

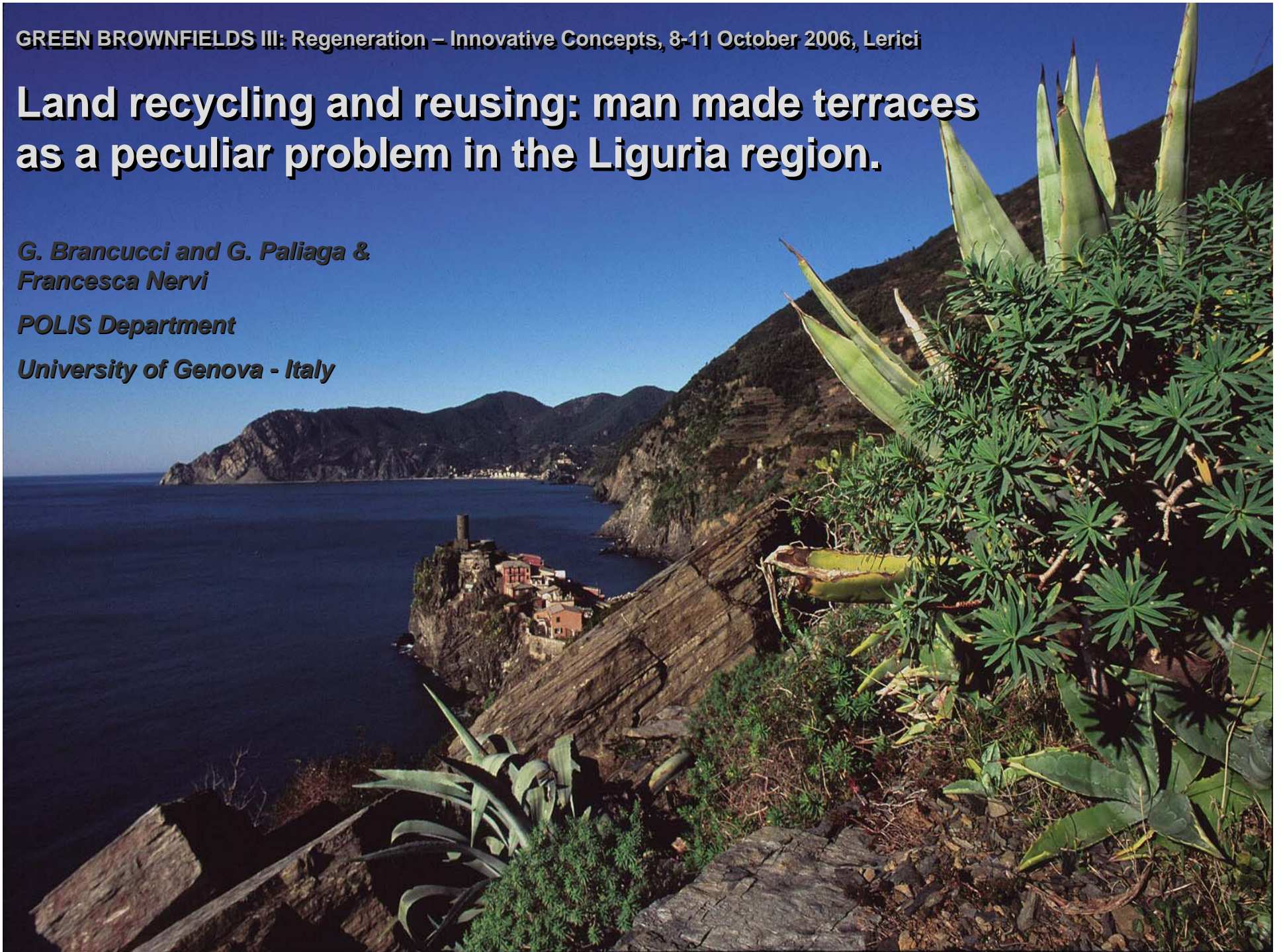
GREEN BROWNFIELDS III: Regeneration – Innovative Concepts, 8-11 October 2006, Lerici

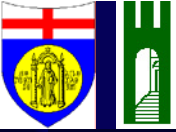
Land recycling and reusing: man made terraces as a peculiar problem in the Liguria region.

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Francesca Nervi***

POLIS Department

University of Genova - Italy





The Ligurian territory



Strong steepness of the slopes facing the tirrenian sea and short hydrological basins



Geomorphic hazard



Scarcity in space for rural and industrial purposes

High heterogeneity of the substratum lithology and complex structural asset





Along the past centuries man has induced deep changes in the landscape of wide areas with the aim to obtain terrain suitable to farming.

This modification has been done varying the profile of the terrain to gain sub horizontal surfaces and managing the flow of the rainfall runoff.



