Interreg CENTRAL EUROPE

Co-funded by the European Union

PoLaRecCE

Protocol of stakeholders and end-users needs and report on potential of the local market

Identification of the main problems related to the degraded agricultural land in the CE regions

Interreg CENTRAL EUROPE

Co-funded by the European Union

PoLaRecCE

Authors

Bruno Ćaleta, Vladimir Kušan, Medeja Pistotnik, Ivona Žiža,

1.Introduction

1.1. Objectives

The following report serves as a presentation of the efforts of the project team to understand the specifics of local markets including the local needs in order to provide relevant inputs to assess the feasibility of the action measures funded through Interreg PoLaRecCE project. The aim of the report is to present the locations where the actions are to be taken, present the identified local needs, discuss the needs in relation to the economic situation on the ground, and finally present the assessment of the local market addressing the identified needs.

1.2. Scope

It should be noted that the main output of this report is the pre-feasibility study, which aims to inform the local decision makers on the current economic feasibility of the preferred action in scope of the PoLaRecCE project. Considering that not all actions are fully decided upon, it is a good time to perform this study, as the final selection of the action and the subsequent full feasibility study can be adjusted to fit the findings of this report better. The methodology or work is based on amalgamation of direct observation methods, interviews with the municipalities (who also represent the interests of the local farmers), as well as desktop research to identify key market dynamics of the local reality.

1.3. Relations to other documents

A short description of how this document relates to other documents developed within the project. In the PoLaRecCE project, this Deliverable 1.5.1 is linked to Activity 1.5, which focuses on the consultation with municipality partner's and/or local farmer to better understand the end-users and stakeholder needs together with survey of the local market. The report is structured around selected locations, where each location is treated differently, and methodology is applied to each location separately.

1.4. Intended Audience

This document is intended for local and regional administration, advisors and policymakers involved in soil management, farmers and land owners.

1.5. Usage guidelines

As a training material for end-users, this document has been written in an easy-to-understand language, supported by explanatory schemes. However, proper references are provided to allow those interested to further explore the topic.

2.Overview of project locations

2.1.CAIRO MONTENOTTE municipality, Italy

2.1.1. Presentation of the project area

The project area is located in Cairo Montenotte municipality (Marked in dark green on the map to the left), which is located in the province of Savona in Liguria region, marked with light green. The total area of the municipality is around 99,5 km^2 with the project area being around 0,002 km^2 in total.

The municipality is prominently industrial with the presence of paint industry and other hard industries as well (manufacturing, bigger industrial goods, automotive, and similar). The project area is the site of the former paint plant, with currently unknown levels of pollution, which is to be investigated within the scope of this project. The area around the project area is going to serve as a company park area, aiming to provide space for startups and other companies from the municipality to be housed there.

The area has a relatively older age structure, where the most populous age group is between 50 and 65 years. Furthermore, the municipality follows closely with the trend of lower fertility observed in Italy, indicating that the demographic structure is expected to get older in the coming years. Education level is assessed as sufficient to support the needs of the pilot project.

The location is well connected with main traffic patterns including being close to highway and rail.

2.1.2. Presentation of identified needs

The main needs of the municipality have been utilisation and revitalisation of the degraded area within the municipality. Considering that the municipality has a significant history of industrial operations, and the municipality has outlined that the area in question is degraded by this industrial activity. It is however unknown the degree to which this degradation occurred, however it is significant enough so that any agricultural production for food is impossible. Hence the municipality decided to utilise the general area as the technological and company park.

In addition to this, the municipality has intended to avail of the booming flower market in Liguria, more is presented in the next subchapter. To this end they have identified a need for a pilot project of creating the production of industrial flowers in the degraded area. This would utilise the land without the direct need to rezone the area, and assist with the revitalisation of the area.

The municipality has also expressed a need to provide employment opportunities for the younger population, as well as entrepreneurship opportunities. Hence the pilot is performed within the scope of PoLaRecCE to estimate the opportunity for the younger population to engage in industrial flower farming in the municipality.

The municipality has selected Peony and Hydrangeas due to their connection to the local market as well as the suitability of the land and the climate for the production of these flowers.

