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Boosting Rural Areas Revitalization in the Mediterranean through Cross-cutting Approach Based on Ecological and Social Resilience

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Abstract

Urban areas have been identified as one of the key challenges to tackle in the next decades. Most of the environmental impacts associated to urban contexts are linked to an unsustainable use of resources basically due to urban planning and society's consumption behaviour. Currently, the paradigm of sustainable cities brought out in the past years situates urban contexts as an opportunity to reduce these impacts. There is a wide range of strategies focused on cities and their transition to a more sustainable urban model: compactness, sustainable mobility, energy efficiency, waste management and greening are some of the most relevant approaches with clear indicators and implementation plans. However, rural areas are still pending for a precise strategy that highlights their ecological added value avoiding to be defined only as "not urban". Rural areas should be emphasized from their productivity perspective and their key role in terms of resilience and adaptation to Climate Change. In the framework of the Interreg Med Programme, Thematic Communities are working on the capitalisation of projects from different kind of approaches of application in the Mediterranean Area. Four of these communities - Renewable Energy, Green Growth, Sustainable Tourism and Efficient Buildings[1] - have several projects that present rural areas as one common territory of intervention. The aim of this paper is to expose the standards and goals proposed by the Interreg Med Thematic Communities for Rural Areas Revitalization as a resilience strategy in the Mediterranean Region, using a cross-cutting approach. The cross-cutting approach stresses the relation among the environment, society and economy: rural liveability, increasing RES production with sharing microgrid systems & efficient buildings, as well as green economy based on sectors such as agricultural & tourism activities. These standards and results will provide reference values to shape final policies recommendations. Consequently, the present paper is based on the joint cross-thematic effort and work from four thematic communities of the Interreg MED programme, previously mentioned. It includes some references to existing research studies, but the aim is to open the path to identify new challenges of Mediterranean rural areas and find potential solutions from a holistic approach.

[1]I would add the weblinks to our communities so that they better understand what we do ...

Keywords

ecosystemic approach; natural-based solutions; climate change adaptation; resilient communities; rural areas;renewable energy; resilient agriculture; green growth; sustainable tourism; energy efficiency; Mediterranean

1. Introduction

1.1. Climate Change in Mediterranean Area

According to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [11], the Mediterranean Region is considered one of the 25 world's major climate change hotspots, which situates the whole area in a highly vulnerable situation for the next decades. Even though MED countries are contributing to a much less extent to Climate Change, they suffer the consequences more than others. Nevertheless, carbon footprints are increasing steadily in southern Mediterranean countries as well, which highlights the need to mitigate climate change. In particular, the energy sector, accounting for 85 % of greenhouse gas emissions in the Middle East and North Africa region, and the transport sector play a crucial role in mitigation efforts. Some of the most relevant impacts predicted have important consequences in natural systems, human settlements and activities and also on human health.

Table 1. ClimateChange impacts in Med Area

Impact areas	Risks due to rise of temperatures	Risks due to rise of sea level
NATURAL SYSTEMS RESOURCES MANAGEMENT	- Desertification / soil degradation. - Species composition alterations and/or extinction. - Agriculture productivity due to temperatures, land degradation and reduced water availability. - Vegetation growth and forest fires (protected areas).	- Salt water intrusion in coastal aquifers. - Increase in droughts & freshwater deficits
HUMAN SETTLEMENTS INDUSTRY INFRASTRUCTURE	- Increased peak demand for cooling in the summer months affecting energy infrastructures due to higher temperatures. - Heat waves due to urban heat island effect. - Vulnerability in islands due to energy and resources supply.	- Touristic coastal zones: flooding and storm surges in low-lying and unprotected coastal zones; wind storms; water shortages and drought; enhanced air pollution. - Flooding on port infrastructure, coastal roads, railways, and airports.

Continued on next page

Table 1 continued

HUMAN HEALTH WELL-BEING SECURITY	- Illnesses and deaths from cardiovascular and respiratory diseases. - Asthma proliferation due to increasing of pollen and other aeroallergen levels. - Increased prevalence of malnutrition and under nutrition and food insecurity in general, especially among those on low incomes, due to a decrease in the production of staple foods.	- Material damages due to natural disasters. - Hygiene and diarrheal disease due to lack of safe water. - Water-borne diseases due to floods, threatening especially those with already limited access to water and sanitation.

