STAKEHOLDER ASSESSMENT OF MOUNTAIN LANDSCAPE CHANGE UNDER CONTRASTING POLICY SCENARIOS: DECISION WORKSHOP IN INNSBRUCK 24 SEPTEMBER 2002

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1 INTRODUCTION

The CARBOMONT programme is assessing changes in carbon (C) and nitrogen (N) cycling in mountain areas across Europe (http://CARBOMONT.UIBK.AC.AT). This involves determining fluxes and budgets for functional plant communities at sample sites in partner team countries. An important part of the project is to relate the results not only to existing landscapes and patterns of land use but to the landscapes that might result from different EU land use policies. Work package 6 of Carbomont is concerned to assess the likely landscape changes that might occur under three contrasting policy scenarios over a period of 20 years. The results will be used with the budget and flux observations to produce models of landscape change and their implications for C & N cycling.

The approach to assessing policy impacts is to invite stakeholders from sample mountain areas to use their judgement to:

- ? interprete the likely implications of three policy scenarios for land use in their area;
- ? estimate the resulting changes in cover of major functional vegetation types;
- ? decide how the pressures on individual vegetation types (such as grazing, fertilization and cutting) might change.

The results can be used to estimate the changes in cover and status of the main functional vegetation types resulting from each of the scenarios and will provide a framework for subsequent landscape modelling.

This report outlines the results of a stakeholder decision workshop held in Innsbruck in September 2002, focusing on possible changes in the nearby Stubai valley. This was the second of a planned series of workshops using the same protocols, to be held at the main CARBOMONT study sites. The first workshop was held in the Cairngorm Mountains, Scotland in August 2002. The protocols were developed in two preliminary workshops also held in Scotland earlier in 2002.

2 THE POLICY SCENARIOS

The three scenarios were intended to provide generic contrasts in approaches to funding and supporting rural land use. They do not correspond precisely to any existing proposals or instruments but provide elements common to several possible policy initiatives. The scenarios are adapted from those used for a project for the

Scottish Office to explore how rural database requirements could change depending on the policy context. The following scenario outlines are based on Shucksmith (2001):

Underlying assumptions

The use of future scenarios has to be based on certain assumptions in order to hold certain elements similar between the scenarios while allowing the most interesting elements to vary. In this case,, because of the central importance of regulatory frameworks to the countryside, it is the policy drivers which are allowed to vary, while other elements are assumed to change in similar ways in all three scenarios. The assumptions below apply to all three scenarios :

i) Markets and technology: The agricultural supply curve will continue to move to the right as a result of uptake of technology (whether or not this includes Gentically Modified 0rganisms); however effective demand for agricultural output will remain stable over this period. Product and process innovations in other sectors will continue on current trends, placing an increasing emphasis on 'knowledge' in the work environment, and globalisation will continue apace. Women's increasing engagement in labour markets will continue.

ii) Economy: It is assumed that the wider economic framework will remain broadly as at present..

iii) Social, cultural, and demographic trends are expected to continue on current trends.. In particular, the 'rural idyll' will remain a strong cultural force in many areas of Europe, feeding both a desire to live in the countryside and a wish to preserve the countryside (often an illusory and sentimentalised image of rural life and space). The ability to live and work in rural areas will be opened up to townspeople even more than at present.

iv) Structural funding: Structural funding is assumed to expand slowly but it is expected that it will continue to be targeted at Objective 1, 2 and 3 areas or similar new classifications of need.

Scenario 1: Status quo - gradual reduction of farm price support by CAP; continuing restrictive planning policies

The basis of this scenario is that the process of CAP modification occurs on an incremental path where the current basis of agricultural support is maintained but with increasing amounts being channelled away from production-related support, towards agri-environmental and direct income measures. There is a continuation of the gradual introduction of policies to encourage the rural economy but with little change in existing restrictive planning controls on development. In summary this scenario represents a minimalist change policy

Scenario 2: Reduce farm prices (rapid reduction of agricultural price support and a switch to environmental or area-based payments); continuation of restrictive planning)

Under this scenario the decoupling of farm support from farmer's production decisions is taken to its logical conclusion through the phasing out of price guarantees and their replacement by production-neutral, decoupled payments, under pressure from the World Trade Organisation. The key assumption is that income transfers to farmers are made on strictly defined environmental or social grounds and that increasing transparency brings with it strong pressure to justify any payments

that are made in terms of the public goods produced. Policy is still on a voluntary basis with some farmers choosing to enrol land into the decoupled environmental schemes now widely on offer, or producing at world market prices. Such changes would be signalled during the forthcoming WTO negotiations, possibly with agreement in 2002/3 and followed by further CAP reform and implementation of decoupling over 5 - 10 years

Scenario 3: Rural Diversification - enhanced rural development policy with positive planning

This scenario assumes that rural land use policy is driven less by further changes in agricultural policy and more by greater emphasis being given to EU rural development policy. This policy is taken to imply the empowerment of local groups in line with the principle of subsidiarity and in accordance with recent community pilot initiatives embodying processes of community-led rural development (i.e. LEADER). The defining principle is one of local control of resources and land use policy, within a broad enabling framework of national and EU policies. Beside this, it is assumed that central governments issue planning guidance which gives greater priority to the development of the rural economy and less to countryside preservation. . Such a scenario provides an alternative to the agricultural-policy-led scenarios which have been criticised as relics of agricultural fundamentalism, at a time when the importance of agriculture to the rural economy has diminished. It is assumed that this proceeds in the context of a partially decoupled CAP, as outlined in Scenario 1 (the current trend scenario). In this scenario it is assumed that both national governments and the EU are prepared to cede much more power to local or regional representative bodies. This is not likely to happen until a minimum of 5-10 years have elapsed and could vary greatly across Europe.

