branch of production. It achieves the highest processing value for farms with a shortage of land. Moreover, the opportunity costs of work are relatively low due to the unfavourable labour market situation. Dairy production still provides the greatest share of farm income.

The cost-cutting pressure has risen constantly, so that the structure of feed use has changed. Whereas previously two-thirds of growth was used as hay and one-third as grass silage, the ratio is now reversed. Even a higher price for milk produced without silage (i.e. 3 to 6 Pfennig/l above the common milk price) often does not pay off. There is a demand for milk produced without silage because the use of silage is not permitted for the production of hard cheese. The structural change of feed use has had an important impact on the composition of the floral species on the grassland because of early mowing. This has probably led to a general decline in the number of species, because the areas have been used very intensively for years.

Figure 1: Structure of the farm income in specialised dairy farms



structure 1994/95; 293 full-time farms; 32 ha arable land; 32 cows

3.5.4 Conclusions and Recommendations

The major part of natural resources and the landscape is used and shaped by farming activities. The Oberallgäu study area is representative of many German alpine regions. In this district, for example, nearly 61 % of the total area is agricultural land; forest area and agricultural land make up to 93 % of the total area. It is obvious that farming has a major influence on the environment. Mountain farming and its relationship to the environment has many aspects. On the one hand, farming in mountain areas provides a lot of positive effects for the environment and society in general. On the other hand, mountain farming that is not adapted to local conditions causes a lot of negative side-effects. Taking these positive and negative effects into consideration, the intended level of environmental quality will be only achieved in co-operation with the farmers. The way towards sustainable mountain farming has to consider both environmental goals and constraints. The principal intention is to reshape or implement measures and to find new ways towards an environmentally sound mountain agriculture.

3.5.4.1 Concept for a differentiated agricultural environment policy

Resource protection, as a rule, entails costs which can cause losses in productivity and which have ultimately to be born by society as a whole. However, resource protection can also bring returns to the national economy as a whole. This can be seen for example in better environmental quality.

It is undoubtedly true that increasing resource protection will lead to increased costs. Indeed, from the point of view of nature protection and resource conservation, it is not necessary to achieve the same high level of environmental quality everywhere. What should be aimed at, is a differentiated form of mountain farming. A minimum standard of protection of abiotic resources should be observed everywhere. The following figure shows what the measures necessary for a differentiated agricultural policy could look like.

In step 1 primarily standards are set or perhaps levies are applied. In the widest sense, the required form of mountain farming in step 1 equals more or less good farming practices of husbandry and agriculture according to the rules. On principle, subsidies should not be granted for step 1 measures. This requires equal standards in all EU countries in order to avoid distortion of market competition. In most cases, additional demands, especially for the protection of biotic and aesthetic resources, will need governmental subsidies as income losses are too great. Various programmes are offered (see step 2). These medium demands for resource protection will certainly play an even more important role in the future. It is to be expected that social acceptance of these measures will also become

more important in the future. This requires transparency of the environmental consequences of mountain farming. However, the measures during step 1 and 2 are not sufficient when it comes to resource protection in certain regions.

Raising demands for resource protection can be met through habitat networks or special protection areas (e.g. for nature or water protection) in small regions. This can be done, for example, through landscape plans by communal authorities. Apart from compensation payments for set standards, bounties for restricted land use seem to be the right instrument (step 3 and 4). In addition, governments can try to obtain land in the course of land consolidation measures in order to transform it into habitat networks. Looking after these networks could be the task of farmers in return for special payments. In this way, land use for agricultural purposes in the strict sense becomes less important. This concept requires authority of districts and local authorities (financial authority and programme regulation).

3.5.4.2 Improvement of important existing support measures adapted to the requirements of nature protection in the study area

Objective 5a and R 2078/92 (KULAP) are the most important agri-environmental measures in the Oberallgäu region. Objective 5a attempts to compensate for unfavourable location conditions. Small-scale farms cannot compete under the conditions of a common market. Nevertheless, they fulfil various tasks in rural mountain areas. Farmers in less-favoured areas need these payments in order to keep farming in these regions. The recent debate on the positive external effects of mountain farming has led to an increased appreciation of its functions and effects by society.

In Bavaria there is also a relevant discussion on the new agri-environmental programme KULAP (R 2078/92). The farmers tend to see only the income effect of this programme and unfortunately not the environmental background which involves a reduction in the intensity of farming in order to maintain biodiversity and to minimise nitrogen surplus. In order to fulfil these environmental aims, it is necessary to adapt this programme to the various local conditions. This also includes raising premiums for special locations.