Sources: Adaptation after the 5th report of IPCC and the Regional Climate Change Adaptation Framework for the Mediterranean Marine and Coastal Areas (2017)

Substantial increase in temperatures is expected worldwide: around 2°C depending on the season and scenarios by 2050, 2 to 6°C by 2100 compared to 1986-2005(IPCC 5^{th} report). In all cases, the rising temperatures in the Mediterranean will be greater than the rise in global temperatures. Alterations of local climates are expected, with more frequent extreme summer heat-waves and heavy precipitation events.

Regarding the rise of sea levels, mean annual precipitation will decrease between 10-20%. Sea acidification is currently occurring at an unprecedented rate. An average of 0.4-0.5 m of sea level rise is projected for most of the Mediterranean under AR 5 low emission scenario RCP 4,5 of IPCC. According to the worst case scenario predicted, by 2100 the mean temperatures could increase by up to 7.5 C and mean precipitation could decrease by up to 60 per cent, accordingly to IPCC report.

1.2. A desirable future for Mediterranean Area

We envisage a MED area that "ends all forms of poverty, fights inequalities and tackles climate change, while ensuring that no one is left behind" (UN 2030 SD Agenda). The future that we desire requires a systemic thinking able to tackle at the same time climatic, environmental, economic, political, institutional, social and technological processes. Complex cross-border and cross-sectorial cooperation is needed through governance structures that allow constant feeds between regions, states and EU policies. Moreover, we need to consider that climate change impacts also take place in challenging and social worrying contexts (migration from Africa, security debates etc.) which should also need to be included in the agreement of solutions and measures to be adopted.
In order to encourage a positive and resilient vision of all these challenges, four pillars [1] (UNEP, 2016) are identified to face a more resilient future for the Mediterranean Region:
-Research & Development allows optimizing scientific knowledge, awareness raising, and technical capacities to deal with climate change at all levels. A Mediterranean research agenda on climate change, collaborative programmes and networking amongst research centres and universities has been successfully developed.
-Technology allows optimizing the uptake of climate-smart and climate-resilient responses such as large-scale international programmes like European Union Horizon 2020, Climate KIC. The Mediterranean Climate Technology Initiative has set up investment plans for climate at national level.
-Funding allows optimizing funding mechanisms such as alliances with banking and insurance sectors, the promotion of region-wide projects or pilot projects supported by public and private actors.
-Policy allows optimizing institutional, policy and legal reforms for Climate Change adaptation and mitigation. Some examples are the enhanced cooperation at territorial level (urban – periurban and rural areas land use planning), the investments in energy efficiency and renewable energy sources, the promotion of universal energy access

and the reform of energy subsidies that have been scaled up and which increased the solidarity with the most vulnerable groups.

1.3. The Rural Areas challenge

Despite the fact that urban areas are the most densely populated, rural areas represent about 44% of European territory, while urban areas only 12% (reference). In the case of the MED area, this is not the exception, an important part of the territory of Portugal, Spain, France, Italy or Greece is considered as rural typology of regions according to Eurostat 2017[2] . Slovenia and Croatia, for example, have both more population living in rural areas in respect to the population living in cities.

Currently, Rural Areas are becoming more vulnerable due to an increasing process of depopulation and aging [4]. In most of the cases, primary sector loses attractiveness for new generations, and most of the people migrate to cities. Regarding land use and urban development, the main risk is to start an urbanization process, transforming crops fields into residential areas, losing landscapes and triggering all the negative social and environmental impacts derived from sprawling.

Climate change is expected to worsen the existing vulnerability of rural areas. According to the 5th IPCC report, "*rural areas are expected to experience major impacts on water availability and supply, food security, infrastructure and agricultural incomes, including shifts in the production areas of food and non-food crops around the world (high confidence). These impacts will disproportionately affect the welfare of the poor in rural areas, such as female-headed households and those with limited access to land, modern agricultural inputs, infrastructure and education*". Such pressures are expected to generate conflicts in resource-dependent livelihoods, especially the ones concerning water.

This clearly should not be the future of rural areas. Rural Areas should be valorised for their productivity perspective and their key role in terms of resilience and adaptation to Climate Change. Even though cities would someday achieve a promising level of sustainability, they will never be able to assume primary and secondary productive sectors.

