THEMATIC EVALUATION

Soil

RDP 2014-2020

November 2022

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0. Executive Summary

This Thematic Evaluation relates to Focus Area (FA) 4C of the Rural Development Programme (RDP) for Malta. The focus area is concerned with the prevention of soil erosion and the improvement in soil management. This FA is chiefly addressed through Measures 4.4 (support for non-productive investment linked to the achievement of agri-environment-climate objectives) and 10.1 (payment for agri-environment commitments) of the RDP, with the bulk of the budget being allocated to Measure 4.4.

The evaluation first describes Malta's agricultural and environmental sectors with a specific focus on soil as well as the direction given by the National Agricultural Policy for Malta, and the Rural Development Programme's measures that support Focus Area 4C.

The methodology of the evaluation is based on the '*Guidelines on the Assessment of RDP Results: How to prepare for reporting on evaluation in 2017'* issued by the European Evaluation Helpdesk for Rural Development[1]. As advocated by the European Evaluation Helpdesk, the evaluation consists of a mixed-methods approach which ensures appropriate triangulation of different data sources. More specifically, the evaluation design consists of the following elements:

- Overview of the implementation of Measures 4.4 and 10.1;
- Interviews conducted with beneficiaries of Measure 4.4;
- Structured focus group with selected beneficiaries of Measure 4.4; and
- An analysis of the data collected during implementation of Measures 4.4 and 10.1.

The valuation notes that Malta has poor soil quality and faces a high risk of soil erosion in addition to facing severe water challenges, both in terms of water quantity and water quality. This situation could be further aggravated by climate changes impacts including reduced precipitation, increasing risk of droughts, and extreme heat rendering the agricultural sector particularly susceptible to these impacts.

Taking into account the main threats to soil quality, the 2014-2020 RDP aims to address soil quality and preservation of Maltese soil through the implementation of measures 1,2, 4.4, 10.1 and 16.2. The budget allocated towards Focus Area 4C in the Programme stands at €27,636,125, representing approximately 14% of the total budget.

Since measures 1, 2, and 16 only indirectly contribute to soil management, the focus of the evaluation was on measures 4.4 and 10.1. The uptake of both measures registered very good progress with the allocated budgets for both measures being exceeded. The target of 3% of agricultural land under management contracts to improve soil management and/or prevent soil erosion was exceeded and the indicator is currently estimated at 12.6%. The indicator is very close to the EU target of 14%. The success of the measure is attributed to the uptake of AECM 5.

In terms of soil erosion and soil organic matter, data obtained shows that 171,960 linear metres of walls were funded (of which 78,645 m were in Gozo and 93,315 m in Malta). It was further estimated that the area of soil protected by the rubble walls in Malta and Gozo is 8,104,499 m^2.

[1] Assessment of RDP Results: How to Prepare for Reporting on Evaluation in 2017 | The European Network for Rural Development (ENRD) (europa.eu)

Assuming that the UAA is 10,730 ha[2] (or 107,300,000 m^2) then the area of soil protected by rubble walls in the RDP is 7.55% of the UAA.

In terms of soil erosion, it was estimated that the average annual soil loss for those parcels that benefitted under measure 4.4 is substantially reduced because of the rubble walls. It was estimated that there is a 66% reduction in soil loss due to the rubble walls.

With regards to soil organic matter the data obtained from the beneficiaries of AECM 5 was collected and analysed for the years 2018 to 2020 (the years where SOM data was collected). The evaluation showed that there has been a substantial increase (over 50%) in SOM between 2013 and 2018. Furthermore, when the AECM was launched in 2018 the average SOM has also increased by about 11% over the two years on those parcels that implemented AECM5. Although these results are very encouraging both in terms of the general improvement in SOM between 2013 and 2018 and also as a result of the programme (2018-2020), the SOM values are those obtained from beneficiaries and not part of a national study – which was used to compute the SOM value in 2013. Therefore, results need to be interpreted with caution.

In terms of recommendations, on a national level there is the need to halt and reverse the depletion of natural resources in agriculture by supporting management practices that reduce water-induced soil erosion, and investments in modern productive systems, enhancing sustainable water management and other practices lowering nutrient losses to water and air.

In line with the National Agricultural Policy, the incentivization of the consolidation of land parcels as well as incentives to improve soil, need to be taken forward for both the sustainability of the agriculture community as well as to protect soils. Sustainable cultivation practices are also advocated in the National Agriculture Policy as well as the importance of organic farming. The development of a Soil Action Plan is required to improve soil quality. New CAP instruments or measures should be designed to address harmful practices and on-going trends (e.g. use of plastic in fields, use of continuously heavier machinery, land abandonment occurring on terraces, enlargement of field size) whose impact is increasingly significant.

It is clear that Measure 4.4 was a successful measure both in terms of uptake as well as its potential impact on preventing soil erosion. In order for the measure to be more effective, selection criteria relating to topography, soil depth, and state of the walls should be used to select projects where the impact on soil is likely to be the highest.

The continued popularity of the AECMs indicates that accompanying training measures are having a positive effect on farmers. It is therefore recommended to support the consolidation of knowledge and its transmission to farmers through quality advice on sustainable soil management.

Soil management is also expected to play an important part in the future CAP strategic Plan. Measures that clearly impact soil and therefore contribute to the indicators on soil should be identified and incentivised and data collection related to the implementation of the measures should be in-built into the requirements of the measure.

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2 https://nso.gov.mt/en/News_Releases/View_by_Unit/Unit_B3/Environment_Energy_Transport_and_Agriculture_Statistics/Pages/Census-of-Agriculture.aspx

1. Introduction

This Thematic Evaluation report has as its key focus the evaluation of Focus Area (FA) 4C of the Rural Development Programme (RDP) for Malta. The focus area is concerned with the prevention of soil erosion and the improvement in soil management. This FA is chiefly addressed through Measures 4.4 (support for non-productive investment linked to the achievement of agri-environment-climate objectives) and 10.1 (payment for agri-environment commitments) of the RDP, with the bulk of the budget being allocated to Measure 4.4.

The point of departure in fulfilling this objective involves an exploration of the local agricultural and environmental sectors with a specific focus on soil. To this end, the following three chapters of this Thematic Evaluation Report describe the current situation with respect to soil and the challenges faced, the direction given by the National Agricultural Policy for Malta, and the Rural Development Programme's measures that support Focus Area 4C.

Based on a clear understanding of the local context, the Thematic Evaluation report proceeds to lay down the evaluation design adopted in assessing the progress and effectiveness of FA4C. Chapter 5 details the methods used in the evaluation exercise where the evaluation has been designed in line with the '*Guidelines on the Assessment of RDP Results: How to prepare for reporting on evaluation in 2017'* issued by the European Evaluation Helpdesk for Rural Development[3]. As advocated by the European Evaluation Helpdesk, the evaluation consists of a mixed-methods approach which ensures appropriate triangulation of different data sources. More specifically, the evaluation design consists of the following elements:

- Overview of the implementation of Measures 4.4 and 10.1;
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- An analysis of the data collected during implementation of Measures 4.4 and 10.1.

Chapter 6 addresses the evaluation question relating to soil erosion and estimates quantitatively and qualitatively how the RDP addressed soil erosion and soil organic matter. Finally, Chapter 7 provides conclusions and recommendations that will be further developed in the ex-post evaluation as well as to inform the development of the CAP Strategic Plan for the forthcoming funding period.

[3] Assessment of RDP Results: How to Prepare for Reporting on Evaluation in 2017 | The European Network for Rural Development (ENRD) (europa.eu)

2. Soils in Malta

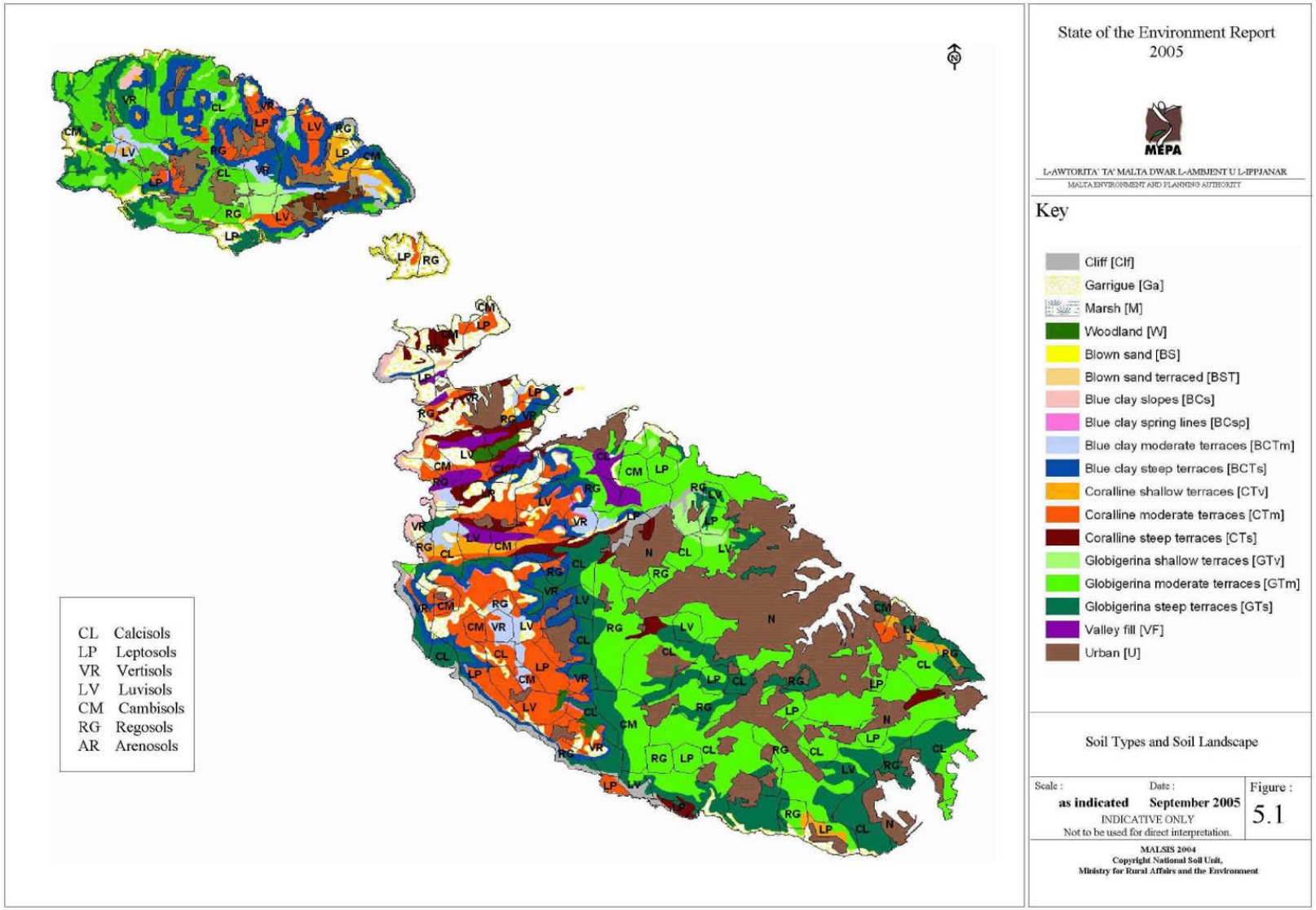
There are different types of soils in the Maltese Islands. Maltese soils are derived from local geology, are highly calcareous, and are affected by cultural elements. D. M. Lang (1960) classified Maltese soil formations as Carbonate, Xerorendzinas, Terra, and soil complexes, further subdivided into subtypes (series) named after the localities where the first examples were noted. Subsequently, additional information was developed through the Maltese Soil Information System (MALSIS) database, which classified the local soil characteristics according to the World Reference Base for Soil Resources (WRB Classification system). MALSIS identified 19 soil units from 7 soil reference groups (Arenosols, Calcisols, Cambisols, Leptosols, Luvisols, Regosols and Vertisols). Typical profiles for each reference group, established from non-Maltese soil survey assessments, are described hereunder.

Arenosols are the deep sandy soils developed in residual sands, in situ after weathering of old, usually quartz-rich material or rock, and soils developed in recently deposited sands as occur on beach lands. In the Maltese Islands, this type of soil is present in localised areas, in Ramla Valley in Gozo, and in Armier, Malta. Calcisols are the dominant soil group in the Maltese Islands. They are recognised by the presence of secondary Calcium Carbonate concentrations as coatings on soil structure faces. The calcic horizons may be present in the lower topsoil and/or the subsoil/substrate horizons. Dryness, and local stoniness limit the suitability of these soils for agriculture; however, if irrigated, drained, and fertilised, Calcisols can be highly productive under a wide variety of crops. Cambisols are soils with limited development showing only a distinct subsoil with a significantly different (browner or redder) colour to the topsoil but no characteristic calcic or reddish clay argic horizons. Calcari-Lithic Leptosols occur mainly on the vertical cliff faces where a very thin weathered layer of soil overlies rock at less than 10 cm depth. These are the most common form of Leptosols, found on relatively undisturbed garigue (both on level and very steep slopes), where rock occurs at 10 to 25 cm depth. Leptosols are shallow soils over rock or gravelly material whose development is often limited by erosion. Shallowness affects cropping by influencing the range and type of cultivations that can be carried out but also by restricting nutrient uptake, root growth and, in the case of fruit trees, root anchorage. The reddish clay Luvisols are the result of soil development under different climatic conditions to those of the present age. They probably formed during the wetter climates associated with Glacial advances in Northern Europe (Pleistocene Stadials). They are now relict soils and all contain secondary calcium carbonate concentrations reflecting the current predominant pedo-climatic regime in the Islands. The shallow eroded remnants of former Luvisols in relatively undisturbed garigue are classified as Chromi-Calci-Epileptic Luvisols. Luvisols are normally fertile soils suitable for a wide range of uses, but certain types require artificial internal drainage and careful timing of cultivations. In Malta, these soils include the 'soil pockets' formed on karst landscape. In Malta, Spolic Regosols have been described; these soils are situated on made ground terraces overlying urban waste material. Vertisols, the cracking claysoils, are restricted to the Blue Clay outcrop in Malta. These soils are recognised by their very clayey nature, the presence of deep, wide cracks during the dry months and the presence of slightly gleyed and rusty mottles.

