

Istituto di Geografia Umana – Stazione Valchiavenna

Università degli Studi di Milano

*Deterioration processes and definition  
of different risk typologies*

Alpter Project - EU Programme Interreg IIIB Alpine Space  
*Terraced landscapes of the alpine arc*

Second Transnational Workshop  
3-4 November 2005, Sondrio

## Summary (dia 1):

- a) Cartographic framing and pilot area presentation (dia 2)
- b) Pilot area of Pianazzola: in the past and in the present (dia 3)
- c) The age of terracings as key-factor in the deterioration evaluation (dia 4-6)
- d) Agriculture functionality as factor of walls endurance (dia 7-8)
- d) Building quality as endurance (or deterioration) factor of walls (dia 9-16)
- e) The role of the drainage network (dia 17-20)
- f) Scheme of the main direct causes of walls deterioration (dia 21)
- g) Examples (dia 22-30)
- h) Possible macro-consequences of walls deterioration (dia 31)
- i) Factors of hazards reduction (dia 32-35)
- l) Fire risk (dia 36)

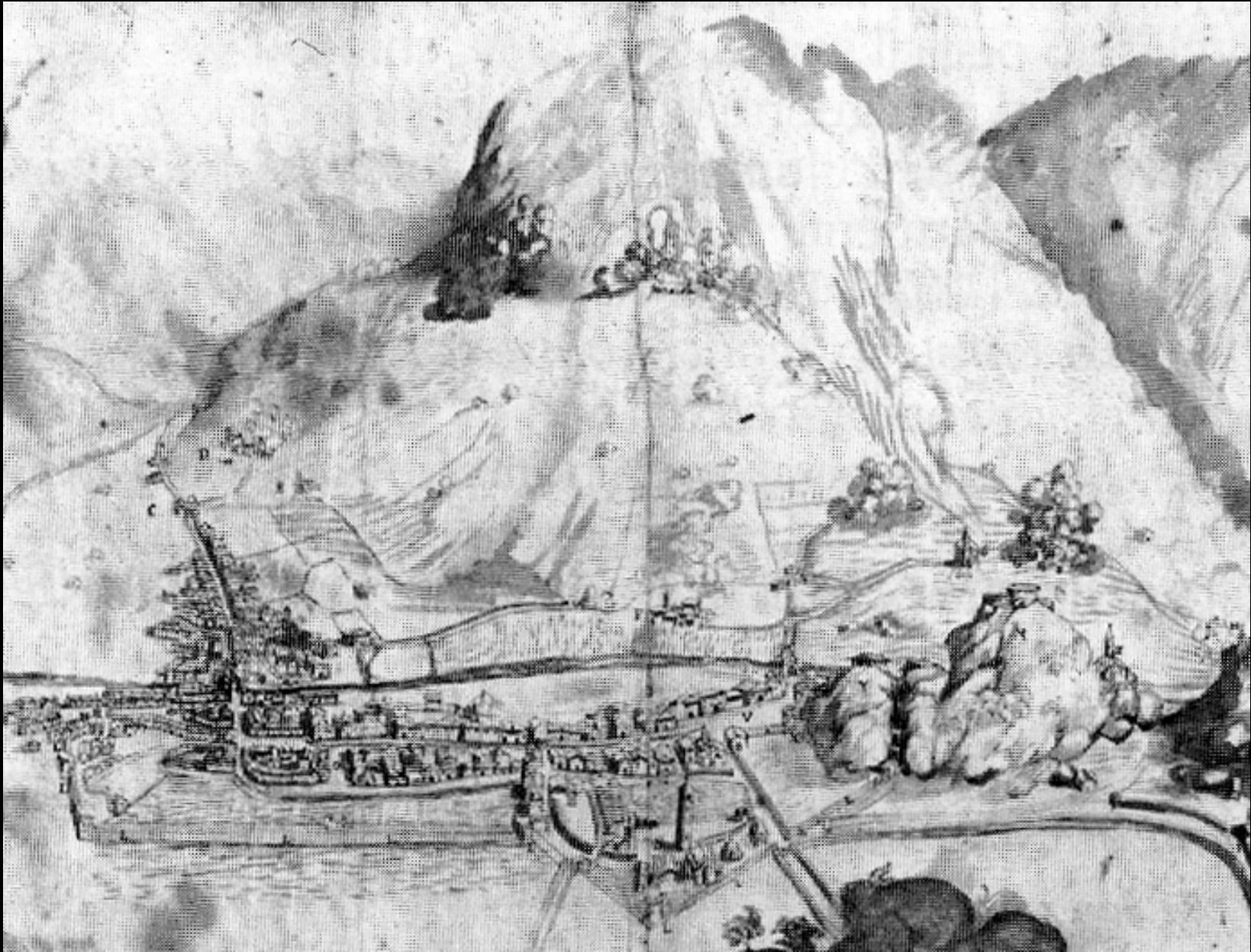








**A preliminary datum: the ancientness of some sectors of the terraced system**



*In the most inaccessible,  
unfruitful and marginal areas  
the origin of the terracings is  
more recent*







*Small plots of land torn up from rocks, under the weight of a growing demographic pressure*



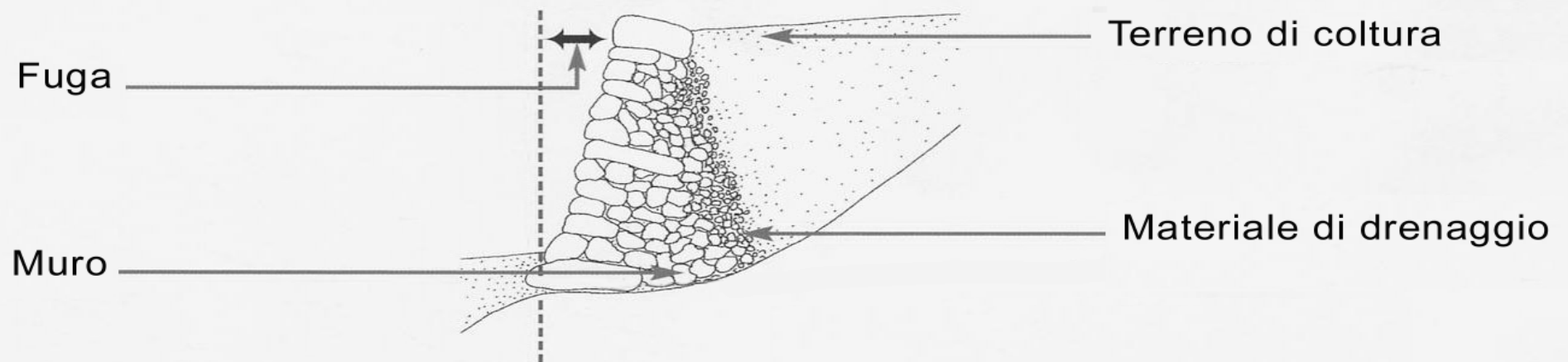
**In some sectors, the solidity of walls is guaranteed by the permanence of cultivations (of vines, most of all)**