A fuller description of the scenarios was provided to participants prior to the workshop.

3 THE STAKEHOLDERS

The invited stakeholders were familiar with the Stubai Valley and represented a wide range of land use interest from farming, conservation and forestry to planning. The participants were:

Peter Höller: Federal Forest Agency and Research Centre, Institute of Torrent and Avalanche Control
Sigbert Riccarbonna: Tyrolean Council for Environmental Affairs
Matthias Drösler: Department of Plant Ecology, University of Bayreuth
Richard Dietrich: Austrian Association of Research on Agriculture
Richard Nortz: Tyrolean Chamber of Agriculture
Erich Tasser: Area of Alpine Environment, European Academy, Bozen
Gudrun Wallentin: Zillertaler Hauptkamm High Mountain Natural Park
Bernd Stampfer: Dept. of Industrial Law, Tyrolean Government
Dieter Stöhr: Tyrolean Forest Authority
Johann Pfurtscheller: Landowner and farmer
Johann Jenewein: Department of Agriculture, Tyrolean Government

Facilitators were *Neil Bayfield* (Centre for Ecology and Hydrology, Scotland), *Alexander Cernusca* (University of Innsbruck) and *Ulrike Tappeiner* (University of Innsbruck)

4 WORKSHOP PROCEDURE

The workshop protocol was unique to the Carbomont Project and designed specifically to assess stakeholders perceptions of the effects of policy scenarios on mountain landscapes. However, the approach was essentially a multiple attribute ranking and scoring procedure (Saatay 1992) and derived to some extent from previous studies using stakeholders to assess the costs and benefits of alternative combinations of land use (Moss et al. 1996).

Prior to the workshop, participants were sent an outline of the procedure and aims of the meeting, together with a copy of the Shucksmith paper describing the three scenarios. The meeting comprised an introduction to the Carbomont Project and the sequence of working, followed by the three stages of the workshop. The workshop written materials and the working language were German but the introductory Powerpoint presentation was in English.

Stage 1. Effects of the scenarios on the main land use sectors

This first stage comprised a discussion of the likely effects of the scenarios on each of the main land use sectors: agriculture, forestry, conservation, recreation and tourism, transport and energy. The principal purpose of this stage was to collectively explore the scenarios and let the stakeholders discover the range of opinion present. The stakeholders were asked to decide whether the scenarios would be beneficial or detrimental to (or change the importance of) each of the land use sectors in the Stubai valley. After a preliminary discussion, individuals assessed the effects of each scenario on a proforma using a simple scale: 0 (no change), + small positive, ++

moderate positive, +++ large positive effect, - small negative, - - moderate negative, - - - large negative effect. The proforma is given in Appendix 1. As well as score boxes there were boxes for noting comments. A tally of the scores was then drawn up on a whiteboard to show the range of opinion for each sector. Further discussion of the scores followed and individuals could then change their evaluations if they wished.

Example: Scoring the effects of the scenarios on the agricultural sector

Sector	**Status quo**	**Reduce prices**	**Rural development**
Agriculture	0	- -	+

Stage 2. Changes in cover of functional land types

The stakeholders next considered each of the functional land cover types and judged how much of that type might be lost under each scenario, and to which other land type(s) it might be redistributed. The land cover types included were:

- **Arable**: *land cultivated to grow crops*
- **Meadows:** *land used for cutting hay or silage*
- **Intensive grazing**: *grasslands used intensively for grazing or cutting for fodder. Includes permanent grassland (meadows used for hay or silage and pastures used for grazing) and short term grassland (ploughed and reseeded at intervals of 3-10 years: mainly in Scotland).*
- **Extensive grazings**: *vegetation used for low intensity grazing that has usually not been improved by ploughing and with little or no fertilizer application. Includes areas of dwarf shrub heath in Scotland.*
- ***Scrub****: plant community dominated by shrubs often resulting from abandonment or low levels of grazing.*
- **Forest**: *deciduous or coniferous forest resulting from planting or natural regeneration.*
- **Wetlands:** *permanently or seasonally saturated communities such as bogs and marshes,*
- **Water:** *streams, rivers, lakes and ponds*
- **Bare**: *rock, scree, gravel and areas of incomplete vegetation cover due to extreme climatic or edaphic conditions*
- **Built environment**: *infrastructure such as settlements, buildings and roads*

For each land type the proportion (not the area) of the type that might be lost was estimated. Then the proportion to be redistributed was estimated for each recipient land type. The total redistributed was always to be 100%. Thus both sets of estimates were proportional and independent of the actual areas involved. All estimates were made on a proforma (Appendix 2).