Anthropogenic modification of the slopes

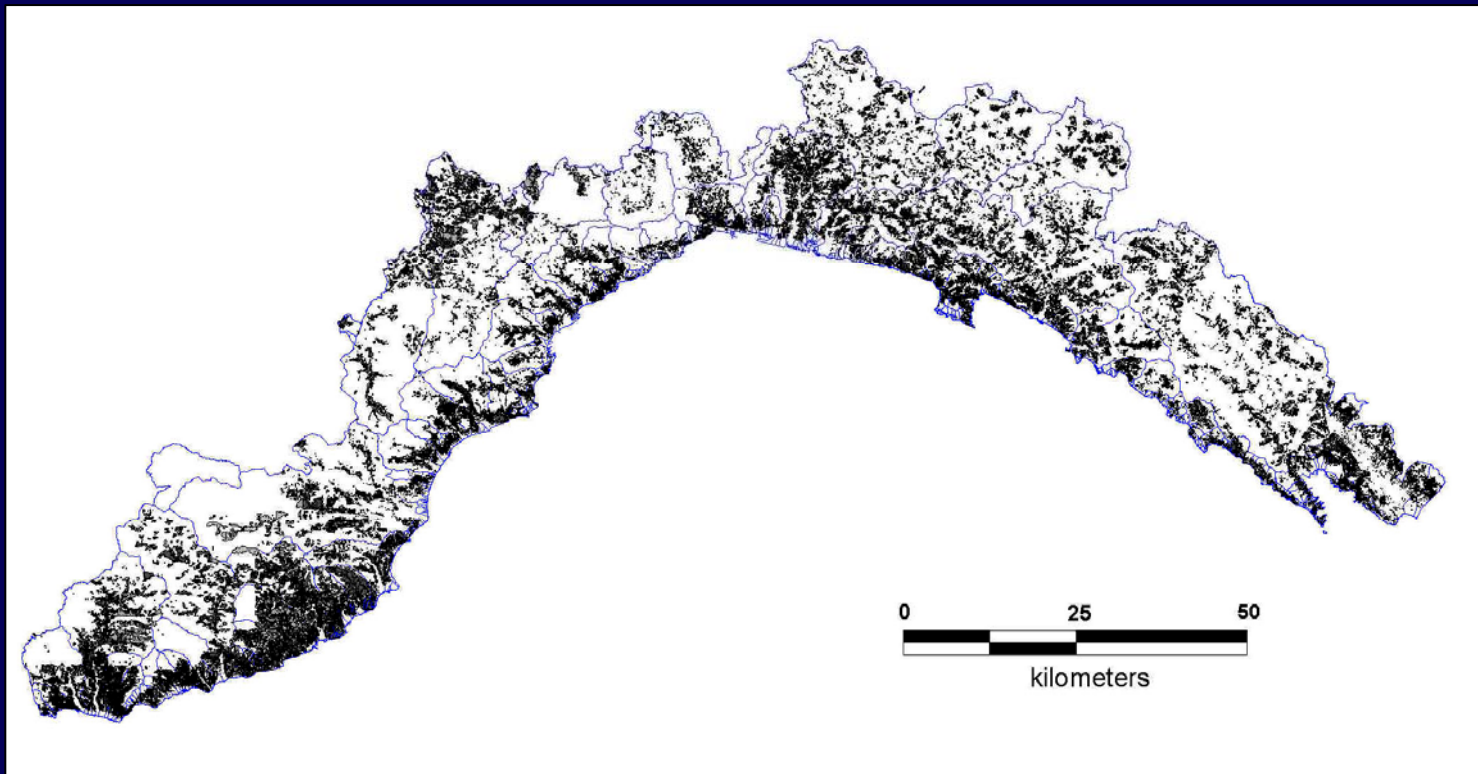




Extension of
terraced areas

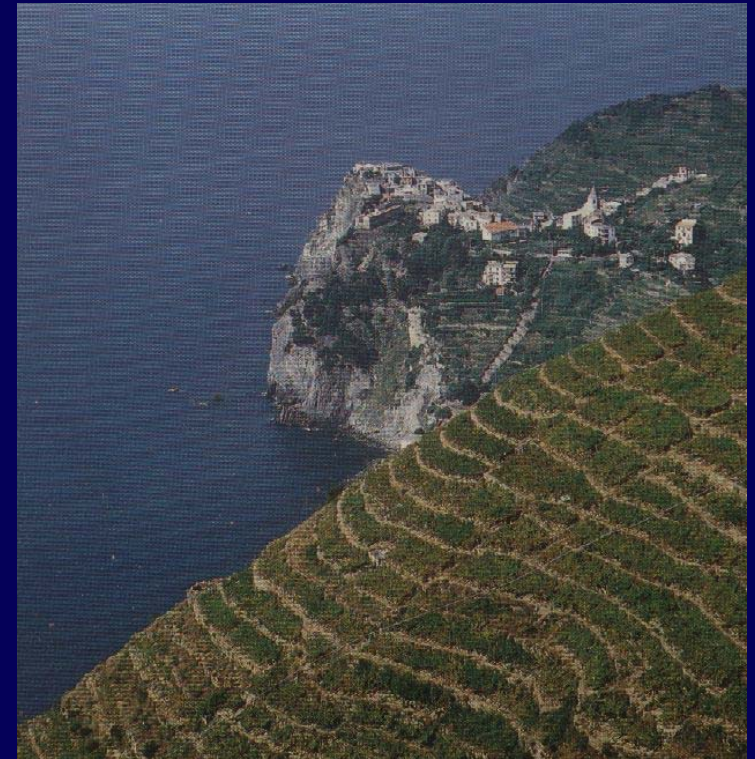


More than 20% of Ligurian
territory

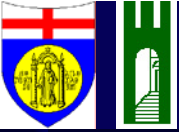




Man made terraces may be regarded as an ancient “industrial” large scale modification of the territory.