The complexity behind defining the future of Rural Areas requires redefining their paradigm according to current challenges. OECD's Rural Policy 3.0 [2] establishes as main change of paradigm the following:

-Well-being considering multiple dimensions of: economy, society and the environment;

-Low-density economies differentiated by type of rural area;

-Integrated rural development approach - spectrum of support to public sector, firms and third sector;

-Involvement of public sector - multi-level governance, private sector - for-profit firms and social enterprises, and third sector non-governmental organisations and civil society;

-Integrated approach with multiple policy demands;

-Three types of rural: within a functional urban area, close to a functional urban area, and far from a functional urban area.

The Rural Development Policy 2014-2020 is the current policy developed by EU Member States. The policy addresses to the following priorities[3] :

-Fostering knowledge transfer and innovation in agriculture, forestry and rural areas;

-Enhancing the viability and competitiveness of all types of agriculture, and promoting innovative farm technologies and sustainable forest management;

-Promoting food chain organisation, animal welfare and risk management in agriculture;

-Restoring, preserving and enhancing ecosystems related to agriculture and forestry;

-Promoting resource efficiency and supporting the shift towards a low-carbon and climate-resilient economy in the agriculture, food and forestry sectors;

[2] http://ec.europa.eu/eurostat/statistics-explained/index.php/Statistics_on_rural_areas_in_the_EU

[3] The 6 rural development priorities are broken down into 18 "focus areas" which define policy emphasis with respect to the identified needs for interventions and 3 cross-cutting objectives, namely, Innovation, Environment and Climate Change..

-Promoting social inclusion, poverty reduction and economic development in rural areas.

Figure 1. Spanish traditional rural village with cultural heritage value and cattle raising activity. Source: Cynthia Echave (2018)

The challenges for Rural Areas demand clearly a revitalization strategy, where people can find an alternative lifestyle in contrast to urban contexts and develop alternative economic sectors such as sustainable tourism, resilient agriculture, and management of protected terrestrial areas. Due to a lower critical mass, self-sufficiency and community organization should be an opportunity to establish new resources management based on renewable energies, circular economy and social cohesion.

2. Resilient Rural Model in Med Area

2.1. Principles based on ecosystemic approach

Ecosystems by definition consist of the interaction between the abiotic and biotic systems within a spatial unit. The relations among them produce processes that allow the ecosystem to achieve stability in time. Based on this concept, any human settlement can also be considered as an ecosystem, which is commonly identified as urban [8]. Currently, there are several strategies focused on cities transition, as well as several assessment tools that have been developed to quantify the level of sustainability of urban ecosystems but few initiatives are dedicated to rural ecosystems [7]. Even though sustainability principles in any human settlement should be the same, there are contextual aspects that require specific solutions for rural areas that do not apply for urban areas.

In this sense, the main difference between the urban environment and the rural environment is the critical mass (inhabitants and activities) and the productive sector that is mainly associated to it. Therefore, we can think that the principles that maintain the stability of the ecosystem over time will depend on the limiting factors in each case [7]. Figure 2 shows a scheme of the principles and their limiting factors applied to the rural context, as well as some of the strategies that could provide new opportunities to seek a more resilient rural environment.

2.2. Shaping rural revitalization through limiting factors resilience

The resilience rural model requires particular strategies different of those implemented in urban areas. In order to formulate a more precise revitalization strategy that takes into account the current situation of Rural MED areas, it is urgent to establish alternative solutions for at least the following limiting factors: land use planning, liveability & social cohesion and circular economy.

Land use planning

Territorial planning main limitations in rural areas are: critical mass, land use distribution, infrastructure and facilities provision. Regarding critical mass, it is fundamental to establish minimal density of population and activities in order to be sustainable in time. From the “sustainability” scope, that would mean to establish villages’ extension according to the availability of resources and landscape preservation. For this purpose, land use distribution requires local resources knowledge as a fundamental database. Potential of local renewable energy sources, local water sources, soil potential as agricultural or species vulnerability form part of the main information required for a

sustainable urban planning. Having a better access to information and comprehension of the territory vulnerability and potentials can provide more accurate guidelines to define land uses.

Regarding facilities provision and mobility, it is necessary to define a different strategy in respect of urban areas. Currently most of the provision is based according to density of population (small villages or municipalities) with a consequent dependence on private mobility. Alternative solutions based on collaborative models can be enhanced in rural areas. Digitalisation and connectivity become key factors for the deployment of alternative access to education, job creation and health assistance.

Liveability and social cohesion

The main limiting factors for social cohesion in rural areas are lack of mixed age groups, depopulation, meaning an elderly population, and lack of employment opportunities. In this case, population composition and potential economic activities have a key role first to create attractiveness and second, to consolidate a 21st century rural culture. For one part, as it has been remarked above, hyper-connectivity and access to internet from remote areas provide a window of opportunities to create alternative service models. But it is crucial to invest in pilot projects that help communities to consolidate themselves through entrepreneurship, new governance tools and citizen awareness.

