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# Pure theory or useful tool? Experiences with transdisciplinarity in the Piedmont Alps

*Franz Höchtl* [a,*], *Susanne Lehringer* [b], *Werner Konold* [a]

[a] *Albert-Ludwigs-University, Department of Forest and Environmental Sciences, Institute for Landscape Management, Tennenbacher Str. 4, D-79106 Freiburg, Germany*

[b] *Via Castello 7, I-21036 Gemonio, VA, Italy*

ARTICLE INFO

Published on line 23 February 2006

*Keywords:*
Scientific methodology
Transdisciplinarity
Applied research
Alpine research
Public participation

ABSTRACT

The article reflects the theoretical concept of transdisciplinarity by presenting the successive work stages of a research project conducted in the Piedmont Alps from 1998 to 2004. It demonstrates why and how transdisciplinary methodology was applied, and the experiences gained from its use. The transdisciplinary strategy was adopted since it enables researchers to cross disciplinary borders and to deal with extra-scientific "real world problems". The Piedmont Project, therefore, focussed on the expected solutions to the undesired negative ecological and social effects of land abandonment in the south-western Alps. The problem-solving strategy has been divided into five steps: problem definition, problem comprehension, problem analysis, treatment of sub areas and their integration in order to achieve overlapping results. The end of the research was marked by the development and implementation of applicable solutions. Experiences with transdisciplinarity were both negative and positive in nature. On the one hand, the necessity of including the local population was a particularly significant and exhausting challenge, requiring a great deal of openness, patience and communication skills. On the other hand, the 'real world' research did bring forth a great amount of practical and theoretical knowledge for the researchers as well as for the stakeholders.



## 1. Introduction

Transdisciplinarity, a term originally chosen in the context of the philosophy and organisation of science, has become a dazzling term of more recent scientific theory and research. The number of conferences and publications on this approach is remarkable (e.g. Nicolescu, 2002; Hirsch Hadorn, 2002; Tress et al., 2003). Anglo-American scientific debates of the 1960s and 1970s influenced the formation of the term 'transdisciplinarity' (Hentig, 1971; Jantsch, 1972). During the 1980s the German philosopher Jürgen Mittelstraß introduced it to the Central European scientific community. According to him, transdisciplinarity is a type of research which crosses disciplinary borders and which is based on real world problems. Transdisciplinary approaches identify and solve such problems without relying on any specific discipline. They enhance the ability to think and work in supra-disciplinary categories (Mittelstraß, 1992, 1995). Transdisciplinary research is problem-oriented and fills the gaps existing between disciplines (Kinzig, 2001). A peculiarity of this type of research is that the problem to be solved not only transgresses the boundaries of scientific disciplines, but also science as a whole. Transdisciplinary thinking helps us recognise problems and their development before they

* *Corresponding author*. Tel.: +49 761 203 3639; fax: +49 761 203 3638.
*E-mail address:* franz.hoechtl@landespflege.uni-freiburg.de (F. Höchtl).
1462-9011/$ – see front matter 
doi:10.1016/j.envsci.2006.01.003

appear and become critical (Mittelstraß, 1995). The research objects of transdisciplinary approaches can be characterised as follows:

- they are of an extra-scientific origin and are a product of everyday life,
- they relate to public goods (e.g. water, air, landscape, health, knowledge) and how they are managed,
- they are of common concern,
- their definition does not make use of scientific terminology, as is normally the case in applied science,
- they are shaped by the application of disciplinary knowledge from different scientific or extra-scientific fields, and
- interdisciplinary collaboration is necessary in order to achieve the research objectives (Kötter and Balsiger, 1999; Fry, 2001).

The transdisciplinary research principle implies renouncing sovereignty over disciplinary knowledge, the generation of new insights by collaboration as well as the capacity to consider the know-how of professionals and lay-people. Collectively, transdisciplinary contributors enable the cross-fertilisation of ideas and knowledge from different actors, leading to an enlarged vision of a subject, as well as new explanatory theories. Transdisciplinarity is a way of achieving innovative goals, enriched understanding and a synergy of new methods (Lawrence, 2004).

This article, primarily addressed to scientists and planners as well as to policy makers involved in the development of sustainable land use strategies for marginal rural landscapes, will illustrate the concept of transdisciplinarity by presenting the successive working steps of a research project conducted in the Piedmont Alps from 1998 to 2004. The intention is not to present the extensive results of this project, which are exposed in more detail in other publications (Lehringer et al., 2003; Höchtl et al., 2005a,b). It will rather demonstrate why and how transdisciplinary methodology was applied and what experiences were gained from its use.

