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Maintenance of the traditional cultivated Alpine landscape by means of
institutional resource regimes involving diverse forms of collective action
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The Application of the Principle of Sustainable Development to the Resource Landscape

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Summary

The principle of the sustainable development of environmental goods at regional level has failed up to now due to the lack of region-specific criteria and indicators and definition of target values. The definition of targets for the environmental and cultural good “landscape” is rendered particularly difficult by the fact that it has proved practically impossible to reach a consensus on thematic objectives and indicators for the socio-cultural and economic dimensions of sustainability. These problems are overcome somewhat by this study because the methodological approach adopted, which focuses on the goods and services provided by a concrete landscape, does not attempt to record and evaluate absolute biodiversity, but instead addresses the question as to who, how and based on what rights biodiversity is used as an environmental good. This focus on the used or unused goods and services provided by a landscape makes it possible to establish whether or not one use (e.g. agriculture) has a negative or positive effect on another use (e.g. recreation). The use of the landscape is evaluated using various landscape indicators and related to the dimensions of space and time with the local population and user groups also taken into account. This makes it possible to make qualitative observations on the changes in landscape use (based on the three changing interaction services of the landscape, the ecological, socio-cultural and aesthetic quality of the landscape). Furthermore, the analysis of the institutional regime of the landscape, which incorporates the extent of the regulation of the goods and services produced, on the one hand, and the coherency among the actors, on the other, enables the comparison of the institutional degree of resource use with the changes in the sustainability of landscape use. The institutional resource regimes relating to the landscape and their influence on the landscape are ascertained in six case studies using indicators. The initial results of the study will be available in 2004.

Résumé

Le principe du développement durable des biens environnementaux au niveau régional a échoué jusqu'à présent à cause de l'absence de critères et indicateurs adaptés à la situation régionale, ainsi que de valeurs à atteindre non clairement définies.

Pour le paysage, un bien environnemental et culturel, la définition de telles valeurs est encore compliquée par le fait qu'un consensus sur les indicateurs et les buts à atteindre des dimensions socioculturelles et économiques de la durabilité est quasiment impossible. Dans le présent travail, ces problèmes sont atténus, car l'approche méthodologique par les biens et services fournis par le paysage ne vise pas, par exemple, à saisir et juger la biodiversité de façon absolue, mais plutôt à comprendre comment, par qui et en vertu de quels droits ce bien est utilisé. L'approche par les biens et services utilisés ou non du paysage permet de savoir si une utilisation (p. ex. l'agriculture) a des conséquences positives ou négatives sur une autre utilisation (p. ex. la fonction de détente du paysage). Les utilisations du paysage sont évaluées à l'aide de différents indicateurs en tenant compte des dimensions spatiales et temporelles, ainsi qu'en associant la population locale et les groupes d'utilisateurs. Il devient ainsi possible de s'exprimer sur les changements d'utilisation du paysage (qui se répercutent sur ses qualités écologiques, socioculturelles et esthétiques, découlant de l'interaction et de la combinaison des différents biens et services). De plus, l'analyse du régime institutionnel du paysage, qui comprend, d'un côté, l'étendue des biens et services régulés et, de l'autre, la cohérence parmi les acteurs, permet une mise en relation entre le type de régime et la durabilité de l'utilisation du paysage. Le régime institutionnel de la ressource paysage et son influence sur le paysage est analysé à l'aide d'indicateurs dans six études de cas. Les premiers résultats seront disponibles en 2004.

1. The concept of sustainable landscape development

As a normative and regulative concept, the concept of sustainable landscape development involves the linking of economic and social dimensions with the requirement of the preservation of natural resources and the consideration of the environment's carrying capacity. Economics, ecology and social balance should, therefore, be understood as a unity in this context (Häberli et al. 2002). Now and in the future, both locally and globally, the habitats of people, animals and plants should be guaranteed for future generations and allow all populations to lead a just and humane life (Bundesamt für Statistik et al. 2002). According to the Swiss Federal Constitution (Article 73), the Swiss Confederation and cantons should strive to achieve an enduring equilibrium between nature, its capacity to renew itself and its use by man. Thus, in the context of the use of natural resources, restrictions should be imposed in all cases in which signs of scarcity and irreversible depletion emerge, both now and in the future. The objectives and strategies for the concretization of the concept of sustainability are defined in Agenda 21, which was ratified by 181 states at the UN conference for environment and development in 1992 in Rio de Janeiro.

The Swiss Federal Council (i.e. government) passed its "Strategy for Sustainable Development", which defines ten fields of action incorporating a total of 22 measures, in 1992. Since 1992, regional and local sustainable development concepts and projects have been developed as part of top-down and bottom-up processes in numerous countries (Keiner 2002). The disadvantage of the holistic definition of sustainability, which incorporates all societal, economic and ecological aspects of life which must, by necessity, be thematically restricted when applied in local and regional contexts, is seen in the otherwise welcome variety of sustainability initiatives implemented up to now. The fact is that a large number of the factors that affect the man-environment system lie outside the action space of the target groups identified by such local measures (local agriculture, forest owners, authorities, population).