Example: estimated changes from arable land to other types. Note: only losses were recorded: gains were to be estimated from changes in other types .

? *Proportion of arable cover loss for Status quo judged to be 10%, Reduce prices 50% and Rural diversification 0%*

✍ *Reallocation to other cover types: occurs only in Status quo and Reduce prices scenarios (no loss in Rural diversification scenario)*

Arable	**% loss**	***Meadow***	***Intensive grazings***	***Extensive grazings***	***Forests***	***Scrub***	***Water***	***Bare***	***Built environment***
Status quo	*10*	-	*90%*	-	*10%*	-	-	-	-
Reduce prices	*50*	-	*50*	-	*20*	*30*	-	-	-
Rural diversi-fication	*0*	-	-	-	-	-	-	-	-

Stage 3. Changes in pressures on individual land types

In the final stage, the stakeholders considered how the management pressures on each land type might change under the three scenarios. The pressures considered were:

- **Grazing**: including use by both domestic and wild animals
- **Cutting**: including mowing (pastures and meadows), felling (woodland) and thinning (scrub and woodland)
- **Burning**: mostly used as a management tool in Scotland but may also be used occasionally elsewhere, and can occur accidentally.
- **Organic fertilizer application:** fertilizer derived from organic sources such as manure and bones.
- **Inorganic fertilizer application:** fertilizer derived from chemical sources.
- **Ploughing**: mechanical inversion of the soil surface
- **Recreation pressures**: include trampling and path formation.

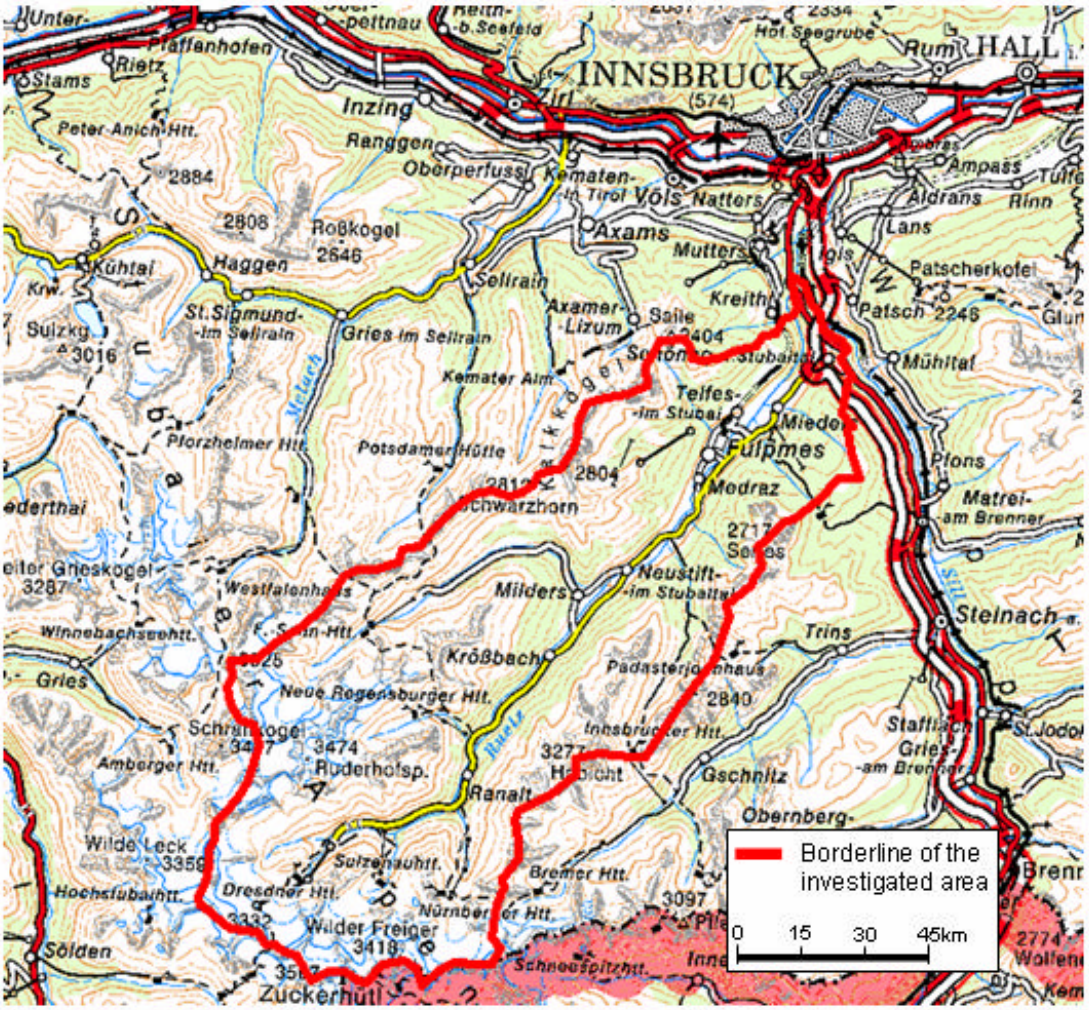
In each case changes were to be expressed as a percentage of current levels (=100%). Thus a drop by a half in grazing rates would score 50% and doubling the rate would be 200%. The proforma for this stage is given in Appendix 3.

