

# TOWARDS A FRAMEWORK FOR LONG-TERM CONSERVATION OF TERRACED LANDSCAPES IN SWITZERLAND: CASE STUDIES OF RECULTIVATED FORMER VINEYARD AND CROP TERRACES

## *Hacia un marco para la conservación a largo plazo de paisajes en terrazas en Suiza: casos de estudio en antiguas terraza con cultivos y viñedos*

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**ABSTRACT:** Terraced landscapes are among Switzerland's most expressive cultural landscapes and have a high ecological, cultural, identificatory, and recreational value. But in many regions they are threatened because farmers are abandoning marginal agricultural land and are no longer maintaining the terraces. In this article, we propose a framework of basic formal and procedural conditions that have to be considered when developing and operating landscape conservation projects, and illustrate and validate them with examples from three case studies. The results show that a broadly anchored and locally and externally accepted governing body is decisive for a project to be successful over the long term. Such a body is in a position to deal with the complexity of management, financing, project coordination, and cooperation while promoting coherence among actors and integrating relevant local and interested external actors into communal structures. This, in turn, helps to enhance other success factors, such as ecological integration and habitat conservation, generation of funds to cover operating costs, and inclusion of communal work.

**KEY WORDS:** Terraced landscape conservation; terraced vineyards; formal and procedural conditions; sustainability; Switzerland.

**RESUMEN:** Los paisajes de terrazas se encuentran entre los paisajes culturales más expresivos de Suiza con un alto valor ecológico, cultural, identificativo y recreativo. Pero en muchas regiones, estos paisajes están amenazados, porque los agricultores están abandonando las tierras agrícolas marginales y ya no mantienen las terrazas. En este artículo, proponemos un marco de condiciones básicas formales y de procedimiento que debe considerarse al desarrollar y operar en proyectos de conservación del paisaje, e ilustrarlos y validarlos con tres casos de estudio. Los resultados muestran que un organismo rector ampliamente aceptado (local y externamente) es decisivo para que el proyecto tenga éxito a largo plazo. Dicho organismo está en condiciones de abordar la complejidad de la gestión, la financiación, la coordinación del proyecto y cooperación, al tiempo que promueve la coherencia entre actores e integra a los actores externos locales e interesados en las estructuras comunales. Esto, a su vez, ayuda a mejorar otros factores de éxito, como la integración ecológica y la conservación del hábitat, la generación de fondos para cubrir los costes operativos y la inclusión del trabajo comunitario.

**PALABRAS CLAVE:** Conservación de paisaje de terrazas; viñedos en terrazas; condiciones formales; sostenibilidad; Suiza.

## 1. Introduction

Terraced landscapes are among the most remarkable cultural landscapes in mountain areas worldwide and could easily be characterized as the “Van Goghs” of cultural landscapes (Rodewald, 2011). They are characterized by man-made terraced areas (Konold, 1996) each comprising a group of terraces (e.g. several field terraces) and form a compact, uniform landscape. Terraces and embankments are the dominant elements in this type of cultural landscape (Lingeri *et al.*, 2007). Terraced landscapes typically provide a variety of ecosystem services (Koohafkan & Altieri, 2011; Romero-Díaz *et al.*, 2019) and have a high ecological, cultural, identificatory, and recreational value. They are considered to be among Switzerland’s heritage (patrimoine) landscapes, which are worthy of protection (Rodewald, 2018). The French term *patrimoine* refers to the cultural and historical heritage of a landscape (see also Rodewald & Liechti, 2016). It focuses on the existing historical expression of a man-made area that has experienced structural and economic changes but in which historically grown and long-lasting structures have been respected and preserved (Rodewald *et al.*, 2014). The term also refers to a kind of “common ownership” that creates a close bond between terraced landscapes and the local people. The Lavaux vineyard terraces, for instance, form the only Swiss cultural landscape that is inscribed on the UNESCO World Heritage List (UNESCO, 2018). The fact that terraced landscapes bring together nature and human life also shows in the broad range of landscape qualities that terraced landscapes provide to society (Rodewald *et al.*, 2014; Bonardi & Varotto, 2016; Tillmann & Salas, 2016).