The latter two soil groups, the heavy cracking clays (Vertisols) found on the Blue Clay, and the deep sandy soils developed in recently deposited sand beaches, are mostly vulnerable to soil degradation, especially if not managed in a sustainable way[4]. A map of Maltese soils is found in **Figure 2.1**.

[4] https://era.org.mt/topic/maltese-soils/

Figure 2.1: Soils of Malta



A Study entitled *Soil Quality Change in the Maltese Islands: A 10-Year Assessment (2003 to 2013)* compared a number of soil parameters between 2003 and 2013[5]. The sampling locations identified for this study were the same as those studied in MALSIS (2003) and were based on a 1 km spaced grid distribution across Malta and Gozo. All grid points located within soil containing natural and agricultural areas were sampled in this study and involved a survey of 280 sites across Malta and Gozo.

In terms of soil compaction, bulk density change was calculated in 97 sites. Results suggest that 59% of the locations assessed in 2013 had a greater average bulk soil density than the same locations in 2003, i.e. soil compaction is prevalent.

Change in electrical conductivity was calculated in 141 sites. Results suggest that 67% of the locations assessed in 2013 had a lower electrical conductivity than the same locations in 2003. Electrical conductivity is a measure of salinity and is also influenced by soil nitrate levels. A number of national initiatives, key amongst which may be the Nitrates Action Programme (2011), may, in part, be an explanation for lower soil electrical conductivity recorded in 2013.

Change in organic carbon was calculated in 70 sites. Results suggest that 59% of the locations assessed in 2013 had higher organic carbon content than the same locations in 2003. The average for soil organic carbon content for the sites assessed in both 2003 and 2013 (70 sites in total) was of 2.11% for 2003 and 2.30% for 2013. This increase in soil organic carbon strongly and positively influences most of the functions associated with soil quality. An additional benefit of an increase in soil organic carbon is that, through carbon sequestration, soil represents a significant sink for atmospheric carbon dioxide.

The study found that average national soil depth in areas where soil was recoded and did not exceed 200 cm, was of 47.76 cm. Shallow soils, less than 10 cm in depth, are often associated with plateaux and surfaces subject to soil erosion (e.g., inclined valley sides). Deeper soils, ranging from 10 to 100 cm depth, are typically associated with agricultural areas on relatively flat and moderately inclined surfaces. Agricultural areas containing soil within the aforementioned depth range, located in inclined valley sides, often retain soil through the construction and maintenance of soil retaining rubble walls.

The National Statistics Office (NSO) in collaboration with the Agriculture Directorate within the Ministry for Agriculture, Fisheries, Food and Animal rights (MAFA) conducted the Census of Agriculture for the reference year 2020 to take stock of the activities being carried out by farmers, livestock breeders and beekeepers in both Malta and Gozo. This statistical exercise analysed the changes that this sector may have gone through since the last comparable exercise in 2010. Of relevance to this evaluation over the 10-year period since the last census, is that the number of agricultural holdings decreased by 14.8 per cent from 12,268 in 2010 to 10,449 in 2020. The amount of utilised agricultural area (UAA) decreased by 6.2 per cent from 11,445 hectares in 2010 to 10,730 hectares in 2020. This statistical information does not give a full picture as to the fate of the lost UAA.

Soil sealing statistics for Malta[6] show that Malta has the highest soil sealing rate in the European Union - established at 16.15% as at 2015 as shown in **Figure 2.2**.

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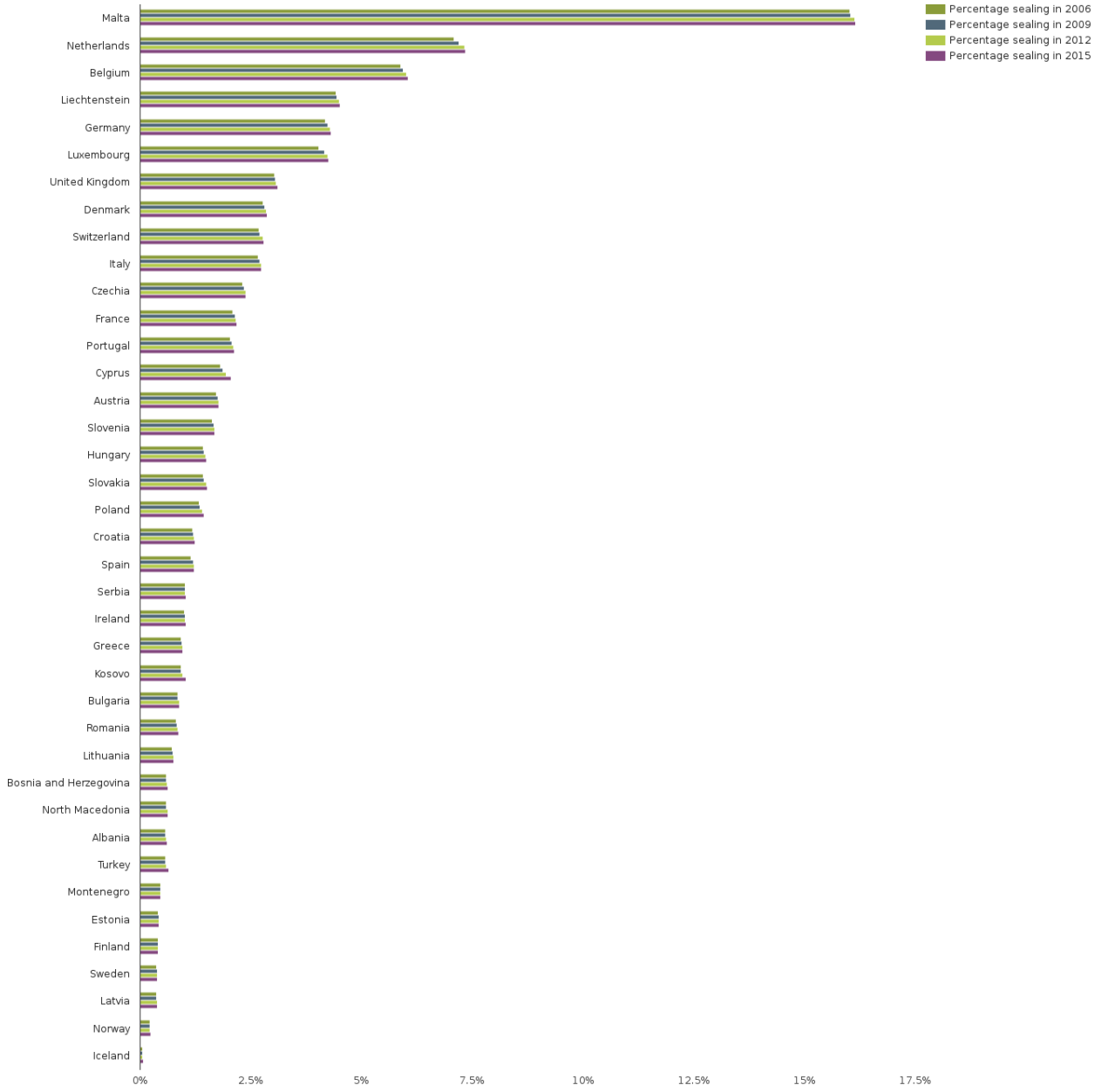
5 https://www.um.edu.mt/library/oar/bitstream/123456789/39349/1/Soil%20Quality%20Change%20in%20the%20Maltese%20Islands.pdf

6 https://www.eea.europa.eu/data-and-maps/daviz/percentage-sealing-by-country-1#tab-chart_5

Figure 2.2: European Union soil sealing by country



Soil erosion by water includes two sub-indicators: a) Mean soil erosion rate and b) Share of Agricultural area under severe erosion. Data is available for three data periods: 2000, 2010 and 2016. The mean soil erosion by water (2016) for the Maltese Islands is 4.47 t ha^{-1} yr^{-1}. The highest mean rate is 5.13 t ha^{-1} yr^{-1} registered in Gozo – Comino as shown in **Figures 2.3** and **2.4**.

Figure 2.3: Mean Soil Erosion by Water

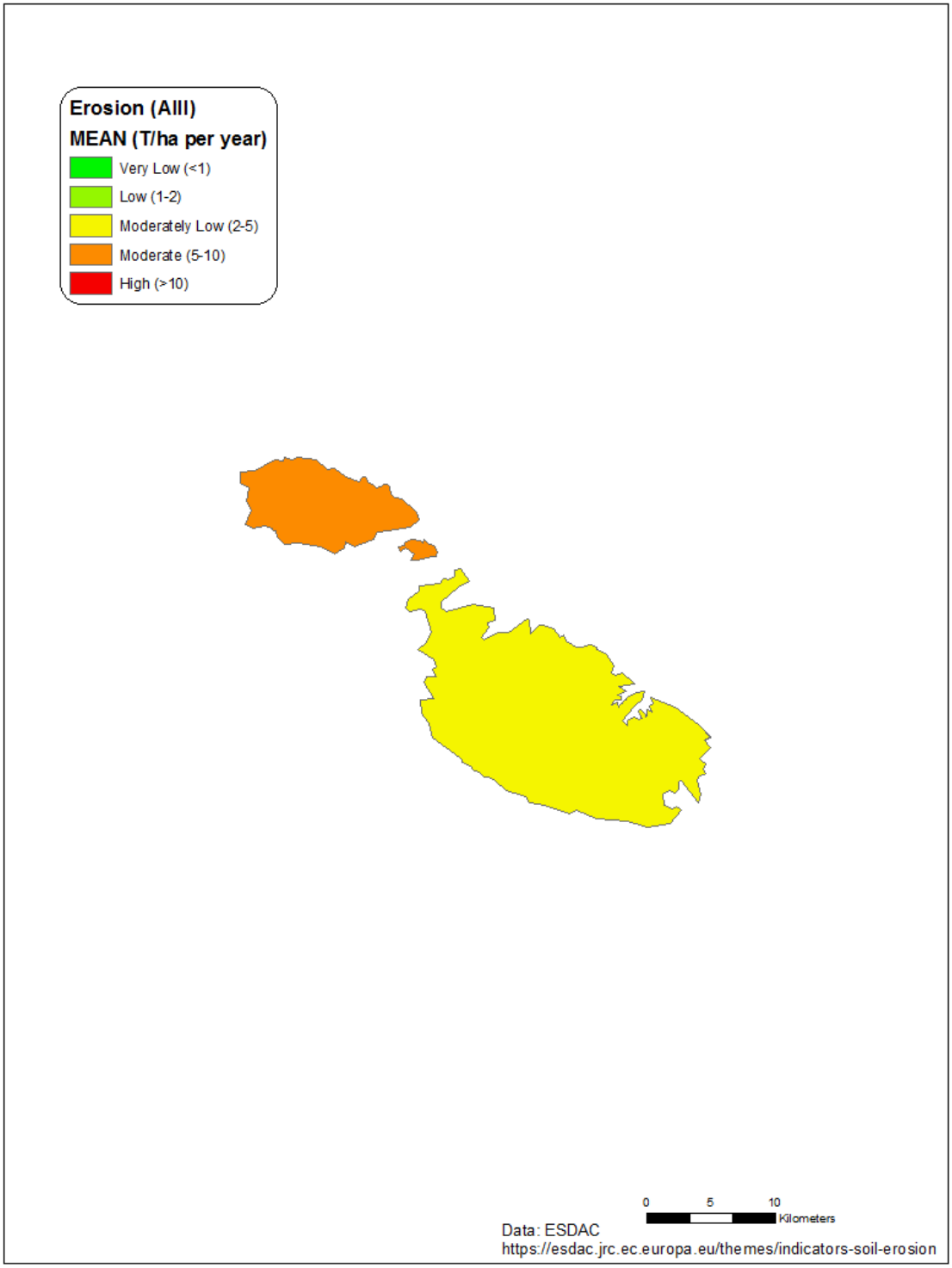
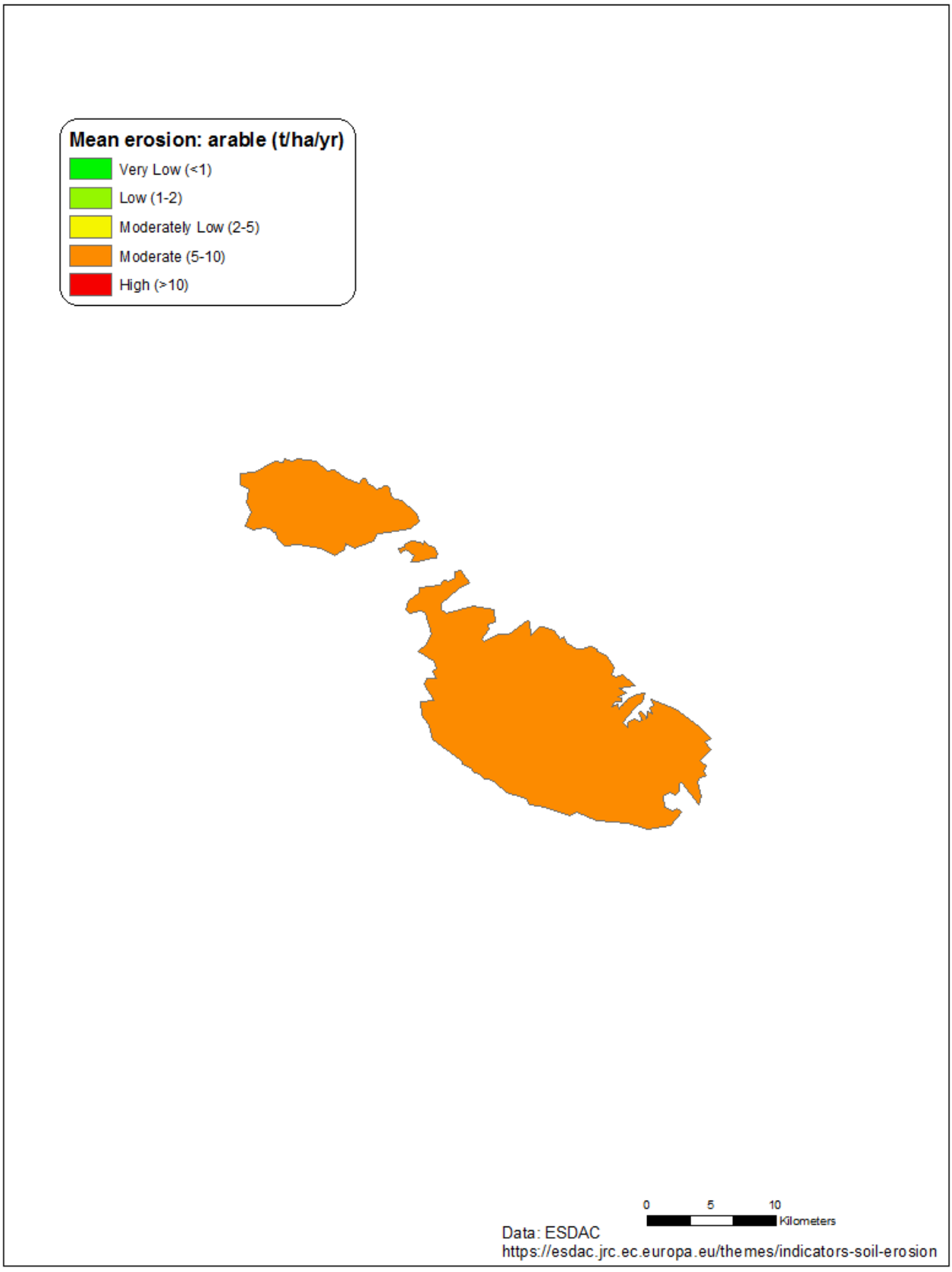