The origins of the concept of sustainability are based on a principle adopted from resource-economics, according to which only the interest that accrues at regular intervals from a given capital (i.e. environmental goods) should be used (Basler 1972). As is generally known, this principle was first applied in the forestry sector, which has adopted this simple and obvious concept as its fundamental rule throughout Europe in recent years. According to Basler (1972), the analogies between the world economy and the forestry sector are so striking that support for this concept would eventually have become virtually unavoidable. Traditionally,

application of the principle of sustainability in the forestry sector was restricted to the area of timber yield; i.e. the latter was not to exceed natural growth in the same period (after Kasthofer 1818). This sustainable yield approach is comparable to the worldview of a utilitarian ethics of nature – the requirement of sustainability is primarily aimed at humans who use natural resources, i.e. plants and animals cannot be “obliged” to adopt the principle of sustainability (Merchant in Dürr 1989). Nowadays, however, sustainable timber yield is merely one component in the multifunctional arsenal of sustainable forest management (ecosystem protection, protection against natural hazards, leisure function etc.).

This anthropocentric approach to the concept of sustainability (Thierstein und Lamprecht 1998) is also justifiable on the basis that the ecological crisis is ultimately down to human intervention in the world’s ecosystems and must, therefore, be described correctly as a cultural crisis (Markl 1986). Hence, the postulate of sustainable development is shifting towards the area of fundamental human rights. In the context of this study, the target area of sustainability is the landscape as the area perceived by man whose character is the result of the action and interaction of natural and/or human factors (definition in accordance with the European Landscape Convention 2000, of which Switzerland is a signatory). The following postulate was formulated in the framework of the Swiss MONET project on sustainability indicators: “The design of man’s natural habitat must be guided by the idea of human rights. Human dignity demands a natural and traditional landscape that is worth living in” (Bundesamt für Statistik et al. 2002). Thus, this approach prompts the legal and political question as to the moral-ethical obligations that are associated with the constitutionally and legally protected right to use components of the landscape acquired through purchase, inheritance or other means and the nature of the role of the state or international community of states in the control of these use rights.

As long ago as 1338/39, the Italian artist Ambrogio Lorenzetti presented a vision of a sustainable and non-sustainable world in his frescoes, *Allegories of Good and Bad Government*, which he painted on the walls of Siena’s Palazzo Pubblico. In the first fresco he associated the vision of ideal government, personified as virtues such as greatness, harmony, strength and wisdom, with the harmonious life and economic activities of man in the country and the city. His depiction of the landscape in this work still corresponds to today’s ideal of a gentle, varied and well-tended traditional Tuscan landscape. As opposed to this, corruption, strife, murder and poverty reign in the in the second fresco, in which the city and country are characterized by decline and devastation (Rodewald 1999). Thus, the success of the concept

of sustainability in the context of the resource landscape is strongly dependent on whether or not we succeed in politically controlling the use of its various goods and services in accordance with the principle of sustainable yield so that overexploitation can be avoided and balance struck between culture and nature. Shortages of the resource landscape involve not only ecological damage such as a decline in biodiversity, but equally the impairment of its aesthetic and socio-cultural qualities. The latter play a decisive role our perception and definition of the area that surrounds us as a landscape.

The conceptual and methodical consequences of the above considerations mean that the traditional ecology-biased instruments for the evaluation of the (target) status of landscapes (landscape and nature conservation planning, spatial and forest development planning) are inadequate. They must be complemented with actor-specific assessments of aesthetic and socio-cultural qualities and with the monitoring of the institutional determinants of the behaviour of landscape users. These determinants largely consist in the structure of property title, disposal and use rights and in the rules imposed by spatially relevant protection and use policies. The necessity of the postulated inclusion of these institutional frame conditions is already evident in the overview of the most important problems found in the area of the landscape provided in Table 1.

The specific combination of a property-rights code and implementation acts from protection and use policies concerning the goods and services of the resource landscape which are regulated as a result is referred to as the institutional regime (IR) of the resource landscape (Knoepfel et al. 2001).

Table 1: Summary of problems in rural areas from the perspective of economic, ecological, social/cultural and political dimensions and based on the data obtained in the interviews (based on Rodewald and Knoepfel 2001)

Dimension	Problem
<i>Economic</i>	Concentration trends
	Shifting of economic activities to urban agglomerations
	Decline of agriculture
	Cutthroat competition and market saturation in the “hard” tourism sector
<i>Ecological</i>	Agglomeration
	Land use
	High volumes of traffic
	Loss of traditional landscape values
<i>Socio-cultural</i>	Loss of attachment to geographical area, identity
	Threat to basic services
	Lack of educational and employment opportunities/emigration
	Deficits in the area of participation, public involvement, integration capacity
<i>Political</i>	Threatened softening of cohesion policy
	Deregulation, specifically in the area of environmental protection and spatial planning
	Gulf between liberal economic policy and environment policy
	Privatization of state-run enterprises and threat to the maintenance of basic services

2. Strong or weak sustainability for the landscape?

Two main currents have emerged in terms of the conceptual approach to sustainability: weak and strong sustainability (Cabeza Gutés 1996, Thierstein und Lambrecht 1998, Getzner 1999). The difference between these two concepts concerns the question of the substitutability of natural and environmental goods by technical developments. In the case of weak sustainability, it is assumed that natural functions can be fulfilled by human capital goods, i.e. technical systems (e.g. avalanche protection structures instead of protection forests, genetically modified organisms instead of natural organisms). In accordance with this approach, social-economic growth at the expense of primary environmental goods would not be fundamentally defined *a priori* as unsustainable. As opposed to this, strong sustainability

assigns an intrinsic value and integrity to nature which is very difficult to reconcile with the above-mentioned concept of substitutability. These conflicting approaches to sustainability are also behind the fact that the concrete application of the concept in the area of landscape change often produces highly diverging assessments, depending on the position of the actors involved (Table 2).