The environmental consequences of various agricultural programmes cannot be reduced to a single measure. Nevertheless, existing deficiencies can be shown. Special evaluations thus have to be carried out. This will also require the definition of farm types including a detailed description of the economic situation.

Figure 2: Concept to realise sustainable mountain farming

Step 4: Regional and local measures in order to take into consideration the special needs of mountain farming and the requirements of resource protection

?? Subsidies to establish direct-marketing and weekly markets
?? Legal conditions to support pluriactivity (tourism, trade)
?? Regional programmes to realise the extensive use of buffer zones or landscape conservation
?? Adjustment of programmes to local conditions (intensity of grassland use, mowing time, number of mowings)

Financing and responsibility by local authority, district, country, EC

Step 3: Special payments for mountain farming

?? Subsidies as a matter of priority for the (extensive) use of grassland
?? Contribution to build or redevelop alpine shelters
?? Contribution for special machines for mowing alpine pastures
?? Contribution for planting and to caring for alpine forests
?? Alpine road construction
?? Subsidies for mountain farm enterprises related to the number of workers and the income of the family (direct payments)

Financing and responsibility by district, country and EC

Step 2: CAP-farm subsidies (examples)

?? Income equalisation supplements (objective 5a)
?? Objective 5b (measures relating to the environment)
?? Compensation payments
?? Milk-quota system
?? Payments to reward positive external effects (ecological farming)

Financing by EC and country

Step 1: Minimum requirements for resource protection (whole agricultural area)

?? Measures against soil erosion and nitrogen loss
?? Fertilising and manure application according to plant requirements
?? Certain ratio of livestock : land

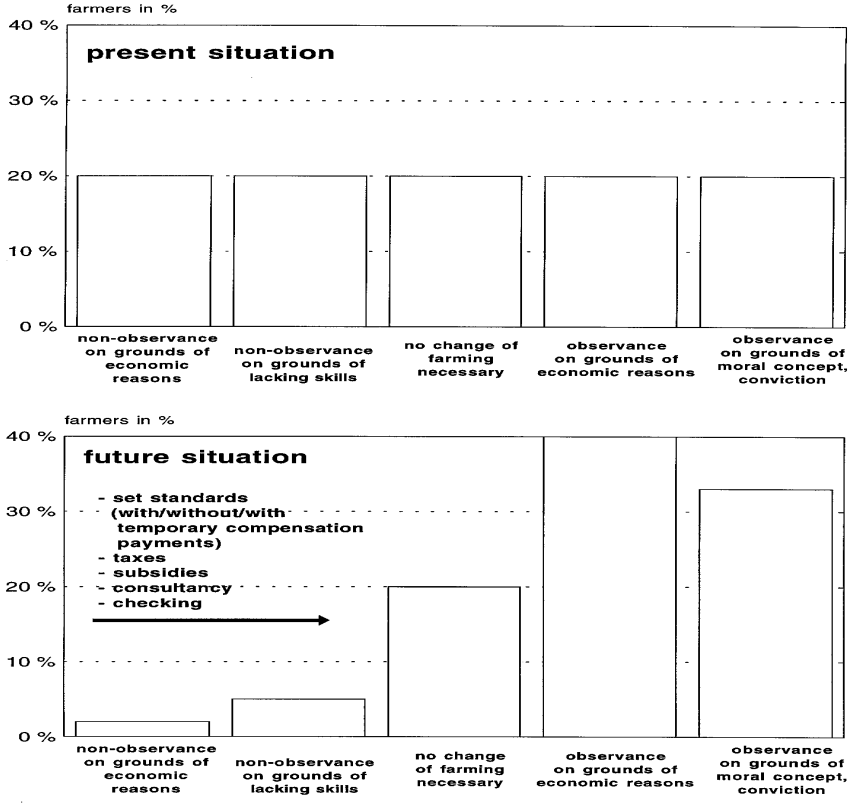
short-term: financial subsidy (adaptation assistance)

long-term: without any subsidy

3.5.4.3 Integrated concepts based on the co-operation between agriculture and nature protection

Special standards, with or without compensation payments, taxes or levies, subsidies or bounties for positive agricultural externalities, are being discussed or realised in the field of agricultural environmental instruments. On economic grounds, all these instruments reduce take up or observance, but the different sociological reasons also have to be taken into account. The effects of such a comprehensive concept are shown in the following figure.