Despite these qualities, Swiss terraced landscapes, like those in other countries (see e.g. Vos & Meeke, 1999; Wei *et al.*, 2016), are under pressure. On the one hand, the pressure comes from land use intensification, be it in the form of construction activities (e.g. urban sprawl; Price *et al.*, 2015) or in the form of intensified agriculture (Ewald & Klaus, 2009; Raemy, 2010). On the other hand, terraced landscapes are threatened by the abandonment of

marginal agricultural land and subsequent forest regrowth (see e.g. Werder & Michael, 2008, on the example of Breaglia in the Grisons, Dutly Bondietti, 2009, on the history of the small terraced village of Linescio in Ticino) or natural hazards. Accordingly, actors involved in projects for the conservation and recultivation of terraced landscapes frequently have to both consider and counteract strong societal dynamics. It is therefore crucial that projects aimed at conserving or reconstructing (abandoned) terraced landscapes take a long-term perspective by seeking to meet sustainability criteria. These must reflect all three dimensions of sustainable development – the ecological, the economic, and the sociocultural (see e.g. Preamble of the European Landscape Convention, Council of Europe, 2000). This, in turn, may justify the conservation of terraced landscapes that are considered a cultural heritage of historical and human value even if it is economically unprofitable (Stanchi *et al.*, 2012).

### 1.1. Conservation, change, and sustainability in relation to terraced landscapes

The success of applying the sustainability concept to landscapes depends strongly on whether the use of the various goods and services that the respective landscape provides can be politically regulated in such a way that over- or underuse is avoided, yields remain sustainable, and a balance is found between culture and nature. Shortages in landscape as a resource occur not only when landscapes are affected by ecological damage, such loss of biodiversity, but also – and this is no less important – when their aesthetic and sociocultural qualities are impaired. These latter qualities are crucial to the fact that we perceive our surroundings as a landscape and describe them as such. This is particularly true of terraced landscapes, which are a particularly pronounced form of human-made cultural landscape and ultimately also depend on human use. Inappropriate use and wrong maintenance causes just as much loss of value as does the complete abandonment of use.

Terraced landscapes' main basic value consists of the alternation between embankments and terraces (including all their technical aspects like water draining systems, stairs, niches, etc.), which form the "skeleton" of the landscape. Conservation efforts thus focus on the shape of the landscape. By contrast, landscape change and sustainability considerations relate more to the use of the terraces. Accordingly, conservation of terraced landscapes could either refer to protection of the pattern of drystone walls alternating with green banks across a mountain slope, regardless of whether the landscape has been abandoned or not. Or it could be framed as a combination of active use of the terraces by means of traditional or adapted cultivation techniques and maintenance of the landscape's morphological skeleton. Only if conservation is understood in this latter, wider way is it possible to preserve a large-scale terraced landscape (see e.g. Bätzing, 2014; Lasanta *et al.*, 2016; Scharrer *et al.*, 2018). The way to sustainable terraced landscapes therefore leads through negotiation and balancing of a regime of careful use, which is critical for the maintenance of landscape qualities (Rodewald, 2007).

In the present paper, we investigate basic conditions – in the sense of potential success factors – that need to be considered when developing and operating landscape conservation projects. We propose a framework of basic formal and procedural conditions that must be fulfilled to enable long-term conservation of terraced landscapes, and illustrate and validate them with several Swiss examples of former vineyard and crop terraces. Based on these, we show important success factors, which have to be considered with regard to the conservation of terraced landscapes.

## 2. Methodology

This paper is based on our own research and practice in the field of initiating, financing, and advising projects for the conservation of terraced landscapes with an agricultural production function. Some of our research was conducted within the Swiss Proterra project (2003–2013) directed by the Swiss Foundation for Landscape Conservation (German: Stiftung Landschaftsschutz Schweiz SL); results were presented in various publications we refer to in this paper (Lingeri *et al.*, 2007; Rodewald, 2007). Further research we refer to here was carried out in the context of the international research project "Landmarks – Understanding pre-industrial structures in rural and mining landscapes" (COSTA27, 2005–2007) (Rodewald, 2006 a, b) and of an analysis of terraced landscapes in the Valais (Rodewald, 2011). Several case studies within both projects involved interviews with experts and local actors. The three cases selected for this paper consist of projects that successfully reactivated agricultural uses in order to maintain and rebuild terraced landscapes that had formerly been partly abandoned. Each one represents one of the three types of terraced landscapes found in Switzerland (see below). In a first step, we establish a framework of basic formal and procedural conditions required for the ecologically, economically, and culturally sustain-

able revival of agricultural uses of terraced land (desk study approach based on bibliographical review). In a second step, we illustrate and validate these conditions based on investigations into project proceedings carried out together with local actors (field study approach). The reported experiences from the case study projects include information about logistical and financial management, farmers' involvement and benefits, as well as the involvement of diverse other actors (local and nonlocal).