Circular economy

Regarding circular economy, the restricting factors in rural areas are not different as in other typologies of territories. To achieve a sustainable resource management, it is necessary to have more knowledge about sustainable traceability of materials and energy fluxes through production processes. Financial schemes are also an important limiting factor, due to low critical mass and degree of isolation. Therefore, it is necessary to promote innovative business models and strategies based on green economy and rural cultural heritage as added values.

Figure 2. Ecosystemic principles and limiting factors for Rural Areas. Source: Cynthia Echave BCNecologia (2018).

3. Interreg MED Communities Contributions

3.1. Interreg MED Programme Architecture

The Interreg MED Programme is a European Transnational Cooperation Programme that gathers 13 European countries from the northern shore of the Mediterranean region. It has an architecture based on eight Thematic Communities[4] which respond to three main strategies for MED area: Innovation, Low Carbon Economy and

[4] www. interreg-med.eu

Natural & Cultural Heritage. Each Thematic Community is formed by several projects that share a common objective: working together for a sustainable growth in the region by supporting innovative concepts, practices and a reasonable use of resources. The thematic communities play a similar role to clusters, in the sense that they are grouping different projects under the same thematic in order to create synergies and networks among the members with the aim to strengthen the impact of projects results on policies and decision-making processes.

Interreg MED projects contribute to mitigation and adaptation to climate change through several kinds of approaches. From the perspective of ecology, ecosystems face constant disturbances and threats, their ability to resilience allows them to absorb and recover quickly from these disturbances without having lost their essential characteristics. The most common approach of our projects is precisely to increase the resilience capacity of our territories in order to preserve and maintain the natural resources and cultural richness that characterizes MED area.

Given the fact that Thematic Communities respond to different strategic sectors and at the same time maintain an intrinsic relationship, it is appropriate to highlight projects contributions from a cross-cutting and ecosystem approach. Regarding the involvement according to the type of territorial areas, 24% of local authorities and 21% of the total research entities involved in INTERREG MED thematic communities develop their approach in Rural Areas and Protected Areas.

Figure 3. InterregMed Projects Contributions to Climate Change. Source: MADE in MED Conference(April 2018).

3.2. Green Growth Community

The Green Growth Community is composed of 14 projects working on a variety of topics, ranging from sustainable agri-food systems, green manufacturing and waste management, to smart cities and financing of innovation for green growth. Most of the projects from the Green Growth Community deal directly or indirectly with sustainability issues in rural areas, but the most relevant contributions of these initiatives to a resilient rural model concern:

Land use planning: Sustainable agri-food systems

-MADRE project is promoting metropolitan agriculture across the Mediterranean region to foster a change process in the urban food supply model, boosting the local economy, job creation in farming, as well as the enhancement of rural-urban linkages, by using transnational working groups as main divers for this model;

-CAMARG project is proposing an online zero-km agri-food platform (eMarketplace) that supports sustainable purchasing and distribution bridging the peripheral countryside (farmlands) with the cities, promoting and provid-

ing visibility to the local food producers in the MED area;
-PEFMED project tests the applicability of the EU Product Environmental Footprint (PEF) method across the MED agri-food regional productive systems (e.g. dairy, meat, wine industry) to enhance innovation and market value.
Liveability and Social cohesion: Encouraging added value to products
-ARISTOIL project is working with olive oil producers across MED area to better stress the health properties of olive oil so as to increase the value of their product, and to improve the welfare of olive oil producers.
Circular economy:
-Enhancement of the competitiveness of rural areas economies:
-CreaInnovation project is providing non-financial support to over 70 SMEs from rural areas in order to enhance their potential in business innovation and sustainable ideas development;
-Re-Live Waste project proposes innovative technologies that transform livestock waste into organic high-value commercial fertilizers (as Struvite), contributing to the creation of new businesses and market opportunities in rural areas.
-Increase the market access of rural economies:
-EMBRACE project is establishing Med clusters (territorial clusters and 2 transnational meta-clusters) in the field of eco-innovation and resource efficiency for wine and agri-food sectors, fostering knowledge transfer in agriculture and promoting the efficient organization of the food chain and risk management.
-Improvement of the sustainability of rural economies:
-MED Greenhouses project is developing an approach of innovative Greenhouses that will support greenhouse farmers, businesses specialized in agri-food and greenhouse industry, unions of agricultural cooperatives to minimize water and energy demand, stimulate environmental awareness on issues related to energy and water efficiency and sustainable production related to greenhouses;
-REINWASTE project works on the reduction of inorganic waste, favouring the adoption of greener innovative concepts by the agriculture and food industries, with focus on SMEs across the MED area;
-GRASPINNO project has been developing tools that are helping public authorities across the MED area to purchase energy efficient solutions for their buildings.

