Interreg IIIB Project 'ALPTER – Terraced landscapes of the alpine arc'

MAPPING TERRACED AREAS IN THE ALPS

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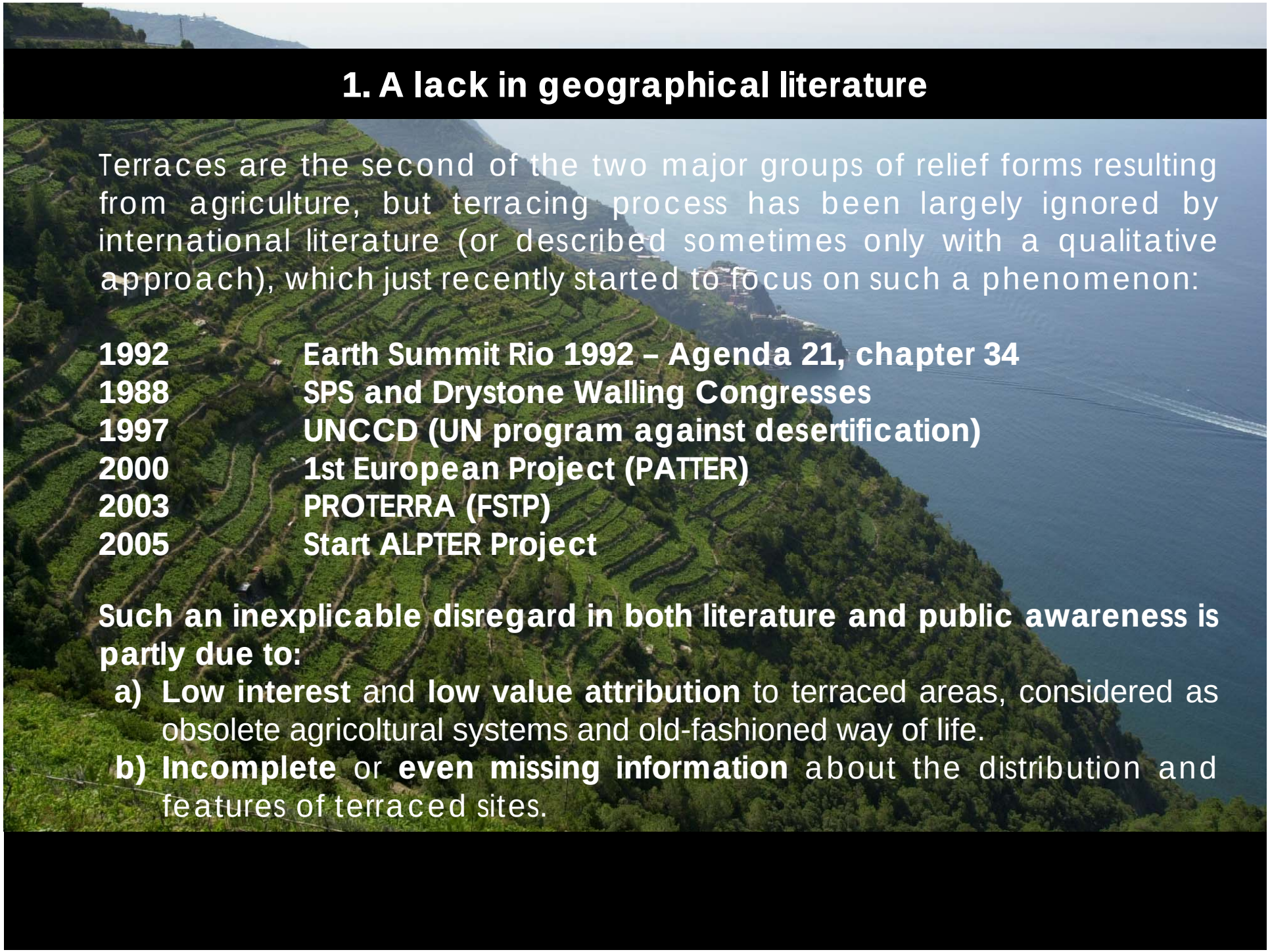
Summary:



1. A lack in geographical literature

Terraces are the second of the two major groups of relief forms resulting from agriculture, but terracing process has been largely ignored by international literature (or described sometimes only with a qualitative approach), which just recently started to focus on such a phenomenon:

1992	**Earth Summit Rio 1992 – Agenda 21, chapter 34**
1988	**SPS and Drystone Walling Congresses**
1997	**UNCCD (UN program against desertification)**
2000	**1st European Project (PATTER)**
2003	**PROTERRA (FSTP)**
2005	**Start ALPTER Project**

Such an inexplicable disregard in both literature and public awareness is partly due to:

a) **Low interest** and **low value attribution** to terraced areas, considered as obsolete agricoltural systems and old-fashioned way of life.

b) **Incomplete** or **even missing information** about the distribution and features of terraced sites.

2. Project ALPTER – Terraced landscapes oif the alpine arc

INTERREG III B is an initiative that aims at promoting interregional cooperation in the European Union for the programming period 2000-2006.

It is co-financed in the framework of the European Fund for Regional development.

ALPTER

PROJECT 'ALPTER'