Example: Assessment of the extent of change in management pressures on meadows resulting from each scenario, as a percentage of current levels (=100%).

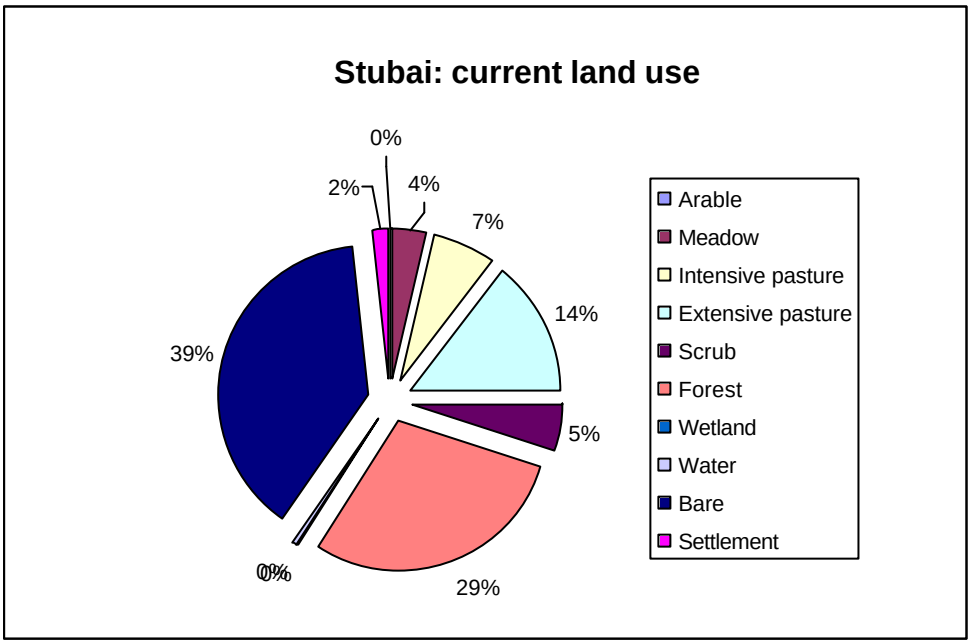
	Change (current conditions = 100%)			
Meadow	Grazing	Cutting	Fertilizing	Recreation
Status quo	50%	100%	125%	200%
Reduce prices	25%	50%	25%	125%
Rural diversification	100%	125%	75%	300%

5 THE STUDY AREA: STUBAI VALLEY

The Stubai Valley in Tirol is a side valley of the Wipp Valley in the Tyrolean Alps. The Wipp Valley is located between the Brenner Pass and Innsbruck on the route from Austria to Italy. The main village is Fulpmes. The main land uses are forestry, and agriculture, but tourism and recreation (particularly walking and skiing) are important contributors to the local economy. There is also an agricultural tool manufacturing business based in the valley.



Bare rock and partial vegetation cover on mountains comprise the largest functional cover type (39%) followed by forest (29%) and extensive pasture (14%). Meadows and pasture comprise about 11% in total and settlements about 2% of the area.



Current land use in Stubai (source: Bundesamt für Eich- und Vermessungswesen)

6 RESULTS

Stage 1: Estimates of impacts of the scenarios on land use sectors

There was considerable variation in the stakeholders assessments of the impacts of the scenarios on different land use sectors, and also in the degree of consensus on scores. There was good agreement about some sector - scenarios such as *agriculture/status quo* (9 out of 11 stakeholders scored -) but for others such as *conservation/reduce prices*, there was clearly quite a lot of uncertainty about possible effects (range of scores from - - to ++).

In general the *status quo* scenario was perceived to have a small negative effect on agriculture but a neutral or small positive effect on other sectors. The *reduce prices* scenario was detrimental to agriculture, conservation, tourism and transport but beneficial to forestry. *Rural diversification* was judged likely to have a neutral to moderately positive effect on all sectors.

Table 1. Stakeholders assessments of the effects of the scenarios on major land use sectors in the Stubai valley: 0 (no change), + small positive, ++ moderate positive, +++ large positive effect, - small negative, -- moderate negative, --- large negative effect. The columns show the numbers of stakeholders scoring in each

impact category. Categories with the highest number of scores are highlighted in red for each scenario. A full listing of stakeholders scores is given in Appendix4.

Sector	Scenario	Impact score totals						
		- - -	- -	-	0	+	++	+++
Agriculture	***Status quo***			9	1	1		
	Reduce prices		8	3				
	Rural diversification			3	4	2	2	
Forestry	***Status quo***			1	5	5		
	Reduce prices		2		2	7		
	Rural diversification			1	4	4	2	
Conservation	***Status quo***			2	3	6		
	Reduce prices		1	5	1		4	
	Rural diversification		1	1	2	5	2	
Tourism	***Status quo***			2	5	3	1	
	Reduce prices		1	6	1	1	2	
	Rural diversification				2	5	3	1
Housing	***Status quo***			1	7	3		
	Reduce prices			1	3	5	2	
	Rural diversification			4	5	2		
Transport	***Status quo***			3	4	4		
	Reduce prices		2	3	3	2	1	
	Rural diversification				1	4	5	1
Energy	***Status quo***				5	6		
	Reduce prices				2	8	1	
	Rural diversification				2	4	5	

Stage 2: Changes in cover of functional land types

Estimates of changes in the cover of land types were calculated from the original area of each type in the Stubai Valley (A), the estimated proportion of each type lost (P) and the proportion of the total reallocated to other land types (R). Thus the final area of each land type = original area (A) – proportion lost (A-AP) + areas gained from other land types (APRx1 to APRx10, where x1-10 are the ten land types).