Table 2: Concretization of landscape sustainability and degree of agreement between the proponents of strong und weak sustainability (+++: high level of agreement; ++ average level of agreement; +: low level of agreement, numerous and significant deviations in opinion) (adapted from Thierstein and Lambrecht 1998)

		Dimensions of landscape sustainability		
		Ecological	Economic	Socio-cultural
Level of concretization of landscape sustainability	Definition of the three dimensions	+++	+++	+++
	Concepts, postulates	+++	+	++
	Thematic objectives	++	+	++
	Indicators	++	+	+

Table 2 shows that in the case of the ecological dimension of sustainability, there is a relatively high level of consensus between the two approaches with respect to concepts, objectives and indicators while significant differences exist with regard to the economic and socio-cultural dimensions. As far as the landscape is concerned, a weak sustainability approach would not be very acceptable, particularly with respect to the substitutability of biodiversity. From the perspective of environmental ethics, the question concerning the minimum level of biodiversity required by the man-environment system seems entirely inappropriate. A similar argument applies in the case of the cultural-historical aspect of the landscape. The definition of target values for absolute protection limits should, therefore, be based on the strong-sustainability model. As opposed to this, in the case of landscapes with strong cultural characteristics, for example the case of settlement and transport areas, it is possible to start with trade-offs in favour of more valuable ecological, social or economic qualities. This kind of holistic assessment is facilitated by the concept of institutional

landscape regimes, which is presented below, as they make it possible to diagnose unsustainable use situations at an early stage and to demonstrate their causes in the form of actor-specific changes in use behaviour and the institutional factors that determine these changes in behaviour.

3. Institutional resource regimes for the landscape

In April 2002 the Swiss National Science Foundation initiated a five-year programme on the topic of “Landscapes and Habitats of the Alps” (www.nfp48.ch) which was based on the Austrian research programme on “Traditional Landscapes” (www.klf.at). In the initial phase of the programme (2002 – 2005) a total of 35 projects focussing on the following five main areas will be completed: processes of perception, processes of change, designing goals in landscape evolution, land use and adding value and, finally, virtual representation. The authors of this paper are carrying out a study on the relationship between property, disposal and use rights, public protection and use policies and changes in selected landscapes entitled *“Pflege der alpinen Kulturlandschaft und ökologische Reproduktionsmassnahmen zur Aufrechterhaltung des Lebens- und Nutzungsraumes mittels institutioneller Ressourcen regime auf der Basis von Gemeinwerken, Allmendregeln und anderer kollektiver Zusammenarbeitsformen”* (“Maintenance of the traditional cultivated Alpine landscape and ecological reproduction measures for the preservation of living and usable areas by means of institutional resource regimes based on common property, the rules governing the use of common land and other collective forms of co-operation”). The study is being carried out in the following six areas: Valle Bavona, canton of Ticino; Sent/Ramosch/Tschlin, in Unterengadin, canton of Graubünden; Val Mora/Münstertal in the canton of Graubünden; Baltschiedertal in the canton of Valais; Aletschgebiet in the canton of Valais; and Lavaux in the canton of Vaud (representing an area outside the Alpine region). These landscapes were selected on the basis of continuing high quality of their landscapes, the variety of socio-economic influences (tourism, desuetude, overexploitation and settlement activity), the existing regional (bottom-up) or national (top-down) conservation projects and varying (collective and private) property structures. The central question to be addressed by the study is: “How do different institutional resource regimes affect the users of landscapes and the state of the landscape, and what influence do collective forms of ownership have on the future sustainable development of the landscape?”

Behind this central question lies the hypothesis that change in landscapes is largely dependent on the definition and design of the property and use rights governing the landscape in question and its elements. Accordingly, the more integrated the institutional resource regime governing a landscape is, the more sustainable its development is likely to be. In an integrated system, the heterogeneous multiple uses made by various user groups are optimally tailored to each other and the implemented protection and use policies ensure that these uses do not exceed the capacities of the entire resource. This approach has already been successfully applied in the case of the resources soil, water and forest (Knoepfel et al. 2001, 2003).

As we know, today there are no actual property rights to the resource landscape. However, processes of appropriation are very common and evidenced, for example in the sense of individual identification with a landscape, its use for recreational purposes, its evocation of a sense of longing and also in its use by the tourism and advertising sectors. Thus, despite the fact that it does not “belong” to us, when describing an environment that is very familiar to us we often use possessive pronouns because we have appropriated it for purposes of identity and well-being (i.e. “our forest”, “my view”, “my town”, “my walk”). As indicated by Binswanger (1998), based on this “co-ownership” we want to be able to dispose of it to a certain extent (for example, through the rejection of traffic noise or ugly buildings) just as we are used to doing in the context of our bodies or psyche. Thus, while the question as to who owns the Matterhorn may seem irrelevant at an initial glance, the increasing marketing of this highly symbolic mountain, the hampering of the individual experience of nature by local residents due to mass tourism and the increasing appreciation of such landscapes clearly demonstrate the important role that the property question plays in the context of sustainable landscape development.