In the past, in some areas, this kind of modification represented the main economical activity

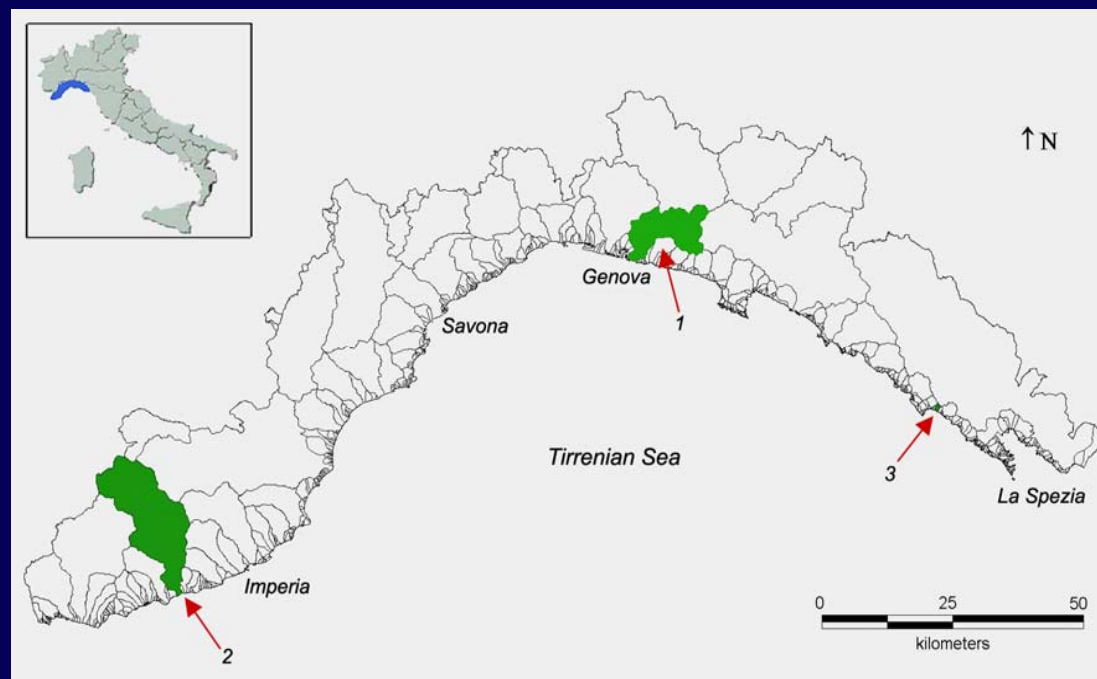


The Argentina valley (2) was famous for corn cultivation.

The Cinque Terre area (3) was and is famous for vineyard and lemons.