## 2. The research project

In the 20th century the Piedmont Alps witnessed profound socio-economic changes that have transformed their landscapes. Due to increasing industrial development, population density and traditional agro-silvi-pastoral land use practices declined considerably in this area. As a consequence today, a major part of these entirely or partly abandoned alpine landscapes is characterised by a natural process transforming former farmland into forests. The historical, ecological and social processes associated with land-use abandonment were the main topics of the project titled '*From rural landscape to wilderness—Changes in alpine landscapes resulting from a decline in land-use in the Val Grande National Park and Strona Valley*'[1] carried out from 1998 to 2004. The objective was to explore perspectives for the future of the affected landscapes and their users. This included the assessment of the two contrasting concepts: maintaining traditional landscapes or tolerating their transformation into ''wild'' areas covered by dense shrub- and woodlands.

The research focused on three study areas, the municipal territory of Premosello Chiovenda (SA[2] 1) and the Portaiola Valley (SA 2) in the Val Grande National Park, as well as the Upper Strona Valley (SA 3) with its villages Piana di Forno and Campello Monti (Fig. 1). All these areas are characterised by the coexistence of various agro-silvi-pastoral uses and abandoned areas, but to different extents. While cultivated alpine pastures dominate the Strona Valley, vast areas undergoing processes of natural reforestation cover the Val Grande National Park, which was established in 1992 as 'Italy's Largest Wilderness Area' (Olmi, 2002). Up to the start of the research project, regional nature conservation administrators and politicians had no clear ideas how to ensure a sustainable future landscape development. Already existing management plans, as in the case of the Val Grande National Park, were not followed and their requirements were in no way implemented. The guiding principles for nature conservation were often very contradictory. On the one hand the experts argued that biodiversity could be best protected without active landscape care by allowing unhindered landscape development. The Val Grande National Park's territory was described as remote and inaccessible and therefore as ''*self-protecting*'' (Höchtl et al., 2005a). On the other hand the biodiversity decline on former cultivated areas as well as the loss of rural landscape and traditional agricultural land use practices were complained. However, definite measures to counteract these developments did not exist.

## 3. Characteristics of the transdisciplinary approach

According to Jaeger and Scheringer (1998) the perception of one or more extra-scientific problems marks the beginning of a transdisciplinary project. Fig. 2 shows an idealistic, transdisciplinary problem solving strategy. It is divided into five steps: problem definition, problem comprehension, problem analysis, treatment of sub areas and their integration in order to achieve overlapping results. This research process aims at the development and implementation of applicable solutions. The following section will describe how this idealistic approach took form in the 'Piedmont Project'.

### 3.1. *Problem perception outside the scientific community*

The first impetus for this research project was a personal, subjective experience. For many city dwellers and also for the authors, the remoteness of the Strona Valley holds a subtle attraction. The lack of nearly all visible traces of modern life, the uncontrolled nature of the narrow, dark forested valley with innumerable watercourses flowing down the steep slopes like silver threads, create a fascinating atmosphere.

[1] Supported by the Bristol Foundation, Zurich, Switzerland.

[2] SA: Study area.