Figure 3: The way towards environmentally sound mountain farming



Such a concept is being realised in many water protection areas of Bavaria. Co-operative actions achieve much better results than regulations decided without any participation of the farmers.

3.5.4.4 Long term research tasks

The external positive or negative impacts of mountain farming on the environment should be investigated in order to describe the connections and interfaces between mountain farming and the environment.

The principal research tasks are:

(i) Influence of farm size on external effects of mountain farming

(ii) Adaptation of measures concerning R 2078/92 under the conditions of mountain farming

(iii) Conceptualisation and realisation of local or regional environmental programmes

(iv) Prospects and limitations of pluriactivity in mountain areas

(v) Elaboration of production methods in order to minimise the negative external effects

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Regionaler Planungsverband Allgäu 1986. Regionalplan Region Allgäu (16). Kempten.

Annexes:

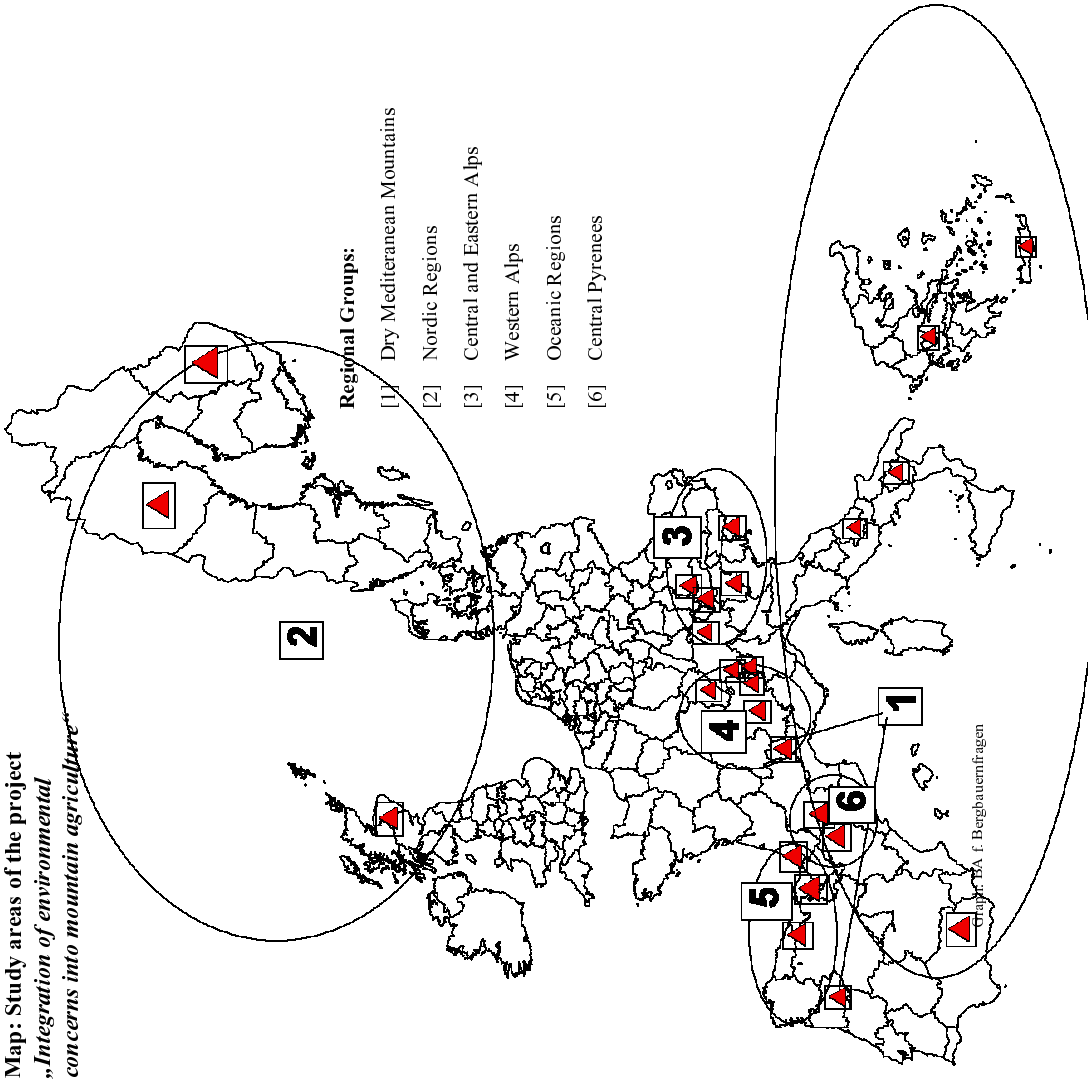
Annex 1: Geographical networks and study areas