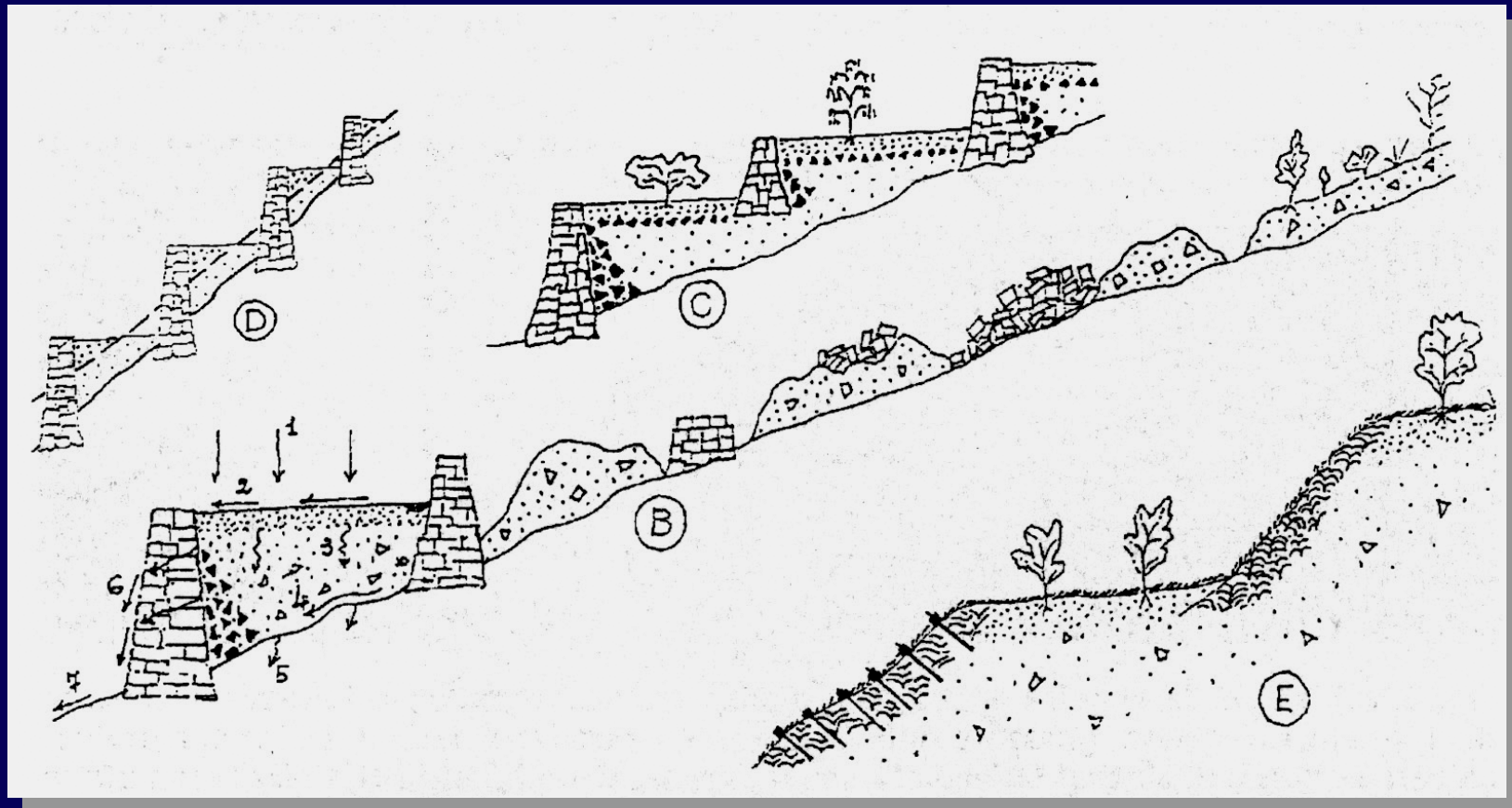
Other areas (1) where mainly used for less precious cultivation practices like chestnut and others.