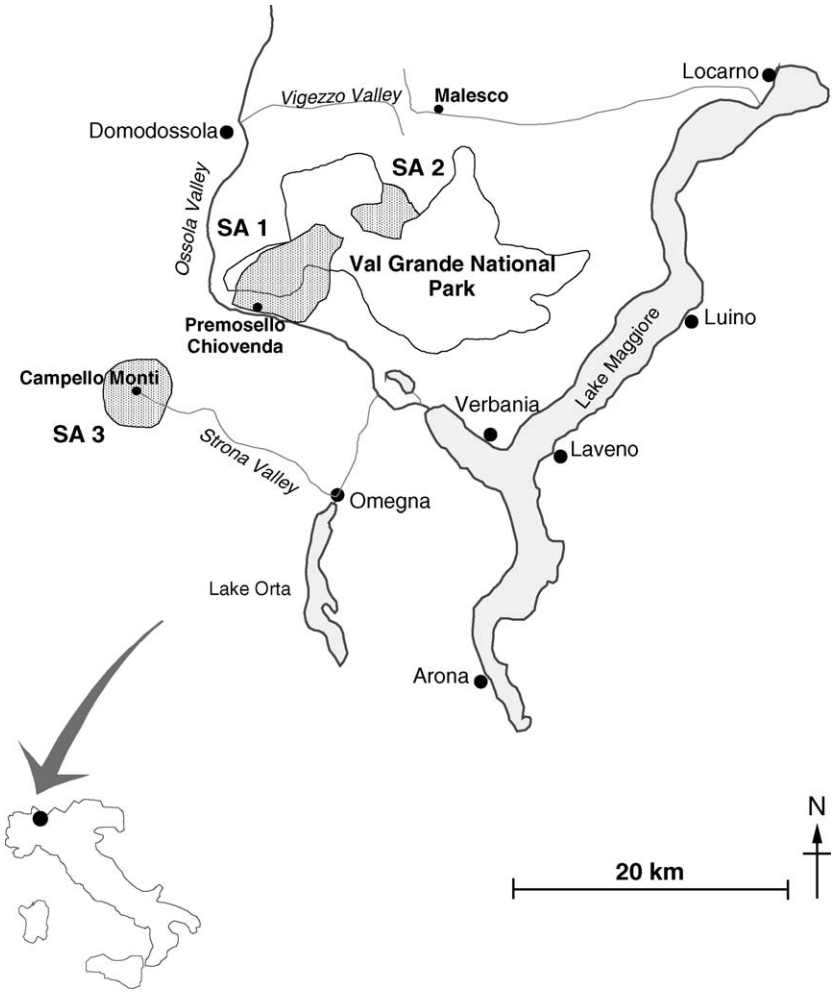


**Fig. 1 – Geographic location of the study areas within the Lake Maggiore region of Northern Italy (SA: study area).**

We visited the area frequently in view of these characteristics, witnessing progressive abandonment, at the same time becoming aware of the profound changes to rural landscapes. This process fostered our scientific curiosity in related ecological and social problems. Over time, contacts with the locals became closer and it was soon clear that their perception of the landscape was completely different. They warned us frequently about picnicking with the children on the meadows surrounding the village, because of the abundance of vipers. They even regarded it as dangerous to wear sandals. Only 'armed' with hiking boots and a stick were we allowed to move around the village. A woman explained to us with regret that nowadays the surroundings were very 'messy' because of land abandonment, pointing out all the parts of the landscape surrounding the village. She emphasized how 'clean' the paths used to be in former times. So in the past mountaineers had been able to reach the alpine huts barefoot while nowadays vipers would even enter houses.

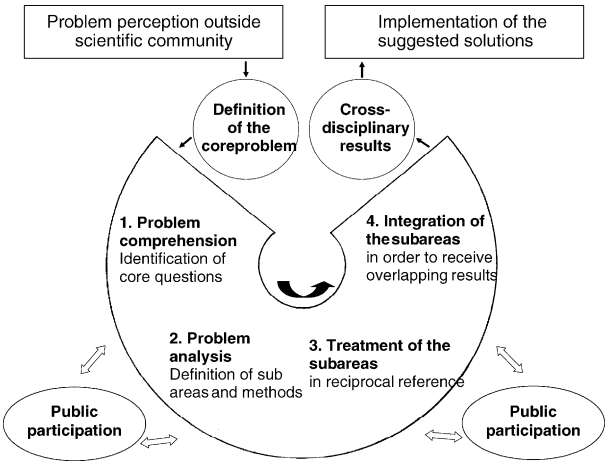


**Fig. 2 – The problem solving strategy in transdisciplinary projects (according to Jaeger and Scheringer, 1998).**

Indeed, vipers are sighted occasionally in the village and the local inhabitants immediately kill them. The news of such an event always spreads like wildfire throughout the small community and all the inhabitants congregate, curiously observing the 'conquered' animal. In abandoned places, where the stone walls of houses and terraces are crumbling, the habitat conditions for vipers are ideal. This problem perception was the impetus for the joint research project.

### 3.2. *Definition of the core problem*

After in-depth reflection and intensive literature research, the core problem was defined as follows:

> In the Piedmont Alps, emigration and land abandonment are leading to considerable landscape changes. The percentage of waste land is increasing at the cost of land used by agriculture and forestry. This leads to a change of biotopes as well as to a decrease in land usability, and consequently, land abandonment and emigration affect not only the landscape, plants and animals, but also humans.

The urgency of the problem and the need to propose appropriate solutions are issues that have been raised by several politicians of the Strona and Ossola Valley and are known from numerous scientific and popular publications (Messerli, 1985, 1989; Bätzing, 1991; Broggi, 1996).

### 3.3. *Problem comprehension: identification of core questions*

To comprehend the problem we immersed ourselves mentally and physically into the local reality and spent many months in the research areas to prepare the project. This was necessary to identify core research questions, in order to detect significant gaps in the knowledge about the existing problem. This helped us gain a detailed comprehension of the importance and intricacy of the problem.

Drawing deductions from this problem perception, the core problem was divided into the following key questions:

1) What influence does the decline in land use have on the structural and vegetation diversity of the alpine landscape?
2) To what extent has the traditional land use system left an imprint on the landscape that is turning into 'wilderness'?
3) How do locals and visitors perceive the landscape changes?
4) What are the consequences of land abandonment for the local population and for visitors?
5) What strategies for a sustainable future development can be derived from the results and how can they be implemented?

These questions concern, at the same time, physical elements and socio-cultural factors that constitute the landscape and that therefore refer to different scientific disciplines: vegetation ecology (1), historical geography (2) and the social sciences (3, 4). Question 5 has an interdisciplinary character. The formulation of the questions was not restricted by any limitations of the individual disciplines. The complexity of the given problem, which derives from the ''real world'', contrasts with the disciplinary organization of science (Tress et al., 2001). It can be analysed only by a common effort of varying methodologies. The results have to be interpreted by creating a bridge between several disciplines in an inherently transdisciplinary approach. As mentioned in the introduction, the objectives of transdisciplinary projects are achieved through interdisciplinary collaboration. In the Piedmont Project, the problem was not solved through interdisciplinary exchange between several scientific working groups. The project, however, met the interdisciplinary claim insofar as each of the two main researchers did not focus on individual issues but applied a wide range of different methods and integrated the partial results in order to obtain overlapping, final results.