The impacts of the scenarios on individual land types can be seen by comparing final areas as a proportion of current areas (=100) (Figure 1). This shows that all the scenarios could result in a reduction in the proportions of meadow, intensive pastures and extensive pastures. *Status quo* and *reduce prices* also reduce the proportions of arable land but *rural diversification* could increase it, probably through encouraging alternative crops.

Scrub was perceived to increase under all three scenarios, mainly through abandonment of agricultural land. Forestry, areas of water and wetlands would be little affected by any of the scenarios, although there could be some small increase in wetland under the *reduce prices* scenario, principally through the neglect of drainage of agricultural land. The largest proportional changes were in areas of settlement, particularly under the *rural diversification* scenario, where stakeholders expected a

substantial stimulation of new domestic and commercial building and some conversion of agricultural buildings and farmhouses.

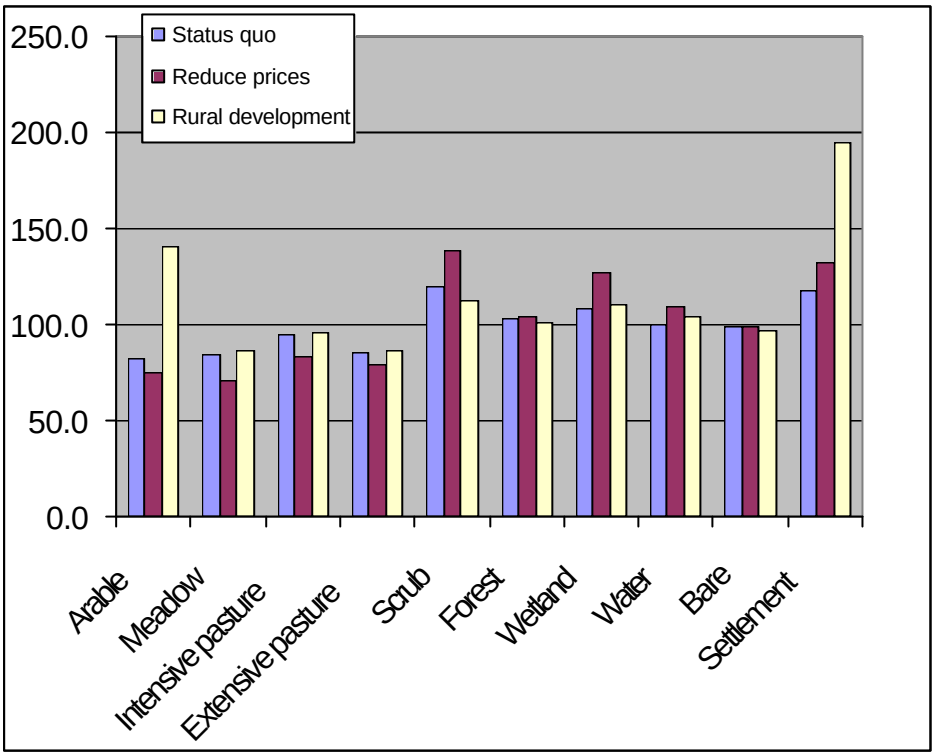


Figure 1. Stakeholders assessments of changes in the proportional areas of functional land types (relative to current areas=100) in response to three policy scenarios over a period of 20 years.

These proportional changes need to be seen in the context of the area as a whole, where the land types with the largest areas such as *bare* and *forest* are generally those with small changes in area. Consequently the landscape fabric (proportions of different land types and features) does not appear to have been greatly modified by the three scenarios (Figure 2).