3.3. Renewable Energy Community

RES Community is composed of 6 projects: PEGASUS, STORES, COMPOSE, PRISMI, LOCAL4GREEN and FORBIOENERGY. Rural Areas and Islands are the common territory of analysis of RES Community. Most of the contributions to a resilience rural model are related to the promotion of a new energy model based on local renewable sources and sharing management through microgrids.
Land use planning: Integration of renewable energy supply and facilities provision
The main contribution from RES Community to land use planning is in the development of several software and assessment tools that contribute to a more precise estimation of RES potential in local level.
-COMPOSE GIS tool is designed to estimate Solar Energy potential production.
-FORBIOENERGY develops assessment tools to estimate biomass potential in forest areas as a protection system.

-PRISIMI developed a software tool to analyze future scenarios of energy renewable potential according to available local sources. The software developed can help to assess sustainable land use planning and use of resources.

Liveability and Social Cohesion: Access to renewable energy as a social right
In terms of social cohesion, projects from RES Community promote bottom-up strategies to encourage the use and access to clean energy through several governance tools. These tools enable the implementation of greener energy rural policies.
-COMPOSE: The project is focused mainly on the promotion of RES in Rural Areas. The main contribution to a rural resilience is citizen awareness through the creation of learning communities and trainings for local authorities. The project is implementing 30 pilots located in MED countries were rural communities are engaged to use and

learn about using local renewable energy.
-LOCAL4GREEN: This project develops fiscal policies to incentive the use of renewable energy at the local level, assessing 66 local authorities located in rural areas and also on islands. The main contribution is how to adapt regulatory framework in order to make feasible policy implementation.

Circular economy: Sharing energy model as a disruptive business model
Regarding the contribution from RES Community to Circular Economy in rural areas, the most relevant are related to microgrids management and biomass value chain.
-PEGASUS: Promotion of prosumer communities as a disruptive business model based on services. Sharing energy management in low density areas became an economic challenge to be sustained on time. This project develops an alternative business model adapted to remote areas.
-FORBIOENERGY promotes circular economy in rural areas through a sustainable use of forest biomass as a local renewable energy source. The added value of this project is that it provides assessment tools for the life cycle analysis and situates forest management as a potential business model to prevent and protect Mediterranean Forest Areas.

3.4. Efficient Buildings Community

Regarding the approach of the 10 projects, the contributions from energy Efficient Buildings Community to a resilient rural model are the following:

Land use planning: Encouraging public facilities provision
The main contribution from the community in this regard is the development of new tools, strategies and methodologies for public buildings owners and managers. Projects are also addressing recommendations for local authorities.
-CESBA Med aims at defining a governance methodology to implement energy efficiency measures at neighbourhood scale (which is the most cost-effective scale).
-IMPULE introduces a management information support system for planning energy efficiency interventions in public buildings through testing in 6 pilot Mediterranean cities.
-PRIORITEE aims at strengthening policy-making and strategic planning competences of local and regional public authorities in the energy management of public buildings.
-SHERPA aims to test and implement a holistic and transnational approach for governance and land use planning. 100 buildings in the whole Mediterranean region have been selected for the testing phase.

Liveability and Social cohesion: Citizens and community awareness
The main contribution from the community in this regard is supporting behavioural shifts by raising capacity of owners, managers, and users of public buildings for a better use and sharing of knowledge and involvement. How is this related to social cohesion?
-EDUFOOTPRINT and TEESCHOOLS are dealing with this issue with a particular focus on schools because of their peculiar function.
-CESBA MED has created a “neighbourhood award” for sharing success-stories, exchanging, and learning from each other. The winning initiatives should improve the quality of life for inhabitants and minimize negative impacts on climate and resources, collect knowledge on urban development, and share it.