### 3.4. *Problem analysis: definition of sub areas and methods*

Due to the complex interactions between landscape and population that characterize cultural landscapes and that became evident in the core questions, we distinguished three methodological focus points or ''sub areas'': historical landscape analysis, ecological landscape analysis, socio-empirical survey (Fig. 3). The division into these three sub areas was necessary to apply 'disciplinary' methods according to the requirements of common scientific quality standards. It is crucial that the methods can be chosen, combined and developed freely and that they can derive from disciplines that are not necessarily interrelated. They were transferred to new fields of application, which go beyond the traditional use: i.e. they were used in a transdisciplinary manner (cp. Jaeger and Scheringer, 1998).

Historic landscape analysis was used to reconstruct the traditional rural landscape of the study area (Konold, 1996). The primary sources used for this purpose came from the local and regional archives and included letters, land use statistics, old land registers and maps, as well as photographs (Rackham, 1986). In addition to these archival materials, persistent traditional landscape elements, such as planar elements (e.g. pastures, vineyards), linear elements (e.g. mule paths, mountain paths) and point elements (e.g. charcoal burning platforms, clearance mounds), were mapped during inspection walks through the landscape. Methods of historical research were complemented by interviews with contemporary witnesses of the land use changes in the area (Foggerty, 2001) and by evaluations of secondary sources.

The ecological inventory of the current vegetation was carried out by means of a synoptic comparison of vegetation tables based on vegetation *relevés* using the Braun-Blanquet method (Braun-Blanquet, 1964) and lists of plant species. Vegetation mapping and the analysis of vegetation-transects were also applied (Glavac, 1996). On the basis of the ecological investigation, the effects of land abandonment on the floristic diversity of the research areas could be identified. In order to document the changes in vegetation cover over time, aerial photographs from the years 1954, 1970 and 1991 were compared and interpreted. The analysis of the carbon–nitrogen ratio in soil samples from an abandoned alpine pasture provided a further contribution to ecologically relevant information.

Sociological studies were aimed at assessing the prevalent perception among people in the region with regard to the present situation and their future expectations (Berg, 1989; Fowler, 2002). Comprehensive questionnaires treating the topics 'life in the village', 'traditional agriculture and its products' and 'landscape and nature' were drawn up by means of participating observation throughout the three years of the field research. Although most of the questions were conceived as closed ones, the questionnaires also contained some open and hybrid questions. The opinion surveys by questionnaires were carried out in the year 2000 and directed to a random sample of 225 residents (return rate 67%) taken from the electoral register of Premosello and Colloro and addressed to all