Figure 2.4: Mean Erosion by Water Arable Land



According to Malta's State of the Environment Report[7] there are various factors that exacerbate soil erosion pressures including agricultural land fragmentation and abandonment, unsustainable agricultural practices and rapid urbanisation. Soil erosion in the Maltese Islands has been identified as a predominant land degradation process and a major threat to the sustainability of the agricultural sector. Soil erosion is triggered by a combination of natural and anthropogenic factors that include steep slope gradients, intense precipitation, low vegetation cover and inappropriate land use. Prolonged erosion leads to an irreversible loss of ecological and agricultural soil function and associated ecosystems services. The aspect of soil erosion that causes most concern is the loss of topsoil, the most fertile part of the soil profile.

The principal drivers of soil erosion in the European Union are unsustainable agricultural practices, overgrazing, deforestation and construction activities. Growth in global population and standards of living as well as climate change also put pressure on soil. These factors have significantly increased the global demand for food and have led to a widespread process of land use intensification. It is also estimated that 12% (115 million hectares) of Europe's total land area is affected by water erosion, a major threat to agricultural soil quality.

Maltese agricultural practices have significant control on agricultural land susceptibility to degradation and soil erosion. Retaining rubble walls in terraced fields are identified as the most important water and soil erosion control method structures in the Maltese Islands. The protection and rehabilitation of rubble walls (S.L. 552.01) and contour ploughing were also identified as key erosion mitigation practices. Thus, the dynamic relationship between human activities and resulting soil erosion requires that erosion be monitored.

[7] Environment & Resources Authority, State of the Environment report 2018 Chapter 4: Land and Coast. Reporting Status from 2009 to 2015.

3. The National Agricultural Policy for Malta

The targets set in the National Agricultural Policy can be achieved by working towards the strategic and operational objectives illustrated in **Figure 3.1**. As explained in Section 4 of this Thematic Evaluation report, the measures in the RDP for the conservation of soil through reduced soil erosion and improvement in soil organic matter are in line with the strategic objectives defined by the National Agricultural Policy, such as sustaining water and key resources and adaptation to and mitigation of geo-climatic conditions. In particular, there are a number of measures that directly and indirectly affect soil conservation.

Figure 3.1: The Objectives and Targets forming the National Agricultural Policy

Source: National Agricultural Policy for the Maltese Islands 2018-2028

The National Agricultural Policy investigates the strengths, weaknesses, opportunities, and threats (SWOT) in relation to each strategic objective with a key strength identified as young farmers willing to conserve water and resources. The NAP recognizes that soil is a fundamental resource for farming and livestock breeding. It acknowledges that soil in the Maltese Islands is in general of a shallow profile and lacks organic matter. The NAP refers to the 2006 value for the average organic matter found in Maltese topsoil as 2.1%, which is low and is a sign of unhealthy soils with low productivity. The NAP further describes ways to increase the organic matter and fertility in soil at farm level such as by adding compost, soil conditioners, livestock manure as well as mulching and shredded pruning waste. It further acknowledges that intensive crop farming practices, such as frequent tilling, ploughing, the application of chemical fertilisers and pesticides prevail in Malta leading to severely degraded soils in active farmland areas in Malta. Continuous use of pesticides, herbicides and fungicides on particular land parcels increases the risk of soil contamination and reduction in fertility. Moreover, excessive ploughing of soil and the utilisation of rotary cultivators that disintegrate the soil

structure and compactness, further reduce the soil-water retention capacity and fertility. Irrigation with groundwater having high conductivity is also leading to soil deterioration since the levels of salts accumulating in soil are increasing.

At a policy level on soil conservation, the NAP aligns with Malta's National Biodiversity Strategy and Action Plan (NBSAP, 2012-2020). Target NR2 of the NBSAP states that: '*Land uses are commensurate with the management of soil and by inference, water resources across the Maltese Islands. This is required in order to promote 1) the build-up and maintenance of soil organic matter; 2) the enhancement of soil biodiversity; 3) the reduction (and reversal, where possible) of soil erosion, contamination and compaction; 4) the minimisation of salinization/sodification levels (where applicable); 5) the mitigation of flood induced soil mass displacement/land sliding; and 6) the increase in infiltration and moisture retention in the soil*.' The NBSAP also calls for soil conservation measures to be incorporated in a soil action plan that is required to address these goals in terms of how to mitigate the threats to Maltese soils and adopt measures aimed at integrated soil conservation. Policy measures in the agricultural policy are also being directed to reach these targets. Long-term planning based on the available data and ongoing research is essential to create an effective soil utilisation strategy for the Maltese Islands that reflects the genuine needs of agriculture and food production whilst curbing deviant practices. Ideally, such a plan should also integrate aspects of soil-less agriculture such as hydroponic and aquaponic systems as well as urban farming to create a mixed food production strategy, including the production of fodder for animals.

The National Agricultural Policy presents a total of 70 policy measures organised in 4 groups of operational objectives, namely economic objectives, social regeneration, resources, and governance.

In relation to soil the following are (resources) objectives and corresponding measures that directly affect soil:

- Enhance the utilisation of land and farm resources by applying sustainable cultivation practices:
    - Measure 037. *Provide for more effective use of Malta's and Gozo's experimental research centres to carry out experiments and pilot projects on various crops in order to identify the most effective and sustainable cultivation practices as well as experiment with and promote successful intercropping methods in crop farming*.
    - Measure 038. *Incentivize the consolidation of land parcels to improve their sustainability*.
    - Measure 039. *Assess appropriately the feasibility and the potential of increasing organic production of Maltese agricultural products*.
- Facilitate sustainable agricultural production through environmentally sound agricultural practices including integrated pest management and plant nutrition:
    - Measure 047. *Increase effectiveness and coordination in the enforcement of plant protection product utilisation including the placing on the market as well as applicability on crops*.
    - Measure 048. *Promote the establishment of agricultural services such as pesticide management and fertiliser application by service providers to achieve uniformity in production and secure professional advice. This should potentially also extend to facilitate organic and environmentally sustainable farming*.
    - Measure 049. *Collect data on integrated pest management practices with a view to plan strategic means with which the farming community can effectively reduce the application of pesticides without reducing economic returns*.
- Develop a soil action plan in relation to agricultural use:

- Measure 050. *Develop a Soil Action Plan by involving all the pertinent stakeholders covering, but not limited to, measures that: a. support initiatives at the field level which contribute towards improved soil quality thereby improving its moisture retention ability as well as its nutrient content; b. promote the use of steam soil sterilizers for the sterilization of farmland that could assist in the reduction of soil borne diseases and nematodes; c. improve knowledge on Maltese soils by updating the available pedological data; d. incentivize processes and practices on the build-up and maintenance of soil organic matter, the enhancement of soil biodiversity, the reduction of soil erosion, compaction and contamination; e. assess the impact of the correct application of manure and other organic matter in Malta's soils particularly on the level of nitrates in order to ensure effective implementation of the Nitrates Directive and align the plan with the farm waste management plan*.

In line with the National Agricultural Policy, the RDP 2014-2020 provides a number of measures to address both indirect and direct impacts on soils. Training opportunities are provided through Measures 1 (knowledge transfer & information services (art 14) and 2 (advisory services, farm management and farm relief services opportunities (art 15). More measures with a direct impact on soil are Measure 4.4 (support for non-productive investments linked to the achievement of agri-environment-climate objectives) and Measure 10.1 (Agri-environment-climate measures).

4. Rural Development Programme Malta (2014-2020)

As outlined in the previous chapters of this Thematic Evaluation Report and as acknowledged in Malta's RDP, soils face a number of threats including erosion, soil sealing, decline in soil organic matter, soil contamination, and soil salinisation. Soil organic carbon content is one of the primary indicators of soil quality, which is mainly affected by intensive cultivation. Figures from 2012 show that the average organic matter in the sampled topsoils in Malta ranged from 0.4% to 2.3%. Increases in temperature and more intense yet less rainfalls, increased pressures on the sustainability of the groundwater resources and reduced overall precipitation, increases vulnerability for soil and agriculture. The relatively low levels of organic content of Maltese soils are also a reflection of the climatic conditions of the region and cultivated soils in general have lower organic matter than non-agricultural soils.

A recent study[8] found that in Member States' decisions, soil quality was given less importance than other environmental concerns (i.e., biodiversity and water, which benefit from binding EU objectives and dedicated legislation or services). This was due to the absence of a specific soil directive or EU soil legislation, and the lack of common EU definitions, targets, and thresholds.

The RDP provides various instruments and measures that may impact activities with an impact on soil quality. Those considered in the evaluation study are presented below.

Horizontal Regulation

First introduced in 2003, cross-compliance sets basic rules for agricultural activities, related to public expectations on the environment, public and animal health, and animal welfare. Regulation (EU) 1306/2013 sets two categories of rules:

- Statutory management requirements (SMRs): these requirements refer to certain provisions of 13 legislative acts (including regulations and directives) that exist independently of the CAP and apply to all farmers (even those not receiving EU support). In particular, SMR1 and 10, although not specifically targeted towards soil, aim at regulating the use of pesticides and fertilisers and may therefore impact soil quality by limiting micro and macro nutrient imbalance.

- Standards of good agricultural and environmental condition (GAEC) provide for Member States establishing, at national or regional level, minimum standards for all farms receiving CAP payments. Farmers who do not comply are penalised by a reduction in or exclusion from the support received under the CAP. As set in Annex II of Regulation (EU) 1306/2013, three GAECs directly target sustainable soil management:

- The requirements of minimum soil cover (GAEC 4) and of minimum land management (GAEC 5) reflecting site-specific conditions to limit erosion;

- The requirement to maintain soil organic matter (GAEC 6), through appropriate practices including, as an EU baseline, the ban on burning arable stubble except for plant health reasons.

Pillar II

Preventing soil erosion and improving soil management is one of the 18 focus areas of the EU rural development policy, set in Regulation (EU) 1305/2013. The Rural Development Regulation sets a total of 20 support measures, a number of which may contribute to sustainable soil management.

[8] European Commission, 2021, Commission Staff Working Document Evaluation

Support for investments in forests (M8), commitments into agri-environment and climate measures (AECMs: M10), support for organic farming (M11). Other rural development measures, in particular investments in physical assets (M4), may indirectly contribute to fostering sustainable soil management. Other measures include support for knowledge transfer and information actions (M1); advisory services, farm management and farm relief services (M2); restoring agricultural production potential damaged by natural disasters and catastrophic events and introduction of preventive actions (M5); Natura 2000 and Water Framework Directive (M12); support for commitment for the environment and climate in forests (M15), payments to areas facing natural or other specific constraints (M13); and support for animal welfare (M14). The choice of measures to be implemented is established in Malta's Rural Development Programmes.

Taking into account the main threats to soil quality, the 2014-2020 RDP aims to address soil quality and preservation of Maltese soil. The main Focus Area (FA) in the RDP dealing with soil conservation is FA4c: preventing soil erosion and improving soil management. The measures implemented that contribute to FA4C are:

- M01 - Knowledge transfer and information actions (art 14)

Through this measure, training aims to improve knowledge about nutrient budgeting, soil organic matter, soil sealing, etc to enhance capacity for more effective soil management, prevent soil erosion and achieve a reduction in contamination of Maltese soil (directly through sub-measures 1.1, 1.2).

- M02 - Advisory services, farm management and farm relief services (art 15)

Advisory support (indirect contribution through sub-measure 2.1) will assist farmers and other rural stakeholders to engage in best practice and implement effective strategies for biodiversity conservation and landscape management. This will include support for improvements in soil management. Training of advisors will also be necessary in order to ensure the provision of the expertise necessary to provide effective advisory support (indirect contribution through sub-measure 2.3).

- M04 - Investments in physical assets (art 17)

Investment in equipment on agricultural holdings will allow for more efficient soil management (indirect contribution through sub-measure 4.1). This may also be achieved through support for non-productive investments, for example, through rubble walls, purchase/planting of trees, etc (direct contribution through sub-measure 4.4).

- M10 - Agri-environment-climate (art 28)

Soil management will be improved both by the tree planting options and by the adoption of SMP which will enhance soil structure, reduce erosion, and increase soil organic matter (SOM). Relevant AECMs are AECM1 (using mechanical control (rather than herbicides) for weeds in permanent crop production systems (olives, vines, orchards); AECM 4 (implementing integrated pest management plans for vineyards and orchards); and AECM 5 (measure for mitigation of soil erosion, enhancing organic matter and mitigating compaction).