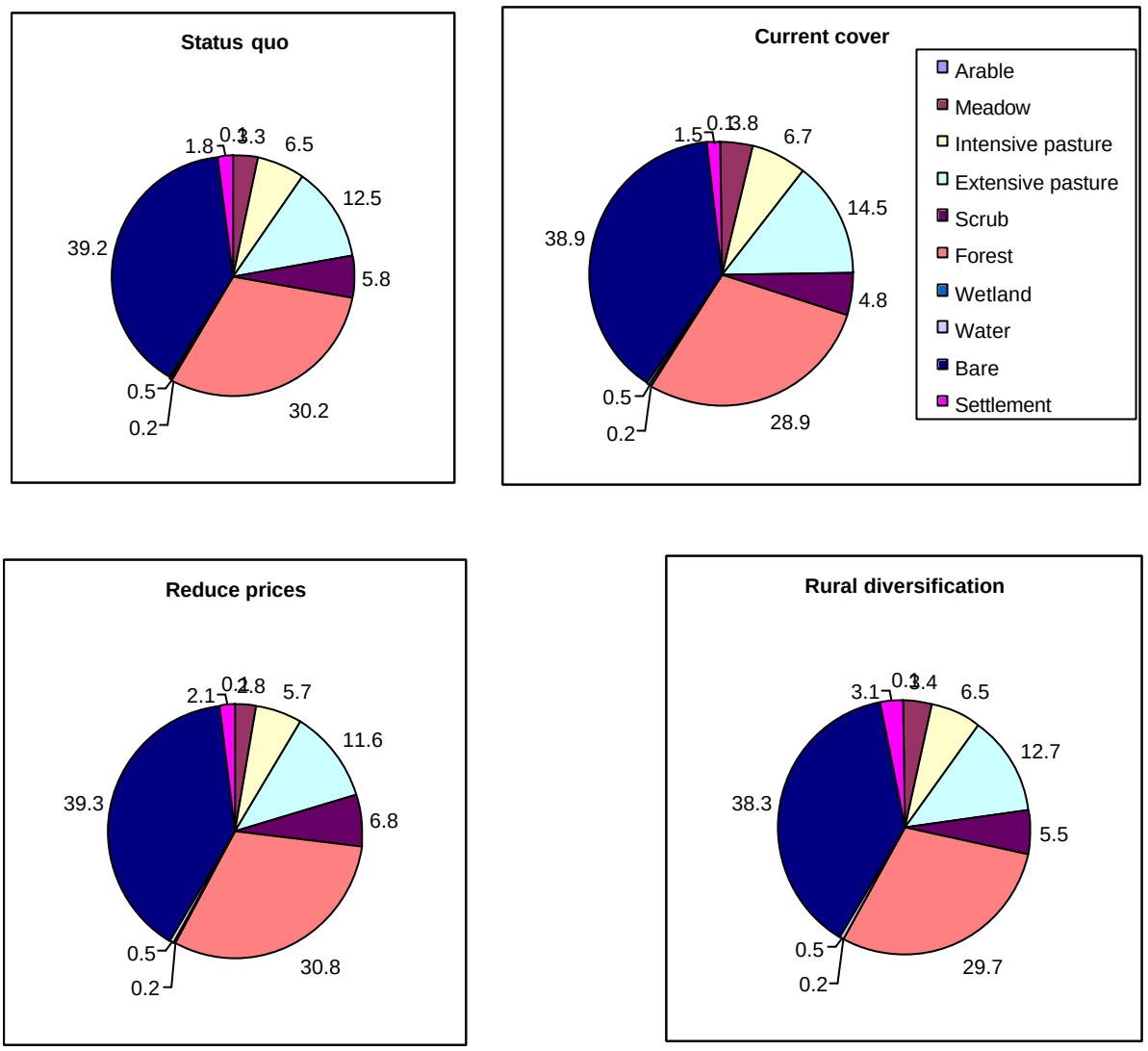


Figure 2. Comparison of the effects of the three scenarios on the areas of the main land cover types in the Stubai Valley

However, the relatively large changes in some of the smaller area categories such as arable, settlements and intensive grazings are likely to have a disproportionate effect on landscape views, since these categories are mainly in the valley bottom and provide the foreground from most viewing points. In a later stage of analysis it is planned to create virtual landscape views showing the changes from different viewpoints.

Stage 3: Changes in pressures on land types

The final stage of the workshop provided information on changes in the levels of management and other pressures on the land cover types, that might result from the three scenarios. Table 2 shows the mean levels of pressure on each of the land types for each scenario, relative to current levels (=100). For each mean the standard deviation (sd) indicates the amount of variation in scores between stakeholders.

Scores with a low sd (10 or less) had good agreement, those with higher values a wider range of scores.

Table 2. Assessments of changes in management and other pressures on functional land types in the Stubai Valley. Changes are relative to current levels (=100) Values 10 or more higher than current levels are highlighted in red. sd=standard deviation. Gray areas: pressure not applicable

Arable	**Grazing**	sd	**Cutting**	sd	**Fertilizers**	sd	**Ploughing**	sd	**Recreation**	sd
Status quo					**90**	7	**88**	10		
Reduce prices					**95**	16	**84**	17		
Rural diversification					**90**	12	**105**	33		
Meadow										
Status quo	**99**	20	**106**	19	**108**	17	**100**	0	**108**	12
Reduce prices	**102**	40	**93**	32	**106**	32	**100**	0	**116**	27
Rural diversification	**102**	11	**97**	14	**99**	13	**100**	0	**116**	17
Intensive grazings										
Status quo	**106**	9	**96**	13	**102**	12	**100**	0	**108**	14
Reduce prices	**115**	31	**87**	26	**99**	30	**100**	0	**110**	24
Rural diversification	**104**	12	**94**	25	**102**	12	**100**	0	**114**	17
Extensive grazings										
Status quo	**83**	17	**97**	10					**112**	25
Reduce prices	**70**	29	**100**	0					**105**	25
Rural diversification	**84**	17	**98**	7					**118**	31
Scrub										
Status quo	**79**	29							**106**	27
Reduce prices	**79**	33							**101**	27
Rural diversification	**87**	21							**110**	32
Woodland										
Status quo	**73**	24	**108**	15					**114**	32
Reduce prices	**63**	32	**101**	34					**110**	33
Rural diversification	**71**	29	**114**	36					**121**	36
Wetlands										
Status quo	**94**	17	**94**	15					**109**	22
Reduce prices	**84**	29	**76**	34					**99**	29
Rural diversification	**98**	22	**92**	16					**116**	30
Water										
Status quo									**135**	66
Reduce prices									**115**	26
Rural diversification									**140**	65
Bare										
Status quo	**86**	27							**115**	21
Reduce prices	**83**	30							**108**	18
Rural diversification	**84**	27							**123**	33