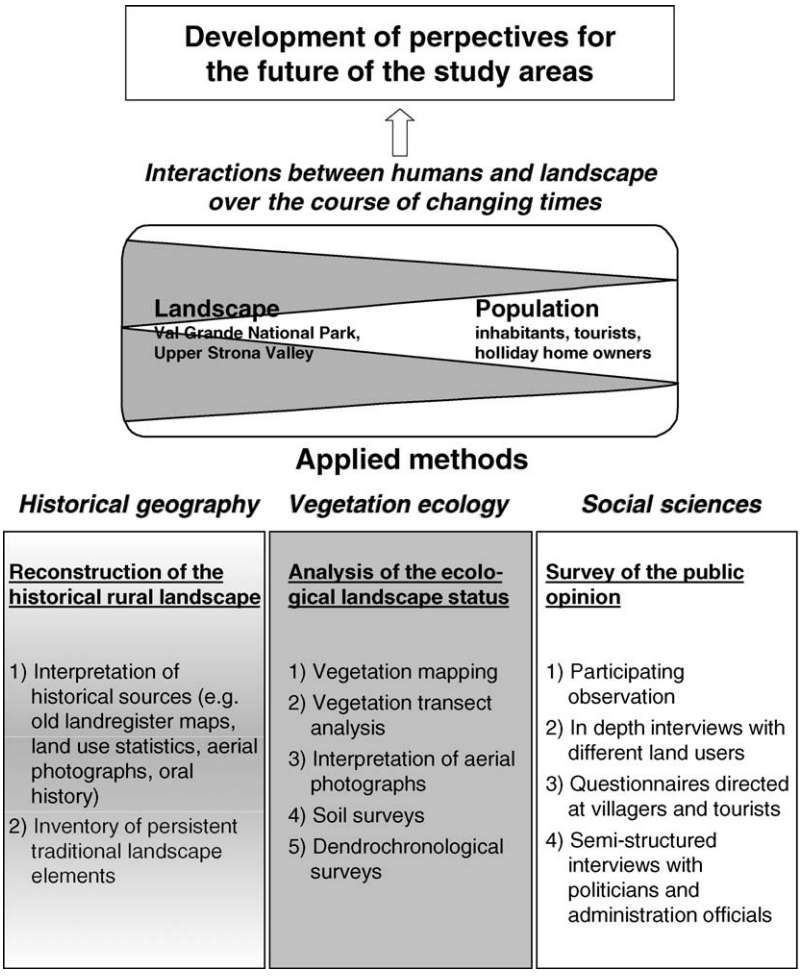


**Fig. 3 – Scheme of the research focus and applied methods.**

55 seasonal households present in August 2000 (return rate 89%) in the villages Campello Monti and Piana di Forno in the Strona Valley. Another questionnaire was aimed at tourists visiting the National Park and the Strona Valley in summer 2001. The questionnaires were available in three languages (Italian, German, English) in the information points of the National Park, in the restaurants and overnight accomodations in the upper Strona Valley and distributed also personally along the main trekking paths (self selective sample according to Friedrichs, 1990). In addition, semi-structured interviews were conducted with eight politicians and nature conservationists as well as with the herdsmen and the local population in the upper Strona Valley. More information about the construction of the questionnaires, the sample and the data analysis are available in Höchtl et al. (2005a).

### 3.5. *Treatment of the sub areas in reciprocal reference*

After the definition of the sub areas, they were examined with appropriate methods. In order to reach coherent solutions to the overall problem, it is suggested that one should treat the sub areas and interpret the results in reciprocal reference (Jaeger and Scheringer, 1998). The example of Alpe Serena, the last of the Val Grande National Park's high alpine pastures that was abandoned in 1969, illustrates how this approach was actually realized and it will particularly clarify the meaning of the term *reciprocal reference*.

Since its abandonment, Alpe Serena has developed for more than 30 years without any human impact. Today, the areas around the huts are still dominated by nitrophytes.[3] The carbon–nitrogen-ratio of the soil at a distance of 100 m from the huts is 12. The vegetation analysis and the soil survey demonstrate that the nitrogen content and the nitrogen availability are still very high. The periodic depositions of dung and the watering of the meadows over centuries can explain this fact. This information about former land use practices was gathered through interviews with former land users as part of the historical research, which was conducted parallel with the vegetation analysis. Therefore, the simultaneous assessment of two sub areas—the ecological and historical landscape analysis—produced the result that historical land use practices have, up to the present, made an impact on vegetation development in fallowed alpine areas, and will continue to do so.

[3] Nitrogen demanding plants.

### 3.6. *Integration of the sub areas in order to receive overlapping results*

The synopsis of the sub area results finally provided the answers to the questions raised by the central research. One of these aimed at defining perspectives for a future sustainable development of the mountain communities. To arrive at these perspectives, many partial results were merged. The following example taken from the Val Grande National Park explains how single results from different sub areas were integrated in order to achieve the formulation of perspectives, which is the project's most important overall objective.

The ecological investigations revealed a clear decrease in floristic and structural diversity in the course of natural succession, turning open land into forest. The proportion of specialized, light-demanding species found in open areas decreased in favour of shade tolerant generalists. Yet, according to the results of the expert interviews, the conservation of biodiversity was the first guiding principle of the national park, taking priority over other objectives. This is why strategies for preventing any further decline in vegetation and landscape diversity had to be developed. Important pre-conditions for the realization of this objective are the willingness of the local population to use the landscape and to counteract natural reforestation, as well as the administrator's ability to provide financial support. So sociological surveys were adopted in order to analyse whether these pre-requisites are met or not.

The social studies in the Val Grande National Park clearly showed that nearly 80% of the locals preferred a well-managed landscape in spite of the widespread succession on formerly cultivated areas. The majority of the various target groups regret the loss of cultural values connected with land abandonment. A large majority demands that the mountain areas should be inhabited and agriculture should be maintained. Particularly around the villages, locals judge the effects of abandonment negatively. The willingness of the younger population to stop succession is also high. Seventy-five percent of this group could well imagine starting an agricultural activity in the future, for example the cultivation of pastures or vineyards. Politicians and administrative officials emphasized their political will to support the mountain areas and to maintain settlements and agricultural activities in the mountains. Various funds and economic incentives exist to promote alpine agriculture.

Based on this, the revitalisation of at least some abandoned areas and the development of still existing cultivations seemed to be a realistic scenario; on the one hand, it conserves biodiversity, on the other hand it strengthens local socio-economic development.[4] This conclusion could be drawn from the integrated results of two sub areas: ecological landscape analysis and sociological studies.

### 3.7. *Public participation or participation of non-scientists*

Great emphasis was placed on creating close and permanent contacts with the local people throughout the entire research period. During the first two research years, in which the focus was on historical and ecological investigations, the local population was involved as often as possible. From spring to autumn we took residence in the villages and tried to get in touch with the locals whenever possible, for example when they worked on the alpine pastures or when they met at the local inns. During these encounters we could communicate the aims of our research in a simple way, and increase the acceptance of our research among the population. The information gathered from the inhabitants broadened the database and deepened our knowledge of the local circumstances. Furthermore, we wanted to give the population the opportunity to participate actively in the research, so every year the results were presented and discussed with them and with local politicians during various events. Everybody was invited to express their personal opinion. The results of these meetings were immediately integrated into the research process.