The objective of AECM 1 is to incentivise farmers to clear weeds growing in vineyards and orchards between 15th October and 15th March, using mechanical means. In order to be eligible to apply for support under this AECM farmers must have at least 1 tumolo of vineyards or orchards. The farmer is obliged to ensure that all such parcels of land registered to him/her comply with all conditions outlined for this measure. Training and advice required under the conditions of acceptance for these measures

may be funded under Measures 1 and 2 and are not included in the support provided by this AECM. The support rate for AECM 1 is €110.67/t/yr or €984.92/ha/yr.

The objective of AECM 4 is to incentivise farmers to have an Integrated Pest Management Plan made and practiced on vineyards and orchards. The objective is to reduce the use of pesticides on a calendar spraying basis, incentivise the application of pesticide only when necessary and ultimately result in lower pesticide application rates. Land managers must attend a training module relevant to the measure by the end of the third year from acceptance on the scheme. Training may be provided free of charge and supported under Measure 1. Furthermore, land managers are obliged to take service from recognised FAS in order to receive advice on adequate fulfilment of all commitments and obligations. This has to be undertaken by the end of the third year from acceptance of the scheme. The support rate for AECM is €168.08/t/year or €1,495.92/ha/year.

Under AECM 5 the support is based on income foregone and additional costs. Training and advice required under the conditions of acceptance for the measure may be funded under Measures 1 and 2 and are not included in the support provided by this AECM. The support rate is €213.75/t/year or €1,902.36/ha/year, which has to cover several costs incurred, including the cost of a consultant to draft the SMP as well as the soil analysis necessary in order to verify achievement of SMP, which must be done annually and on a parcel basis. An SMP must include composting, together with at least 2 of the following actions/practices:

- Crop residue incorporation
- Mulching
- Planting of trees to target erosion
- Conservation tillage
- Green manuring
- Cultivation of forage crops
- Plant vegetative filter strip in low lying and runoff areas of fields
- Strip cropping.

- M16 - Co-operation (art 35)

In many instances environmental improvements can only be achieved through partnership work. In a situation such as Malta, where farmers operate on very small parcels of land, individual actions spread out over the whole territory may have little impact. Dilapidated rubble walls, for example, are problematic in many areas resulting in soil erosion and potential for increased flooding, and individual action often does not target areas most in need of restoration or improvement. Supporting cooperative actions, particularly through territorial partnerships (e.g., focused on specific targeted areas or valleys) will enable strategic decisions to be made that target the most vulnerable or high-risk areas for support, and ensure that actions to restore rubble walls, control flooding, and manage soil conservation are integrated and cost-effective (direct contribution through sub-measures 16.3 and 16.5).

Measures contributing to soil management

A recent study[9] analysed the measures contributing to soil management based on their intended impact on sustainable soil management. The study distinguished the intended impact on sustainable

[9] European Commission, Directorate-General for Agriculture and Rural Development, *Evaluation support study on the impact of the CAP on sustainable management of the soil: final report*, Publications Office, 2021, **https://data.europa.eu/doi/10.2762/799605**

soil management from intended impact on other issues related to the sustainable management of natural resources (e.g., water, biodiversity, climate change mitigation and adaptation). Direct and indirect effects are also distinguished. A measure is considered to have a potential direct effect on land use (or management practices) when it sets a rule or supports the establishment of a given land use (or the implementation of specific practices). Indirect effects appear when the rule or support provided by the instruments or measure induces changes in land use or management practice. **Table 4.1** identifies the intended impact and the theoretical effect of the measures found in Malta's RDP 2014-2020 on sustainable soil management. The Table shows that all the measures selected under FA4C have a direct or indirect impact on soil. The Table does not show Measure 16 as this was not included in the Study.

Table 4.1: Intended impact and theoretical effect of the RDP measures on sustainable soil management

	Intended impact		**Theoretical effect on soil management**	
	Soil quality, sustainable soil management	Environment / biodiversity / sustainable management of natural resources, which could include soil issues	Land use	Management practices
M1: Knowledge transfer and information actions & **M2**: Advisory farm management and relief services	No	Yes	I	I
M4: Investments in physical assets: M4.1, M4.3 and M4.4	No	No	D	D
M8: Forest investments: M8.5	Yes	Yes	No	D
M10: Agri-environment-climate M10.1 Agri-environment and climate commitment	Yes	Yes	D	D
M11: Organic Farming	Yes	Yes	I	D

Source: Alliance Environnement, based on Regulation (EU) No 1305/2013, 1306/2013, 1307/2013 and 1308/2013. Legend: Yes = Intended effect, laid down in the regulation; No = No intended effect on soil; D = Direct effects identified; I = Indirect effects identified.

The analysis in the study confirmed that key beneficial practices are those involving permanent soil cover, application of organic amendments, maintenance and creation of permanently covered areas (e.g., forest, grasslands, wetlands), and the setting up of landscape elements. Practices associated with conservation agriculture, organic farming and agroforestry contribute to maintaining or improving soil quality. This is also the case, but to a lesser extent, with integrated pest management, and of course strictness of the standards is a big factor. AECMs proved to have the capacity to foster very relevant management practices, tailored to the local needs and context. Still the examples of such measures that were found in the case-study area are seldom and benefited to limited areas. Lastly, the organic farming measure has significant effects on the reduction of the use of PPPs and thus on soil pollution. Nevertheless, its effect on soil quality remains controversial because the repeated use of machines can affect soil compaction, erosion, and soil organic matter.

Together with other measures with more direct effect, knowledge transfer (M1), advisory services (M2) and cooperation (M16) measures can achieve significant effects on sustainable soil management. The study showed that CAP instruments and measures can act in synergy to foster the implementation of sustainable soil activities by farmers. Most of the synergies noticed were between RD measures themselves. In particular, the combination of AECMs and other RDP measures (notably M1, M2 and M4) was highlighted by specific examples identified in the case studies. However, according to the majority opinion of the stakeholders in the Member States studied, the effects of these synergies on soil quality and on the promotion of sustainable soil management are limited, because soil concern was not the main objective of the supported projects and because relevant measures with indirect effects (e.g., M1, M2, M16) could be further implemented to better foster the adoption of sustainable soil management. Locally, successful examples of projects involving more than two CAP measures combined to foster implementation of relevant practices by farmers were identified. However, the project leaders outlined the difficulties introduced by the reform of the CAP in 2014, which requires separate applications to be filed for each measure, thereby increasing the difficulty of implementing combined measures under a single project. RD measures also acted in synergy with the requirement under cross-compliance and greening: in particular, AECMs can be a second step toward sustainable soil management, based on requirements set by cross-compliance.

Regarding soil-relevant RD measures, the information collected during the case studies have shown that the payment levels provided under these measures sometimes hindered their attractiveness (and therefore their effectiveness). This is especially true for AECMs (M10.1), for which the payment rate granted under a specific operation may not be attractive enough for highly productive farms (BelgiumWallonia, Czechia, Germany-Bavaria, Ireland, Sweden). However, for most of the stakeholders interviewed, the payment rate of RD soil-relevant measures was found high enough to offset opportunity costs, but sometimes too low to cover the administrative costs further incurred by beneficiaries as part of transaction costs (e.g. M10.1 in Italy-Tuscany). Therefore, the payment rates of AECMs (M10.1) were not systematically sufficient to achieve the uptake necessary to address the needs identified, to generate positive results and to foster the implementation of soil-relevant activities. On the other hand, payments rates under organic farming (M11) were generally found to be set at an appropriate level to encourage application by farmers. As previously described, the CAP payments were not always necessary to foster the implementation of practices beneficial for soil protection. However, the analysis demonstrated that support has been necessary to foster unprofitable practices and land use and to prevent decline in traditional practices beneficial for soil protection.

Case-study results show that, on the side of managing authorities, most of the administrative burden comes from monitoring and reporting and from control obligations. As for beneficiaries, controls were also the most important source of administrative burden mentioned during interviews. The EU requirements for the implementation of the control system (notably on-site inspections), often necessary to guarantee the effectiveness of the CAP support granted, indeed created heavy costs for both administrations and beneficiaries. Nevertheless, the impact of national or regional implementation choices are more ambiguous, as they can either ease or strengthen the administrative burden of soil-relevant CAP instruments, both on the farmers side and managing authorities' side. Comparison of administrative costs and total budget spent on each studied instrument shows that proportionality between administrative costs and budget allocation varies not only according to the instrument/measure at stake, but also to national/regional implementation choices. AECMs (M10.1) represent a significant share of the total CAP budget but is also associated with more administrative burden than other soil-relevant CAP instruments, although local choices and the nature of the operations supported influence administrative burden. Administrative costs related to the crop

diversification measure may be deemed to be justified considering the considerable budget involved. Based on the assessed effectiveness of the instruments, the low administrative burden of soil-relevant CAP instruments seems to be proportionate to their limited effectiveness. AECMs (M10.1) are the most demanding soil-relevant measure in terms of administrative burden, but they also appear to be the most effective CAP instrument for soil protection, and therefore an efficient instrument with regard to this cost-effectiveness ratio. Support for organic farming (M11) generates the same pattern of high administrative burden and high level of effectiveness, but to a lesser extent. Meanwhile, crop diversification generates both moderate administrative burden and moderate effectiveness. The case studies highlighted that control obligations are not always sufficient to ensure the effectiveness of the measures and instruments.

Implementation of the measures in Malta

Measure 1: This measure including sub-measures (1.1, 1.2, and 1.3) has a budget allocation of €1,760,000 under FA4C. To date there has been 1 contract awarded to MCAST under Measure 1.1 for a value of €285,000. Courses are being undertaken in relation to all the AECMs under Measure 10.1 as required by the RDP. Due to Covid-19 restrictions between 2020 and 2021, courses were suspended for a period as it was not considered appropriate to give online courses.

The courses are:

- Farming & business management practices (Course 1)
- AECM 1 - Measure to control weeds in orchards and vineyards by mechanical, instead of chemical, methods (Course 2)
- AECMs 2 and 6C - Support for the maintenance of recommended tree species replacing alien species or planting on slopes and terraces to present soil and wind erosion and measure for the integration and maintenance of autochthonous Maltese species AECM 6C Carob and Mulberry (Course 3)
- AECM 3 - Measure supporting the introduction of bee boxes on holdings (Course 4)
- AECM 4 - Implement an Integrated Pest Management Plan (IPMP) targeting vineyards and orchards (Course 5)
- AECM 5 - Measures for mitigation of soil erosion, enhancing organic matter and mitigating compaction through the introduction of a Soil Management Plan (Course 6)
- AECM 6a & b - Measure for the integration and maintenance of autochthonous Maltese species: Maltese Black Chicken & Maltese Ox (Course 7).

Although a call under Measure 1.2 was issued, no applications were received.

Measure 2: This measure including sub-measures (2.1, and 2.3) has a budget allocation of €350,000 under FA4C. One contract was awarded to AgriConnect for a value of €500,000. Data on number of participants receiving advice is still pending.

Measure 4.1: This measure has a budget allocation of € 949,496 under FA4C. No investments funded under measure were allocated to FA4C. The funded interventions under this measure primarily contributed towards focus area 2A. As explained below, investment that is targeted towards soil management is non-productive and in fact is addressed through M4.4. It is therefore recommended that funds are reallocated to another focus area.

Measure 4.4: This measure has a budget allocation of €17,108,000 under FA4C. Under measure 4.4 up to the end of September 2020, the following grants were given. Table 4.1 shows that the allocation to FA4C has been exceeded.

Table 4.1: Grants to beneficiaries of Measure 4.4

	Count	Project Cost	Grant Value	Grant Value (%)
LOCAL COUNCILS	27	€ 3,114,773	€ 2,491,819	11%
INDIVIDUAL FARMER	147	€ 9,131,138	€ 7,266,015	32%
CO-CULTIVATORS	1	€ 28,199	€ 22,559	0%
PARTNERSHIP	1	€ 303,256	€ 150,000	1%
COMPANIES	3	€ 583,501	€ 424,041	2%
MINISTRIES	10	€ 17,596,462	€ 12,072,832	54%
TOTAL	189	€ 30,757,328	€ 22,427,265	100%

Table 4.2: Summary of beneficiaries of measure 4.4

Beneficiaries	Count	Project Cost	Grant Value
Malta	157	€ 12,007,814	€ 9,454,798
Gozo	32	€ 18,749,515	€ 12,972,467
TOTAL	189	€ 30,757,328	€ 22,427,265

Measure 10.1: Under measure 10.1 there are 3 AECMs that contribute to FA4C. These are AECM 1, AECM 4 and AECM 5. The budget allocated to the AECMs under FA4C is € 5,033,926. Table 4.3 shows the commitments for 2016 to 2020 in terms of expenditure and land area under AECM 1. Data shows that of the 967 beneficiaries, 758 (or 78%) received training under measure 1; the remaining 22 % had not yet received training.

Table 4.3: Summary of commitments under AECM 1 of Measure 10.1

Year	2016		2017		2018		2019		2020	
Commitment	Area (ha)	Amount	Area (ha)	Amount	Area (ha)	Amount	Area (ha)	Amount	Area (ha)	Amount
	154.0	€151,641	201.8	€198,722	338.1	€332,994	364.6	€359,083	290	€285,458

Table 4.4 shows the commitments for 2016 to 2020 in terms of expenditure and land area under AECM 4. Data shows that of the 32 beneficiaries, 29 (or 91%) received training under measure 1; the remaining 9% had not yet received training. The small number of beneficiaries is due to the fact that applicants can either benefit from AECM 1 or AECM 4 and not both. There is therefore a preference to choose AECM1.

Table 4.4: Summary of commitments under AECM 4 of Measure 10.1

YEAR	2016		2017		2018		2019		2020	
Commitment	Area (ha)	Amount	Area (ha)	Amount	Area (ha)	Amount	Area (ha)	Amount	Area (ha)	Amount
	0	0	34.7	€51,919	47.1	€70,505	47.1	€70,523	67.5	€101,040

Table 4.5 shows the commitments for 2016 to 2020 in terms of expenditure and land area under AECM 5.