Some areas nearby the coastline where mainly used for the olive

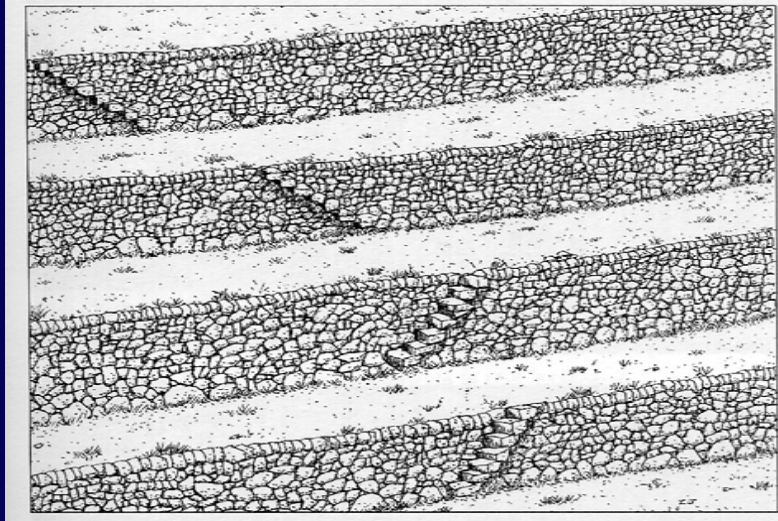




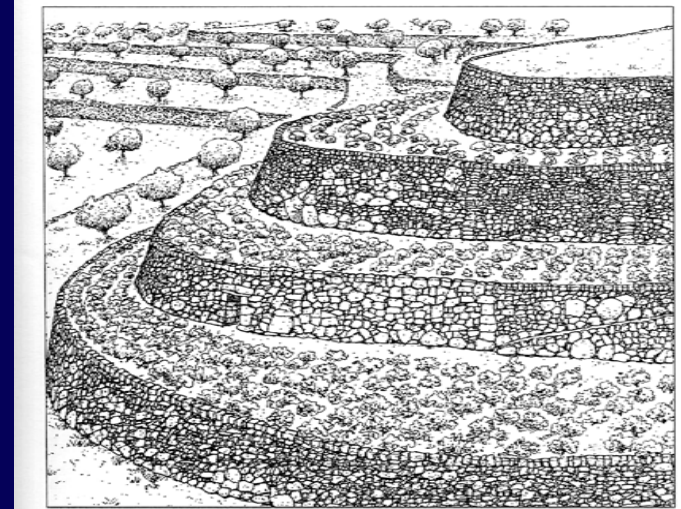
Various building up techniques



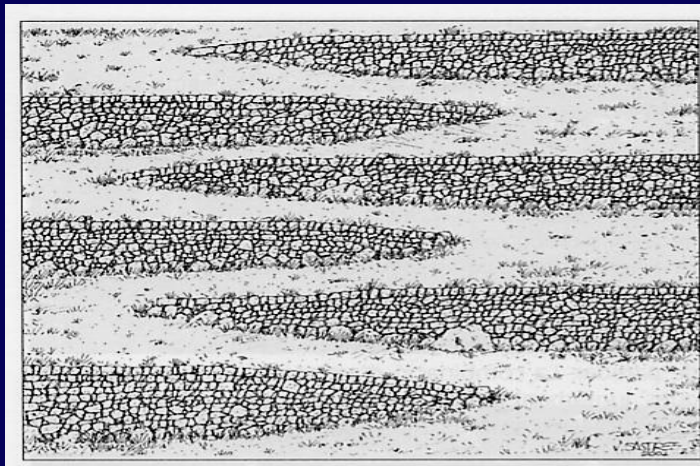
Terraces dispositions



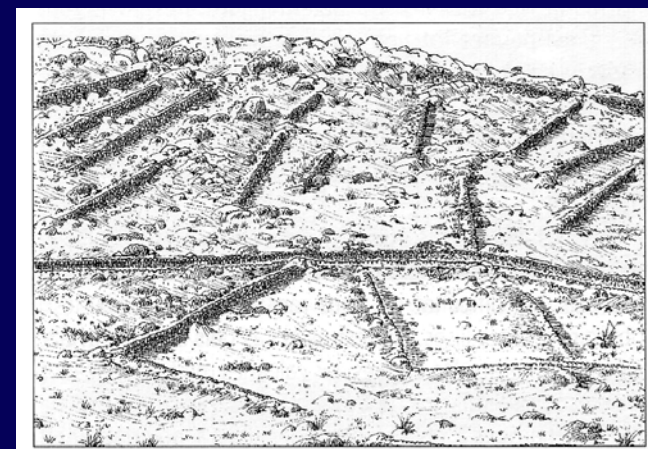
REGULAR AND CONTINUOUS



CONCENTRIC



PARALLEL DISCONTINUOUS



IRREGULAR



LITHOLOGY AND STONES DISPOSITIONS





5 Terre, a terraced landscape





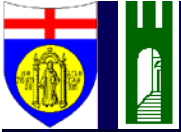
Terraces are spread from sea level to the main watershed