Circular Economy: Innovative financial schemes
The main contribution from the community in this regard concern the improvement of the efficiency of policy tools and energy saving plans, mainly by promoting new and innovative financial mechanisms (Energy Performance Contract - EPC). The full name of the scheme should be provided, followed by the acronym.
-ENERJ promotes strategies supporting local authorities towards the optimization of the procedure of planning the sustainable energy measures through a more efficient use of available financing possibilities for these measures.
-NEW FINANCE aims at increasing the confidence of public building owners and private investors to overcome

the barrier in financing energy efficiency measures at local and regional levels and thus accelerate new investments in energy efficiency and renewable energy resources in public buildings.
-SISMA aims at fostering the adoption of public/private innovative financing mechanisms to finance long term payback energy efficiency investments in public buildings, to be addressed to local public authorities.
-STEPPING's objective is to increase the adoption of EPC investment schemes in the elaboration of energy efficiency plans for public buildings in the Mediterranean area, raising the knowledge of the institutions in designing, implementing, and managing energy efficiency plans for public buildings.
Energy efficiency (EE) plays an important role in the de-carbonization scenarios. According to IEA (2017: 327), EE can contribute to the "Sustainable Development Scenario"[12] with the abatement of 44% of global CO2 energy-related emissions in 2040 (compared with a moderate scenario) [13]. Together with renewable energy sources, they can abate up to 80% of global energy-related CO2 emissions. Buildings were responsible for 19% of global GHG emissions in 2010 (IPCC, 2014: 678) and therefore they are a key lever to reach GHG abatements goals. Moreover, public buildings represent the perfect starting point for Energy Efficient Buildings policies, because the public sector, as required by the EE Directive EED/2012, has to lead the way, as it stands in an ideal position to play an exemplary role in this area.
Therefore, all these different projects explore and experiment specific solutions for efficient buildings that should be regarded as a complete set of systemic solutions and they should be treasured at a higher political level.
EB Community contributes to rural areas' revitalization providing tools and guidelines to achieve more efficient public buildings, especially when they have to assume multiple uses. The community's outcomes (planning and management tools, governance and financial mechanisms) include: footprint calculators, life cycle assessments, transnational collaborative e-platforms, technical guidelines and the development of blue and green infrastructures. Although urban areas are the main territory of analysis and testing for the community, all outcomes have also possibilities of being extrapolated as a methodology for rural areas and islands.

3.5. Sustainable Tourism Community

Sustainable Tourism Community is composed of 18 Projects. The contribution of projects to the three limiting factors is described below.

Land use planning: Landscape, environment and cultural heritage preservation
-BLUEMED seeks to valorise cultural and natural underwater sites. To this end, preservation protocols will be developed for the protection of the sites. Moreover, land exhibition facilities will be developed only after the careful examination of their environmental impacts. Therefore, the whole project's activities encompass the ICZM/MSP principles (Integrated Coastal Zone Management, ICZM / Maritime Surveillance P? (MSP)(Full names of those principles should be provided, followed by the acronym) principles which are vital for the sustainability of rural and coastal ecosystems.
-CO-EVOLVE develops tourism driven strategic plans for destinations. The plans are based on the ICZM/MSP principles and could be seen as a means for promoting the co-evolution of economic uses in coastal areas.
-EMBLEMATIC brings together several mountainous destinations of the Med area in order to develop alternative tourism packages that will promote a type of tourism which is labelled as "slow". The development of the itineraries is conducted with the maximum respect to the physical carrying capacity of the destinations and ecosystems, and all activities and establishments foreseen by the project are planned under the principle of the balanced spatial development of the considered areas.
-MITOMED+ supports tourism planning through the development of an indicator system. Based on the indicator system, planning on rural tourism areas could be more effective and more efficient since it will be based on robust quantitative information.
-COASTING project promotes a bottom-up and multi-stakeholder approach for developing local strategies and plans for tourism development at local level, in rural areas which respect land consumption, and take into account the environmental and social impacts.

-HERIT-DATA plans to develop a sustainable and responsible tourism management scheme in favour of cultural heritage in Med regions, in particular by taking advantage of technology and innovation in management tools (smart destinations) as well as in other policy and social measures.

Social cohesion: Bringing new job opportunities and encouraging local development

-DESTIMED seeks to improve the management of the protected areas and set them as locomotives of sustainable development of the local economies. To achieve that, local clusters are built in order to form a unique tourism product which will tap on protected areas tourism potential in order to expand local income and employment. Emblematic destinations rely on the local assets of the Med mountains in order to strengthen their visibility. Through carefully designed itineraries, adjusted to the particularities of pristine natural areas, tourism is enhanced as an alternative source of income for local populations.