*... and, after the abandonment, by the quality of the building system*



## *The building of a dry-stone wall*





*Building quality: shape and size of the blocks;  
disposition in the wall*

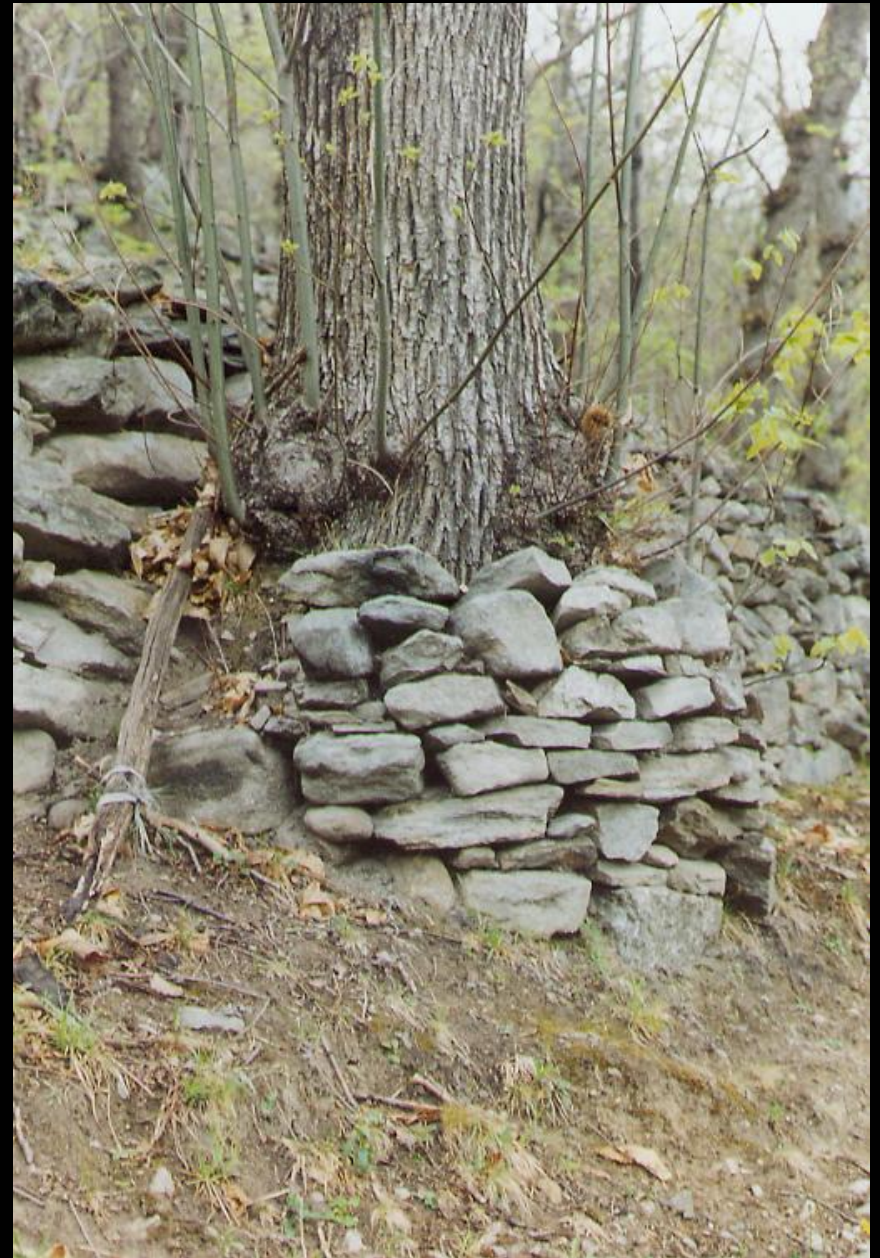


**Geometric embeddings with lithic fragments**



*An examples of huge dimension terracing  
(the walls are 3,5 metres high) with a good  
building quality technique*

*Micro-terracing of good building quality for the cultivation of chestnuts on high slopes*