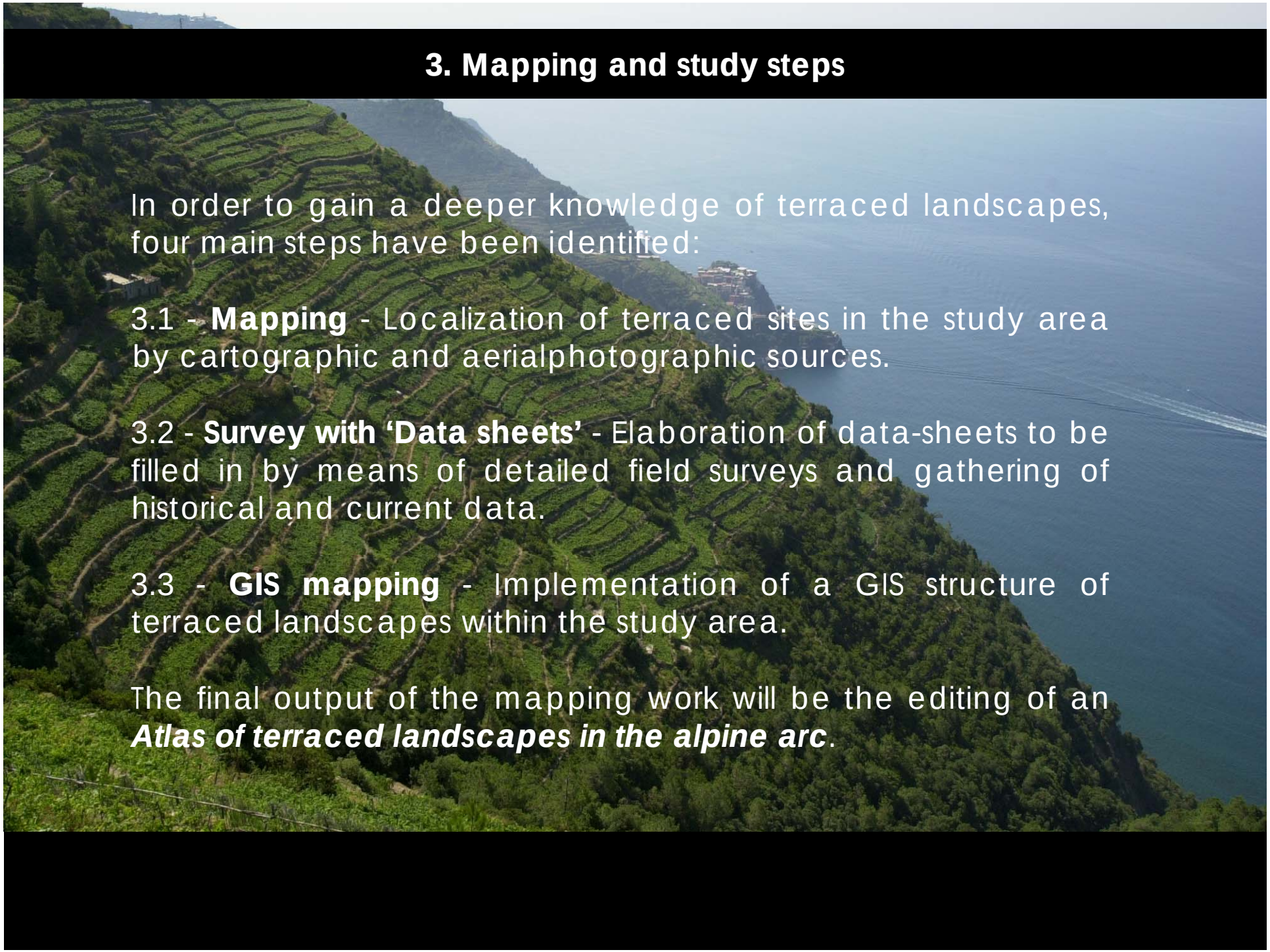
A project for study and recovery of the terraced agricultural areas in the Alps. Aimed at enlarging the territorial knowledge, developing tools for promotion of disfavored areas and hazard.

Some results :

- A **Common Protocol for the survey and analysis** of terraced sites.
- A **Network** linking different experiences of study and recovery in EU terraced areas.
- **Integrated Projects of recovery** and revitalization of terraced abandoned areas.

Project Partners:

Regione Veneto (Lead Partner)
Regione Bregaglia (CH)
University of Ljublijana (SLO)
Dep. Alps Maritimes (FR)
Regione Liguria (Italy)
Universität BOKU (Wien – AU)
I.R.E.A.L. P. (Sondrio - Italy)
Regione Valle d'Aosta (Italy)
(with collaboration of: Slow Food, Unesco)



3. Mapping and study steps

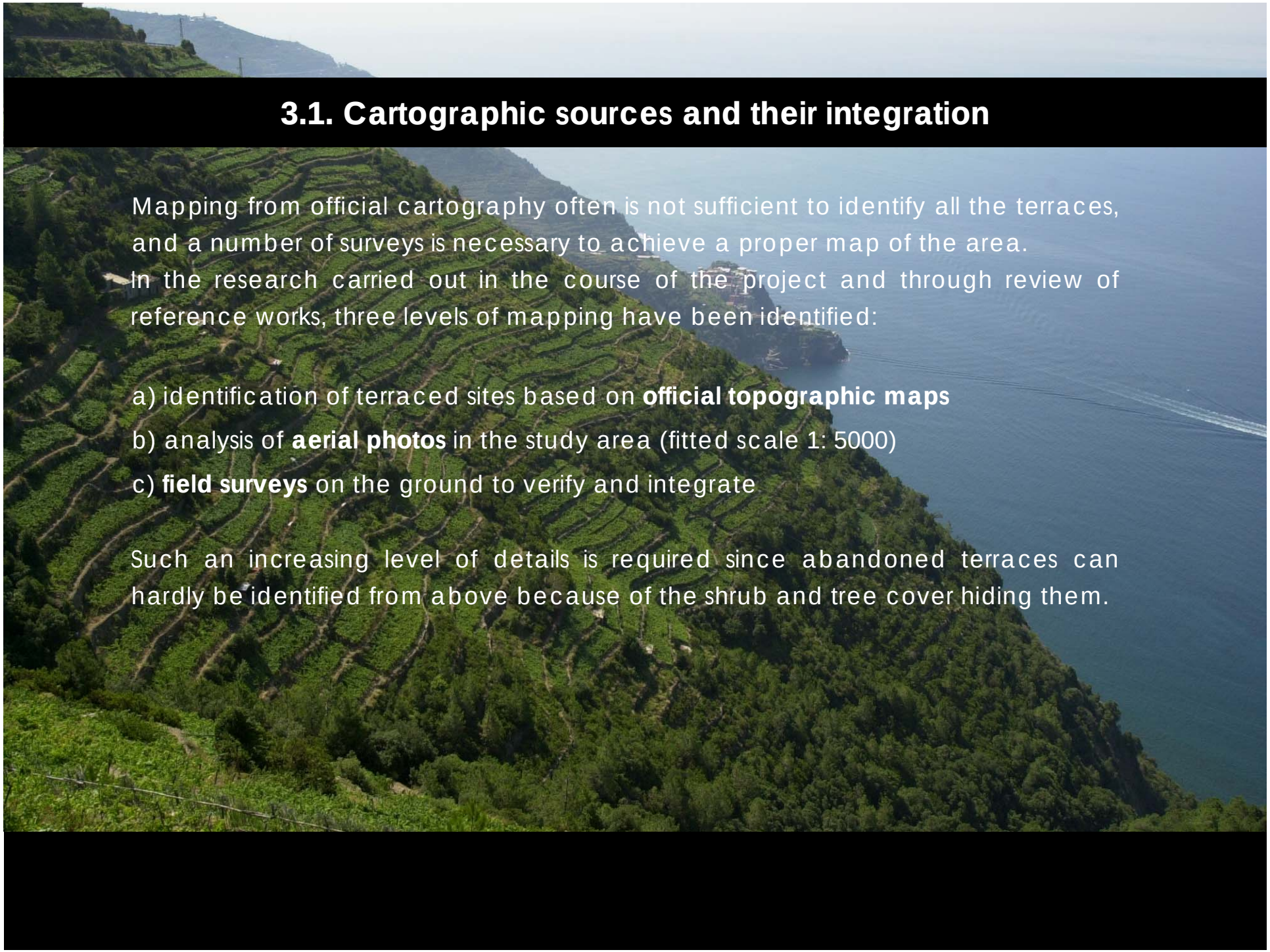
In order to gain a deeper knowledge of terraced landscapes, four main steps have been identified:

3.1 - **Mapping** - Localization of terraced sites in the study area by cartographic and aerialphotographic sources.

3.2 - **Survey with 'Data sheets'** - Elaboration of data-sheets to be filled in by means of detailed field surveys and gathering of historical and current data.

3.3 - **GIS mapping** - Implementation of a GIS structure of terraced landscapes within the study area.

The final output of the mapping work will be the editing of an ***Atlas of terraced landscapes in the alpine arc***.



3.1. Cartographic sources and their integration

Mapping from official cartography often is not sufficient to identify all the terraces, and a number of surveys is necessary to achieve a proper map of the area.
In the research carried out in the course of the project and through review of reference works, three levels of mapping have been identified:

a) identification of terraced sites based on **official topographic maps**

b) analysis of **aerial photos** in the study area (fitted scale 1: 5000)

c) **field surveys** on the ground to verify and integrate

Such an increasing level of details is required since abandoned terraces can hardly be identified from above because of the shrub and tree cover hiding them.

3.1. Cartographic integration: An example

The example here below shows the difference in precision of mapping levels :
- identification of terraced sites based on the Regional topographic map (C.T.R.N.) 1: 5,000, at regional level;
- analysis of aerial photos in the study area;
- field surveys in a selected number of spots on the ground (see Picture below).

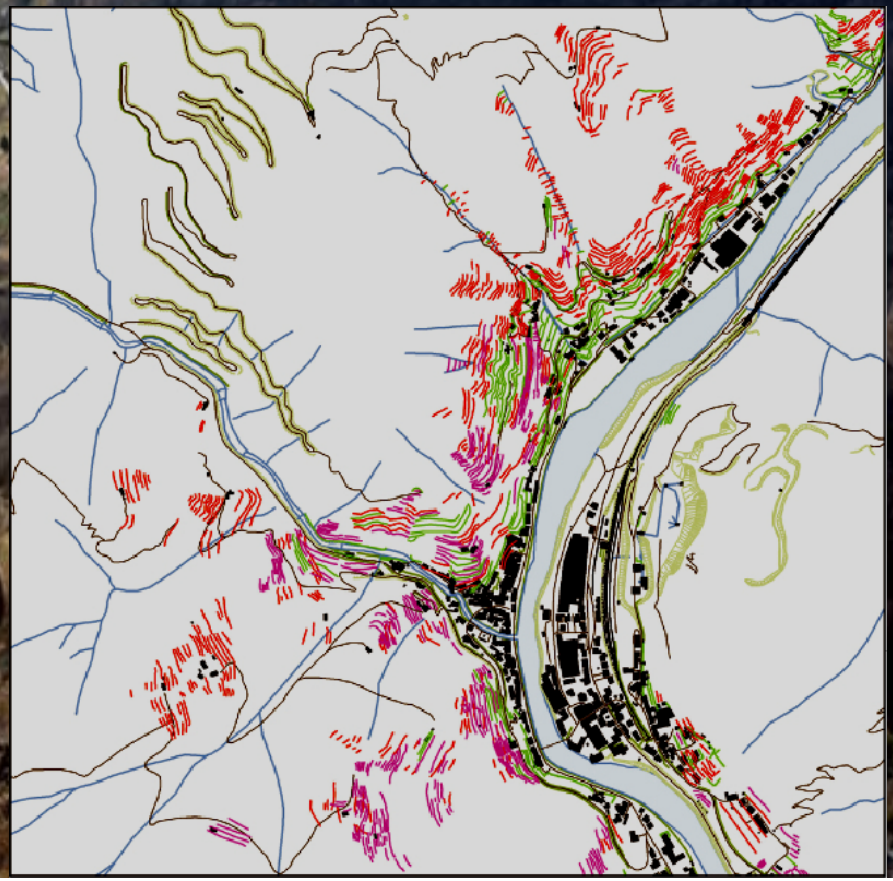
Such an increasing level of details is required since abandoned terraces can hardly be identified from above because of the shrub and tree cover hiding them.