Annex 2: The regional network "Central and Eastern Alps"

Annex 3: List of institutions contacted

Annex 4: Principal agri-environmental pressures and impacts

Annex 1: Geographical networks and study areas



Map: Study areas of the project
„Integration of environmental concerns into mountain agriculture"

Annex 2: The regional network "Central and Eastern Alps"

Austria: Bundesanstalt für Bergbauernfragen,
(Federal Institute for Mountainous and Less-Favoured Areas),
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Paolo De Giorgi (e-mail: degiorgi@agri.ch)

Annex 3: List of interviews and institutions contacted

Study area Tyrol Oberland (Austria):

BirdLife Austria: Vienna
Chambers of Agriculture: Imst, Landeck
Forestry Commission of Tyrol: Innsbruck
"IRI" - Regional management organisation: Imst
LEADER initiative Ötztal: Umhausen
Provincial Government of Tyrol, Departments for Agricultural Policy, Nature Protection, Regional Development and LEADER programmes: Innsbruck
Regional management bureau: Landeck
"MIAR" - Regional management organisation: Landeck
University Innsbruck, Institute for Botany, ICALPE International Centre for Alpine Environments
University Innsbruck, Research Institute for Alpine Agriculture and Forestry

Study area Triglav National Park (Slovenia):

Triglav National Park Administration: Bled
Ministry of Agriculture, Forestry and Food, Departments for Regional Development, Agriculture and Forestry: Ljubljana
Ministry for Environment and Physical Planning, Departments for Natural Heritage and Physical Planning: Ljubljana
Ministry of Economical Development, Department for Regional Policy: Ljubljana

Study area Val di Cembra (Italy):

Programming service: Trento
World Wide Fund for Nature, WWF Trento
Control and agriculture activity promotion service: Trento
Biological product office: Trento
Commerce service: Trento
Department of Agriculture and Forestry Public relation service: Trento
Mountain Office: Trento
Mayor of Cembra

Study area Appenzell-Ausserrhoden (Switzerland):

Farm manager: Appenzell
Agricultural consultant for the transformation of holdings into organic farming: Appenzell
Agricultural secretary: Appenzell
Nature and landscape protection service: Appenzell
Agricultural water protection service: Appenzell
Swiss Federal Institute of Technology: Reckenholz
Environmental protection society: St. Gallen, Appenzell
High-school Trogen, Department of Biology: Trogen
Regional Development Board: Appenzell
Traffic and Transport Association: Appenzell

Study area Oberallgäu (Germany):

Board of Agriculture: Kempten; Immenstadt
Protection of nature authority: Sonthofen
Non governmental organisation dealing with the protection of nature: Sonthofen
Public health office: Sonthofen
Forestry offices: Kempten; Sonthofen
State water authority: Kempten
Bavarian authority of environmental protection: Munich
Objective 5b office: Kempten
Technical University of Munich Chair of agrarian politics and chair of landscape ecology

Annex 4: Principal agri-environmental pressures and impacts

A. Agricultural

Tyrol Oberland (A)	Oberallgäu (D)	Val di Cembra (I)	Triglav National Park (SLO)	Appenzell (CH)
extensification and transformation of high mountain meadows (-)	manuring and eutrophication (-)	extensification (-)	agri-amelioration, land-consolidation (-/+)	loss of agricultural holdings (-)
disagreement between agriculture and nature protection (-)	intensification, loss of moors, litter meadows, oligotrophic grassland (-)	land abandonment (-)	land abandonment (-)	manuring and eutrophication (-)
common land ownership (+/-)		land fragmentation (-)	road construction (-)	
overaged forests (-)		quality products (+)	changes in agricultural land-use and farm buildings (+/-)	
farm road construction (+/-)		afforestation (+)	uncontrolled grazing, forest grazing (-)	
CAP does not suit (-)				

B. Non - Agricultural

tourism (+/-)	tourism, particularly short-time tourism (-)	porphyry quarries (-)	tourism (-/+)	air- pollution (-)
land competition, extending settlement (-)	settlement, road construction (-)	insufficient infrastructure, social-cultural isolation, poor labour market (-)	traffic (-)	
traffic (-)	erosion (-)	tourism (+)	illegal building of holiday houses (-)	
lack of information (-)			smaller uncontrolled tipping sites (-)	

\+ positive impact
\- negative impact

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