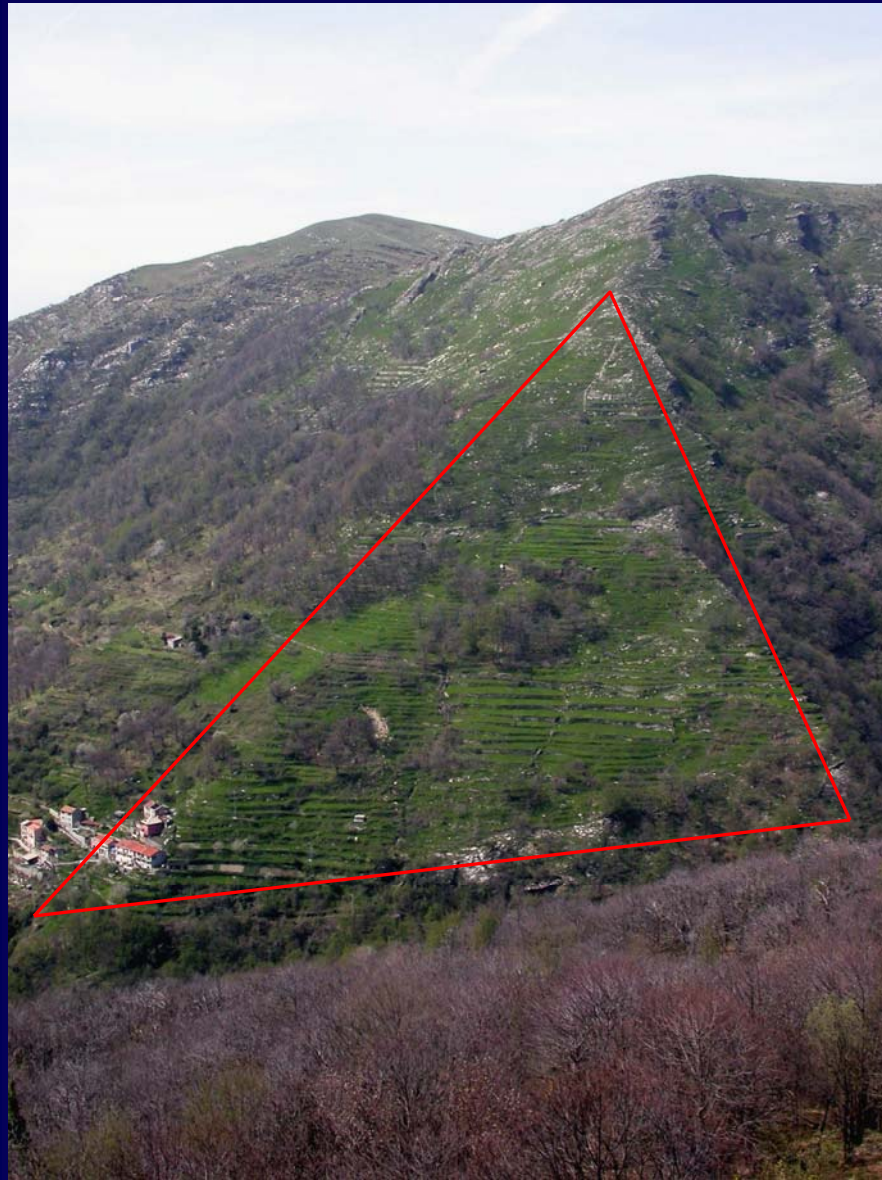
Laboratory of Applied Geomorphology, University of Genova - POLIS Dep.t www.geomorfolab.it

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The hinterland of Genova: the Bisagno basin