In general most of the changes expected would be modest, with maximum changes of about 40% and the majority in the range 5-20%. In some cases no change was expected. Changes of ± 10% or more have been highlighted in the Table. The overall pattern was for a decline in most agricultural pressures and an increase in use of land types for recreation of various kinds.

On arable land the main pressures are the levels of fertilizers and frequency of ploughing. In general stakeholders judged that use of arable land (of which there is very little in the Stubai valley) would become less intense, with lower levels of fertilizers and less frequent ploughing. A small increase in ploughing was predicted for the *rural diversification* scenario, reflecting a possibly more varied pattern of land use with new types of funding for alternative land uses. Little change in use of meadows was expected except that recreational use might increase, particularly under *reduce prices* and *rural diversification.*

Intensive grazings were expected to be grazed more heavily, particularly under *reduce prices.* Recreational use might increase under al three scenarios. The pattern on extensive grazings was however quite different, with substantial drops in levels of grazing (particularly *reduce prices*), as price support declines in all three scenarios. More recreational use was also expected under all three scenarios.
The declines in grazing levels in forests and scrub were also expected to drop sharply, and there were expected to be modest increases in recreational use, through anticipated funding for new recreation based enterprises under the *rural diversification* scenario. Levels of timber extraction were not predicted to be much affected by any of the scenarios.

Cutting and grazing of wetlands were predicted to decline slightly as environmentally based management payments become more prevalent under all three scenarios. Some increase in recreational use of wetlands (such as creating fish ponds or shooting wildfowl) might occur under *status quo* or *rural diversification* as a means of increasing farmers incomes. This seemed less likely under *reduce prices*.

Increased use of rivers and lakes for recreation was expected under all scenarios. Bare and semi-bare ground was expected to be used more for recreation (particularly skiing) but use for grazing could decline as extensive use of higher ground becomes increasingly uneconomic.

DISCUSSION

An important question in stakeholder workshops like this is how representative the participants were of the interests of the area. A small group can rarely be fully representative, but each stakeholder was asked to make judgements based on his own general knowledge and experience of the area as well as from his professional perspective. In this case the protocol involved getting individual scores and not just the consensus of the group (which can often be swayed by a persuasive individual) so it was possible to see which decisions had a narrow range of scores and those for which there were more variable results. Since the stakeholders represented a fairly wide range of interests, the conclusions that they broadly agreed on should be fairly reliable and those on which there was a wider scatter of scores relatively uncertain. To explore the views of a wider cross section of stakeholders would probably require a different approach, such as interview surveys of interest groups such as farmers or hoteliers.

Another question concerns how realistic the scenarios are. The Common Agricultural Policy is currently under review and various proposals are under consideration.

Change seems inevitable and indeed has already been occurring, with gradual erosion of farm price support and introduction of some rural diversification policy instruments (Dax & Hovorka 2002, European Commission 2001, Crabtree 2002). However, although elements of area-based and environmentally-based payments to land users, and introduction of more rural diversification measures seem likely, the balance of change is still uncertain, and subject to the vagaries of political decision making. Consequently the scenarios adopted for this study are broadly generic. It is nevertheless hoped that they address many of the issues that are likely to be taken into account in the revisions of the CAP by the European Union.

The data produced from this workshop will be combined with a Geographic Information System covering the Stubai Valley to produce predictive landscape models that will be used in the CARBOMONT programme to examine the implications of the policies for carbon and nitrogen cycling in mountain areas. It will also be possible to produce virtual landscape views showing the visual impacts of the scenarios from different viewpoints. However, it will probably be necessary to slightly modify the views so that they cannot be precisely located in case this should be seen as promoting or suppressing development in any specific location.

The intention is to hold workshops at CARBOMONT sites across Europe using the same protocols. This will permit comparison of the effects of the same scenarios in very different mountain situations.

RERERENCES

Crabtree, R. (2001). The public system framework to support mountain agriculture in force in Northern Europe and the mechanism of measurement of positive externalities. Euromontana Capracotta Seminar 21-24 June 2001. Final Report: Mountain Agriculture towards Sustainable Development. pp.59-64

Dax, T & Hovorka, G (2002). Co-operative strategies and institutional development in the Alpine pasture area Teichalm-Sommeralm, Austria. Innovative structures for sustainable developmant of mountain areas. ISDEMA Project. Paper to the Thessaloniki Seminar 17-18 March 2002.

European Commission (2001). Unity, solidarity, diversity for Europe, its people and its territory. Second Report on Economic and Social Cohesion. European Commission, Luxembourg.

Shucksmith M. (2000) The future of the countryside: scenarios for policy change. Draft paper to Scottish Executive (slightly modified with permission).