2.1.3.Assessment of the local market (pre-feasibility study)

Liguria stands as Italy's leader in flower production, with the region accounting for 437 million or 30% of the national output. This is mostly due to the favourable Mediterranean climate and the established horticultural infrastructure that supports the production. This industry has a significant history in flower production, with markets going back to the pre-renaissance periods.

This industry boasts an impressing 11,7% annual growth rate in the past 5 years, which is owning also to the good connections to the export facilities, including Mercato Florovivaistico in Genova, as well as the presence of the Port of Genova, which is one of the busiest ports in Italy, and a historic trading city. All in all the selected action is set to avail of a range of enablers in the region, increasing the likelihood of the potential success of the action.

Looking at the Peony and Hydrangeas market, Liguria is identified as particularly suitable for their cultivation, due to its versatility and the adaptability to the local environments. Furthermore the microclimate, presence of warm sea air, as well as cold mountain air, represents a good mix of conditions that suit the flowers very much.

We should also take into account the seasonality of demand. Considering the higher temperatures of the coastal Liguria, reports suggest that the flowers tend to bloom early, while the main demand is in the summer/early autumn. Essentially, considering the location of Cairo Montenotte and the mix of the conditions explained, it makes it possible to extend the flowering season of the Peony, enabling the producers to enter the market when the prices are generally higher.

Italy's Peony market is valued at 13,3 million in 2024 with a projected annual growth rate of 1,9% over the coming 5 years. The lower rate of growth reflects the market maturity and the pressures from the international producers, however considering the later blooming periods, the municipality could avail of the market in a greater degree than other producers in Italy.

The distribution networks and the supply chains operate through a sophisticated network of production, processing, and distribution facilities. Liguria is directly part of regional Italian, wider European as well as worldwide markets, due to good connections by road, rail and sea. Liguria is also a leader in outdoor flower cultivation in Italy, the specialisation that creates integrated supply networks that avail of economies of scale.

The Government has recognised these realities and tends to support the production of flowers through the EU and national funds. Additionally, the region has strong commitment to the research and innovation, with programmes directly tailored to develop protocols for extending cultivation calendars and improving post-harvest characteristics.

In terms of regulatory concerns we see no major obstacles as the flower production would not require additional regulation from the municipality.

All in all, we see that the planned action has passed the pre-feasibility assessment, and demonstrated that the market for the products exists. In the subsequent step a full economic feasibility assessment should be performed to plan out the business plan and determine the key financial and non-financial expectations, goals and KPIs needed to be monitored.

2.2.GYOMAENDRŐD municipality, Hungary

2.2.1.Presentation of the project area

The project area is located in Gyomaendrőd municipality (Marked in dark green on the map to the left), which is located in south eastern Bekes country (marked in light green). The total area of the municipality is around 303,9 km^2 with the project areas, consisting of two separate areas, being around 0,005 km^2 in total. Considering the small nature of the project area, it is in essence obvious that any interventions in this project will serve as a pilot for the larger municipality.

The municipality is mostly agricultural and forestry land, with compacted and heavy soil. The population of the area is around 12k people, with slightly ageing population structure, and average education.

The location is well connected with main traffic patterns including being close to highway, rail, river, and road connections. The location is also close to Bekes airport, a small regional airfield, as well as relatively close to main hub Budapest.

2.2.2. Presentation of identified needs

According to the survey and the discussions with the municipality representative after the survey, the main identified need in the area is better utilisation of the soil, which is currently plagued with overuse. According to local reports, Hungary did not have well planned out soil management, which resulted in over-farming and hurting the general fertility of the soil. Additionally, the country in the past has observed deforestation, as the soil is being used more and more for agriculture, which reduces the amount of forests in the area. Both identified issues have been the initial motivation of the municipality to join the PoLaRecCE project.

In addition to the above, according to the performed discussions, the municipality is also noted for emigration due to changing economic conditions. This, coupled with an ageing population, means that there are less and less people to dedicate to traditional farming, which is inherently a labour intensive process.