4. The goods and services provided by the landscape

In order to evaluate the situation with respect to the use of landscape, which is important in the context of sustainability, we have adopted an approach that is common in resource economics and involves the identification of the specific goods and services provided by the resource landscape just as with other renewable natural resources (Knoepfel et al. 2001). These goods and services (Table 3) basically include all of the locatable protection and use goods and services, for example, space for the construction of housing, transport infrastructure, agriculture and tourism. This approach avoids the unreliable reduction of the

different landscape functions to ecological protection goods as often occurs with the more traditional approach. Furthermore, the inclusion of services makes it possible to take the central aesthetic and hence closely associated environment-ethical components of landscapes into account. Unlike the basic resources of water, soil, forest etc. landscapes produce “excess” goods and services. We define this “excess” as *ecological, socio-cultural and aesthetic landscape quality* which results from the interaction and combination of the different goods and services provided by the aforementioned basic resources (cf. also van Mansvelt and van der Lubbe 1999). For this reason, they are referred to as *interaction services*.

The status of the goods and services in relation to each other is basically equal. They are “possessed”, held, used and exploited by individuals, the state and associations, or by all or none of these (Bromley 1997/98). If the use of one good hinders the protection of another, the quality of the central interaction service of the landscape resource in question is negatively affected.

Table 3: The goods and services provided by the landscape (The interaction service means the overall quality arising from the relevant goods and services which constitutes the “excess” dimension of the landscape as compared with the basic resources of soil, water, air, forest etc.)

Interaction service	Goods and services	Potential users of the goods and services
1) Ecological quality of the landscape	1a) Provision of (a)biotic spatial factors 1b) Provision of networked priority natural areas 1c) Store of genetic variety (biodiversity) 1d) Regulation of the water cycle 1e) Regulation of dynamic processes (natural events) 1f) Regulation of population dynamics 1g) Space for natural history and science	1a) Entire population 1b) Farmers 1c) NGOs, scientists 1d) Power plant operators 1e) Community 1f) Hunters, mushroom collectors, scientists 1g) Historians, Pro Natura (Swiss nature conservation organization)
2) Socio-cultural quality of the landscape	2a) Space for agricultural use 2b) Space for forestry use	2a) Farmers 2b) Forest owners

	2c) Space for settlement activities 2d) Spatial structuring of mobility and transport 2e) Space for cultural history and built heritage 2f) Space for cultural diversity 2g) Location that provides satisfaction and well-being	2c) Owners of development land 2d) Transport associations, land owners 2e) Tourism operators, protection of monuments 2f) Regional managers, marketing companies 2g) Town planners, cyclists
3) Aesthetic quality of the landscape	3a) Space for recreational functions (incl. tourism, leisure, experience of nature) 3b) Space providing maximum possible free access 3c) Provider of stories and images of home 3d) Location for aesthetic perception of the landscape 3e) Bearer of value added (advertising, regional marketing, tourism) 3f) Space for identity and provider of identification structures	3a) Golf-course builders, funicular operators, tourism operators, nature conservation representatives 3b) Private owners, recreation seekers 3c) Publishers, creators of culture 3d) Tourists, residents 3e) Postcard manufacturers, photographers, regional planners, nature conservation associations 3f) Local authority officials, farmers, citizens forums, would-be builders, tourism promoters

Landscape – a collective good?

As a rule, there is an overlap between the numerous goods and services used by various actors in the context of landscapes. Apart from being an economic good used by mountain farmers, mountain pastures also provide space for leisure seekers to enjoy nature and constitute a location of genetic diversity. Such overlaps between goods and services that are used in different ways represent one of the main problems encountered in the analysis and control of the sustainable use of all natural resources. They frequently result in the presence of a number of actors who simply act in their own interest and on the basis of different property and use rights. This gives rise to rivalries with respect to the use of individual or groups of goods and services provided by the resource landscape which could jeopardize the capacity of the landscape to produce the aforementioned interaction services. As its continued existence is

necessary to ensure the ongoing fulfilment of general welfare requirements, in this regard landscape is a collective good (which is meritorious in nature) (Lenk und Maring 2001).

The – normative – concept of the collective good entails, however, a social obligation on the part of the owners of the property and use rights to the basic resources of landscapes and, possibly also, to the aforementioned interactive services. The scope of this obligation is defined by the constitution and the rules imposed by the relevant policies. Today, natural and immaterial resources that are at risk from overexploitation are often defined by politics and/or science as collective goods (or “commons”). The suggestion here is that a large number of people should have direct or indirect access to the (individual) goods and services provided by such resources, which is why the body or instance that governs the right of disposal to the resource in question should be located at collective level (Wijkman 1982). The concept of the “commons” is, however, somewhat confusing in this context as, particularly in the case of “ownerless” resources like landscape or air, the right to the use of such goods can actually reside (formally or informally) with private, collective or state entities. Thus, the real extent to which interested users can be excluded and the actual distribution of these rights among these user groups can be grossly contradictory to the economic-normative concept of the “commons”. The traditional German, Swiss and Austrian system of the *Allmende*, i.e. common land or pasture, is a good example of real collective property or ownership (Lenhard und Rodewald 2000) as, contrary to the widespread theory of the “tragedy of the commons” (Hardin 1968), it was regulated in a way that ensured the long-term maintenance and conservation of the pasture or irrigation system (Ostrom 1990, Trawick 2002). Marquardt shows how various legal forms of ownership were generally at work in the case of the *Allmende*. Thus, such systems often involved the property of extended families, co-operative property and absolute private ownership (Marquardt 2002).