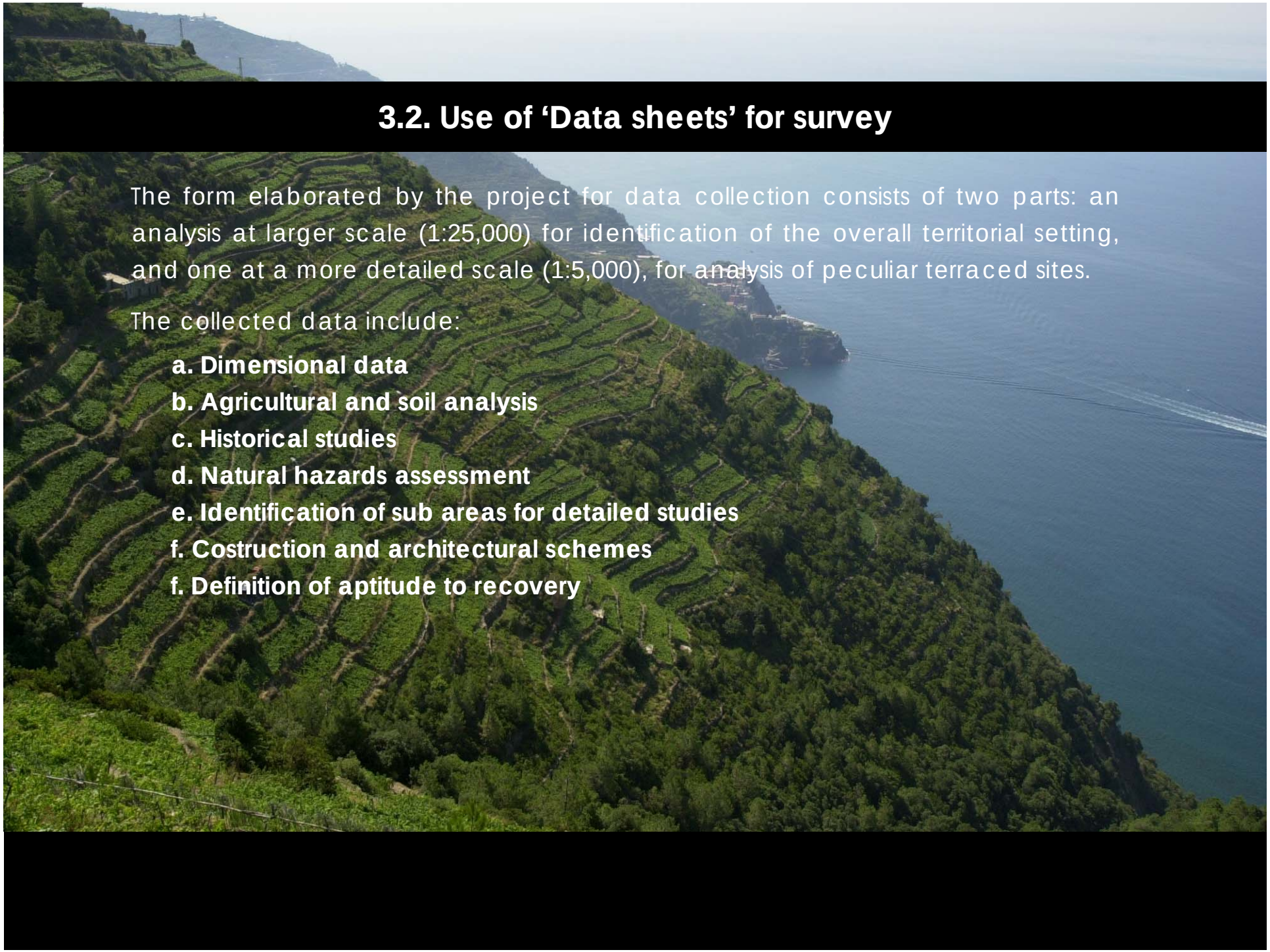
Comparison among the three mapping levels in the valley of River Brenta (Veneto, Italy)

Source: Regional Topomap
Year: 1999/2000
Mapped: 22% of the total
52 km of walls

Source: Aero-photographs
Year: 1967
Mapped: 83% of the total
190 km of walls

Source: field survey
Year: 2006
Mapped: presumably 100%
230 km of walls





3.2. Use of ‘Data sheets’ for survey

The form elaborated by the project for data collection consists of two parts: an analysis at larger scale (1:25,000) for identification of the overall territorial setting, and one at a more detailed scale (1:5,000), for analysis of peculiar terraced sites.

The collected data include:

a. Dimensional data
b. Agricultural and soil analysis
c. Historical studies
d. Natural hazards assessment
e. Identification of sub areas for detailed studies
f. Costruction and architectural schemes
f. Definition of aptitude to recovery

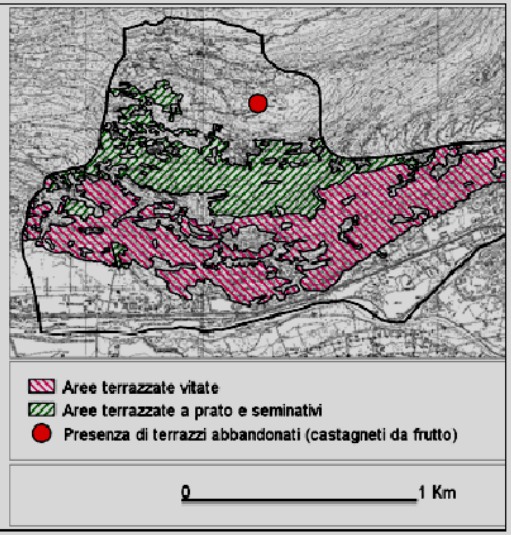
3.2. ‘Data sheets’ for survey: excerpts

Below: Excerpt of the **large-scale data sheet** concerning basic identification and dimensional data

A – Identification and location

State:	Region:	Municipalities:
Italy	LOMBARDY	SONDRIO – CASTIONE ANDEVENNO
Pilot area:		

Geographic Coordinates centre of the area, Gauss-Boaga W (or UTM WGS 84)	
Longitude:	1.564.400
Latitude:	5.113.360
Total surface (Km²):	7,5 km²
Average Altitude :	750 m
Cartographic Reference	
Type of map: Regional Technical Map CTR digital aster format	**Scale:** 1:10.000
Sheet N.: C3c2 e C3d2	**Denomination:**