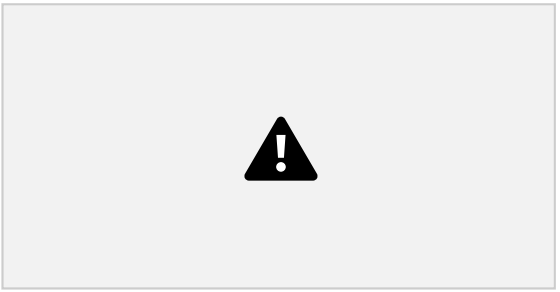
When we look at the needs further we see that the country is undergoing a transition from fossil fuels to a more sustainable energy mix, with biomass, solar, and wind being the primary choices for increasing renewable share. To this end, the municipality has expressed the need to include wood biomass as the potential source of renewable energy, while also expressing concerns by the fact that a good portion of the locally consumed biomass has to be imported from abroad, raising prices. Especially considering that protecting forests is one of the key priorities of EU green policy, and the fact that the needs discussed above can also be addressed through dedicated production of wood biomass.

Hence the municipality has selected this as their pilot for the PoLaRecCE project, also due to the fact that some pollution present in the land can be treated with replanting forests in the area. Additionally, growing trees is a less farming intensive process, which would give a rest to the soil, while it is also less labour intensive process, addressing the labour shortages above.

2.2.3. Assessment of the local market (pre-feasibility study)

Taking into account the anticipated action of exploring pilot biomass wood plantations, it is necessary to examine this market to assess the potential of this action before assessing feasibility.

According to the Eurostat data around 23% of Hungary's territory is covered by forest, with the gross value of the sector being around 327 million EUR in 2022 (up from 238,5 in 2020 representing a 37% increase). This increase showcases that the country has recognised this opportunity and is investing into the segment. However, the segment still represents only 6% of the total gross value added of the bio-based primary sector, which is dominated by crop and animal production. Hence, we also see here the dominance of the farming segment, which has led to the identified need of soil overuse in the pilot location.



Furthermore, we also see that the majority of the spices grown in Hungary are already dedicated to fuelwood, with it holding 54% of all species. This suggests that the market has the right characteristics to support the intended actions in the project.

Looking at the market dynamics, the reports from the local sources in the Bekes area indicate that there is a stable and consistently growing demand for firewood. Reports also indicate that the current local production cannot meet the demand, as it is also outlined by the interview with the local community. This would indicate market potential, wood biomass is a very logistic intensive process as the wood has to be moved in heavy trucks, requiring multiple trips. Hence it is always preferable to utilise local production, as the costs of logistics are lower compared to national or international supply.

We also need to take into account the seasonality of supply, as the trees need time to grow before they are harvested. This means that increasing the amount of wood plantations would not immediately increase the supply of firewood, which means that we can expect the current market dynamics of prices and demand to remain stable in the future.

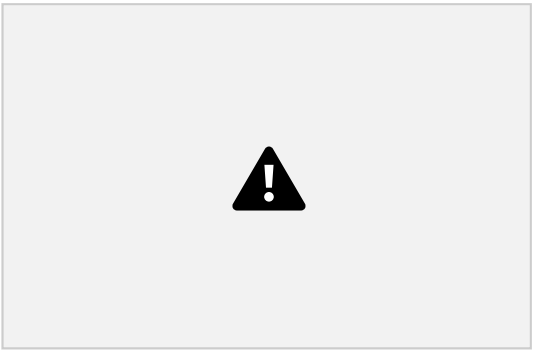
Looking at the accessibility of market and regulatory concerns, we see no major issues here, as the land where the plantations would be set up are zoned for agriculture, which includes tree growing as well. Additionally, we see the presence of large-scale buyers such as DALERD Délalföldi Erdészeti Zrt, a local forestry management company, which also serves as a principal buyer and seller of firewood. On the other hand, there are little to no constraints of municipalities setting up their own sales channels or utilising firewood as a social transfer, given to the people in need.

If we also take into account that biomass is one of Hungary's priorities for renewable transition, we can also expect this demand to grow. The National Energy and Climate plan targets 21% renewable energy by 2030, and the same plan estimates that biomass energy production will increase by 28% by 2030. Essentially, we see no risks of market upsets unless a great portion of the available land is transferred to the wood plantations, which is also not the plan of the municipality nor is it suggested in this project.

All in all, we see that the planned action has passed the pre-feasibility assessment, and demonstrated that the market for the products exists. In the subsequent step a full economic feasibility assessment should be performed to plan out the business plan and determine the key financial and non-financial expectations, goals and KPIs needed to be monitored.