### 3.8. *Implementation of the suggested solutions*

Transdisciplinary research is defined as a problem-oriented, autonomous approach and, depending on the applied methodology, it can be either practice- or theory-oriented (Jaeger and Scheringer, 1998). The implementation of the results is not essential for transdisciplinary projects, but in many cases this is the objective (Cortner, 2000; Leal Filho, 2005). According to the experts interviewed, one strategy to counteract the ongoing abandonment of land use could be to support existing agro-silvi-pastoral land use practices as much as the establishment of new agricultural businesses, together with the development of ecotourism. Encouraged by the results of the research project, the national park administration initiated the revitalisation of an already abandoned alpine pasture in the year 2003, in cooperation with the Malesco community. They chose the Alpe Straolgio in the upper Portaiola Valley. As the authors were actively involved as researchers, this represented an ideal opportunity to put into practice the results of the previous research project (Höchtl and Lehringer, 2004).

A political process has recently started in the Strona Valley, aimed at integrating the upper part in the adjacent Sesia Valley Regional Park, which may be a first step to the establishment of a vast UNESCO Biosphere Reserve as suggested in the research project's conclusions (Lehringer et al., 2003). As a result of the good contacts with the local and regional authorities the authors are invited to participate in the application of these plans.

As already mentioned in the introduction to this article, at the beginning of the project administrators and politicians had quite rudimentary visions regarding sustainable development. Existing ideas and plans were pursued only hesitantly and barely implemented. As a result of the researcher's personal contacts with the political authorities and the local population as well as the repeated evening presentations and discussions an exchange process arose, which led to in-depth reflection on the problem and the definition of basic measures to counteract the undesirable effects of land abandonment. Therefore, the results of the Piedmont Project exceed the generation of pure scientific data. The revitalisation of the

[4] The Italian skeleton law on protected areas (Legge quadro sulle aree protette, 6. dicembre 1991, no. 394) gives national parks a clear order to promote sustainable socio-economic development and tourism in the marginal zones.

Alpe Straolgio and the foundation of a protected area in the Upper Strona Valley are finally a concrete indicator for the project's success.

### 3.9. *Disadvantages and advantages of the methodology*

As a result of the transdisciplinary approach, many new, interesting and useful insights could be gained and it is arguable whether conventional research of only one discipline could have produced the same results. On the other hand, however, this methodology also had the following disadvantages.

The time required to build up the contacts with the locals slowed down the research process, especially at the beginning of the project. Fortunately, our sponsor, the Bristol Foundation of Zurich, exercised great patience in this respect. Projects which are supposed to deliver usable results within a short period of time—as is often the case—usually do not have enough time available to establish intensive contacts. However, if the human factor plays a decisive role in the problems to be investigated, a certain amount of time is required in order to avoid precipitant action and superficiality.

The need to get to know the local population, to win and maintain their trust, was a huge challenge, demanding a high degree of openness, patience and communication skills, especially because we were foreigners and therefore outsiders. At the start of the project, many mountaineers were often rather reserved, mistrustful and indifferent. It sometimes took many months to overcome their resistance. This exhausting phase could have been omitted if the research had been strictly theoretical. However, a special quality of transdisciplinary projects is that they do allow for a fair amount of time dedicated to communication (about 30% of the working hours in the Piedmont Project were used for internal and external communication, e.g. for informal discussions, workshops, presentations, information events, e-mails and public relations).

But it was the transdisciplinary approach that made it possible to deal with a real-world problem, crossing the boundaries between disciplines. The application of the wide methodological range, the reflection on the problem from different perspectives, the interconnection of the sub areas, as well as the mutual information exchange with local politicians, nature conservationists, land users and many other people, therefore enhanced the validity and transferability of the results. The inclusion of indigenous knowledge, which is seldom recorded systematically in written form, was the key to an improved understanding of many sub issues. The systematic body of knowledge acquired from the locals through the accumulation of experiences, informal experiments, and intimate understanding of the environment sustained the development of perspectives for the future of the studied communities (cp. Michael Warren and Rajasekaran, 1993).

Furthermore, the interest in and the appreciation of the locals' knowledge, enhanced their ecological self-awareness. For the first time their ''everday acitivities'', i.e. the traditional agro-silvi-pastoral land use practices, were regarded as ecologically useful and acknowledged by ''experts''.

The wide range of different and for us, as natural scientists, completely new methods proved a challenge. It was particularly laborious and time consuming to comprehend and master the sociological methods, but at the same time, the application of the transdisciplinary methodology enhanced our ability to broaden our views. Consequently, our methodological competence improved greatly.