3.2. ‘Data sheets’ for survey: excerpts

Below: Excerpt of the **small-scale data sheet** with constructive and morphological schemes

B – General Dimensional Characters

Terraced surface (Km²)	7,5 km²		
Terraced cultivated surface (%):	38% (source Dusaf 2001)	**Min and Max altitude of cultivated terraces:**	300 min 900 max
Terraced uncultivated surface (%):	25% (source Dusaf 2001)	**Min and Max altitude of uncultivated terraces:**	300 min 1.200 max

C – Climate

Solar exposition (more than one possible)	**N**	**NE**	**E**	**SE**	**S**	**SO**	**O**	**NO**
Average precipitation for year (mm)	999,37 mm (1982-2005)							
Max rain precipitation in a month (mm and month)	Absolute value: 462,1 mm (Nov 2002) Average value: 113,41mm (October)							
Min rain precipitation in a month (mm and month)	Absolute value: 0 mm (Jan 93, Feb 97, Mar 98, Jan 00) Average value: 31,33 (Feb)							
Attachments (climate graph, ...): See attached file								

D – Access to the area (actual)

Accessibility level:	**Low (only by local road)**	**Medium (by road of regional level)**	**High (by high flow route)**
Notes:	Along the bottom of the valley, runs the National Route n.38. Within the area there are a total of 6 municipal roads. Some of them are narrow, with many turns.		

3.3. GIS Basic indicators

Although several data are significant in describing terraced sites, the most useful and appliable in GIS analysis have been identified to define a 'core set' of indicators.

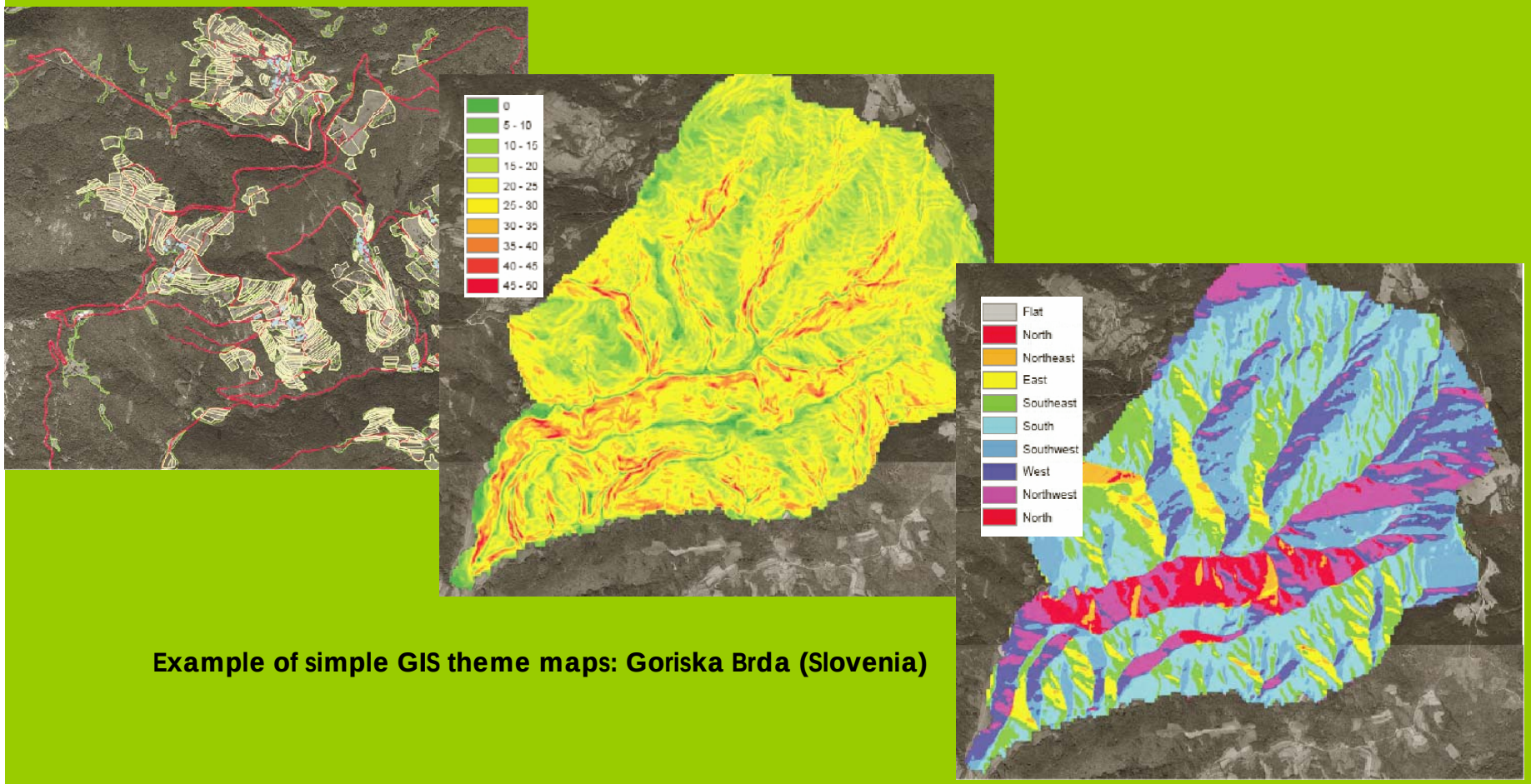
This set have been thought to contain data that are both easy to measure and significant enough to describe the main characters of a terraced area. This can enable to realize GIS analysis (through digital tools as ARCGIS 'spatial analyst') based on the chosen indicators.