2.3. ORMOŽ municipality, Slovenia

2.3.1. Presentation of the project area



The project area is located in Ormož municipality (Marked in dark green on the map to the left), which is located in the North Eastern part of Slovenia. The total area of the municipality is around 141,6 km^2 with the project area being around 0,039 km^2 in total. It is a specific aim of the municipality and project partners to utilise this area as a pilot with potential to expand production in the future, if proven feasible. The specifics of this project area is that the action is driven by the collaboration between the municipality and the local Re-Use Centre (slo. Center Ponovne Uporabe), which is a company that recycles and reuses products, promoting circular economy practices.

The municipality is mostly agricultural with some industry production (mainly sugar) in the past, within the city itself there are some degraded areas due to the industrial activity. One of these areas is the project area that was the clay pit in the past, and is now underutilised.

The location is relatively well connected, with access to road and rail, as well as close access to the Croatian/Slovenian border.

2.3.2. Presentation of identified needs

Based on the discussions with the municipality the main identified need within this project is to revitalise the locations, which were degraded through industrial use. The municipality has had some previous pilot projects for the revitalisation, and has hence now decided to participate in this project to continue with the pilots.

The main issue in the municipality is not directly land pollution, or rather it is not clear to them if the land is polluted through industrial use, which is also something that they would like to verify through the scope of the project. If the land is proven to be polluted the municipality could then tailor future planning to this reality.

On the other hand, the municipality has a degree of degraded land, which is currently mainly zoned as agricultural land, and it is very hard to change the zoning, as the regulation in Slovenia does not allow easy transfer between agricultural and other types of land. Hence the municipality has the need to find the use for this land, as it is not easily farmable for food production.

In addition the municipality of Ormož is ranked below average in economic income in Slovenia, so it is their need to identify the use for the land that would, on one side prevent further degradation of the land, while also enabling utilisation of the land in order to generate economic benefit for the municipality.

For the reasons stated above the municipality has partnered with Re-Use Centre in order to identify the use for the land as a pilot site for the production of White Mulberry that is used as a feed for the silkworms for the production of high quality silk. The subsequent assessment is looking at the feasibility of growing White Mulberry trees in Ormož municipality, as well as the specifics of the silk market in Central and Eastern Europe.

2.3.3. Assessment of the local market (pre-feasibility study)

White Mulberry for silk production is not a completely new thing in Slovenia, with several active plantations during the Austro-Hungarian Empire that produced silk in Slovenia. However, within the last century the production of silk and White Mulberry has been almost extinguished, with some recent revival projects across the country. It should be also noted that Slovenia has an indigenous subspecies of White Mulberry, which is assessed to be very suitable for the production of the silk.

The efforts to revive this industry branch have been in the pilot process, however they are showing promise in Slovenia. The municipality of Ormož is especially suitable for production of White Mulberry due to warm summers and good average temperatures for production, as well as sufficient rainfall.

Looking at the market characteristics, the silk market in the EU is significantly dependent on Asian silk imports, with about 113,2 million EUR annual imports, 90% of which come from China. On the other hand, Italy dominates the EU silk processing with around 292 million EUR exports in 2023, with other EU states also having significant silk production processes as well.

Considering the recent economic developments and trade tensions, it is EU priority to diversify supply chains, hence encouraging local EU production of silk is directly in line with this priority. Furthermore, it is EU policy to enable tracible sustainable production for raw materials including silk, which in itself operates in a premium market, further increasing economic potential of the segment.

Slovenia is in the right spot to capitalise on the abovementioned market conditions, as it can provide original Mulberry subspecies that can outperform commercial varieties, while capitalising on their role as integral member of the EU to avail of the market access. Furthermore, providing high-quality raw materials relatively close to the producers in Italy, other neighbouring countries, and with access to Danube river logistics corridors, limits the cost of logistics, enabling competition also on price.

Considering that the municipality of Ormož is already partnering with the commercial partner Re-Use Centre, which will handle the production and logistics, it is limiting the risks for the municipalities and the costs of setting up production capacities themselves. Within the scope of full feasibility study and analysis together with the Re-Use Centre will be performed in order to understand economic viability of the project.