## 3. Overview of terraced landscapes in Switzerland

Based on our research within the Swiss Proterra project (Lingeri *et al.*, 2007; Rodewald, 2007), we identified 76 major terraced landscapes in Switzerland and their characteristics. They are mainly used for vines or meadows and pastures. When categorizing them according to the way in which the terraced areas are embedded in the landscape, we worked with a slightly modified set of existing criteria (Ambroise *et al.*, 1989), such as "extensiveness", "compactness", and "landscape pattern". This led us to distinguish three physiographic types of terraced landscapes:

- Type I: Terraced landscapes with extensive terraced areas (8 terraced landscapes; see Figure 1a and case study Ramosch; Figure 2)
- Type II: Terraced landscapes with patches of extensive terraced areas (31 terraced landscapes; see Figure 1b and case study VinEsch; Figure 2)
- Type III: Terraced landscapes with scattered small terraced areas (37 terraced landscapes; see Figure 1c and case study Mergoscia; Figure 2)

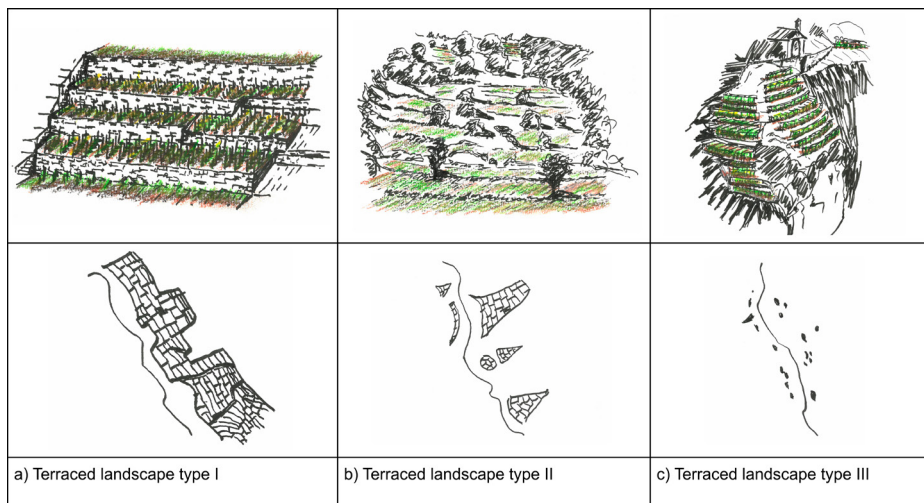
Figure 2 shows the location, characteristics, and distribution of terraced landscapes in Switzerland.

## 4. Evaluation of formal and procedural conditions for terraced landscape conservation projects

We found that a number of formal and procedural conditions are crucial to promoting large-scale projects for the conservation of terraced landscapes. By formal conditions, we mean general incentives for the protection and maintenance of cultural landscapes based on public policies. By procedural conditions, we refer to the specific requirements that need to be fulfilled at the local project level to ensure a project's success and sustainable outcomes.

### 4.1. Formal conditions for terraced landscape conservation

With regard to formal conditions for sustainable development of terraced landscapes, we distinguish the following five levels: (1) normative protection, (2) planning security, (3) maintenance support, (4) targeted land man-



Figures 1a-c: Physiographic types of terraced landscapes in Switzerland.  
 Figura 1. a-c: Tipos fisiográficos de paisajes de terrazas en Suiza.

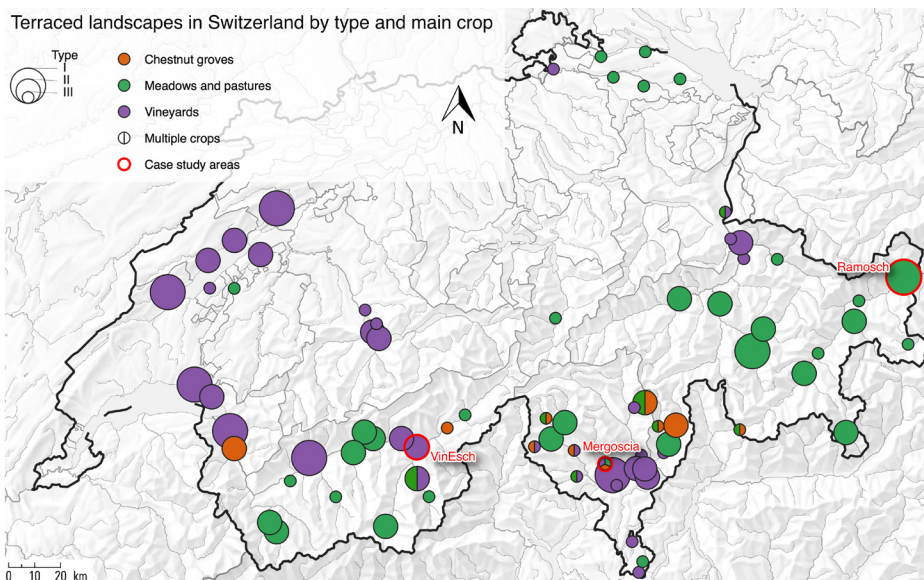


Figure 2: Terraced landscapes in Switzerland by type and main crop (circled in red: case study areas).  
 Figura 2: Paisajes de terrazas en Suiza por tipo y cultivo principal (círculos en rojo son casos de estudio).

agement, and (5) management, project coordination, and cooperation (Rodewald, 2007)<sup>1</sup>.