-MEDCYCLETOUR seeks to promote the cycling tourism in the Med area. By capitalising on the Eurovelo route, itineraries on a large range of rural areas will be developed. This kind of tourism could help the locals to diversify their income.

-MEDFEST's aim is to compose unique culinary tourism itineraries by building on the rich and diverse heritage of the Med. Most of the project's activities are taking place in rural areas where real culinary experiences could be offered. The Medfest itineraries could support local income and extend the tourism period for rural areas.

-TOURISMED develops a pilot fishing tourism business model that seeks to bring together actors from the fisheries and leisure sectors. Fishing tourism will be an extra income for fishermen and the model will contribute to the creation of employment position infishing, leisure and other complementary sectors.

-CONSUME-LESS promotes a label to support local touristic enterprises (hotels, local producers etc) to improve their sustainability in terms of water, energy, garbage consumption and stimulate the public to use the green facilities participating in the initiative. The project could thus support local and sustainable economic initiatives.

-ALTER-ECO calculates the carrying capacity of tourist places promoting alternative routes and activities for tourists, more focused on Mediterranean identity, local activities and local typical products supporting the growth of local economies. The concept of diversification of activities for the mass tourism and the tool for calculating the carrying capacity can be also applied to rural areas (small touristic villages etc).

-INHERIT will promote sustainable tourism alleviating seasonality and tackling the surpassing of the hosting capacity, by designing and implementing a "bottom-up" protection approach relying on self-regulation and monitoring by local society and tourism stakeholders

Circular economy: Nature-based solutions improving water and waste cycle management

-CASTWATER provides the local authorities and tourism enterprises with valuable monitoring tools in order to constantly assess their water management practices. Specific guidelines have been produced in order to assist enterprises engagement in the notion of circular economy and reuse of water resources.

-BLUEISLANDS contributes with guidelines for public authorities for waste management by detecting, monitoring and measuring the impact of tourists in the generation of litter and consequent pollution of water. Even if it is focused on Mediterranean islands, the approach can be applied to remote areas.

The sustainable tourism community promotes a more efficient and effective management and planning of destinations with particular focus on rural and insular areas. This is initially achieved by the fact that near all modular projects adopt and test a multilevel approach in stakeholders' involvement and governance processes.

Moreover, the large size of a community provides the projects with the ability to exchange experiences and spot best practices among a large pool of projects with similar targets. The large size of the community guarantees the wide representation of Mediterranean, thus ensuring that management practices can be adjusted to the particularities of the different Med areas. Concluding, the improved management and planning of destinations, although tourism driven, could still be adapted to the management of other activities and thus act as a management and planning prototype for rural and insular areas.

Table 2. Interreg MED Communities contributions to Rural Revitalization

MED Community	Model objectives	Research & Development	Policies
GREEN GROWTH	Transformation of livestock waste into organic high-value commercial fertilizers Water & energy efficient greenhouses Zero-km agri-food marketplaces	62 Research entities involved 871 SME involved 7 Planning and assessment tools 40 Pilots	2 Fiscal policies 280 Local authorities involved 4 Governance tools
RENEWABLE ENERGY	Rural Microgrids management based on local RES Community Storage system improvement	8 Research entities involved 7 SME involved 25 Planning and assessment tools 56 Pilots	3 Innovative Policies 66 Local authorities involved 4 Governance tools
EFFICIENT BUILDINGS	Public Sector energy efficiency	30 Research entities involved 10 SME and LE involved 35 Planning and assessment tools 36 Pilots	384 Local authorities involved 17 Governance tools & Guidelines. Strong linkage with the EU DG Energy
SUSTAINABLE TOURISM	Smart Destinations Water Monitoring Tools	39 Research entities involved 9 SME involved 88 Instruments for enhancing the development of sustainable and responsible tourism. 177 Regions and subregions engaged in implementing sustainable tourism plans.	72 Strategies 150 Number of tourist destinations covered by a sustainable tourism evaluation tool 57 Local authorities involved

4. Conclusions

Rural revitalization in the Mediterranean counts on a policy framework and increasing network [9] at European level, with some examples and ongoing pilot projects. Even though the statistics are still calling for more effort in this sense and putting the emphasis on the vulnerability of these territories, it is necessary to encourage feasible rural development based on sustainable self-sufficiency, green economy, and social cohesion.