Table 4.5: Summary of commitments under AECM 5 of Measure 10.1

YEAR	2016		2017		2018		2019		2020	
Commitment	Area (ha)	Amount	Area (ha)	Amount	Area (ha)	Amount	Area (ha)	Amount	Area (ha)	Amount
	0	0	0.0	€51,919	120.0	€228,235	698.1	€1,327,948	1,116.4	€2,122,833

Measure 16.2: Under Measure 16.2 there is a budget allocation of €2,141,511. In 2020, the MA issued two calls for applications under M16.2, closing in February and April with an allocated budget of €3 million. One application was received under the February call, but this application was later withdrawn by the applicant, while the April call attracted four applications with a requested budget of circa €3.7 million. Following PSC evaluation two out of the four submitted applications were awarded. An additional three applications were awarded in relation to the calls issued in 2019, bringing the total commitment levels by 2020 to around €3 million. Two of the approved applications contribute towards FA3A and three approved applications contribute to P4. In 2020, no realised payments were made. Another project was approved in 2021 so that by the end of 2021 six projects were approved with a total budget of €6,137,838.

The budget allocated towards Focus Area 4C in the Programme stands at €27,636,125 representing approximately 14% of the total budget (Table 4.6).

Table 4.6: Allocation of Expenditure in Malta RDP under Focus Area 4C

Measures	Expenditure (€)
1.1 - skills acquisition	1,440,000
1.2 - demonstration projects	80,000
1.3 - farm exchange visits	240,000
2.1 - advisory services (cross compliance)	316,667
2.3 - training of advisors	33,333
4.1 - investments in agricultural holdings	949,496
4.4 - non productive investments	17,108,000
10.1 - payment for AECMs	5,033,927
10.2 - conservation of genetic resources	293,192
16.2 - support for pilot projects	2,141,511
TOTAL	**27,636,125**

5. Evaluation Methodology

This chapter describes the approach adopted in evaluating the progress and effectiveness of Focus Area 4C. The evaluation has been designed in line with the Guidelines on the 'Assessment of RDP Results: How to prepare for reporting on evaluation in 2017' and 'Assessing RDP Achievements and Impacts in 2019' issued by the European Evaluation Helpdesk for Rural Development[10].

In accordance with the above guidelines, the proposed judgement criteria for FA4C are:

• Soil erosion has been prevented

• Soil management has improved

The following indicators are to be used to address the criteria:

Common result/target indicator:

• R10/T12 - % of agricultural land under management contracts to improve soil management and/or prevent soil erosion

• R11/T13 - % of forestry land under management contracts to improve soil management and/or prevent soil erosion[11]

The following other common indicators might be used to answer the CEQ:

Common output indicators (Data collected via the operations database):

• O4 number of holdings/beneficiaries supported

• O5 total area (ha)

• O6 Physical area supported (ha)

Common context indicators:

• CCI 41 – Soil organic matters in arable land

• CCI 42 - Soil erosion by water

The guidelines note a qualitative assessment may be undertaken using the following methods:

• Survey to beneficiaries (and non-beneficiaries) of primarily and secondarily programmed measures/sub-measures;

• Structured focus groups; and

• Interviews with managers of these measures.

[10] Available at: Assessment of RDP Results: How to Prepare for Reporting on Evaluation in 2017 | The European Network for Rural Development (ENRD) (europa.eu) and https://enrd.ec.europa.eu/evaluation/publications/assessing-rdp-achievements-and-impacts-2019_en

[11] This indicator is not relevant to Malta as there are no forests

Against this background, the evaluation consists of a mixed-methods approach which ensures appropriate triangulation of different data sources. More specifically, the evaluation design consists of the following elements:

1. Data from the Managing Authority and ARPA on contract status for AECMs;
2. GIS representation and analysis of rubble wall data;
3. Analysis of field data for Soil Organic Matter;
4. Interviews with key stakeholders; and
5. Interviews with selected beneficiaries.

On the basis of the above methods, this Thematic Evaluation Report aims to provide an insight on the effects resulting from the implementation of the various measures on FA4C. In turn, this could inform the process of developing a strategy and recommendations for soil conservation measures under the future CAP Strategic Plans (CSP). The methods and potential limitations are described hereunder.

Data from the Managing Authority and Paying Agency

In order to compute the output and result indicators, information related to beneficiaries was obtained from the Managing Authority (MA) and the Paying Agency (ARPA). This data was used and compared to national statistics to estimate the relevant indicators. It is noted that although GIS data was requested for the Evaluation, this was not provided by the time of writing this Report.

GIS analysis and field data

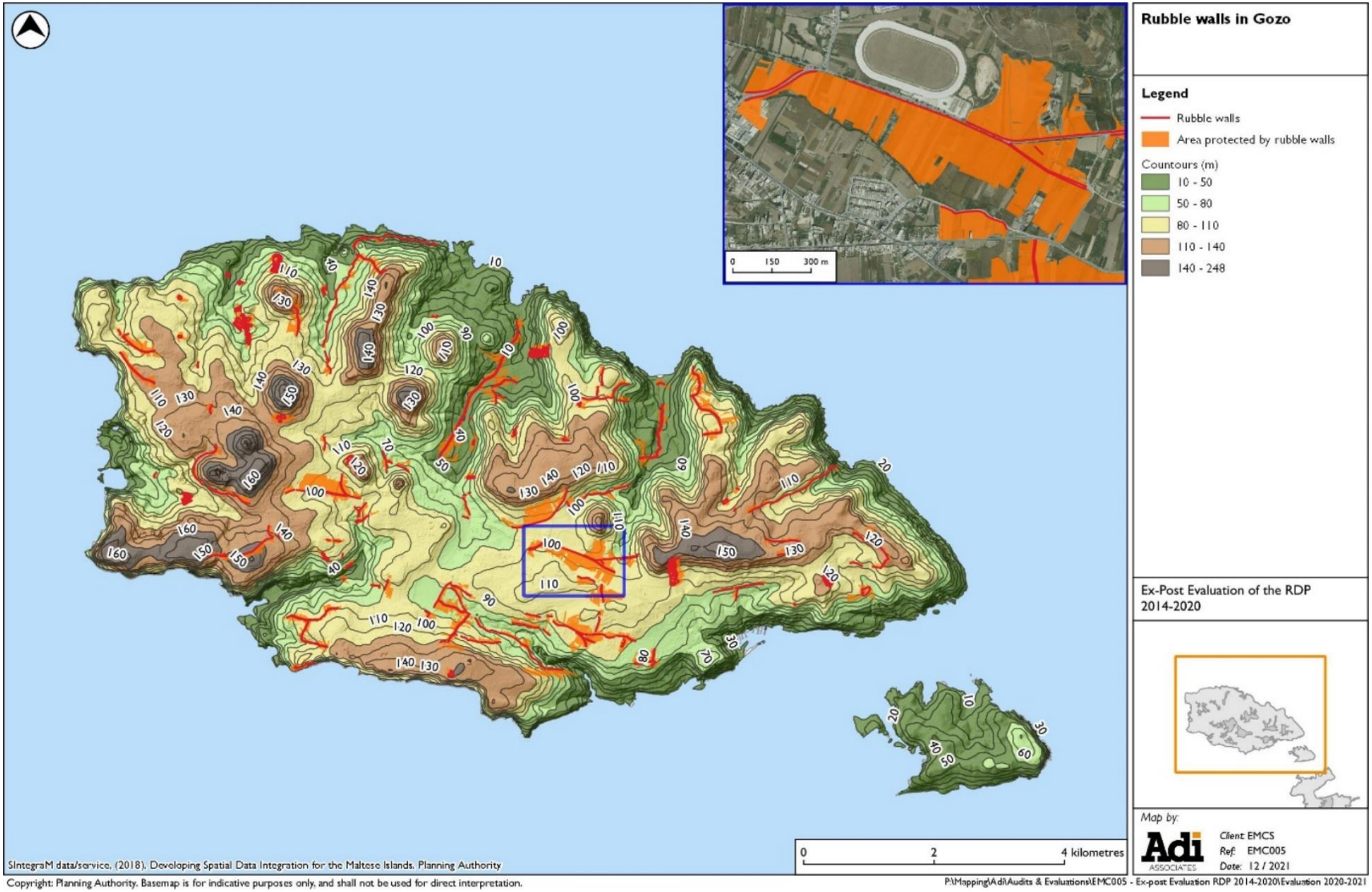
In order to compute context indicators on soil erosion Geographic Information Systems (GIS) data was requested. ARPA was requested to provide the evaluators with the shape file of all the rubble walls funded under Measure 4.4. The evaluators used this data to estimate the area of the parcels of land that was protected by the rubble walls (see **Figure 5.1**). The data was fed into the RUSLE equation as described below. Since LPIS GIS data was not made available, the identification of parcels benefitting from restored rubble walls had to be plotted manually.

Soil Organic Matter (SOM) data was also obtained from ARPA. The information gathered from beneficiaries under measure 10.1, specifically AECM 5, relates to measured SOM annually over a 5-year period. Data was obtained as an excel file; although shape file GIS data was requested this was not made available at the time of writing this Thematic Evaluation. While the former was used to estimate SOM values and annual average values, the GIS data was intended to be used to spatially represent the SOM figures in Malta and Gozo.

Interviews with beneficiaries and key stakeholders

The evaluation also used qualitative data through a number of interviews with key beneficiaries and other stakeholders including the Managing Authority and the Paying Agency. Interviews were mainly held with beneficiaries under Measure 4.4 due to the large budget allocated to this measure.

Figure 5.1: Rubble walls in Gozo with associated parcels



Soil Erosion

Soil erosion is one of the major environmental concerns in the European Union, with a negative impact on the environment and economy. As a result, different programmes have been implemented in order to mitigate this problem.

In Mediterranean areas, the implementation of support practices with stone (rubble) walls has demonstrated a high effect in reducing soil loss. Accordingly, through the 2014-2020 RDP several parcels are supported by stone walls (measure 4.4). To calculate the impact of this measure, the following methodology has been used.

The geostatistical analysis is based on a derivation of the P factor of the Revised Universal Soil Loss Equation model (RUSLE; Panagos *et al*., 2015). To estimate soil loss in Europe, the annual soil loss rates by sheet and till erosion is calculated according to the following equation (1):

$$E=R*K*C*Ls*P$$

E: annual average soil loss (t ha^{-1} yr^{-1})

R: rainfall erosivity factor (MJ mm ha^{-1} h^{-1} yr^{-1})

K: soil erodibility factor (t ha h $ha^{-1}MJ^{-1}$ mm^{-1})

C: cover-management factor (dimensionless)

LS: slope length and slope steepness factor (dimensionless)

P: support practices factor (dimensionless).

The R-factor is calculated based on high resolution temporal rainfall data. The R-factor in Malta is 1,672.4 MJ mm ha^{-1} h^{-1} yr^{-1}.

The K-factor is estimated for the 20,000 field sampling points included in the Land Use/Cover Area frame (LUCAS) survey. K-factor in Malta is 0.0381 ±0.0022 t ha h $ha^{-1}MJ^{-1}$ mm^{-1}.

The C-factor is based on modelling using a combination of land-use class and vegetation and crop composition and land management practices. The C-Factor in Malta is 0.151 (0.434 for arable land and 0.148 non-arable land).

The Ls-factor is calculated using the recent Digital Elevation Model (DEM) at 25m. Ls-factor in Malta is 1.34.

The P-factor is defined as the ratio of soil loss after a specific support practice to the corresponding soil loss after up and down cultivation. It considers (a) contour farming implemented in EU agro-environmental policies, and the protection against soil loss provided by (b) stone walls and (c) grass margins. These variables are summarized in the following equation:

$$P=P_c * P_{sw} * P_{gm}$$

where P_c is the contouring sub-factor for a given slope of a field, and P_{sw} is the stone walls sedimentation sub-factor (known as terrace sub-factor) and P_{gm} is grass margins sub-factor (known as strip cropping sub-factor and buffer strips). Based on the Panagos *et al*. (2015b) modelling, the P-factor in Malta is 0.5251.

Based on those factor values, E in Malta is 6.02 t ha^{-1} yr^{-1}.

However, under the Rural Development Programme for Malta 2014-2020 a practice support programme was implemented, and now several parcels are supported by stone walls, the P factor does not reflect this improvement on the current E value for Malta.

P_{sw} value ranges from 0.1 to 1, where 0.1 are the areas with major influence on stone walls (good condition stone walls) and 1 are the areas without influence of stone walls (none).

According to the quality of the walls (Munro *et al*., 2008):

- None: 1 (non-arable land) – 0.9 (arable land)
- Strongly deteriorated 0.8- 0.72
- poor: 0.6- 0.54
- moderate: 0.4- 0.36
- good condition: 0.2- 0.18

P_c value is calculated using the following range:

Slope (%)	Support practice factor for contouring (Pc)
9–12	0.6
13–16	0.7
17–20	0.8
21–25	0.9
>25	0.95

P factor calculation

In order to estimate the P descriptive statistical analysis will be carried out by the calculation of total areas of parcels that benefitted from the RDP. Using the line shapefile of the rubble walls constructed under this programme, the total area that benefitted from the programme will be calculated by creating (manually) a polygon for each parcel area contained by rubble walls.

The P value will be calculated by assigning a value of 0.18 to P_{sw} value of the total area of benefited parcels (because 0.18 represents good condition rubble walls as per above) and compare it with the value of 0.5299 (2015, previous research) for when the same parcels had rubble walls in a bad condition. The comparison therefore provides a before and after assessment of the parcels that were funded by the RDP.

By replacing P_{sw} on the P factor equation (2) and by replacing P on the E equation (1); the E value of Malta after the implementation of the programme will be obtained.

The comparison this E value with the E value calculated by previous research on Malta will demonstrate the impact on the soil erosion in Malta after the implementation of the programme.

Soil Organic Matter assessment

The evaluation of Soil Organic Matter will be assessed by descriptive statistics and geostatistical analysis. Using Soil Organic Matter (SOM%) as a marker of soil recovery, the descriptive statistics assessment will be carried out through the calculation of average and trends of SOM% from 2018 to 2020 on the parcels that benefitted from SOM. Moreover, with the land use cultivations information (arable land, tree planting, etc) it is possible to evaluate the differences of SOM content on parcels before and after implementation to demonstrate the improvements in soil quality. The latter information has not been made available to date.