At the level of *normative protection*, the question is whether a given landscape has a formal protection status or is included in a national inventory (e.g. the Swiss Federal Inventory of Landscapes and Natural Monuments of National Importance, ILNM). Switzerland's terraced landscapes are not protected as such or listed as such in any federal (or cantonal) inventory. Only one landscape listed in the ILNM is practically identical to an area of terraced vineyards, namely Lavaux on the northern shore

of Lake Geneva; another listed landscape overlaps to a large extent with an area of terraced vineyards on the northern shore of Lake Biel. However, various terraced landscapes are part of a larger landscape listed in the ILNM.

At the level of *planning security*, enabling conditions mainly include specific spatial planning measures. In Switzerland, agricultural land is protected by its inclusion in an agricultural zone. This ensures that the construction of new buildings is limited to agricultural buildings as well as buildings and infrastructure that are necessarily

<sup>1</sup> Höchtl *et al.* (2011: 120ff) identified very similar instruments: financial, normative protection, planning acts, organization and information.

dependent on a specific location. Inclusion in an agricultural zone thus guarantees the structural preservation of agricultural landscapes. Most of Switzerland's terraced landscapes belong to an agricultural zone; but some of them, especially those located near settlements, fall into building zones. Up to 2013, land in an agricultural zone that was overgrown with forest automatically fell under the legal protection of the forest law. Since 2013, this is no longer the case; the cantons are free to "freeze" boundaries between forest and agricultural land if they seek to prevent a steady increase in forest (Article 10 of the Federal Act on Forest).

At the level of *maintenance support*, terraced landscape conservation depends on measures to support ongoing

and periodic maintenance of the structural elements in terraced landscapes. These include drystone walls, embankments, paths, stairs, water pipes, traditional agricultural buildings, and special facilities (pergolas, beehives, caverns, etc.). Maintenance support can be public (e.g. governmental support for structural improvement) or private (e.g. project support from NGOs and foundations).

At the level of *targeted land management*, enabling conditions are created by means of governmental instruments to support and guide the productive use of agricultural land. This comprises subsidies (i.e. agricultural direct payments according to cultivated area, slope, biodiversity, or landscape qualities) and environmental regulations.

Table 1: Procedural conditions for terraced landscape conservation (adapted and expanded from Lingeri *et al.*, 2007; Rodewald, 2007)  
 Tabla 1: Condiciones de procedimiento para la conservación de los paisajes de terrazas (adaptado y ampliado de Lingeri *et al.*, 2007; Rodewald, 2007)

Sustainability dimensions	Procedural conditions (success factors)	Description
General	Long-term nature	Landscape enhancement is promising if the measures implemented produce long-term benefits for the landscape, its direct users (agriculture, tourism, etc.) and the general (local) population.
Sociocultural dimension	Legal protection	A binding legal basis, for example in the form of protection zones that exclude certain undesirable developments, is crucial for the preservation of a landscape and the long-term safeguardance of the project objectives.
	Participation of the landowners	Landowners play a key role when it comes to the future use of their land. They have certain responsibilities and influence important decisions. The better they are involved, the more likely the project will be successful.
	Participation of the local population	A landscape is part of the local culture. A project's chances of success are enhanced if the local population can identify with it and actively participates in its development and implementation.
	Coherence among actors	Because different actors have different roles in society, coordination among them is essential. Ideally, they should complement each other. This requires successful negotiation of shared interests, objectives, and decisions within the network of involved actors.
	Governing body	A broadly supported but locally anchored governing body is the basis for successful project implementation. This requires adequate management structures, information flows, actor coordination, and rules for landscape use and monitoring.
	Conflict resolution mechanisms	In order to identify, negotiate, and resolve conflicts, sound conflict resolution mechanisms need to be established from the beginning.
	Acceptance by and inclusion of authorities	Cooperation between the project's governing body and the authorities as well as other circles with project experience is needed to ensure that local ideas can be supported and linked with existing incentives and instruments.
Economic dimension	Initial project budget	A reasonable initial project budget is decisive not only for acceptance and success, but also for possible continuation of the project.
	Coverage of operating costs	Recurring project costs should be in a reasonable proportion to project benefits. Operating costs should ideally be financed largely from the project, without requiring major sponsoring.
	Economic importance of land use	An economic benefit of the project is important, as it increases appreciation of the landscape and social acceptance of the project.
Ecological dimension	Ecological integration	Land use must be adapted to local natural conditions. Furthermore, it must help to stabilize dynamic natural processes.
	Habitat creation and protection	Land use has to create and protect habitats for flora and fauna.