THE 'CORE SET' OF INDICATORS

- **Extent** of terraced surface
- **Slope** gradient and aspect
- **Geological** substratum
- **Soil** granulometry (clay, silty, sandy)
- **Land use**
- **Water** channel system
- **Maintenance** conditions (partially or totally abandoned,...)
- **Accessibility** to the terraced sites (distance from a through road)
- **Disorders** (number of evidences)

3.3. GIS use in mapping and analysis

Beyond simple mapping and monitoring, the analysis of terraced sites might thus be significantly improved by creating a GIS structure. Basic indications for the GIS structure on terraced sites should include the following items:



Example of simple GIS theme maps: Goriska Brda (Slovenia)

3.3. GIS elaboration: Example of historical analysis

Land use in Ödenkirchen in 1828

Land use in Ödenkirchen today

A interesting example of historical analysis through GIS use is the one undertaken in an Austrian study area, Ödenkirchen near Ulrichsberg, where land use changes occurred since 1828 were recorded. GIS-based digital map of the study area has then been obtained, enabling a comparison between the historical and the current land use system:

the main transformation is from cultivated fields to grassland (meadows and pastures), the area shifted from farm to woodland is not as important as in other alpine regions, because of the funding policies of the Austrian government .

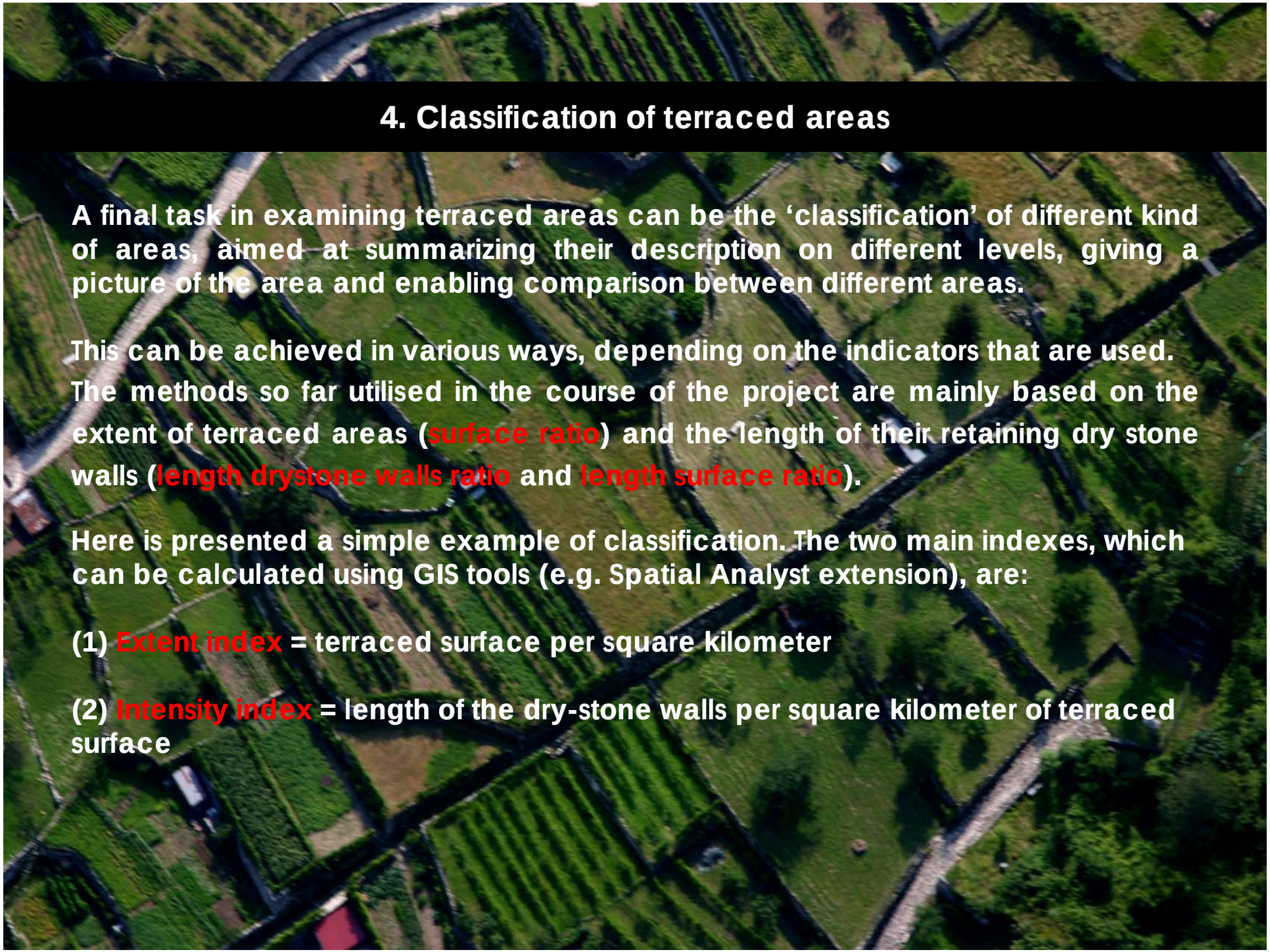
3.3. GIS elaboration: Quantitative results

	1828	2005
Meadows and pastures	29.0%	74.2%
Agricultural fields	67.2%	13.6%
Woods	2.0%	11.7%
Streets and settlements	1.8%	0.5%
Total	100.0%	100.0%

LAND USE CHANGE	AREA (m²)	PROPORTION
Fields → Meadows	267,731	50.1%
Fields → Woods	26,194	4.9%
Meadows → Woods	26,028	4.9%
Meadows → Fields	12,105	2.3%
Area of land use change	332,058	62.1%
Total surface	534,753	100.0%

One of the possibilities offered by GIS use is to realize quantitative analysis that gives concrete numbers about the evolution of the examined character.

Right here can be seen two tables concerning the study area shown before that measure the changes in land use and bring to the attention some trends.



4. Classification of terraced areas

A final task in examining terraced areas can be the ‘classification’ of different kind of areas, aimed at summarizing their description on different levels, giving a picture of the area and enabling comparison between different areas.

This can be achieved in various ways, depending on the indicators that are used. The methods so far utilised in the course of the project are mainly based on the extent of terraced areas (surface ratio) and the length of their retaining dry stone walls (length drystone walls ratio and length surface ratio).