*Hanging micro-terracing of good building quality*



*Micro-terracing of good building quality for the chestnuts cultivation*

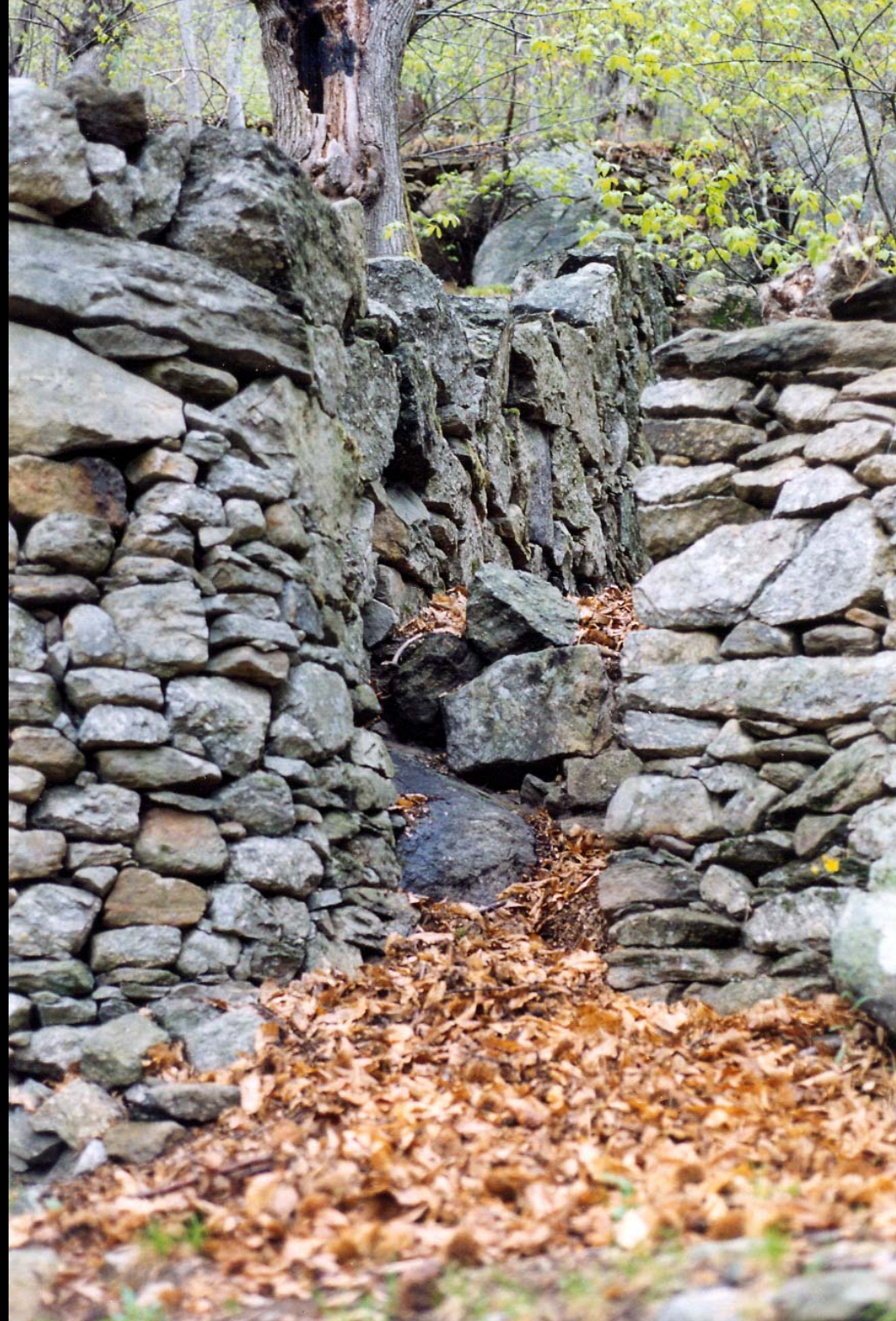


# Mediocre building quality





*Abandonment: occlusion of the superficial drainage network*





































*Abandonment:  
lack of maintenance in the lines  
of communication which, in  
certain cases, constitutes  
segments of the superficial  
drainage network of waters*

*The main causes of deterioration in the walls of terracings (from Fédération des Parcs Nat. Rég. de France, 2001)*

| Part of the wall | State-causes  | Initial phase   | Intermediate phase  | Advanced or final phase   |
|------------------|---|---|---|---|
| High             | The weight of too heavy machineries                           |     |    |    |
|                  | The action of wild boars looking for food on the border rocks |     |    |    |
|                  | The action of flocks: trampling of borders                    |     |    |    |
|                  | Installment of trees in the upper parts of the wall           |     |    |    |
|                  | Cutting of trees and natural falling down                     |     |    |    |
| Central          | Growing of trees in the middle of the wall                    |     |    |    |
|                  | Filling and hydrostatic thrust in a particular point          |   |  |  |
| Low              | Filling and hydrostatic thrust at the feet of the wall        |   |  |  |
|                  | Use of materials sensitive to cold                            |   |  |  |
|                  | Growing of trees at the feet of the wall (lifting action)     |  |  |  |





*Abandonment:  
lack of maintenance, growing of  
self-vegetation along the walls*

# *Hydrostatic pressure*



*Hydrostatic pressure and growing of self-vegetation in the internal upper part of the wall*