Ultimately, the question arises as to whether the division of nature and the landscape into ecologically valued goods does not eventually give rise to “ownership imperialism” (Lenk and Maring 2001) and, whether “ownerless” goods should not be promoted out of ethical considerations (intrinsic right of nature). Experience shows, however, that ownerless goods (e.g. the fish stocks in the world’s seas) tend to be overexploited as a direct result of the lack of well-defined property rights. The same principle should be applicable for the landscape. Its interaction services must be largely described as ownerless services which should be managed collectively in the public interest and which, due to the lack of clearly defined use rights, are

currently at risk from *de facto* appropriation by identifiable user groups and the overexploitation that inevitably arises as a result.

The institutional landscape regime approach – in tune with resource economics – assumes that “ownerless” resources such as the oceans, air, Antarctica, (biologically diverse) biomass and indeed, the landscape can only be used sustainably if the property, use, disposal, information and transaction rights to the resource itself and the goods and services it provides are precisely defined, and a transparent mechanism is provided for the distribution of these rights among identifiable and responsible user groups (Knoepfel et. al., 2003). Thus, from this perspective, it is less significant whether the resource is publicly or privately owned. What is more important is how the property and use rights are designed and organized (Binswanger 1998). Thus, for example, Binswanger suggests that to fulfil the aims of sustainability, more patrimonial elements should be incorporated into the property rights – in this context *patrimonium* is understood as the opposite of *dominimum*, i.e. property which is inherited from the father and is intended to be passed on to the next generation and, hence, used but not used up. The greater the level of collective decision-making and disposal rights, the more convincing and effective this kind of design of disposal and use rights could be (Rodewald 2002). Such an approach would also correspond to an old ecological theory concerning greater collective responsibility for the environment and the landscape as man’s collective legacy (Ward und Dubois 1972, Markl 1986, Ost 2003).

5. The quality targets and indicators of sustainable landscape development

Today, the implementation of the concept of sustainable development in the context of the landscape has only shown some initial signs of success. Some promising work was carried out in the context of the Austrian research programme “*Kulturlandschaften*” (Traditional Landscapes) (studies by T. Wrbka [Wrbka et al. 1999] and H. Haberl [Haberl and Schandl 1999]). Other initial work has been carried out as part of the studies on “*Bergspezifische Umweltqualitätsziele*” (“Mountain-specific Environmental Quality Targets”), which were implemented by the German Federal Environment Agency in the context of the Alpine Convention (UBA 2000/2), and the “*Landschaft 2020*” project (“Landscape 2020”) staged by the Swiss Federal Agency for the Environment, Forest and Landscape (Iselin 2001). The problems identified in a review of the literature on criteria/indicator systems for the landscape can be summarized in the following six points:

1. The difficulty posed by dealing with the central aesthetic aspects of landscapes which are not directly quantifiable
2. The difficulty posed by the regionalization of criteria and indicator systems
3. The problematic definition of target values
4. The lack of time series and reference statuses
5. The often expensive process of defining of indicator values (the top-down approach is inadequate)
6. The lack of methodical validation

It is possible to derive numerous target values from the legal provisions, the (inter-)national nature and landscape conservation programmes and from the research. These objectives can be assigned to the individual goods and services listed in Table 1. The case-study-based assessment of the landscape using indicators derived from the defined targets ultimately provides information on the extent to which the stated objectives have been achieved. Thus, this approach was also adopted for our case studies.

Unlike other resources, with landscapes it is not generally possible to start with absolute target values because, in Europe's highly cultivated landscapes, landscape quality is always subject to culture-specific changes in use and varying aesthetic valuations. The examples of the way wildernesses and the Alps are valued clearly demonstrates how the relationship with the landscape has changed significantly over the centuries (Schama 1996, Stremlow 1998, Rodewald 1999). It is simply impossible to define an absolute target for this cultural "plasticity" of the landscape. Similarly, an anthropocentric sustainability approach cannot provide target values for changes in natural space or climate that are not caused by man. Hence, the fulfilment of objectives for the sustainable use of the various goods and services provided by landscape can only be quantified relatively by means of time series and, furthermore, in most cases it can "only" be defined in qualitative terms. Moreover, numerous socio-cultural, aesthetic and economic sustainability indicators can only be assessed by the actors on-site, i.e. the local population, people and institutions directly associated with the landscape, lovers and experts on the landscape, nature conservation organizations and local authorities.