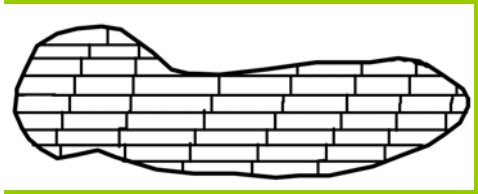
Here is presented a simple example of classification. The two main indexes, which can be calculated using GIS tools (e.g. Spatial Analyst extension), are:

(1) Extent index = terraced surface per square kilometer

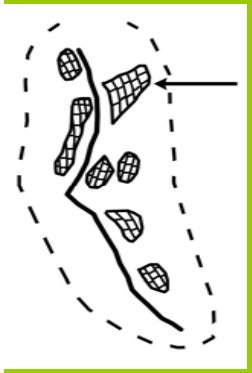
(2) Intensity index = length of the dry-stone walls per square kilometer of terraced surface

4. Classification of terraced areas

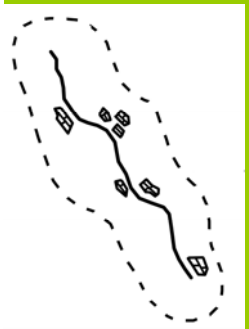
EXTENT INDEX TYPOLOGIES



Type 1: **entirely terraced slope (*macroterraced*)**

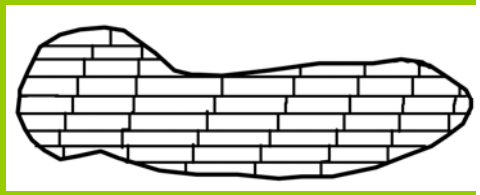


Type 2: **partly terraced slope (*mesoterraced*)**

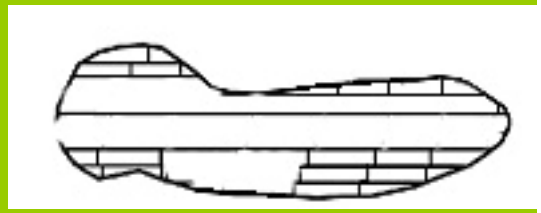


Type 3: **sparsely terraced slope (*microterraced*)**

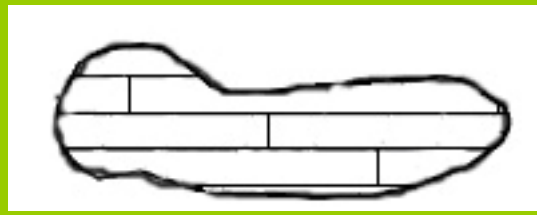
INTENSITY INDEX TYPOLOGIES



Type 1: **high-intensity terraced landscape**



Type 2: **variable-intensity terraced landscape**



Type 3: **low-intensity terraced landscape**

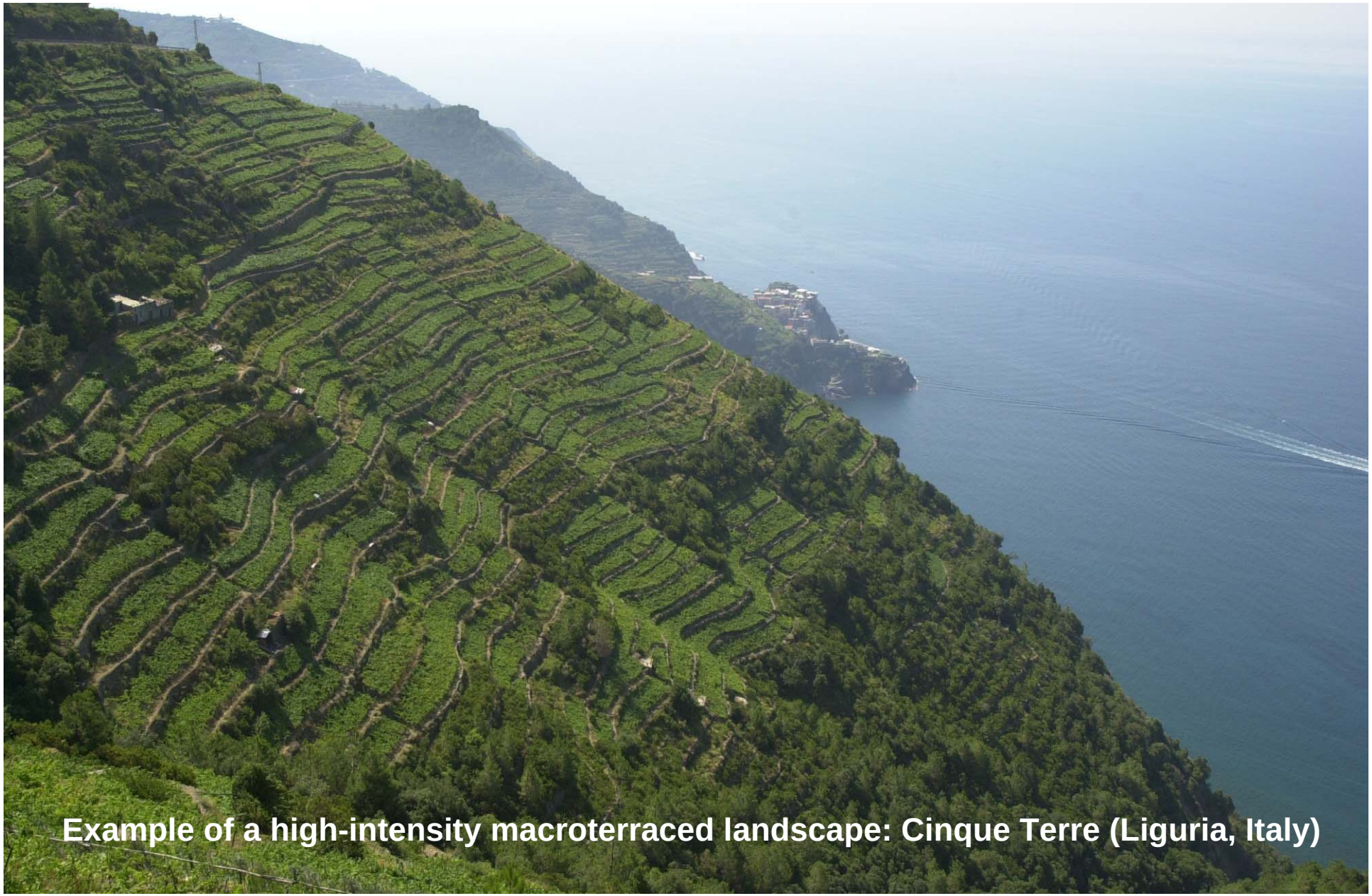
4. Classification of terraced areas

According to the two index defined above, 9 classes of areas can be defined, that can be examplified by different geographical areas, as shown here below.