At the level of *project management*, incentives for participatory bottom-up planning processes and initiatives (e.g. regional policies) help to enhance coordination and cooperation.



4.2. *Procedural conditions for terraced landscape conservation*

Unlike the formal conditions, enabling procedural conditions are determined by success factors related to the development and operation of landscape conservation projects at the local project level. Based on our literature and case studies analysis, we identified 13 success factors (Table 1). We assume that the degrees to which these success factors are present in a project give an indication on the extent to which that project is sustainable in the long term.



5. **Terraced landscapes in Switzerland: Case studies**

In order to illustrate and validate the formal and procedural conditions identified, we examined their applicability in one representative project of each of the three types of terraced landscapes in Switzerland: Mergoscia (meadows and pastures, chestnut, vineyards, crops), VinEsch (vineyards), and Ramosch (meadows and crops). We were involved in all three projects during the last 10 years, thereby gaining the competence required to evaluate the outcomes of the projects as compared to the initial situation and the project goals. The selected projects concern terraced landscapes on a broader level; this enabled us to exclude overly specific situations that could not have been generalized to the level of large-scale conservation of terraced landscapes.



The following project profiles provide a short description of the project and an evaluation of selected formal and procedural conditions.

<p><b>Terraced landscape of Mergoscia, Canton of Ticino</b> (Type III terraced landscape; see also Figures 1 and 2)</p>	
	
<p><b>General information</b></p>	
<p>The village of Mergoscia at 731 m a.s.l. forms the entrance to the Verzasca Valley and is situated on a sunny south-facing slope. It has a large amount of terraced terrain – vines are cultivated up to over 800 m, and there are terraced chestnut groves – as well as a multitude of other cultural and natural treasures. In the 19th and 20th centuries, Mergoscia, like the entire Verzasca Valley, experienced substantial population decline due to emigration. In 1990, the municipality’s population reached an all-time low of 130. Today, it has risen to about 220 again. Only 32 people are employed in Mergoscia itself; 53% of them work in the service sector, 41% in agriculture and forestry, and the remaining 6% in industry and commerce.</p>	
<p><b>The project</b></p>	
<p>The project’s objective is to preserve and enhance the diverse landscape of Mergoscia by maintaining, reconstructing, or restoring various objects of natural or cultural interest (e.g. historical buildings, terraces, chestnut groves, natural habitats).</p>	
<p><b>Formal conditions</b></p>	
<p>The formal conditions for successful projects are partly fulfilled.  <b>Planning security:</b> The project area is located in the agricultural zone, which excludes other uses.  <b>Maintenance support:</b> The cantonal authorities consider the landscape important and fund part of the project.  <b>Targeted land management:</b> Agricultural subsidies (e.g. direct payments for maintaining open farmland, promoting biodiversity, and interconnecting habitats) and subsidies for promoting specific species make extensive use of the terraced landscape economically viable.</p>	

Procedural conditions (selected success factors)
<p><b>Governing body:</b> The Pro Mergoscia association was founded in 2003 by local actors with the intent to preserve and cultivate the unique cultural and natural landscape of this mountain village (<a href="http://www.mergoscia.ch">www.mergoscia.ch</a>). The association is broadly anchored and accepted. Since 2003, it has successfully implemented various environmental and architectural projects. It has about 240 members. Pro Mergoscia is supported by both local actors (e.g. municipality, civic community) and external actors (e.g. cantonal authorities, NGOs, apprenticeship companies...). However, municipal support depends strongly on the composition of the local council.</p> <p><b>Coverage of operating costs:</b> A significant amount of drystone walls was repaired in the course of a landscape development project. Thanks to this work, the recultivated terraces can now once again be used in a sensible way (mowing, grazing by skudden sheep), which also creates the possibility of receiving agricultural direct payments (e.g. for maintaining the cultural landscape and promoting biodiversity). In consequence, the terraced landscape is preserved.</p> <p><b>Participation of the local population:</b> At first, the local population did not participate much. In the course of reconstruction work, however, the project established operating groups for managing use of the restored distillation plant, drying house, and chestnut groves. These local groups comprise and actively involve the local population. In autumn, for example, inhabitants may independently collect chestnuts, have them dried in the drying house, and then take them home. This is accompanied by celebrations.</p> <p><b>Habitat creation and protection:</b> With the clearing of bushes, removal of problematic plants, and extensive agricultural use of the terraces, the project area has become much more open and diverse again. This contributes to habitat diversity in a region that is nowadays largely forested.</p>
Challenges
<p><b>Economic importance of land use:</b> Agricultural use of the terraced landscape is profitable in the context of Switzerland's current agricultural policy. Furthermore, direct payments for landscape quality cover the annual costs of maintaining the terraces. However, this means that the current cultivation system is highly dependent on external funding and, hence, vulnerable to changes in agricultural policy.</p>