Although in many places there is an increased demand for transdisciplinary research, the publication of the results caused certain problems because some reviewers and publishers still think in tight categories, in terms of specific disciplines (cp. Monty Reichert et al., 2002). As described above, the results in our project were generated from a multiplicity of separate results. During the review process of one of our papers a referee even insisted on subdividing this article dealing with the main results into several parts, so that each publication would only cover one sub area of the overall problem at a time. This procedure, however, would have distorted the integrative character of the results. So it would be desirable for reviewers and editors to make more arrangements for the communication of results produced by transdisciplinary projects.

### 3.10. *Conclusions*

A transdisciplinary approach does not have only advantages and it is in no way a panacea. The concept is particularly suited to solving problems related to the management of collective, i.e. public goods, on which the holder cannot exclude a third person's consumption and in which many and different individuals or groups are participating, as for example the landscape. Bearing this in mind it is obvious that transdisciplinary research is not any 'better' or more fashionable than research within a single discipline (Kötter and Balsiger, 1999). Many problems within basic research can be analysed better by applying the traditional methods of one discipline (Loibl, 2002). The key issues should always determine the path of research to be followed in order to reach a satisfactory solution (Kötter and Balsiger, 1999). Depending on the focus of the research, it would be desirable for different methodological approaches to be adopted and accepted.

As landscape research deals with a very dynamic object that is in a continuous interaction between society and environment and which is, therefore, a future-oriented branch of science, it is necessary to face the challenge of going beyond the boundaries of the different disciplines. This must be done in order to discover the common communication level between the scientific community on the one hand and non-scientific stakeholders on the other. This strategy proved to be successful in the Piedmont Project. The experience of this project underlines the need for sustainable strategies directed to local and regional needs. To develop sustainable policies, the concern of the local population needs more attention even by researchers because the challenge of the development of the European cultural landscape cannot solely be resolved by desk work.

The 'real world' research finally not only brought forth a great amount of practical and theoretical knowledge for the researchers and for the stakeholders, it also generated enormous personal benefit owing to the new insights and many new friendships resulting from the close contact with the villagers. These experiences were worthwhile and call for more.

## REFERENCES


Bätzing, W., 1991. Die Alpen: Entstehung und Gefährdung einer europäischen Kulturlandschaft. Beck, München.

Berg, B., 1989. Qualitative Research Methods for the Social Sciences. Allyn and Bacon, Boston.

Braun-Blanquet, J., 1964. Pflanzensoziologie: Grundzüge der Vegetationskunde. Springer, Heidelberg.

Broggi, M., 1996. Für ein ausgewogenes Tun und Unterlassen im Alpenraum. Zolltexte 22, 20–22.

Cortner, H.J., 2000. Making science relevant to environmental policy. Environ. Sci. Pol. 3 (1), 21–30.

Foggerty, J.E., 2001. Oral history: a guide to its creation and use. In: Egan, D., Howell, E.A. (Eds.), The Historical Ecology Handbook. Island Press, Washington, Covelo, London, pp. 101–120.

Fowler, F.J., 2002. Survey Research Methods. Sage Publications Inc., Tousand Oaks.

Friedrichs, J., 1990. Methoden empirischer Sozialforschung. 14. Auflage. Westdeutscher Verlag, Opladen.

Glavac, V., 1996. Vegetationsökologie. Gustav Fischer Verlag, Jena.

Fry, G.L.A., 2001. Multifunctional landscapes—towards transdisciplinary research. Landscape Urban Plan. 57, 159–168.

Hentig, H.V., 1971. Interdisziplinarität, Wissenschaftsdidaktik, Wissenschaftspropädeutik. Merkur 25, 855–871.

Hirsch Hadorn, G., 2002. Unity of knowledge in transdisciplinary research for sustainability. In: Encyclopedia of Life Support Systems, EOLSS Publishers, Oxford.

Höchtl, F., Lehringer, S., 2004. Agire o non agire: Strategie future di conservazione per il Parco Nazionale della Val Grande. Final report on the results of the INTERREG IIIA sub project. Institute for Landscape Management, University of Freiburg, Freiburg i. Br.

Höchtl, F., Lehringer, S., Konold, W. 2005a. Kulturlandschaft oder ''Wildnis'' in den Alpen? Fallstudien im Val Grande-Nationalpark und im Stronatal (Piemont, Italien). Zürich, Bristol-Stiftung. Paul Haupt Verlag, Bern, Stuttgart, Wien.

Höchtl, F., Lehringer, S., Konold, W., 2005b. ''Wilderness'': what it means when it becomes a reality—a case study from the southwestern Alps. Landscape Urban Plan. 70, 85–95.

Jaeger, J., Scheringer, M., 1998. Transdisziplinarität: Problemorientierung ohne Methodenzwang. GAIA 7 (1), 10–25.

Jantsch, E., 1972. Towards interdisciplinarity and transdisciplinarity in education and innovation. In: Problems of Teaching and Research in Universities, Organization for Economic Cooperation and Development, Paris, pp. 97–121.