Limitations of the Methodology Implemented for the Evaluation

The first key limitation of the proposed methodologies concerns the difficulty of observing the impact of the RDP 2014-2020 implementation. Soil processes are long-term phenomena whose trends cannot be observed on the timescale of the RDP programming period, including this reduced interim evaluation period. Although attempts were made at estimating soil erosion and improvement in soil quality through SOM data, the available databases do not make it possible to assess the effects of the various parameters of soil quality. Against that backdrop, the evaluation built on the outputs of the RDP, but its impacts on soil quality could be approached only through expected effects and changes in general impact metrics.

The second main limitation relates to the assumptions made when estimating soil erosion. It was assumed that the variables of the RUSLE are constant for all the parcels in the Maltese Islands; the only variable that was changed was that related to rubble walls. The impact of the RDP on soil erosion is therefore an estimate based on mathematical modelling.

The third limitation is related to the fact that the effects of the RDP 2014-2020 on soil cannot be isolated from the effects of the other environmental concerns, i.e., water, biodiversity and climate: it is very difficult to break down the RDP budget, costs and benefits that address only sustainable soil management. Also, issues related to agricultural soils not clearly identified by stakeholders and some operations supported by the RDP may be identified as addressing primarily water, biodiversity, or climate, even though they may also be very relevant for soil. In that respect, the evaluation encompassed a strict identification of the implementation choices to address soil quality, on the basis of the identification of a clear list of measures as assigned in the budget.

6. Evaluation Results

This chapter describes the results of this interim thematic evaluation. On the basis of the methods described in Chapter 5, this Thematic Evaluation Report aims to provide an insight on the impacts of the Programme on FA4C. In turn, this could inform the process of developing a generational renewal strategy under the future CAP Strategic Plans (CSP).

a. Result indicator

As mentioned above, the common result/target indicator for FA4C applicable to Malta is:

• R10/T12 - % of agricultural land under management contracts to improve soil management and/or prevent soil erosion

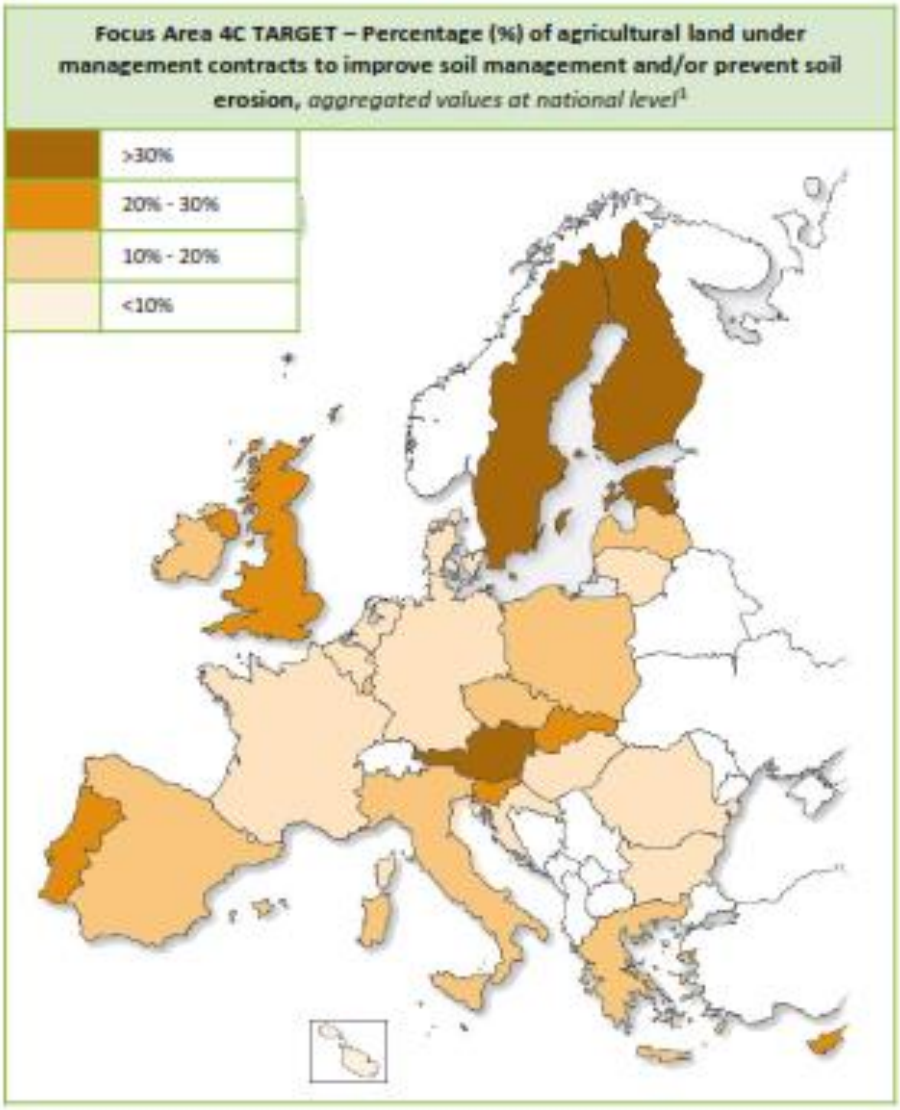
The target at EU level is to manage 14% of agricultural land to improve soil management and/or prevent soil erosion[12] as shown in **Figure 6.1**.

In order to compute this indicator, the AECMs under M10.1 relevant to FA4C are AECM 1 that registered 363.7 ha in terms of physical area supported; AECM 4 where 52.8 hectares were supported; and AECM 5 where 932 hectares have been supported. Therefore, under this Focus Area a total of 1,348.5 ha have been supported; this represents 12.6% of the UAA (10,730 ha[13]). These AECMs are responsible for surpassing the common result indicator target value which was set at 3%. Although the target indicator for Malta has been surpassed, the EU one of 14% has not. However, it is considered relatively close and a far improvement on the initial target of 3%. The success is largely attributed to the high uptake of AECM 5.

[12] The European Network for Rural Development (2016) Rural Development Programmes 2014-2020: Key facts & figures FOCUS AREA 4C: Preventing soil erosion and improving soil management

[13] https://nso.gov.mt/en/News_Releases/View_by_Unit/Unit_B3/Environment_Energy_Transport_and_Agriculture_Statistics/Pages/Census-of-Agriculture.aspx

Figure 6.1: European targets for FA4C



b. Soil erosion

In accordance with the methodology described above, the impact of the rubble walls on soil erosion was estimated using the RUSLE equation, which is: E=R*K*C*Ls*P as described above. E is the annual average soil loss and in measures in tonnes per hectare per year (t ha^{-1} yr^{-1}).

The P-factor is defined as the ratio of soil loss after a specific support practice to the corresponding soil loss after up and down cultivation. It considers (a) contour farming implemented in EU agro-environmental policies, and the protection against soil loss provided by (b) stone walls and (c) grass margins. These variables are summarized on the following equation: $P=P_c * P_{sw} * P_{gm}$

where P_c is the contouring sub-factor for a given slope of a field, and P_{sw} is the stone walls sedimentation sub-factor (known as terrace sub-factor) and P_{gm} is grass margins sub-factor (known as strip cropping sub-factor and buffer strips). Based on the Panagos *et al*. (2015b) modelling, the P-factor in Malta is 0.5251.

Based on the different factors in the equation the E value for Malta is estimated at 6.02 t ha^{-1} yr^{-1}. However, under the RDP measure 4.4 several parcels are supported by stone walls, so the P factor does not reflect this improvement on the current E value for Malta where the P factor was taken as an average value covering the Maltese Islands.

P_{sw} value ranges from 0.1 to 1, where 0.1 are the areas with major influence on stone walls (good condition stone walls) and 1 are the areas without influence of stone walls (none). The RUSLE equation was therefore re-calculated with the same variables as above but amending the P_{sw} factor as follows: before RDP implementation it is assumed that the rubble wall is in poor condition therefore P_{sw} is given a value of 0.6 and after RDP implementation it is assumed that the rubble wall is in very good condition therefore the P_{sw} is given a value of 0.18 in accordance with Munro *et al*., 2008 as described in Section 5 above. On this basis the following annual average soil loss figures are obtained:

	Annual average soil loss figure (t ha^{-1} yr^{-1})
National Figure	6.02
For parcels before RDP implementation	6.77
For parcels after RDP implementation	2.30

The figures show that the estimated average annual soil loss for those parcels that benefitted under measure 4.4 is substantially reduced because of the rubble walls. The 66% reduction in soil erosion due to the rubble walls is considered significant. If the average annual soil loss for those parcels that benefitted under measure 4.4 is compared to the national average, then there is a reduction in soil loss of 62%, which is also considered significant. It is pointed out, however, that all the variables in the RUSLE equation were kept the same, with the exception of the P_{sw} value. Further refinement can be carried out if GIS data is made available and the parcels are identified spatially, so that the other variables can be computed.

In addition to computing the RUSLE equation and in the absence of GIS data on land parcels, the evaluators estimated the area of soil that is protected by the rubble walls financed under measure 4.4. ARPA provided the GIS shapefile of all the rubble walls in Malta and Gozo that benefitted under Measure 4.4. The data shows that 171,960 linear metres of walls were funded (of which 78,645 m were in Gozo and 93,315 m in Malta).

The parcels associated with these walls were identified manually and plotted individually in GIS. Due to the laborious nature of this work this exercise was only done for Gozo (see **Figure 6.2** and **Figure 6.3**). Once data from the LPIS system is available the evaluators will easily identify the parcels associated with the rubble walls and will not have to plot them one by one; this will be done for Malta and the data in this section re-computed. Using the GIS plotted data, the area of soil protected by the rubble walls in Gozo was estimated at approximately 3.7 km^2. Assuming an average soil depth of 50 cm[14], the volume of soil protected by rubble walls is estimated at 1,853,275 m^3. This means that 78,645 metres of wall protect 1,853,275m^3 of soil (or 3,706,550m^2); this is equivalent to 1 linear metre of rubble wall protecting 23.6 m^3 (or 47.1 m^2) of soil.

Using the above computation, it is estimated that 93,315 metres of rubble walls in Malta protect approximately 2,202,234 m^3 (or 4,397,949 m^2) of soil. Therefore, the estimated area of soil protected by the rubble walls under the RDP in Malta and Gozo is 8,104,499 m^2.

Assuming that the UAA is 10,730 ha[15] (or 107,300,000 m^2) then the area of soil protected by rubble walls in the RDP is 7.55% of the UAA.

14 https://www.um.edu.mt/library/oar/bitstream/123456789/39349/1/Soil%20Quality%20Change%20in%20the%20Maltese%20Islands.pdf

15 https://nso.gov.mt/en/News_Releases/View_by_Unit/Unit_B3/Environment_Energy_Transport_and_Agriculture_Statistics/Pages/Census-of-Agriculture.aspx