Cultural landscape of VinEsch, Canton of Valais (Type II terraced landscape; see also Figures 1 and 2)	
	
General information	
<p>This vineyard is located in a place called Esch, at an altitude of about 800 m a.s.l., on the western slope of the Visp valley, opposite Visperterminen. It has some 472 meters of drystone walls forming 18 terraces for vine cultivation. Vines have been grown in Esch for centuries. Most plants are old, and there are some rare varieties, such as Himbertscha.</p>	
The project	
<p>In 1980, Josef-Marie Chanton, known as “the pioneer of grape varieties”, discovered the last Himbertscha vines. Himbertscha was and remains one of the rarest native Valais grape varieties. Over the years, he multiplied the number of plants. Thanks to this rescue, there is now a Himbertscha wine on the market – an exclusive product of the Chanton winery in Visp. In 2010, when the owner of the Esch vineyard decided to give up cultivation for reasons of age, Chanton resolved to save the vineyard. In the same year, he founded the VinEsch association (<a href="http://www.vinesch.ch">www.vinesch.ch</a>). It has members from all over Switzerland who share the aim of preserving and maintaining this historically valuable vineyard.</p>	

<b>Formal conditions</b>
<p>The formal conditions for successful projects are partly fulfilled.</p> <p><b>Normative protection:</b> The terraced area is not protected, but it is partly owned by the VinEsch association.</p> <p><b>Planning security:</b> The project area is located in the agricultural zone, which excludes other uses. However, the high quota of forest-covered former vineyards to be recultivated has given rise to discussions with cantonal foresters.</p> <p><b>Maintenance support:</b> The project is of little interest to the canton, but it has received support from the Swiss Foundation for Landscape Conservation and other institutions – which demonstrates the importance of such revalorization projects.</p> <p><b>Targeted land management:</b> The employed farmer benefits from direct payments and from sale of the wine by the winery of the VinEsch association’s founder.</p> <p><b>Project management:</b> The locally accepted institution (association) is based on 100% voluntary work done by its members, who come from other parts of the Valais or Switzerland, and a team that organizes the joint work days and the compensation of members (bottles of wine and honouring of active members during the general assemblies).</p>
<b>Procedural conditions (selected success factors)</b>
<p><b>Long-term nature:</b> The long-term maintenance of the vineyard depends on the continued availability of volunteer work.</p> <p><b>Participation of the local population:</b> Most of the association’s members are from outside the region and/or owners of secondary homes. However, some local people participate in VinEsch festivities.</p> <p><b>Governing body:</b> The association consists of members who are highly motivated and interested in “their” vineyard. The activities are organized as social events. The identification with VinEsch is high.</p> <p><b>Acceptance by and inclusion of authorities:</b> Authorities appreciate the association’s activities, but are not directly involved in the operations.</p> <p><b>Coverage of operating costs:</b> Operating cost are covered by membership fees and support grants from NGOs and other institutions.</p> <p><b>Ecological integration:</b> Quality work and ecological integration, for example regarding the construction of drystone walls, is guaranteed through professional project support.</p> <p><b>Habitat creation and protection:</b> Recultivation reverses the natural development towards more wilderness and means that some habitats disappear. However, at the same time, new habitats are created.</p>
<b>Challenges</b>
<p><b>Economic importance:</b> The economic benefit from selling the wine is low, and there is a risk of high maintenance costs, for example as a result of natural events like debris flows that threaten the stability of the terraces. A further challenge is the limited accessibility of the vineyard, as there is no access road.</p> <p><b>Long-term nature:</b> The project fully depends on the voluntary activities of the members of the association. A decrease in social cohesion could lead to the association’s dissolution. The project objectives and activities are hardly revised or refreshed, and the repetitiveness of the activities might eventually cause members to leave the association. Furthermore, the people in charge of the project are mainly elderly or retired.</p>

<p><b>Terraced landscape of Ramosch, Canton of Grisons</b> (Type I terraced landscape; see also Figures 1 and 2)</p>	
	
<b>General information</b>	
<p>Between the villages of Sent and Ramosch, on the southern slopes of the Inn Valley in the Lower Engadin and in part in the near Val Müstair, there is an impressive terraced landscape of 1,243 hectares. One of its core terraced slopes is in Ramosch, with terraced areas of about 40 hectares partly dating from the Bronze Age. Sent and Ramosch used to be known as the granary of the Engadin. In the 20th century, crop production was gradually replaced by hay meadows. In 1983, the crop terraces of Ramosch became part of the Federal Inventory of Landscapes and Natural Monuments (ILNM). However, technical irrigation systems threaten the meadows’ high biodiversity.</p>	