On the other hand, the project could benefit from other EU and Slovenian national funding to further support innovative solutions in Slovenia, further boosting the feasibility of the solution.

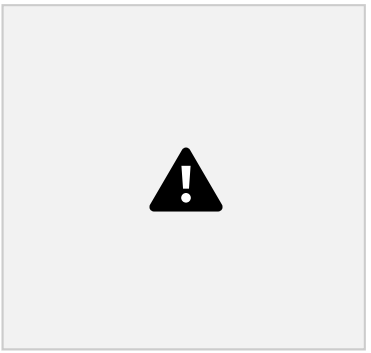
Additionally, considering that the Ormož municipality is mainly an agriculture municipality, the production of White Mulberry and silk enables transformation of the production into high value agriculture, which should grow the economic base of the municipality. This can provide positive externality for the municipality residents, without causing additional soil degradation, or other negative impacts. Furthermore, the population of the municipality is also highly skilled in agriculture already, hence little to no adaptation to the project is required.

All in all, we see that the planned action has passed the pre-feasibility assessment, and demonstrated that the market for the products exists. In the subsequent step a full economic feasibility assessment should be performed to plan out the business plan and determine the key financial and non-financial expectations, goals and KPIs needed to be monitored.

2.4. SKAWINA municipality, Poland

2.4.1.Presentation of the project area

The project area is located in Skawina municipality (Marked in dark green on the map to the left), which is located in Lesser-Poland Voivodeship in the southern part of Poland. The total area of the municipality is around 100,15 km^2 with the project area being around 0,008 km^2 in total.



The municipality is mostly agricultural with some industry production, which has caused so far unknown pollution. While the municipality is aware that the pollution exists they are unaware of the extent of the polluted lands and the degree of pollution within the municipality. The pollution is mainly expected to be caused by industrial use and coal burning, which is still performed in the municipality. Unlike other project areas the Skawina municipality has not yet decided fully what they will do with the land, as the main point of the assessment within the PoLaRecCE project is to determine the degree of pollution and propose the best solutions for the land.

The location is relatively well connected, with access to road and rail, as well as very close to the major airport in Krakow.

2.4.2. Presentation of identified needs

Based on the survey and the discussions with the municipality we see that the primary identified need is to determine the degree of pollution present in the soil. The municipality is aware of some studies identifying florine in groundwater and surface water, however the degree to which this penetrates into the soil, and the fact whether this is the only source of pollution is still unknown.

Additionally, Skawina municipality owns several small plots that are currently zoned as agricultural land, one of them is part of the PoLaRecCE project. The need of the municipality is to identify the potential uses of the land that will, on one hand, treat the issue of soil pollution, and on the other hand provide a productive use of the land.

To this end at present the municipality is still exploring options of the land use, which will be further explored in the subsequent project steps. Here we are presenting the potential solutions, mainly utilisation of the land as Christmas tree plantations, using the land for biomass plantation, or creating the park area from the locations. The solutions are briefly discussed in terms of market potential and the uses, while the full feasibility study will be performed after the selection is made.

2.4.3. Assessment of the local market (pre-feasibility study)

Taking into account all proposed options, we will examine the Christmas trees plantation, wood biomass plantation, and park area proposal.

The Christmas tree market in Poland is a significant economic sector that combines traditional agriculture with modern markets through both domestic sales and international exports. Poland accounts for approximately 10% of the total European sales of Christmas trees, with significant export performance reaching around 9,6 million EUR in 2023.

The market operates through the network of specialised plantations primarily located in regions with favourable growing conditions in the northern and western provinces. Plantations usually require 8-12

years to bring trees to market size, hence requiring long-term planning and significant capital investments. The market is operating on both direct-to-consumer sales channels and wholesale distributors, which can subsequently operate on more regional or international markets. The markets require significant logistical efforts, as the trees require heavy-duty transfers, while on the other hand the handling has to be careful, as the look of the tree subsequently determines the price.

Overall, considering the location of the municipality, coupled with small land size, significant capital requirements, and long time to revenue the feasibility of the action at present is somewhat diminished. However, we need to examine in details the specifics of the business to determine the full feasibility of the proposed action.