*Collapse of the overlooking terracings and mediocre building quality*



*Superficial flowing of water*



*Collapse of trees grafted in the wall*



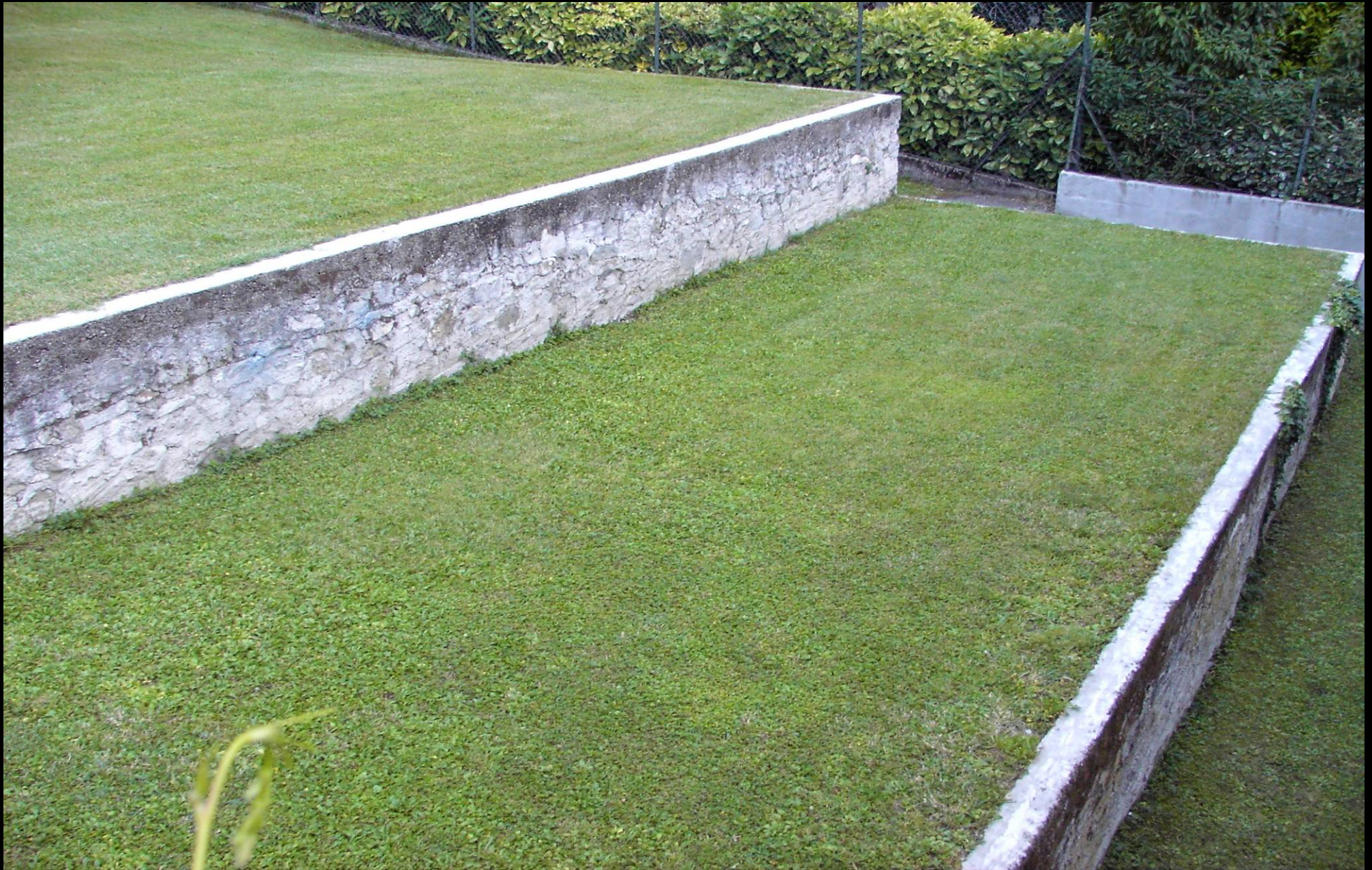
*Collapse caused by the chopping down of trees*







*Use of unsuitable techniques of terracing*



*Possible macro-  
consequences*



Tresenda, 1983

*Factors of temporary hazard reduction: a well structured soil in its upper horizons can slow down the regressive erosion...*





*... but it does not stop it*

*June 2004*



*June 2005*

*Factors of permanent hazard reduction: collapse on significantly wide terracings*





*Fossilization of portions of the slope: limited height of walls with accumulation of colluvium on the foot*

*Herbaceous and shrubby ri-naturalization: high risk of fire*