<b>The project</b>
First concepts for conserving the crop terraces were developed in the late 1980s. In 1997, the Swiss Foundation for Landscape Conservation (SL) encouraged the former municipality of Ramosch (today Scuol) to start a project for maintaining and promoting the recultivation of abandoned crop terraces. Project objectives focused on restoring embankments and rare stone walls, protecting open terraces by preventing forest growth, and promoting the production of rye and other crops in collaboration with the Gran Alpin marketing association. In 2009, the foundation Pro Terra Engiadina ( <a href="http://www.proterrae.ch">www.proterrae.ch</a> ) was created in order to coordinate the steadily growing number of individual projects. Since then, the conservation project also includes an important educational component for local people.
<b>Formal conditions</b>
The formal conditions for successful projects are entirely fulfilled. <b>Normative protection:</b> The terraced area of Ramosch is protected by federal acts (ILNM). <b>Planning security:</b> The project area is located in the agricultural zone, which excludes other uses. <b>Maintenance support:</b> The project is of high cantonal and national interest due to the landscape's cultural and natural values. This makes it possible to generate financial contributions. <b>Targeted land management:</b> Farmers can benefit from direct payments (e.g. subsidies for landscape quality). <b>Project management:</b> A strong regional institution (foundation) with a professional office has been established to manage several projects that are linked by the same philosophy of land use.
<b>Procedural conditions</b> (selected success factors)
<b>Long-term nature:</b> The inclusion of local and regional actors in a broadly accepted foundation and its collaboration with partners at the national level gives the project a long-term perspective. The region is also appreciated as a destination for natural and cultural tourism. <b>Legal protection:</b> The site is protected by federal law (ILNM). <b>Participation of the landowners:</b> The farmers are included and work within the project. They get a higher price due to the "Gran Alpin" label. Some also produce malting barley for the beer brewery in the nearby village of Tschlin. <b>Coherence among actors:</b> Coherence between the different social groups involved is fostered by the fact that the large number of individual projects are all interrelated, linking ecology, tourism, cultural heritage, and the economy in a shared overall concept. However, there are diverging views on the economic outcome and on the question of technical agricultural investments (e.g. irrigation). <b>Governing body:</b> The foundation includes private and public actors from the local, regional, and national levels; farmers play an important role. <b>Initial project budget:</b> The initial costs were covered by the Swiss Foundation for Landscape Conservation (SL), which was decisive in enabling the project to be launched. <b>Economic importance of land use:</b> Farmers' operating costs are covered by agricultural subsidies and the higher prices they obtain for their high-quality products. <b>Ecological integration:</b> The project may be seen as an effort to re-establish the former, well-adapted cropping system with cereal production in the lower, non-terraced areas and extensive hay meadows on the biodiversity-rich terraces. However, the question of the degree of intensity of land use remains contentious. <b>Habitat creation and protection:</b> Habitat diversity has increased thanks to the renewed cultivation of abandoned meadows and pastures on the higher terraced areas of Ramosch.
<b>Challenges</b>
<b>Habitat creation and protection:</b> The economic success of the cultivation of formerly partly abandoned terraces leads to efforts to use the land more efficiently. However, the introduction of technical irrigation systems and the construction of better access ways risk to threaten today's high biodiversity.

As the descriptions of the three case studies show, the basic conditions enabling long-term conservation of the terraced landscapes differ. The spider graph (Figure 3) illustrates these differences by means of the formal conditions and the 13 success factors of the procedural conditions. The influence of the success factors on sustainability outcomes was graded into the four categories "high", "medium", "small", and "negative". The graphs show that the project in Ramosch, which fully meets the formal

conditions for successful projects, is also the most successful when considering the procedural conditions. However, formal conditions alone cannot guarantee successful promotion and sustainable outcomes of a project. The 13 success factors we identified must also be fulfilled in a well-balanced way to enable sustainable project development. The balance between them is mainly determined by local social processes, which are often influenced by local history and memories. The case study of