Extent \ Intensity	HIGH	VARIABLE	LOW
MACRO	HIGH MaTL	MEDIUM MaTL	LOW MaTL
MESO	HIGH MeTL	MEDIUM MeTL	LOW MeTL
MICRO	HIGH MiTL	MEDIUM MiTL	LOW MiTL

1	HIGH MaTL	High-intensity macroterraced landscape
2	MEDIUM MaTL	Variable-intensity macroterraced landscape
3	LOW MaTL	Low-intensity macroterraced landscape
4	HIGH MeTL	High-intensity mesoterraced landscape
5	MEDIUM MeTL	Variable-intensity-mesoterraced landscape
6	LOW MeTL	Low-intensity mesoterraced landscape
7	HIGH MiTL	High-intensity microterraced landscape
8	MEDIUM MiTL	Variable-intensity microterraced landscape
9	LOW MiTL	Low-intensity microterraced landscape

4. Classification of terraced areas



Example of a high-intensity macroterraced landscape: Cinque Terre (Liguria, Italy)

4. Classification of terraced areas

Example of a variable-intensity macroterraced landscape: Brenta River Valley (Italy)

4. Classification of terraced areas

Example of a variable-intensity mesoterraced landscape: hills near Vicenza (Italy)

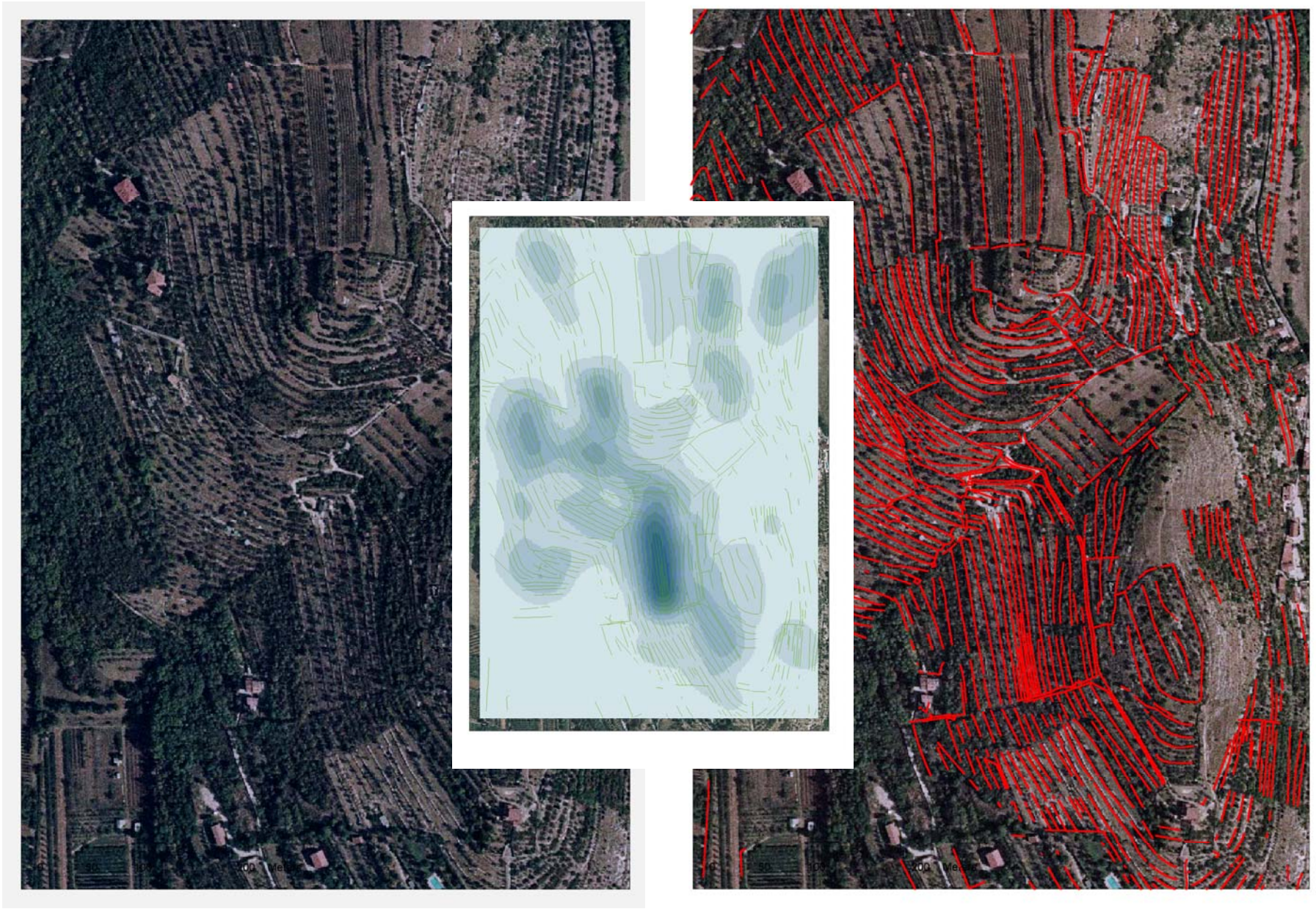
4. Classification of terraced areas

Example of a variable-intensity macroterraced landscape: Goriska Brda (SLO)

4. Classification of terraced areas

Example of a low-intensity macroterraced landscape: Ulrichsberg (Upper Austria)

4. Classification of terraced areas: the difference of scale



5. References: To know more…

www.alpter.net

For up-to-date studies, best-practices and the 'Network for terraced lanscapes', counting up to 59 members from all over Europe

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Thank you for your attention!