

Testimonial video and associated training material

8. Terracing



Anna Spiteri is the Managing Director of an environmental research company established in Malta since 1994. In her testimonial video clip and the present training material, she shares the outcomes of field surveys combined with desk research on the important roles of terraces in the rural Mediterranean landscape with focus on the Maltese Islands' rubble walls.

Mediterranean Terraces

Terraces that demonstrate an ingenious and sustainable way of transforming hilly slopes into arable land are widespread in Mediterranean landscapes, stretching from southern Portugal to the Middle East highlands. The main types of historic terraces that are found in Mediterranean include: step terraces (often parallel to the contour of the hillside), braided terraces, which zigzag up the slope being connected by switchbacks, pocket terraces with crescent-shaped walls (often protect soil for individual trees), squarish terraced fields, and check-dams built across watercourses. Since the 1950s, modern false terraces built with mechanical earthmovers have become widespread. Over recent decades however, terraces have been abandoned in many regions as agriculture declined (e.g., Tuscany in Italy, Guadalquivir valley and La Rioja in Spain, and the Greek islands of the Aegean)¹. Despite their ecological and heritage values, several gaps are remaining in understanding their histories, how they were constructed, what their socio-economic implications were for early populations and why they are so important today. The survey and testimony of Anna Spiteri provides insights on the history and the functional role of the Maltese Islands' rubble walls and thus highlight the importance of terraces as land management elements of the rural Mediterranean landscapes.

¹ Srivastava, A.; Kinnaird, T.; Sevara, C.; Holcomb, J.A.; Turner, S. Dating Agricultural Terraces in the Mediterranean Using Luminescence: Recent Progress and Challenges. *Land* 2023, 12, 716.

The Story of the Maltese Rubble Walls

Rubble Walls, locally known as 'Hitan tas-Sejjeħ', are a predominant and integral feature of the Maltese rural landscape. These traditional agricultural structures reflect the history, knowledge, and skill of our ancestral agrarian societies. For ages, Maltese farmers have realized the important role that these walls play in the preservation and sustainability of the local agricultural economy.



Rubble walls are a dominant feature of the rural landscape in the Maltese Islands (Wied Marsalforn, Gozo)

Lack of good quality soil or water can make agriculture a hard and unprofitable business. The limited surface area, the hilly topography, the water scarcity and the meagre soils of the Maltese Islands have always been a challenge for the local agricultural sector. In an effort to exploit the limited resources available, farmers have literally re-sculptured the land surface by cutting terraces across the hilly landscape. The use of terraced fields allows for sloping areas to be cultivated and is also designed as a means to slow surface runoff and prevent the soil from being washed away. In both Malta and Gozo, terracing supported by rubble walls has been used by the local farmers for many centuries.

Rubble walls are 'dry' stone walls, that is, walls entirely built without the use of cement or mortar. Their stability comes from the skilful placing and fitting together of the stones. The use of basic 'dry' stone building can be traced back to prehistoric times and examples of 'dry' stonewalls and buildings can be found all over the world throughout history. In the Maltese Islands, early examples of 'dry' stonewalls can be seen around the entrances of the Megalithic Temples, dating back as far as 5000 BC, and also at the Bronze Age village of Borg in-Nadur.



Rubble walls are 'dry' stone walls (Wied Qirda, Malta)

It was however, during the Arab occupation (870 -1127 A.D.) that the construction of rubble walls became a widespread agricultural practice. The Arabs established important agricultural practices and introduced new irrigation techniques and also new crops. Rubble walls were used not only to delineate the boundaries and ownership of agricultural land, but also as a measure against soil erosion in terraced fields. Ever since, this network of rubble walls surrounding agricultural fields has dominated the Maltese rural landscape.



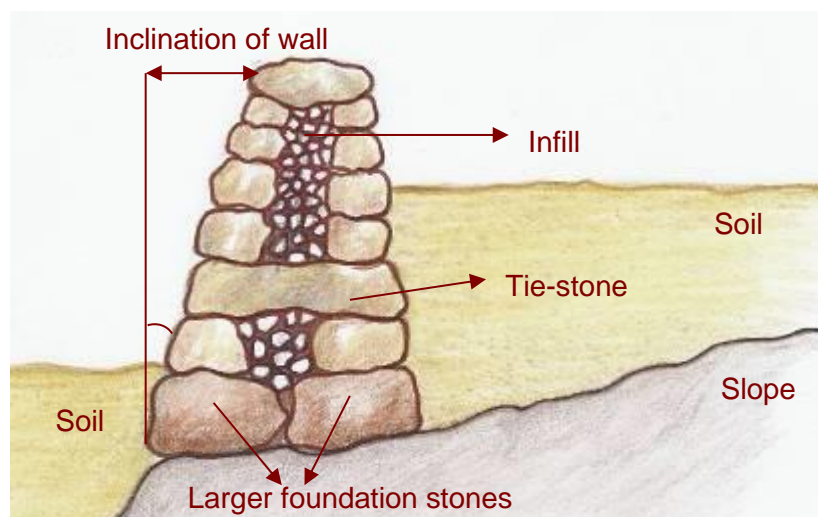
*Rubble walls as **silent warriors** (Wied Qirda, Malta)*