Moss, R., Catt, D.C., Bayfield, N.G. & French, D.D. (1996). The application of decision theory to sustainable management of an upland Scottish estate. Journal of Applied Statistics 23, 211-229

Saatay, T.L.(1992). Multicriteria Decision Making: The Analytical Hierarchy Process. RVS Publications, Pitsberg.

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We would like to thank Alexander Scharfs for translating the forms and background materials for the workshop.

Appendix 1

Stage 1. Effects of the scenarios on the activities of the following sectors of rural land use proforma

Score each box: 0 (no change), + small positive, ++ moderate positive, +++ large positive effect, - small negative, - - moderate negative, - - - large negative effect

	Status quo	Reduce farm prices	Rural diversification
Agriculture			
Forestry & tree planting			
Conservation			
Recreation and tourism			
Housing settlements, populations			
Transport, routes and provision			
Energy use and production			

Appendix 2 Stage 2: Assessing losses of cover and reallocation to other types proforma (reduced size)

		Loss	Reallocation								
Land cover type	Scenario	Loss (%)	Arable	Intensive grazings	Extensive grazings	Scrub	Forests	Wetland	Running /standing waters	Bare	Built environment
Arable	Status quo										
	Reduce prices										
	Diversification										
Intensive grazing	Status quo										
	Reduce prices										
	Diversification										
Extensive grazing	Status quo										
	Reduce prices										
	Diversification										
Scrub	Status quo										
	Reduce prices										
	Diversification										
Forests	Status quo										
	Reduce prices										
	Diversification										
Wetlands	Status quo										
	Reduce prices										
	Diversification										
Freshwaters	Status quo										
	Reduce prices										
	Diversification										
Bare	Status quo										
	Reduce prices										
	Diversification										
Built environment	Status quo										
	Reduce prices										
	Diversification										

Add any comments as numbered notes below

Appendix 3 Stage 3: Changes in management pressures proforma (reduced size)

			Grazing	Cutting	Fertilizers	Ploughing	Recreation	Other
Arable	1	Status quo						
	2	Reduce prices						
	3	Diversification						
Int. grazings	1	Status quo						
	2	Reduce prices						
	3	Diversification						
Extensive grazings	1	Status quo						
	2	Reduce prices						
	3	Diversification						
Scrub	1	Status quo						
	2	Reduce prices						
	3	Diversification						
Forests	1	Status quo						
	2	Reduce prices						
	3	Diversification						
Wetlands	1	Status quo						
	2	Reduce prices						
	3	Diversification						
Running/standing waters	1	Status quo						
	2	Reduce prices						
	3	Diversification						
Bare ground	1	Status quo						
	2	Reduce prices						
	3	Diversification						

Please add numbered comments below:

Appendix 4. Listing of individual stakeholder scores for impacts of the scenarios on land use sectors in the Stubai Valley. 0 (no change), + small positive, ++ moderate positive, +++ large positive effect, - small negative, - - moderate negative, - - - large negative effect.

Sector	Scenario	Stakeholder											Impact score totals						
		1	2	3	4	5	6	7	8	9	10	11	- - -	- -	-	0	+	++	+++
Agriculture	***Status quo***	+	-	-	-	-	-	-	-	0	-	-			9	1	1		
	Reduce prices	- -	- -	- -	- -	- -	- -	- -	-	-	-	- -		8	3				
	Rural diversification	0	-	0	0	0	+	++	-	++	-	+			3	4	2	2	
Forestry	***Status quo***	0	+	0	+	+	+	-	0	+	0	0			1	5	5		
	Reduce prices	+	+	+	0	+	+	- -	0	+	+	- -		2		2	7		
	Rural diversification	-	+	++	+	0	0	+	0	++	0	+			1	4	4	2	
Conservation	***Status quo***	0	+	0	0	-	+	+	+	+	+	-			2	3	6		
	Reduce prices	-	++	-	- -	-	++	++	0	++	-	-		1	5	1		4	
	Rural diversification	- -	0	+	-	+	0	+	+	++	+	+		1	1	2	5	2	
Tourism	***Status quo***	+	0	++	0	0	0	+	0	-	+	-			2	5	3	1	
	Reduce prices	++	++	-	-	-	+	- -	0	-	-	-		1	6	1	1	2	
	Rural diversification	+++	++	+	0	+	+ +	++	+	+	0	+				2	5	3	1
Housing	***Status quo***	0	0	0	0	0	+	+	0	+	0	-			1	7	3		
	Reduce prices	+	+	+	+	0	+	++	0	++	0	-			1	3	5	2	
	Rural diversification	+	-	-	-	0	0	-	0	+	0	0			4	5	2		
Transport	***Status quo***	+	0	0	-	+	0	+	+	0	-	-			3	4	4		
	Reduce prices	0	++	-	- -	0	0	-	+	-	+	- -		2	3	3	2	1	
	Rural diversification	+	+	++	++	+	++	++	0	+++	++	+				1	4	5	1
Energy	***Status quo***	0	0	0	+	+	+	+	+	0	+	0				5	6		
	Reduce prices	+	+	0	+	+	+	++	+	+	+	0				2	8	1	
	Rural diversification	+	++	0	++	+	++	+	+	++	++	0				2	4	5	