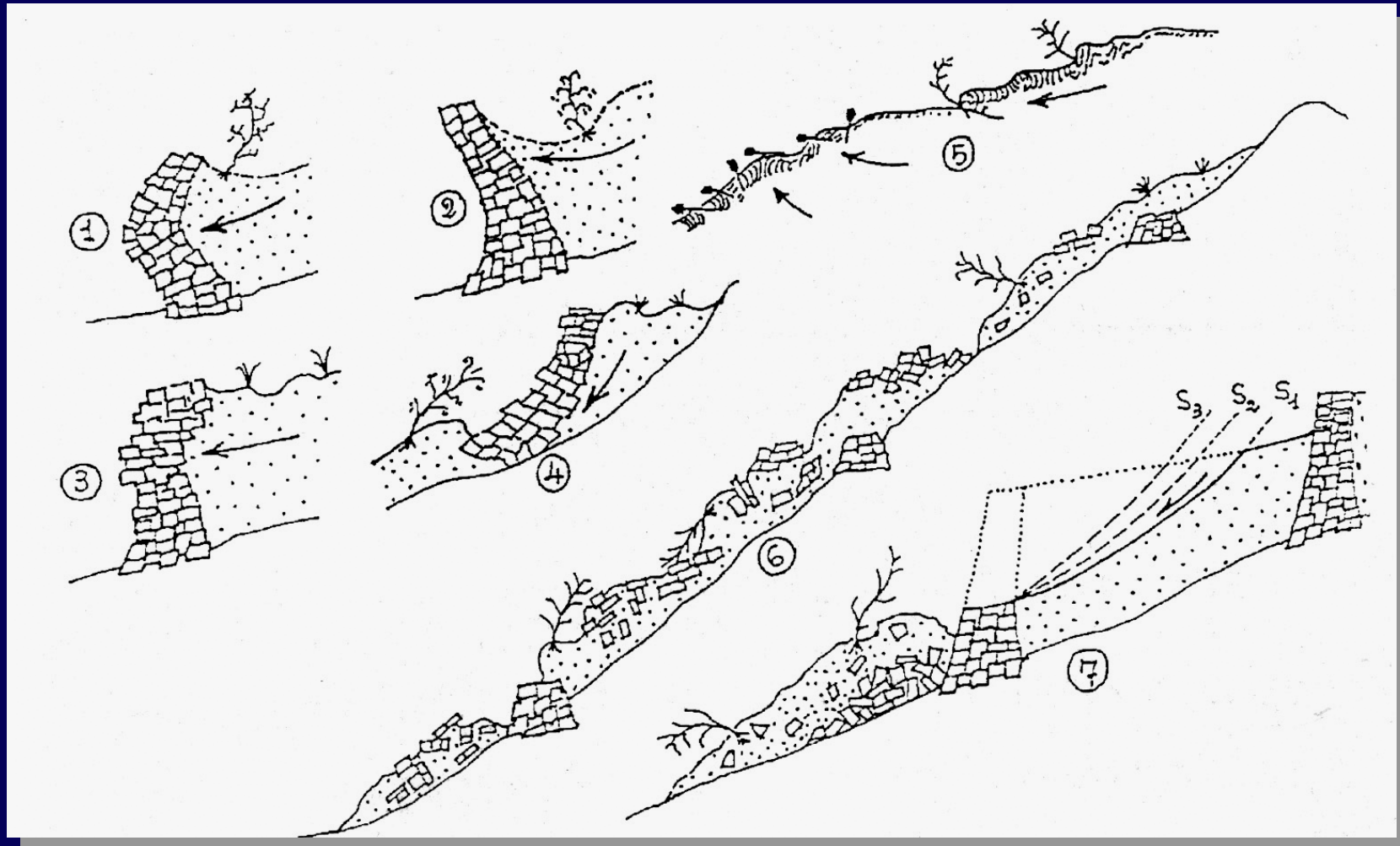


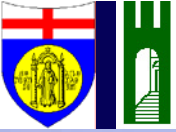
Actually most of those areas are in abandon causing an increase of the hazard related with the stability of the slopes because of the lack in maintaining the terraces

Those areas may be regarded as “agro-industrial abandoned sites”, that may cause an increase of the geomorphic hazard



DEGRADATION OF TERRACES



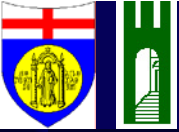


Managed terraces



The first effects
of degradation

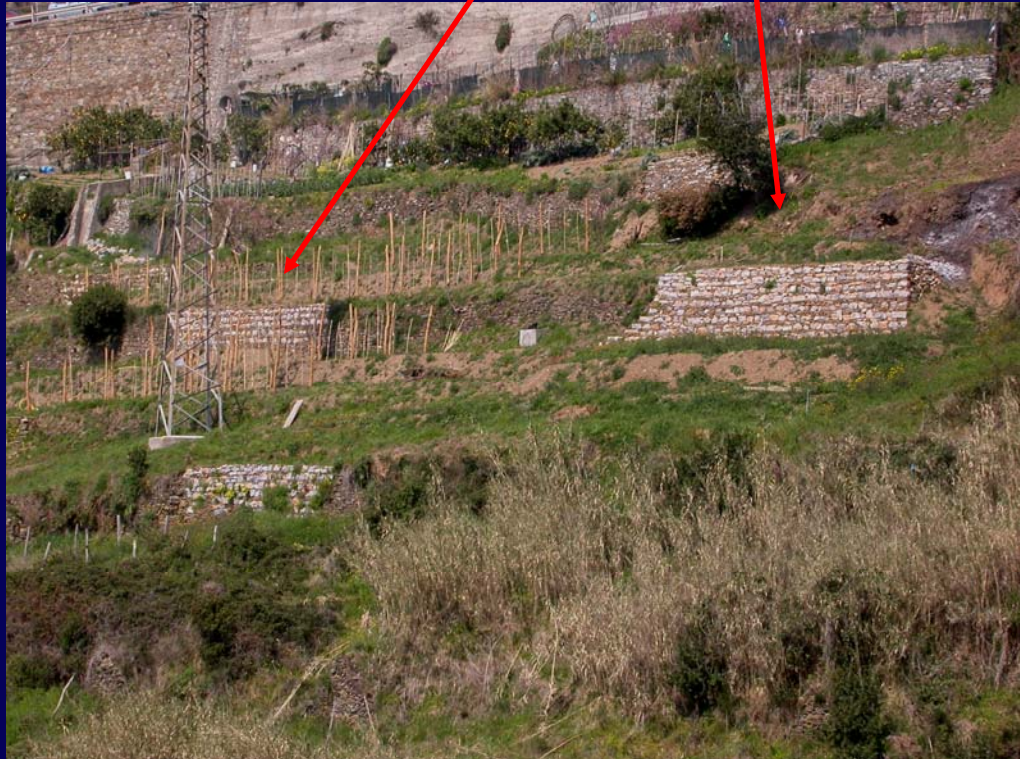




Degradation



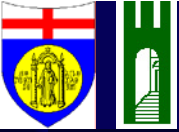
Wrong recovery





Wrong recovery

The permeability
of the original wall
has not been
conserved



The effect in case of severe
rainfall:

Landslides and heavy solid
transport in the stream.