The biomass market represents a critical component of Poland's renewable energy strategy, accounting for 25% of the renewable energy production and 7% of the total mix. Poland is also Europe's third largest producer of wood pellets behind Germany and France. The production of wood biomass has grown significantly over the past decade driven by the EU renewable energy targets, and the demand for coal alternatives. The country is seen as a net exporter of biomass with main markets being Denmark and Germany.

Poland has extensive forest resources, which cover around 28% of the land area and are managed largely by the State Forests Enterprise, which is in charge of harvesting timber. The company harvests around 20,5 million tonnes of timber annually, however recent reports have indicated potential bottlenecks in the supply chain. This is mostly due to inefficient logistics, which reduce the amount of recoverable biomass, indicating gaps in collection and distribution.

In terms of production and logistics feasibility the similar factors as explained in the case of Gyomaendrőd municipality exist, as the locations are somewhat similar in nature when concerning growing fuel-oriented trees.

Considering the regulatory feasibility, this would have to be explored in greater details in the full feasibility as the presence of a single forestry company in charge of timber harvesting could pose potential hurdles that the business would have to overcome.

All in all, the feasibility of the wood biomass production is proven in case Gyomaendrőd, which can be also replicated in the case of Skawina municipality, however deeper study is needed.

Considering the feasibility of a municipal park area, the market considerations are almost non-existing as it is unlikely the park would cause any economic value, and it would represent solely social and wellbeing value in the municipality. Hence it is considered as inherently feasible, however in subsequent study a question of the most optimal use of land would be posed, as this solution, despite its feasibility, might not provide the highest overall value to the municipality.

3. Conclusion

This pre-feasibility exercise confirms that each pilot location has a credible pathway from degraded or under-utilised land to productive non-food agriculture, which is aligned with municipal priorities and relevant market dynamics. Common threads include: (i) the drive to revitalise sites affected by historic industrial activity or soil overuse, (ii) realistic access to markets and logistics, and (iii) limited regulatory barriers at the pilot scale, provided pollution risks are properly characterised and managed. The next stage should translate these findings into clear business cases based on selected remediation measures, implementation plans, and measurable KPIs.

In Cairo Montenotte (Italy), industrial flower cultivation (peony and hydrangea) leverages Liguria's established floriculture ecosystem, export infrastructure and the microclimatic opportunity to extend flowering into higher-price windows. Coupled with the municipality's company-park vision, the pilot can catalyse youth employment and entrepreneurship. The full feasibility should address contamination due diligence, controlled-environment options where needed, phased planting, and firmed route-to-market partnerships.

In Gyomaendrőd (Hungary), dedicated wood-biomass plantations directly respond to soil exhaustion, labour constraints, and persistent local demand for fuelwood. The concept fits national renewable-energy objectives and benefits from proximity to buyers, but requires patient capital, a staggered rotation strategy, and logistics planning. The feasibility phase should fix species/rotation choices, contracting models (including offtake with regional forestry actors), and social uses (e.g., energy-poverty alleviation) alongside financial returns.

In Ormož (Slovenia), White Mulberry for sericulture reconnects with regional heritage while addressing degraded land constraints and zoning rigidity. The collaboration with the Re-Use Centre de-risks operations and positions the pilot within premium, traceable EU value chains, particularly given proximity to Italian processors. The next step should validate agronomic performance of indigenous subspecies, refine husbandry and harvesting protocols, and structure contracts and certification to unlock higher-value outlets.

In Skawina (Poland), the immediate priority is robust soil investigation to bound risk and inform the land-use choice between Christmas trees, biomass, or social park. Early evidence suggests biomass could replicate the Hungarian logic, whereas Christmas trees imply longer time-to-revenue and higher handling risk; a park would maximise wellbeing rather than cash returns. A simple, criteria-based decision matrix—market potential, capex/opex profile, time to impact, environmental co-benefits—should guide selection followed by full feasibility in the same way as with other sites.

Across all sites, we recommend: (1) full feasibility studies with sensitivity analyses and bankable delivery plans; (2) explicit KPI frameworks (soil recovery metrics, jobs created, yield/ha, price realisation, and community benefits); (3) proactive funding strategies combining Interreg, EU/national schemes and private co-financing; and (4) structured stakeholder engagement and skills support to anchor benefits locally. Taken together, these pilots are practical, investable steps towards economic renewal with tangible environmental gains.