The set of criteria/indicators used in our studies (Table 4) is based on a large number studies that have been carried out on sustainability indicators (OECD 1994, Haberl et al. 1999, Wrbka et al. 1999, van Mansfelt und van der Lubbe 1999, Bundesamt für Statistik und BUWAL 1999, Iselin 2001, BUWAL 1999/2002, Rodewald und Neff, 2001, Bundesamt für Statistik et al. 2001, UBA 2000/2002). The indicators were also validated on the basis of the concrete situation with respect to the landscape in the six case study areas included in the study. They provide an adequate description of the system. We opted for classification in accordance with the driving-forces-state-response indicator model as the alternative model – the pressure-state-response-model – would portray the changing positive and negative influences on the landscape that cover a wide area too narrowly (Iselin 2001). Moreover, in view of their central significance, it made sense to divide the social sustainability dimension into a social and a cultural dimension. The data on the various indicators was collected by means of a survey of experts and representatives of the case-study areas, and classified in accordance with a qualitative scale of “high”, “average” and “low”.

Table 4: Criteria/indicators for the description of the regional degree of sustainability of the landscape, based on six case-study areas in rural landscapes. The assessment is based on regionally authorized concepts, plans, models and actor surveys. (CL: classification as Driving Force [D], State [S], Response [R]; SA: sustainability area, ecological [ecol], economic [econ], social [s] and cultural [c]).

Criterion	Indicator	CL	SA
A. Sustainability of agriculture and forestry	A1. Pollution of soil and water bodies	D	ecol
	A2. Degree of ecological optimization of agriculture and forestry and proportion of ecological/organic operations	R	ecol
	<u>A3. Naturalness/vitality of the forest (proportion of trees that are not native to the site, plantings, conservation-based timber harvesting processes, natural regeneration, efficiency of the ecosystem)</u>	S	ecol
	<u>A4. Maintenance of the protection forest function/ecological instabilities</u>	S	ecol
	A5. Proportion of ecological compensation areas within the agricultural area	R	ecol
	A6. Proportion of extensive meadows and pastures	S	ecol
	A7. Economic costs	D	econ
	A8. Yield situation	D	econ
	A9. Employment	D	econ
	A10. Operations' survival capacity	D	econ
	A11. Regional marketing and quality label	R	econ
	A12. Degree of local production and processing (origin of operations)	S	s
	A13. Degree of integration of non-farmers into farming activities	R	s
	A14. Level of satisfaction, well-being, links with tradition among land owners and farmers	S	s
	A15. Variety of uses/range of products	R	c
	A16. Level of maintenance of buildings, traditional access facilities and features worthy of conservation (terraces)	R	c
	A17. Degree of change (infrastructure, improvements, roads, increase in number of buildings)	R	c
B. Natural and aesthetic state of the landscape	B1. Proportion and quality of natural areas (within and outside the forest, wilderness areas)	S	ecol
	B2. Variety (biotope types; structural variety of the forest, proportion of dead wood in the forest, quality of forest fringe) and level of networking	S	ecol
	B3. Proportion of near-natural/natural stretches of flowing water	R	ecol
	B4. Proportion of near-natural/natural wooded areas	R	ecol
	B5. Characteristics and rarity of geomorphologic structures	S	ecol
	B6. Maintenance costs	D	econ
	B7. Extent to which maintenance costs are covered	D	econ

	B8. Level of official involvement	R	econ
	B9. Total value added from landscape and image of the locality (products, image bearers)	R	econ
	B10. Quality of recreation and experience	S	s
	B11. Accessibility	D	s
	<i>B11a. Permeability of area for man</i>	D	s
	B12. Acceptance of legal conservation provisions (and conservation associations) among landowners and farmers	R	s
	B13. Involvement of external entities in the care and maintenance of the landscape	R	s
	B14. Locations for encounter in the public space	S	s
	B15. Characteristics of aesthetic trait carriers for variety, uniqueness, naturalness and harmony (objective)	S	c
	B16. Presence of places of power, symbolism and special aesthetic perceptions (subjective)	S	c
	<i>B16a. Aesthetic quality of building</i>	S	c
	B17. Variety of maintenance methods (<i>Heuhisten</i> (traditional method of drying hay), mowing of wild grass, bog grazing, dry stone wall construction, maintenance of historical infrastructure, forest pastures etc.)	S	c
	B18. Availability of local knowledge about particular characteristics of the natural area	D	c
	B19. Awareness of collective memory (experience of loss, stories, legends, images of the landscape)	D	c
C. Level of settlement activity and tourism/leisure	C1. Level of construction pressure	D	ecol
	C2. Rate of land use (built area per inhabitant)	D	ecol
	C3. Temporal and spatial level of non-construction pressure	D	ecol
	C4. Level of dissection (by roads category 1-4)	D	ecol
	C5. Level of soil sealing	D	ecol
	C6. Positive effects of non-agricultural/forestry use (e.g. ecological compensations)	R	ecol
	C7. Value added from tourism and leisure services associated with nature that remains in the locality	D	econ
	C8. Level of regional trade cycle (supply and waste disposal facilities)	R	econ
	C9. Employment outside agriculture and forestry	D	econ
	<i>C9a. Number of jobs/ha trade and industry area</i>	D	econ
	C10. Economic costs (clean-up, noise protection etc.)	D	econ
	C11. Positive anchoring of tourism and leisure-oriented use in village community	R	s
	C12. Level of satisfaction and well-being among non-agricultural/forestry land users	R	s
	<i>C12a. Quality of residence</i>	S	s
	C13. Degree of attachment to the landscape	R	s
	C14. Compatibility with local recreational requirements of local population	R	s
	C15. Existence of participatory initiatives (conservation association, neighbourhood association, LEK, LA21, zone plan), level of participation	R	s