The knowledge contained within the traditional practice of rubble walls is a real gift. When thinking about the future, we must not disregard or forget traditional practices. Most people accept these rubble walls as integral elements of our local rural character, however, few realise their extreme importance. Rubble walls are like silent warriors who protect our livelihood and our quality of life in the tranquil setting of the Maltese countryside.

The Maltese building technique of rubble walls

Maltese rubble walls make use of natural, unhewn stones of different sizes, which are found in the countryside, hence the term 'rubble'. These stones are called '*ġebel tax-xaġħri*' and are usually made of the hard-wearing upper coralline limestone. In her book, '*Hitan ta-Sejjeħ*', architect Elizabeth Ellul (2005) provides a detailed study of the construction methods, the tools employed, and the different types of rubble walls found on the islands. She identified three basic rules in the building of these walls:

- 1) the largest stones are placed at the base of the wall, except those used as tie-stones,
- 2) there should be an infill in between the two outer walls, and
- 3) the wall has to incline slightly inwards as it goes higher.



Schematic diagram of rubble wall construction to obtain terracing



Rubble wall infill, 'mazkan' (Wied Ġhomor, Malta)

A rubble wall is constructed as a double wall with an infill of tightly packed smaller stones, called '*mazkan*', in the centre. This gives strength to the wall, preventing it from collapsing inwards. The strength and stability of the wall also depends on proper foundations which, ideally, are laid directly on the bedrock. The walls are built up to the desired height layer by layer, and at intervals, large tie-stones are placed which span both faces of the wall.

The building technique is mostly focused on protecting the wall from giving in under the pressure of surface runoff during rainfall events. Apart from strengthening the wall, the central infill is also extremely important in regulating the drainage of rainwater around and inside these walls. According to Ellul (2005), the stones used for the infill must be graded and laid down systematically with the larger stones placed at the base.

Additionally, flow holes can often be seen at the base of these rubble walls. Primarily these flow holes prevent the collapse of the walls by relieving the pressure of heavy storm water. They are mostly used in walls retaining clayey soils, since these soils tend to hold more water and expand, thus increasing the pressure on the surrounding walls.



Flow hole at base of rubble wall (Wied Ġhomor, Malta)

The multiple benefits of Terracing: The example of rubble walls

“rubble walls (are hereby declared) as protected, in view of their historical and architectural importance, their exceptional beauty, their affording a habitat for flora and fauna, and their vital importance in the conservation of the soil and of water”

The Rubble Walls and Rural Structures (Conservation and Maintenance) Regulations
Legal Notice 160 of 1997, Malta

Ø **Soil Formation Supporters**

Rubble walls support the conditions required for soil formation in that they allow for crops to be cultivated and help in retaining soil moisture. In the long-term, the inputs of crop residues (roots, stubble etc.) and natural fertilizers build up the characteristics of the soil, consequently increasing its productivity. Therefore, if the field created behind the rubble wall is well managed, the edaphological characteristics and the agricultural productivity of the soil can be greatly improved over the years.



*Stubble, an important agricultural input for soil formation
(Wied Għomor, Malta)*

Ø **Water Collectors**

In areas with steep slopes, rainwater runs quickly down the slopes allowing little time for the runoff water to infiltrate. When terracing is used, previously sloping areas are transformed into a number of horizontal areas delineated by rubble walls. Both the terracing and the rubble walls themselves slow down the surface runoff allowing the water to infiltrate into the soil. Consequently, the soil is kept humid for a longer period of time.

Ø **Walls of life**

Rubble Walls built using traditional methods and materials provide an important habitat for a variety of local flora and fauna. In rainy winters rubble walls are wet to the core. During drier periods, the infill, ‘mazkan’, is able to retain moisture for a long period of time, providing a varied environment with different gradients of humidity, ranging from very damp at the bottom of the wall to very dry at the top (Ellul, 2005). This allows for different species of flora to grow and establish their roots alongside and within the cavities of the rubble walls.