Figure 6.2: Parcels protected by rubble walls

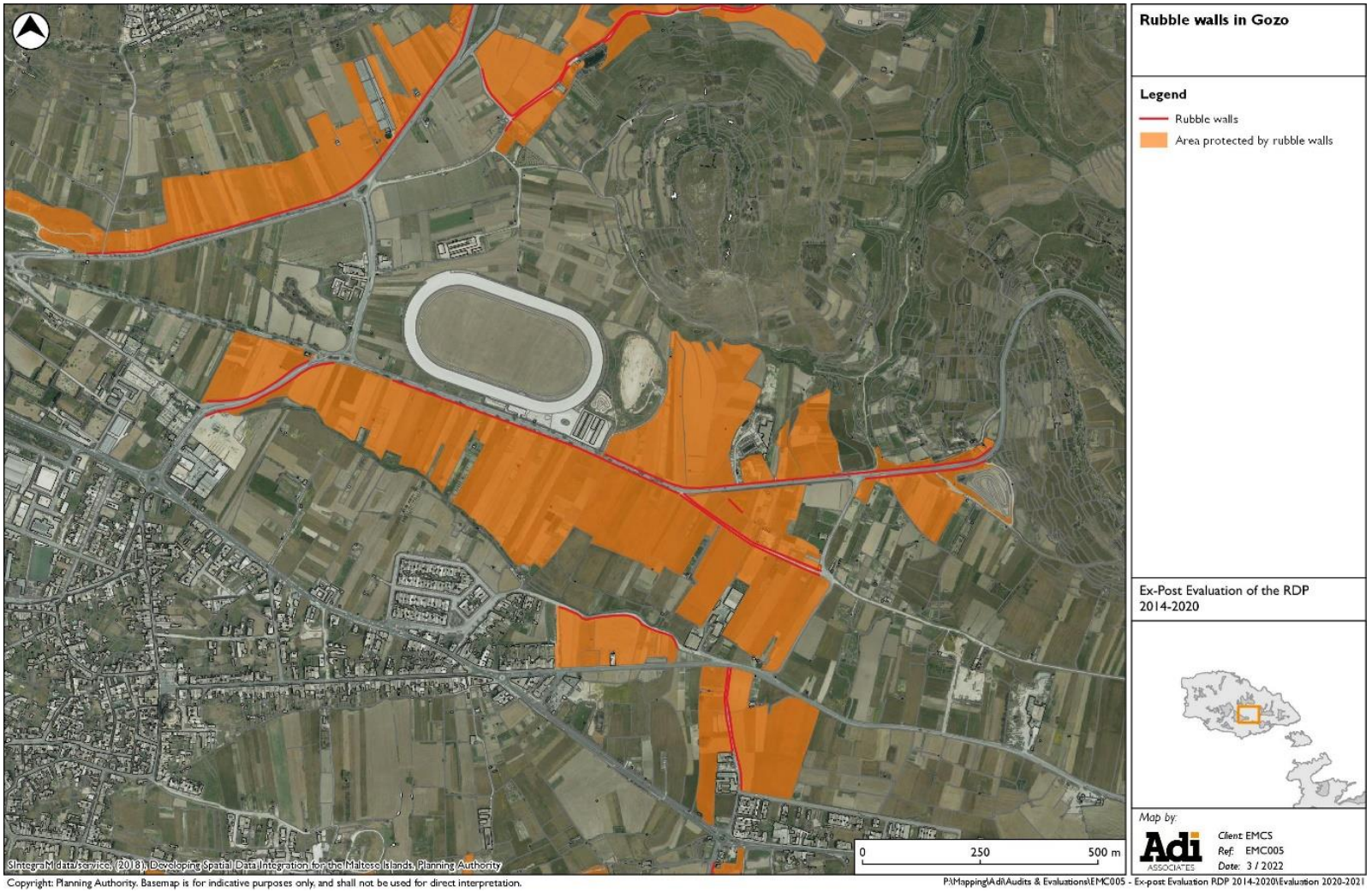
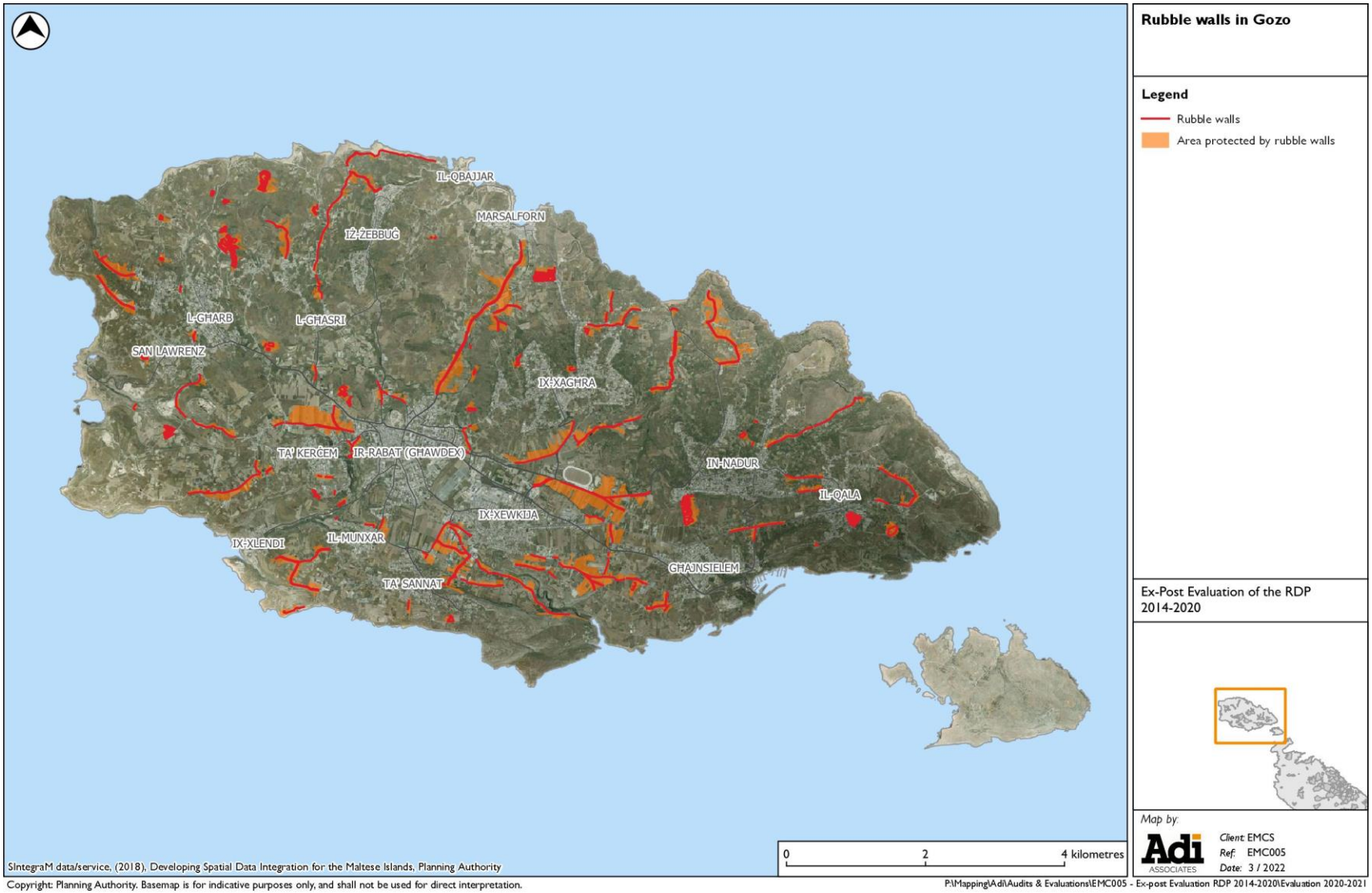


Figure 6.3: Parcels identified throughout Gozo



c. Soil organic Matter

As described above, in 2013 the national average of soil organic matter stood at 2.3%. In undertaking this evaluation, data from beneficiaries of Measure 10.1, AECM 5 was collected and analysed. In order to receive payments under AECM 5 beneficiaries are required to test their Soil Organic Matter (SOM) before commencement of the measure and then annually. The Managing Authority supplied data in an excel file containing a number of variables for AECM5 for the period 2018 to 2020 including: applicant details, parcel number, details on commitment, land type (dry or irrigated), and Soil Organic Matter (SOM) in %. The data was analysed and where SOM entries didn't have data for the years 2018 to 2020, these were removed from the sheet. Similarly, where data was available for 2018 but not for 2019 and 2020 then these entries were also removed as the Managing Authority explained that the commitment did not continue. Therefore, entries that were retained were those that had SOM data for 2018 to 2020, SOM data for 2019 to 2020 and SOM data for only 2020. This resulted in approximately 3,500 entries or parcels that had SOM data that could be analysed. Although GIS data was requested to identify the location of the parcels and therefore to plot the SOM data spatially, this was not available at the time of writing this report therefore spatial analysis of the SOM data could not be carried out.

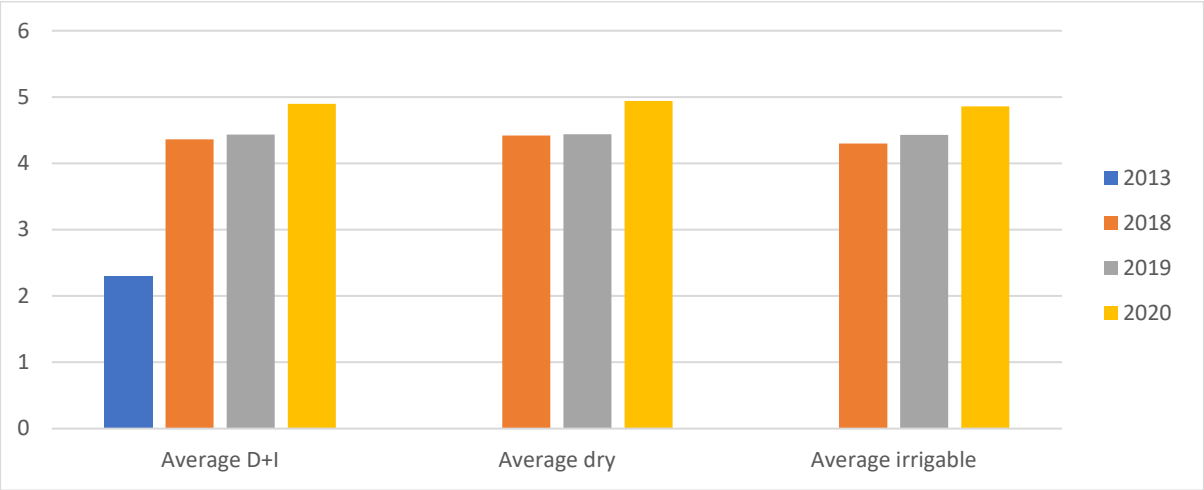
The measure started in 2018 and data for this evaluation is available up to 2020 as described in **Table 6.1**. From the data provided by the MA, the average value of SOM was estimated for the years 2018 to 2020. Since the data was presented as dry or irrigated land the SOM data was classified accordingly. Figures for dry and irrigated land are presented separately and the average of all SOM data (dry and irrigated parcels) was also estimated. This was compared to the national average of 2.3% of 2013.

Additionally, the data was analysed for the percentage increase in SOM between 2018 and 2020 and between 2013 and 2020 as shown in **Table 6.1** and **Figure 6.4**. The table shows that, based on data obtained from the beneficiaries (approximately 3,500 parcels), there has been a substantial increase (over 50%) in SOM between 2013 and 2018. Furthermore, when the AECM was launched in 2018 the average SOM has also increased by about 11% over the two years.

Table 6.1: Soil Organic Matter in beneficiary parcels

	SOM%				% SOM increase	% SOM increase
Year	2013	2018	2019	2020	(2018-2020)	(2013-2018)
Dry agriculture	2.3	4.36	4.44	4.9	11	53
Irrigable Agriculture		4.42	4.44	4.94	10.5	52
Total dry + Irrigable		4.3	4.43	4.86	11.5	53.4

Figure 6.4: Change in SOM over time



d. Interviews with key stakeholders and beneficiaries

A number of online and face-to-face meetings were held with stakeholders and beneficiaries in November 2021 – February 2022. The following meetings were held:

- Stakeholders:
  - Managing Authority (various staff responsible for the different measures)
  - ARPA (various staff responsible for the different measures)
- Beneficiaries:
  - MCAST (M1)
  - Agri Connect (M2)
  - Infrastructure Malta (M4.4)
  - Ministry for Transport, Infrastructure and Capital Projects (M4.4)
  - Ministry for Gozo (included site visits and focus group with farmers) (M4.4)
  - Parks Malta (M4.4)
  - Hili Ventures Ltd (M4.4)
  - Caruana Cini Ltd (M4.4)
  - Ghajnsielem Local Council (M4.4)
  - Kirkop Local Council (M4.4)
  - Local Action Groups (M4.4)
  - Qormi Local Council (M4.4)
  - Zabbar Local Council (M4.4)
  - Dingli Local Council (M4.4)

Stakeholders

Various staff from the Managing Authority were interviewed with respect to the implementation of the measures related to FA4C. Progress in the different areas was discussed as well as challenges. One of the main challenges faced in the last couple of years related to the impact of Covid-19, in particular in relation to measures 1 and 2 where face-to-face interaction had to be limited and courses stalled for a period of time. Additionally, as both measure 1 (training) and measure 2 (advice) are conditions for receiving funding under Measure 10.1, the MA explained that farmers found it a challenge to attend in-person courses and often could not distinguish between the 2 measures. In addition, under Measure 1 the beneficiaries had to attend a generic course as well as a specific course on the AECM they were benefitting from. This proved a challenge for the beneficiaries especially as the courses were delivered in a classroom style type of set up.

With regards to Measure 4.4, several Local Councils applied and benefitted from the measure. Feedback from the MA suggests that challenges encountered related to the often-complex tendering and bureaucratic processes that Local Councils must go through to be able to award contracts. The time lag between the application and the actual works often means that there could be changes in the parameters of the application as well as changes at Local Council level making the process somewhat tedious.

The MA mentioned that staff turnover is also a challenge as new staff needs to be trained and there is a time lag between when a member of staff leaves, and replacements are recruited.

Beneficiaries

The meetings with beneficiaries were mainly centred on Measure 4.4, since this is the measure with the largest budget contributing to FA4C. Three types of beneficiaries were consulted: Government entities, Local Councils, land managers, farmers and private companies. In general, Government entities found the process relatively straightforward with most being used to Government procurement procedures and requirements. The vast majority of projects involved repair of rubble walls with some having additional investments in valley works such as clearing of water courses and planting. When queried on how stretches were selected for repair of walls, in general the main reason is repair of those walls that were in a bad state and those that were identified by the community as requiring repair.

A number of Local Councils benefitted from Measure 4.4. While some admitted to having difficulties with the application process, others acknowledged that they received assistance from the former MEUSAC now known as Servizzi Ewropej f'Malta (SEM). This facilitated the process greatly. Other challenges included obtaining reliable estimates from architects at the application stage, contacting owners / tenants of the areas of the proposed interventions, and commissioning the work through the tendering process. Notwithstanding most beneficiaries commented that the Programme left a positive impact on the locality and would re-apply if such a measure was made available again.

The Ministry for Gozo was by far the largest single beneficiary absorbing just under half the total budget under M4.4. A meeting was held with Ministry representatives and a focus group with Gozitan farmers affected by the interventions was carried out on site in Gozo. Site visits at the different areas of interventions were also carried out by the evaluators (see Figure 6.5). The focus group with the farmers (about 8 in all) overwhelmingly confirmed that they have seen improvements in their fields through the repair of their rubble walls. Most are located in a valley and therefore suffer from stormwater runoff and therefore potential soil loss. As shown in Figure 6.5 large stretches of rubble walls have been built with some of them spanning several metres in height.

The Local Councils that benefitted from measure 4.4 explained that in addition to addressing soil erosion issues, other benefits were reaped from the investment – mainly related to the rural landscape. Being traditional features, rubble walls create a rural feel especially in narrow rural roads or when they are close to other vernacular features. A typical case was highlighted by the Qrendi Local Council where the mayor pointed out that the local community were enjoying their rural walks more thanks to the repair of stretches of wall in an area that is frequently used by locals (see Figure 6.6).

Figure 6.5: Rubble walls in Gozo

Figure 6.6: Rubble walls in Qrendi

7. Conclusion and Recommendations

This thematic evaluation has focused specifically on Focus Area 4C of the Rural Development Programme (RDP) for Malta. The focus area is concerned with the prevention of soil erosion and the improvement in soil management. This FA is chiefly addressed through Measures 4.4 and 10.1 of the RDP, with the bulk of the budget being allocated to Measure 4.4.

Soil organic matter is a key determinant of soil productivity. It influences many functions such as exchange of nutrients, water retention, and soil ecology. A major threshold of soil organic matter content is two percent. Below this level, a potentially serious decline in soil quality will occur. In 2003, the organic content in Maltese soils stood at 2.11% and in 2013, 2.30% . 59% of the locations in 2013 had higher organic carbon content when compared to 2003. This represents a marginal improvement in soil quality and its functions. Soil depth was also measured in 2013. The average soil depth, excluding sites exceeding the 200 cm depth, was 47.76 cm. Soil depths less than 10 cm were typical of plateaux and steep valley sides. Soils between 10 cm and 100 cm have been associated with agricultural areas.