	C16. Importance in terms of cultural identification	R	c
	C17. Level of preservation of traditional access structures, buildings and structures worthy of conservation	D	c
	C18. Level of change in non-agricultural/forestry use (infrastructure, use, increase in number of buildings, newly-sealed areas)	D	c
	C19. Positive effects of the change (e.g. architectural effect, Land Art)	R	c

6. Analysis of the landscape institutional resource regime

As mentioned at the outset, the objective of our study was not just to define the sustainability indicators for goods and services produced by the landscape presented above and to demonstrate the changes in the sustainability of the use of the landscape by means of a survey of the corresponding data. In terms of the stated aim of the study, it is far more important – based on a comparative research design – to explain these changes as far as possible in terms of institutional regimes that are undergoing changes and were also fundamentally different in design from the outset due to nature of the case study areas selected. By definition (cf. Knoepfel et al. 2001, 2003), such regimes incorporate all of the formal determinants, which can be defined by the state, of the behaviour of the – homogenous and heterogeneous – groups of users of the goods and services provided by the landscapes studied and identified in the previous stage of the study. These determinants are found at both the level of (mostly civil-law-regulated) property, disposal and use rights to the goods and services provided by the basic resources that constitute landscapes (in particular: soil and water, but also biomass and air(space)) and at the level of specific (mostly public law) implementation acts based on conservation and use policies. The implementation acts are aimed at those in possession of formal use rights, but also include other actor groups who do not possess any real (individual and legally assigned) use rights to the basic resources in question.

The concept of the institutional resource regime adopted by our study qualifies these regimes on the basis of the two central dimensions of “extent” and “coherency” which are central to the sustainability of the resulting situation with respect to the use of the resource in question. It proposes that the regimes that ensure sustainable use are those that:

- 1) define all of the goods and services of a resource that are actually availed with sufficient precision and substance by means of corresponding (private and or public law) regulations, and regulate their content in such a way that rivalries between them are

managed and changes in the capacity for self-regulation¹ of the resource itself are avoided (high or low “relative extent” of the regime);

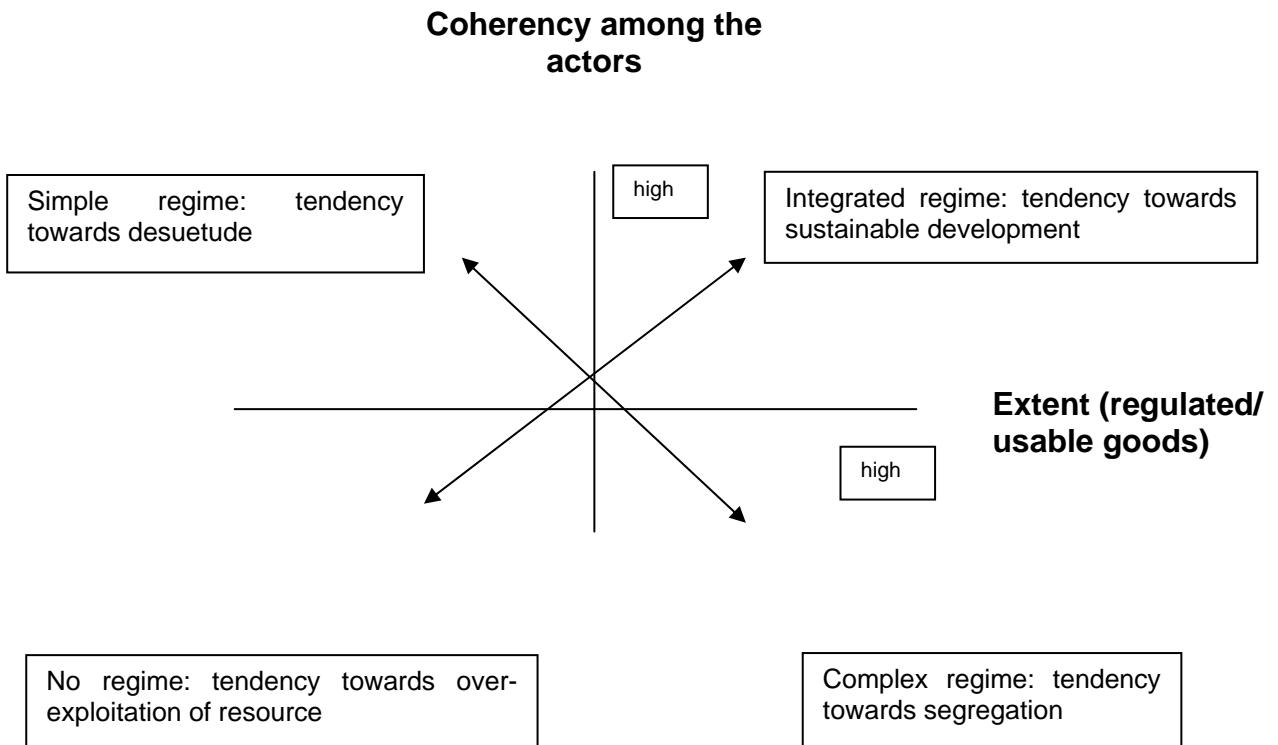
2) oblige actors who enjoy the corresponding use rights to behave with consistency. This is achieved by specifically ensuring that the corresponding regulations:

- avoid contradictions between the provisions of conservation and use policies through the imposition of co-ordination obligations among the responsible authorities etc. (coherency of relevant policies);
- avoid contradictions in the definition of the use rights due to various actors in the context of the basic property rights order as such contradictions could result, for example, in too many/few use rights being defined and assigned to one or more services provided by one and the same resource or in use rights being defined and assigned that overlap with other rival goods and services (internal coherency in the “regulatory system”);
- avoid contradictions between the policy implementation acts and the rights defined in the basic property rights order which can lead to either the failure of the policy or to the impairment of the predictability of use rights defined in accordance with civil law which is important for sustainability (“external coherency” between public policies and the “regulatory system”).

Figure 1 shows this definition in schematic form.

¹ in our case the “interaction services”.

Figure 1: Representation of the institutional resource regime and how it corresponds to the level of ideal-typical landscape development (after Knoepfel et al. 2001)



With respect to the empirical determination of these regime dimensions, which differ from area to area and are subject to change within individual areas over the course of time, as was the case in the precursor studies on the resources soil, water and forest (Knoepfel et al. 2003), indicators had to be defined which the conditions specific to the landscape into account. As with the precursor studies, in the landscape study presented here, the scientific challenge consisted in portraying the (mostly scientific) dimensions of the changes in landscape quality firstly as changes in the use of specific goods and services provided by the landscapes in question, and to then link these with (social-scientific) data on the use behaviour of the actor groups who are in some way “entitled” or “not entitled” to avail of these goods and services, and, finally, to associate this data with empirical information on formal use rights and policy implementation acts.

Once again, in conformity with the research protocol adopted in the precursor studies, this data was collected in the following three steps:

1. Identification of the actor groups that actually use the identified goods and services in a given landscape based on particularly sensitive “focus areas” within the selected landscape areas. These actors can be roughly categorized as either “ins” or “outs”, depending on whether they are permanently resident within or outside the area in question. The main actor group involved here can be found in the third column of Table 1; the field studies should identify this group and record any changes in their profile, use preferences, the exercising of their rights (which is important for the later stages of the research) and their position *vis à vis* rules issued by the authorities.
2. Identification of the *user behaviour* (to be ascertained using the indicators) of the identified actor groups and changes it may undergo in the time series.
3. Identification of the different (customary) legal *titles*, which the identified actor groups exercise in pursuing their use activities. These include, firstly, all kinds of civil-law-based rights which are usually recorded in the land registries and can be identified with the help of legal experts who are familiar with the area. However, the studies will also include rights and restrictions of use rights based on the rules imposed by various policies (building inspection, environmental protection, hydraulic engineering, agriculture, infrastructure policy etc.). Finally, real uses will also be found, for which no – formal – rights or regulations are available (*de facto* appropriation).
4. Identification of (civil) use rights that are *not availed of* and policy implementation acts that are *not complied with* (and thus invisible at the level of the analysis of actors who actually use the resource). Such obviously irrelevant institutional “determinants” of use behaviour can be identified on the basis of (policy) outputs or land registry analyses (“owner unknown”) and are of particular significance in the context of the mountain landscapes which the main focus of attention in our study.
5. Analysis of the *actors associated with the identified policies*, their resources, their institutional determinants and their (intermediary) products based on traditional policy analysis (Knoepfel, Larrue, Varone, 2001). As landscape regulation generally takes the form of a multi-level processes, higher-level actors (i.e. national, federal cantonal and regional) must be included. In terms of the (presumably very common) occurrence

of contradictory but also well-coordinated policy products, the strategies of the concretely defined user groups and their interactions with the relevant authorities are of particular interest.

It is possible to determine the institutional resource regimes and the dynamics of the changes that take place within them on the basis of this empirical data. The results of the precursor studies would suggest that these dynamics can actually explain a lot about the more or less sustainable use of a resource. We suspect, in particular, that regimes that develop in the direction of “integrated regimes” offer good preconditions for the successful development of sustainable landscape use (Figure 1). In those cases in which the opposite applies, the resource is at risk from overexploitation. Regimes with an extensive extent that display low coherency between the actors (“complex” regimes) could give rise to a tendency for segregation of the landscape in that they would force actors with contradictory behaviours to dissociate from each other spatially. We suspect that this is behind the situation that is common today whereby intensive uses that do not conserve resources (for settlement and agriculture) are separated from island-like nature conservation zones. The opposite situation involving the abandonment – in the interest of sustainable development – of agricultural areas that were formerly intensively used (e.g. Alpine pastures in southern Alpine areas) can also arise in this context. In the latter case, the apparent coherency is false as neither concrete intentions with regard to use or opposing intentions with a focus on conservation are imposed.

7. Conclusion

The study presented in this paper is still under way (spring 2003). The results of the six case studies will be publicized by the IDHEAP in autumn 2003 and the synthesis report will be available in spring 2004. Preliminary results already show, however, that the concept of the institutional resource regime is also applicable for the assessment and explanation of processes of change in the landscape and that it may provide an important source of inspiration in the debates on the conditions necessary for sustainable landscape use and new institutional strategies.

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