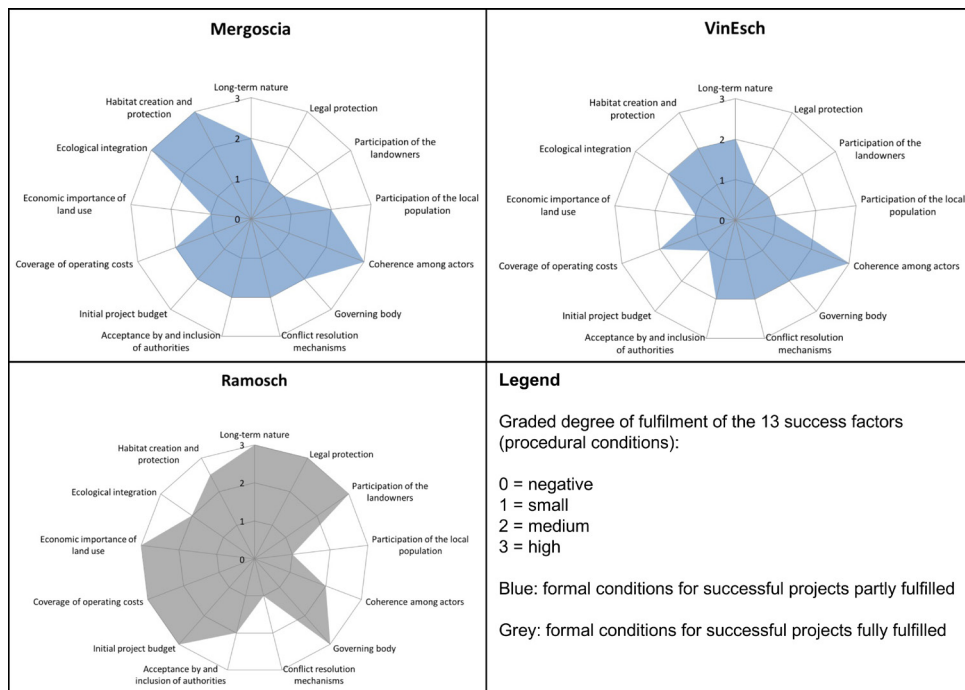


Figure 3: Spider graphs showing the degree of fulfilment of the 13 success factors for the three case studies of Mergoscia, VinEsch, and Ramosch.

Figura 3: Gráficos de araña que muestran el grado de cumplimiento de los 13 factores de éxito para los tres caso de estudio: Mergoscia, VinEsch y Ramosch.

VinEsch shows a type of “citizenship relation” between people living or working in urban areas, on the one hand, and a rural area to which they feel committed, on the other. They exercise the partly exclusive privilege of working in the vineyard in a team of likeminded people. This shared identity could easily be lost in the event of social conflicts among members or an increase in economic obligations. Whether such a potential gap would be filled by local authorities or other local actors is completely unclear. Compared to VinEsch, the case study of Mergoscia shows clear advantages in the involvement of local actors, actor diversity, and wider actor networks. The case study of Ramosch further shows that integrating a conservation project and its governing body into a wider range of cultural projects may be a crucial success factor. Doing so provides a certain economic and social buffer for each individual small project, as it becomes part of a regional self-image under a widely accepted philosophy of “the right way to look ahead to the future”.

The results show that a broadly anchored and locally and externally accepted governing body might be closely linked to the long-term nature of a project. Such a governing body is in a position to deal with the complexity of management, financing, project coordination, and cooperation while promoting coherence among actors and integrating relevant local and interested external actors (e.g. NGOs, national and cantonal authorities, the general public) into communal structures. This, in turn, enhances other success factors, such as ecological integration and habitat conservation, generation of funds to cover operat-

ing costs, inclusion of communal work (e.g. by land users or volunteers), and even legal protection.

## 6. Conclusion and Outlook

Swiss experiences of enhancing and maintaining terraced landscapes suggest that a broadly anchored and locally and externally accepted governing body, the involvement of project insiders and outsiders as well as the economic, social, and ecological value added that the project generates are crucial success factors that enhance a project’s long-term success. The better a single project is embedded in a regional ecological, sociocultural, and economic setting, the more it will be buffered against short-term adversities such as shortages of finances or personnel and yield fluctuations. When aiming at maintaining the various qualities that terraced landscapes contribute to society, the framework presented in this article provides a basis for a first appraisal of a project’s potential for successful long-term terraced landscape conservation. In order to evaluate its applicability, it should now be tested in other contexts and countries.

Because terraced landscapes are frequently simply considered as productive agricultural land, making their structural “skeleton” (embankments and drystone walls) a precondition for land use, and because terraces and embankments remain stable for a long time after their productive use is given up, public awareness usually only emerges when the drystone walls begin to crumble, the

soil starts to erode, and hazards arise. At this point, however, it is often too late to initiate a conservation project, due to the high initial costs of restoring the skeleton to eventually enable the renewed use of the terraces. It is therefore essential to start conservation projects long before the terraces show visually recognizable signs of decay. This requires two things: first, the nationwide (and worldwide) identification and characterization of terraced landscapes; and second, on this basis, the development of appropriate policies and actions for their conservation. While the mere restoration of walls and embankments in the sense of museum-like conservation might be valuable for individual outstanding examples, conservation must generally go far beyond that. From a large-scale perspective, we need a clear view of priorities, necessary inputs, and potential outcomes when reactivating terraces. In this context, the consideration of formal and procedural (pre-) conditions for successful recultivation projects enables a targeted pre-evaluation and weighing of project aims and opportunities.

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