As described above, Malta has poor soil quality and faces a high risk of soil erosion in addition to facing severe water challenges, both in terms of water quantity and water quality. This situation could be further aggravated by climate changes impacts including reduced precipitation, increasing risk of droughts, and extreme heat rendering the agricultural sector particularly susceptible to these impacts.

Taking into account the main threats to soil quality, the 2014-2020 RDP aims to address soil quality and preservation of Maltese soil through the implementation of measures 1,2, 4.4, 10.1 and 16.2. The budget allocated towards Focus Area 4C in the Programme stands at €27,636,125, representing approximately 14% of the total budget.

Measures 1, 2, and 16 only indirectly contribute to soil management, therefore the focus of the evaluation was on measures 4.4 and 10.1. The uptake of both measures registered very good progress with the allocated budgets for both measures being exceeded. The target of 3% of agricultural land under management contracts to improve soil management and/or prevent soil erosion was exceeded and the indicator is currently estimated at 12.6%. The indicator is very close to the EU target of 14%. The success of the measure is attributed to the uptake of AECM 5.

In terms of soil erosion and soil organic matter, data obtained from ARPA and the Managing Authority was used to assess the impact on the programme. The data shows that 171,960 linear metres of walls were funded (of which 78,645 m were in Gozo and 93,315 m in Malta). It was further estimated that the area of soil protected by the rubble walls in Malta and Gozo is 8,104,499 m^2. Assuming that the UAA is 10,730 ha[16] (or 107,300,000 m^2) then the area of soil protected by rubble walls in the RDP is 7.55% of the UAA.

In terms of soil erosion, it was estimated that the average annual soil loss for those parcels that benefitted under measure 4.4 is substantially reduced because of the rubble walls. It was estimated

16 https://nso.gov.mt/en/News_Releases/View_by_Unit/Unit_B3/Environment_Energy_Transport_and_Agriculture_Statistics/Pages/Census-of-Agriculture.aspx

that there is a 66% reduction in soil loss due to the rubble walls. This estimate can be further refined when GIS data of land parcels is made available.

With regards to soil organic matter the data obtained from the beneficiaries of AECM 5 was collected and analysed for the years 2018 to 2020 (the years where SOM data was collected). The evaluation showed that there has been a substantial increase (over 50%) in SOM between 2013 and 2018. Furthermore, when the AECM was launched in 2018 the average SOM has also increased by about 11% over the two years on those parcels that implemented AECM5. Although these results are very encouraging both in terms of the general improvement in SOM between 2013 and 2018 and also as a result of the programme (2018-2020), the SOM values are those obtained from beneficiaries and not part of a national study – which was used to compute the SOM value in 2013. Therefore, results need to be interpreted with caution. Furthermore, a more detailed assessment will be undertaken during the ex-post when more years of data will be available.

Recommendations

This final section presents a set of recommendations emanating from the Thematic Evaluation distinguishing between recommendations to be considered at a national level and those which can be considered for the implementation of the RDP Programme as well as those for monitoring and evaluation.

National Recommendations

On a national level there is the need to halt and reverse the depletion of natural resources in agriculture by supporting management practices that reduce water-induced soil erosion, and investments in modern productive systems, enhancing sustainable water management and other practices lowering nutrient losses to water and air.

The impact of the CAP must always be considered in relation to national policies and therefore policy which is aimed at protecting quality and quantity of soils must be enforced. The thematic evaluation of young farmers[17] highlighted that one of the pressing needs for agriculture is the lack of available land for farmers. It recommended that efforts are required to take stock of abandoned land and ensure that land regulations protect arable land and promote the use of land for productive purposes. Furthermore, there is the need for a better legal structure to avoid land fragmentation as this impinges on the use of land for productive purposes and does not allow for large production and expansion. This is further reinforced from an environmental perspective where the National Agricultural Policy advocates for the incentivization of the consolidation of land parcels to improve their sustainability. The policy direction, coupled with incentives to improve soil, needs to be taken forward for both the sustainability of the agriculture community as well as to protect soils.

Sustainable cultivation practices are also advocated in the National Agriculture Policy through the establishment of pilot projects on various crops to identify the most effective and sustainable cultivation practices as well as experiment with and promote successful intercropping methods in crop farming. The importance of organic farming and its promotion locally is also warranted – a deep understanding of barriers to organic farmers needs to be carried out.

The development of a Soil Action Plan is required to improve soil quality (to reduce soil borne diseases and nematodes, to improve soil organic matter, to enhance soil biodiversity), to improve knowledge on Maltese soils, to reduce soil erosion, compaction, and contamination and to assess the impact of

[17] E-Cubed Consultants, EMCS, Adi Associates (2021). Thematic Evaluation Young Farmers RDP 2014-2020

the correct application of manure and other organic matter in Malta's soils. The CAP could then build on the Action Plan and supplement it with measures that will assist the agriculture community implement the plan.

Programme Recommendations

Given the poor quality of Maltese soils further measures to avoid soil degradation such as cover crops and maintenance and creation of permanently covered areas should be considered in the CAP SP.

New CAP instruments or measures should be designed to address harmful practices and on-going trends (e.g. use of plastic in fields, use of continuously heavier machinery, land abandonment occurring on terraces, enlargement of field size) whose impact is increasingly significant.

It is clear that Measure 4.4 was a successful measure both in terms of uptake as well as its potential impact on preventing soil erosion. While more field data is required to confirm this (such as measuring soil depth before and after project implementation), initial estimates and qualitative data shows that soil erosion is reduced through the restoration, repair, and maintenance of rubble walls. Additional positive impacts on the rural landscape also point to such a measure being considered for the CAP Strategic Plan. In order for the measure to be more effective, selection criteria relating to topography, soil depth, and state of the walls should be used to select projects where the impact on soil is likely to be the highest.

The continued popularity of the AECMs indicates that accompanying training measures are having a positive effect on farmers. It is therefore recommended to support the consolidation of knowledge and its transmission to farmers through quality advice on sustainable soil management. The choice of practices and appropriate innovation requires tailored agronomic expertise, taking into account the specific context at farm level. A broader implementation of the measures supporting training, knowledge transfer and cooperation among stakeholders can be a key to removing barriers to innovations and allowing farmers to implement sustainable soil management practices while limiting economic risks. Following feedback from the beneficiary of Measure 1 as well as that from the Managing Authority, consideration should be given to finding ways to better engage farmers. The classroom style of learning may not be ideal and more innovative approaches should be sought. The provision of advice under measure 2 also needs to be made more attractive to farmers.

It is important that any changes in criteria during the programming period, for any of the measures are well-communicated to potential applicants and agricultural organisations. This will ensure that any interested beneficiaries are aware of such changes and can thus make the necessary considerations.

As pointed out in this evaluation no investments under Measure 4.1 were allocated to FA4C, therefore the initial projected budget under this FA must be reallocated to another FA (likely to FA2A). In order to reap benefits for soil from this on-farm investment measure, selection criteria related to soil / water management could be given some weighting and the interventions clearly indicate how soil is going to be affected. The system that is currently in place makes it very challenging to identify potential impacts on soil from Measure 4.1.

Finally, ensuring that soil management is effectively addressed beyond the implementation of the current programme should also be considered. Soil management is also expected to play an important part in the future CAP strategic Plan. Indeed, fostering sustainable development and efficient management of natural resources such as water, soil, and air, including by reducing chemical dependency is one of the nine Strategic Objectives of Regulation (EU) 2021/2115 of the European

Parliament and of the Council of 2 December 2021. Measures that clearly impact soil and therefore contribute to the indicators on soil should be identified and incentivised and data collection related to the implementation of the measures should be in-built into the requirements of the measure. Simple data collection by beneficiaries will allow for a more in-depth analysis of the success or otherwise of the proposed measures.

Recommendations on data, monitoring and evaluation

Based on the findings and limitations on data encountered during the evaluation, the following recommendations are proposed:

In order to improve future evaluations, more information from beneficiaries could be gathered. For example, to assess soil erosion, it would be beneficial if information on soil depth is provided at the start of the project and at the end to verify if soil has actually been retained on the field. Data should all be inputted into a GIS so that analysis can be undertaken spatially.

It would be beneficial for the evaluation that as far as possible data is supplied to the evaluators in GIS. This would allow for a spatial analysis of the programme implementation. LPIS GIS data would enable analysis of impacts of both soil erosion and soil organic matter to be carried out in greater detail.

To further use the opportunity of the FADN sample to monitor environmental impact, such as the quantity of plant protection products / fertiliser used, or the area ploughed. The FADN is a powerful database, which can provide very useful information on changes in the implementation of agri- and environmentally friendly management practices and the impact of the CAP support. It could also be worth including data on the practices implemented or agri-environment and climate indicators.

8. Glossary of Terms[18]

Agri-Environment Climate Measures (AECMs)

AECMS are voluntary measures taken up by the farmer who is compensated by costs incurred and income forgone in implementing such measures. These measures are generally simple to implement but need proper adherence in terms of compliance.

Baseline

State of the economic, social or environmental context at a given time (generally at the beginning of the intervention), and against which changes will be measured.

Beneficiary

Person or organisation directly affected by the intervention whether intended or unintended. Beneficiaries receive support, services and information, and use facilities created with the support of the intervention (e.g. a family which uses a telephone network that has been improved with public intervention support, or a firm which has received assistance or advice). Some people may be beneficiaries without necessarily belonging to the group targeted by the intervention. Similarly, the entire eligible group does not necessarily consist of beneficiaries.

Common Evaluation Question (CEQ)

An element of the Common Evaluation Framework which focuses the evaluation on measuring achievement against EU policy objectives. The Common Evaluation Questions could be complemented with programme-specific evaluation questions.

Common indicator

An indicator is a quantitative or qualitative factor or variable that provides a simple and reliable means to measure achievement, to reflect changes connected to an intervention, or to help assess the performance of a development actor. In the context of the rural development policy, the set of common indicators, binding for all Member States, serves to measure achievements and changes at both RDP and European level.

Context indicator

It provides information on relevant aspects of the external environment that are likely to have an influence on the design and performance of the policy, e.g. GDP per capita, rate of unemployment, water quality.

Evaluation

Evaluation is a process of judgement of interventions according to their results, impacts and the needs they aim to satisfy. Evaluation looks at the effectiveness, the efficiency, the coherence and at the relevance of an intervention.

Ex-post evaluation

[18] Taken from https://enrd.ec.europa.eu/sites/default/files/evaluation_publications/glossary_evaluation_june2021.pdf

Evaluation which recapitulates and judges an intervention when it is over. It aims at accounting for the use of resources, the achievement of intended and unintended effects. It also tries to draw conclusions which can be generalised to other interventions. For impacts to have the time to materialise, ex post evaluations need to be performed sometime after implementation of the intervention.

Focus area

The sub-field of policy at which the intervention is targeted. The six Union priorities for rural development are broken into 18 operational focus areas in order to better structure the attribution of measures and planned interventions.

Implementation

Implementation describes the process of making sure that the provisions of EU legislation can fully enter into application.

Indicator

Tool to measure the achievement of: an objective; a resource mobilised; an output accomplished; an effect obtained; or a context variable (economic, social or environmental). The information provided by an indicator is a datum used to measure facts or opinions. An indicator must, among other things, produce simple information which is communicable and easily understood by both the provider and the user of the information. It must help the managers of public intervention to communicate, negotiate and decide. For that purpose, it should preferably be linked to a criterion on the success of the intervention. It should reflect as precisely as possible whatever it is meant to measure (validity of construction). The indicator and its measurement unit must be sensitive, that is to say, the quantity measured must vary significantly when a change occurs in the variable to be measured.

Land Parcel Identification System (LPIS)

A geographic information system that allows the Integrated Administration and Control System (IACS) to geo-locate, display and spatially integrate its constituent data. It contains diverse spatial data sets from multiple sources which together form a record of all agricultural areas (reference parcels) in the relevant Member State and the maximum eligible areas under different EU aid schemes in Pillars 1 and 2 of the CAP. LPISs comprise alphanumerical and graphic elements.

Measure

Within the framework of European rural development policy, the basic unit of programme management, consisting of a set of similar projects and disposing of a precisely defined budget. Each measure has a particular management apparatus. Measures generally consist of projects. Many measures are implemented through a process of Calls for Proposals and subsequent appraisal.

Monitoring

An exhaustive and regular examination of the resources, outputs and results of public interventions. Monitoring is based on a system of coherent information including reports, reviews, balance sheets, indicators, etc. Monitoring system information is obtained primarily from operators and is used essentially for steering public interventions. When monitoring includes a judgement, this judgement refers to the achievement of operational objectives. Monitoring is also intended to produce feedback and direct learning. It is generally the responsibility of the actors charged with implementation of an intervention.

Output indicator

It measures activities directly realised within programmes. These activities are the first step towards realising the operational objectives of the intervention and are measured in physical or monetary units. Example: number of training sessions organised, number of farms receiving investment support, total volume of investment.

Recommendation

Proposal aimed at enhancing the relevance, effectiveness, efficiency, added value and coherence of the programme/strategy; at redesigning the objectives and measures; and/or at the real-location of resources. Recommendations should be linked to evidence-based conclusions

Result indicator

It measures the direct and immediate effects of the intervention. It provides information on changes in, for example, the behaviour, capacity or performance of direct beneficiaries and are measured in physical or monetary terms. Example: gross number of jobs created, successful training outcomes.

Soil Organic Carbon (SOC)

Carbon contained in soil organic matter.

Soil Quality

The capacity of a soil to function within ecosystem and land-use boundaries to sustain biological productivity, maintain environmental quality, and promote plant and animal health.

Thematic Evaluation

Evaluation activity which complements planned evaluation during the programming period, in response to specific evaluation needs or information gaps on a specific theme or subject. Thematic evaluation can be conducted in the form of specific evaluation study, survey, set of case studies, etc

Utilised Agricultural Area (UAA)

Utilised agricultural area (UAA) is the total area taken up by arable land, permanent grassland, permanent crops and kitchen gardens used by the holding regardless of the type of tenure. Common land used by the holding is not included. The term does not include unused agricultural land, woodland and land occupied by buildings, farmyards, tracks, ponds, etc