Kinzig, A.P., 2001. Bridging disciplinary divides to address environmental and intellectual challenges. Ecosystems 4 (8), 709–715.

Kötter, R., Balsiger, P.W., 1999. Interdisciplinarity and transdisciplinarity. Issues Integrative Stud. 17, 87–120.

Konold, W., 1996. Von der Dynamik einer Kulturlandschaft. In: Konold, W. (Ed.), Naturlandschaft. Kulturlandschaft. Ecomed, Landsberg, pp. 121–135.

Lawrence, R.J., 2004. Housing and health: from interdisciplinary principles to transdisciplinary research and practice. Futures 36, 487–502.

Leal Filho, W., 2005. Environmental Education, Communication and Sustainability. Peter Lang Scientific Publishers, Bern, Frankfurt/Main, New York.

Lehringer, S., Höchtl, F., Konold, W., 2003. Effects of land use changes and depopulation on landscape, social life and tourism—overview about the results of a case study from the Piedmont Alps in Italy. Austrian J. Forest Sci. 120 (1), 1–18.

Loibl, C., 2002. Aber was bitte ist Transdings . . .? Kontexte 2, 6–7.

Messerli, P., 1985. Auf die Landwirtschaft einwirkende und von der Landwirtschaft ausgehende Belastungen—Versuch einer Bilanz. In: Bundesamt für Landwirtschaft (Ed.), Die Berglandwirtschaft im Spannungsfeld zwischen Ökonomie und Ökologie, Kolloquium MAB vom 23. November 1984. Bundesamt für Landwirtschaft, Bern, pp. 103–123.

Messerli, P., 1989. Mensch und Natur im alpinen Lebensraum: Risiken, Chancen, Perspektiven. Haupt, Stuttgart.

Michael Warren, D., Rajasekaran, B., 1993. Putting local knowledge to good use. Int. Agr. Devel. 13 (4), 8–10.

Mittelstraß, J., 1992. Auf dem Wege zur Transdisziplinarität. GAIA 1 (5), 250.

Mittelstraß, J., 1995. Transdisziplinarität. Panorama 5, 45–53.

Monty Reichert, W., Daniels-Race, T., Dowell, E.H., 2002. Time-tested survival skills for a publish or perish environment. J. Eng. Educ. 91 (1), 133–137.

Nicolescu, B., 2002. Manifesto of Transdisciplinarity. State University of New York Press, Albany.

Olmi, F., 2002. La più grande area Wilderness delle Alpi e d'Italia. In: Barbaglia, D., Cresta, R. (Eds.), Genti e luoghi di Valgrande. Alberti Libraio Editore, Intra (preface).

Rackham, O., 1986. The History of the Countryside. Butler & Tanner, London.

Tress, B., Tress, G., Decamps, H., d'Hauteserre, A.M., 2001. Bridging human and natural sciences in landscape research. Landscape Urban Plan. 57, 137–141.

Tress, B., Tress, G., van der Valk, A., Fry, G. (Eds.), 2003. Interdisciplinary and Transdisciplinary Landscape Studies: Potentials and Limitations. Delta Series, vol. 2. Alterra Green World Research, Wageningen.



**Franz Höchtl**, PhD (1970) graduated in agricultural biology at the University of Stuttgart-Hohenheim (Germany) in 1997. Since 1998 he has been working as a junior scientist at the University of Freiburg. From 1999 to 2003 he was collaborating in two research projects about landscape development strategies for alpine communities in Piedmont (Italy). At present his work encompasses the analysis of the social and ecological effects of forest expansion in South Germany and the design of instruments for its control. Furthermore, he is the coordinator of a research project about the synergies of monument and nature conservation in traditional vineyards and historical parks.

**Susanne Lehringer**, PhD (1956) graduated in biology and participated in a postgraduate course in communication sciences at the University of Stuttgart-Hohenheim where she received a scholarship for scientific journalism from the Robert-Bosch-Foundation. From 1983 to 1989 she has been working as editorial journalist for environment at a weekly journal for Forestry. She is living in Italy since 1989. From 1989 to 1998, she wrote as a freelance journalist for science communication reporting from Italy to German media. From 1998 to 2004 she has been collaborating in the presented ''Piedmont-Project''. Currently she is a freelancer in science communication and environmental education.

**Werner Konold**, PhD (1950) is an agricultural scientist who obtained his doctorate degree on the ecology of small running waters. Thereafter, he worked as a researcher on the reclamation of sanitary landfills, the vegetation of fallowed vineyards, and on the history, limnology and vegetation of ponds and lakes in the alpine foothills. Throughout this time, he engaged in general research on the history and ecology of cultural landscapes. Further research activities include the history and restoration of waters and floodplains, change of rural landscapes, sustainable rural development and nature conservation. Since 1997 he has been the Chair of the Institute for Landscape Management at the University of Freiburg.