Even though the IPCC 5th report calls for a strong support to rural areas, a policy framework dedicated to rural areas is essential since currently climate change adaptation and mitigation regional policies do not make any specific reference to rural areas specificities, neither to their strategic role.

As it has been exposed, Interreg MED Projects through the Thematic Communities they are part of contribute to the empowerment and revitalization of MED territories from a holistic technical, ecological, and social approach, providing methodologies, models, technologies and policy recommendations to enhance the adaptation capacity of MED rural areas.

Land use planning, liveability, social cohesion and circular economy have been highlighted as key limiting factors to boost a rural revitalization strategy based on ecological and social resilience. The overall contribution of Green Growth, Renewable Energy, Efficient Building and Sustainable Tourism MED Communities for that purpose is:
-Land use planning: encouraging the developing of integral plans that ensure a sustainable use of resources in short and long term; proposing design adaptation strategies to rethink the food supply system and promote local agriculture; providing assessment strategies to estimate local renewable energy potential, facilities provision for energy sharing systems management and energy efficient public buildings; promoting forest and villages protection through a sustainable diversification of activities linked to territory added value.
-Liveability and social cohesion: encouraging local development and creation of job opportunities through green local economy development based on cultural and natural heritage preservation; providing strategies to encourage citizens and communities awareness; proposing innovative energy policies to allow equitable renewable energy access.
-Circular economy: enhancing the competitiveness of rural areas economies by increasing the market access, new sustainable business models and innovative financial schemes; providing assessment tools and strategies to promote sustainable tourism based on natural based solutions.

The next steps of our research are to analyse and systemize the results of the different projects involved in the Interreg Med Communities with the purpose to elaborate and disseminate contributions to cross-thematic policies relevant for rural revitalization promoting ecological and social resilience.
Concerning future research outside the Interreg MED thematic communities, a better knowledge of the limiting factors, both quantitative and qualitative, should help the revitalization process considering the specificities of rural areas in the Mediterranean.
European Funding programmes should put more emphasis on rural revitalization strategies that take into account the concerns of each region. At the same time, funding programmes should include multi-actor and cross-thematic approaches following the philosophy of the Horizontal projects of Interreg Med.

5. Acknowledgments

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6. References

1. UNEP/MAP (2016). Mediterranean Strategy for Sustainable Development 2016-2025. Valbonne. Plan Bleu, Regional Activity Centre. ISBN 978-92-807-3576-5.

2. Garcilazo, J.E. Rural Policy 3.0. *OECD* 2012. http://www.oecd.org/cfe/regional-policy/rural-policy-3.0.pdf

3. OECD The New Rural Paradigm: Policies and Governance. *OECD* 2006. ISBN Number: 9264023917.

4. OECD. Innovation and Modernising the Rural Economy, *OECD Rural Policy Reviews* 2014, https://doi.org/10.1787/9789264205390-en.

5. Alberti, M. Advances in Urban Ecology Integrating Humans and Ecological Processes in Urban Ecosystems. *Springer-Verlag US* 2008. ISBN 978-0-387-75509-0

6. Rueda, S. Barcelona, Mediterranean City, compact and complex: a vision of sustainable future. *Ajuntament de Barcelona*; 2002.

7. Rueda, S., De Cáceres, R., Cuchí, A., Brau, Ll. UrbanismeEcològic. *Agencia d'Ecologia Urbana de Barcelona* 2012. ISBN 978-84-615-6947-2

8. Bettini V., Alberti, M. Elementi di Ecologia Urbana *Trotta Editorial* 1998. ISBN: 978-84-8164-261-2

9. ENRD European Network for Rural Development. https://enrd.ec.europa.eu/home-page_en

10. UN Environment/MAP – United Nations Environment Programme – Mediterranean Action Plan Secretariat

to the Barcelona Convention. Regional Climate Change Adaptation Framework for the Mediterranean Marine and Coastal Areas. https://wedocs.unep.org/bitstream/handle/20.500.11822/17500/rccaf_eng.pdf?sequence=1&isAllowed=y

11. IPCC. Fifth Assessment Report (AR5). https://www.ipcc.ch/report/ar5/

12. The “Sustainable Development Scenario” is based on the assumption that energy policies will change significantly to achieve universal energy access, Paris Agreement’s objectives and air-quality improvement.

13. The “New policies scenario” is the central scenario of the World Energy Outlook 2017. It “aims to provide a sense of where today’s policy ambitions seem likely to take the energy sector” (IEA, 2017: 37).