Caper, ‘Kappara’



Moorish Gecko, ‘Wizgħa tal-kampanja’

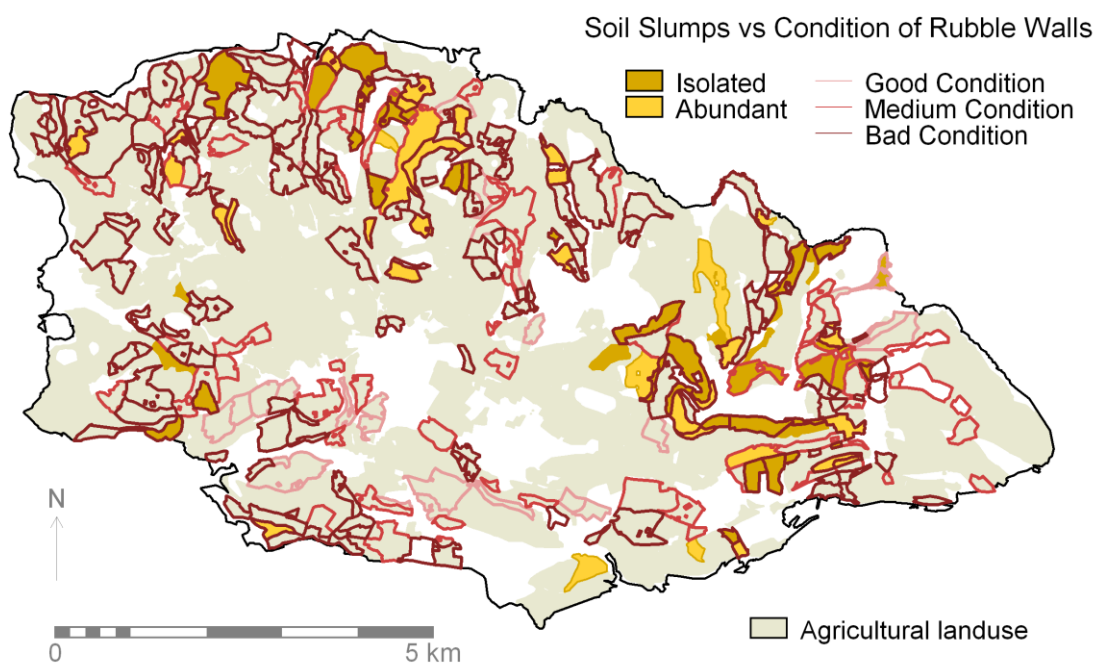
The natural fissures and cavities found in between the rough stones used to build these walls also provide shelter for many small animals. Ellul (2005) provides an interesting list of fauna that inhabit or make use of these rubble walls for various reasons. Among others, the list includes the Maltese Wall Lizard that lives in these walls, the Gecko which uses the wall to live and to build its nest, the Edible Snail which is attracted to the cool dampness of the wall in summer, the Spider which looks for food in this wall and the Weasel which nests in these walls.

∅ *Silent Fighters against Soil Erosion*

The most important role of rubble walls is undoubtedly to prevent soil erosion. Soil erosion has always been a major concern and a threat to the sustainability of the agricultural sector in the Maltese Islands, where soil is a limited resource, and except for the fertile agricultural land found in valleys, soils are usually very shallow ranging in depths from 20 to about 60 cm. The soil erosion process is related to soil fertility loss and vegetation cover reduction, both of which play a central part in the larger framework of the process of desertification, which in turn leads to a devastating consequence: irreversible resource loss. Furthermore, given that the Maltese Islands have a typical Mediterranean karst setting characterized by young and shallow soils, it is important to point out that soil erosion usually results in more dramatic impacts in karst environments. Soil conservation practices such as the use of rubble walls can be employed effectively to combat the processes leading to soil erosion, and eventually desertification.

A field survey of rubble walls in Gozo carried out by IRMCo in 1999 in the context of the EU-funded International Cooperation (INCO) Project entitled ResManMed: Resource Management in Karstic Areas of the Coastal Regions of the Mediterranean, proved very enlightening in assessing the relationship between the condition of the rubble walls and the areas affected by soil erosion. The rubble walls were classified according to their condition, i.e., good, medium or bad. In parallel to this, the occurrence of soil slumps at the field level was recorded according to the following categories: isolated or abundant.

As shown in the map below, the occurrence of soil slumps strongly correlates with the condition of the rubble walls on the island. The map clearly reveals that a high incidence of soil slumps was found predominantly in areas where the rubble walls were found to be in a poor condition.



Occurrence of soil slumps in relation to the condition of rubble walls in Gozo
© IRMCo Field Surveys (1999)