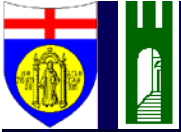
The effect reach the lower
part of the basin





Ceriana (Imperia) landslides and severe flood (2000)





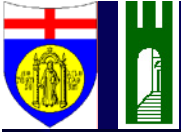
What terraces mean in term of the Geomorphic System?



Man has become one of the processes aging in the
geomorphic system
In some situation man is one of the dominant ones.

Moreover man is capable of deep changes
acting in short period

The effect is of putting the system
out of equilibrium



Abandon of the hinterland



Erosion
Raise in fluvial solid transport
Widespread slope instability

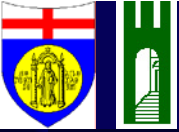
Increase of the urbanisation



Reduction of permeability
Increase of rainfall-runoff
Increase of stream transport
Reduction of catchment's travel time



INCREASE OF GEOMORPHIC HAZARD



Making terraces along large portion of the territory has induced a new equilibrium in the morphogenetic system active in the area

UNTIL THE PRESIDIUUM OF TERRACES

Once man has abandoned terraces the morphogenetic system got out of equilibrium





Suddenly all the sediments being stopped for many years along the slopes became available to erosion

Nowadays:

- the morphogenetic system is tending to a new equilibrium

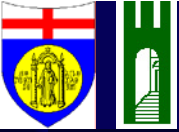
The effects:

- landslides and increase of the solid transport in streams and rivers

Consequences:

The coastal zone management must take into account even the management of the hinterland.

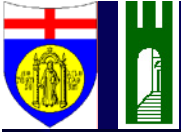
We need an integrated and multidisciplinary approach to the problem.



Today the focal point to reduce conflicts, to get a better landscape and territory management and to reduce one of the most important factor of the hydrological hazard is



To include terraces in the risk assessment procedures and strategies.



The Interreg III ALPTER project

Loss of productive land, increase of natural hazard, loss of biodiversity and disappearance of a rich cultural heritage are all consequences of the decay of terraced structures.

The project is working in areas spread all over the alpine region, to collect data, develop specific technologies and realize examples of productive recovery. The final aim is to promote large scale transformation. At the same time, a network will be build, to put in contact the different subjects involved in this topic, to permit exchange of information and cooperation



Partners del progetto

Regione del Veneto (Lead partner)

Univ. degli Studi di Padova

Regione Lombardia

Univ. degli Studi di Milano

Regione Liguria

Univ. degli Studi di Genova

Federaz. viticoltori Alto-Piemonte

I.R.E.A.L.P. (Istituto per la Ricerca nell'area Alpina)

Université de Provence (CNR)

Universität für Bodenkultur Wien

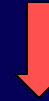
Volvox - Group for landscape architecture (SW)



Terraces census



Aerial photography, cartography, survey...

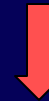


Hazard analysis
(DEM, morphometry
of the surface,
floods, landslides...)

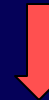
Natural processes



**GIS analysis, monitoring
and modeling:**
Decrease of damages
by floods along the coast



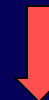
Hazard maps



Infrastructures, towns...



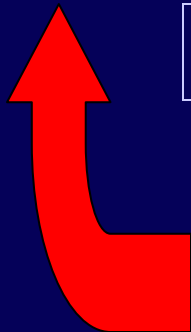
Vulnerability assessment

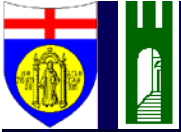


Risk maps

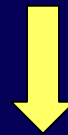


Risk analysis





**The first step: census of terraces
(condition, use, type of vegetation...)**



Field survey



Census

**Aerial photography and
cartographic analysis**



**Definition
of the real
extension**



The second step: modelling the hazard

One of the contribution to the project that the Laboratory of Applied Geomorphology is going to develop together with the Regione Liguria Spatial and Landscape Planning Department is a model to quickly and precisely monitor and survey the terraced territory with the aim of GIS technologies and to predict the geomorphic hazard in a large and complex area.

Integration of surveyed data and morphometry data



Dynamic model of geomorphic hazard



The model will allow to individuate the areas where the recovery is indispensable





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Thank you!