C3. Socioeconomic Impact Assessment

LIFE16 ENV/ES/000159

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[Socioeconomic Impact Assessment]

[Marzo 2022]

x	External	x	Informative	x	Technical		Others

	Internal	x	Monitoring		Financial		

This project has been funded with support from the European Commission.
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Content

ABSTRACT

This study has assessed the impact of the LIFE TECMINE project on the sectors involved, such as the population, the administration and the private sector (mining companies, technicians and the scientific community), in relation to social, economic and environmental aspects. In order to carry out this study, the impacts that the project generate in the implementation and dissemination actions were identified and the indicators that respond to these impacts were defined. Furthermore, the effects of the different social, economic and environmental impacts were estimated and evaluated.

The project has managed to change the perception of mining restoration by the local population and professionals in the sector, as greater stability of the land and greater vegetation cover have been achieved in much shorter period of time than with traditional restoration.

Another key aspect of the project has been the collaboration between a private company, the administration and researchers, which has opened the door to greater cooperation between the actors involved in mining restoration. As a result of this cooperation, a network has been created with more than 120 members from private companies, universities, research centres and public administrations.

The development of a European project in the area has been highly appreciated by the local population, as it gives territorial relevance to an area very affected by the phenomenon of rural depopulation.

INTRODUCTION

SCOPE OF THE DOCUMENT

The main objective of this report is to explain the procedure followed to measure the performance indicators related to socioeconomic impact, of which VAERSA team is responsible for.

These indicators reflect the pre-restoration situation. The main is to assess and, if possible, to quantify, the impact positive or negative in the socioeconomic context of the area and the sectors involved.

A comparison between the baseline and the final assessment will profile a full scenario of the project's impact and the indicators performance.

STRUCTURE OF THE DOCUMENT

First of all, the document includes the general and specific objectives of the action. Then, the description of the baseline scenario is shown. After that, the methodology followed to estimate de Impact Assessment is explained. The Evaluation and Results sections show the values obtained, which are referred to the pre-restoration situation, and finally, conclusions and further considerations section includes the measurement work of the Performance indicators during the project.

The structure of the document is:

- General and specific objectives of the action
- TECMINE´s socioeconomic context
- TECMINE´s stakeholders groups
- Methodology
    - Impact Generating Activities
    - Identification of Impacts
    - Impact Assessment methodology
- Conclusions and further consideration
- References
- Annexes
        - Annex I. TECMINE´s socioeconomic context
        - Annex II. TECMINE'S stakeholders group

- Annex III. Impacts and results matrix
- Annex IV. Surveys Results

GENERAL AND SPECIFIC OBJECTIVES OF THE ACTION

The general objective of the Socioeconomic Impact Assessment (SEIA) included in the C3 Monitoring action is the evaluation of the social, environmental and economic impacts generated by TECMINE project.

The specific objectives established in this evaluation are the following:

- Understanding of the impacts derived from the development of the project
- Estimation and evaluation of the effects of the different impacts in the social, economic and environmental areas

TECMINE´s SOCIOECONOMIC CONTEXT

The project is located in the province of Valencia, region of Rincon de Ademuz and municipality of Ademuz. This region is located between the communities of Aragon and Castilla La Mancha. Although Ademuz is administratively linked to the Valencian Community, territorially, geographically and culturally it is closer to Aragon. It is distant from Valencia and its provincial capital 146 km and only 44 km from Teruel and 114 km from Cuenca.

The closest population centre to the project area is the municipality of Riodeva (province of Teruel, Autonomous Community of Aragon).

The area of influence of the TECMINE project is a predominantly rural area in which the exodus of population persists towards the nearby large centres.

The following is a general description of the project area at three levels; social, economic and environmental. However, in Annex I (Baseline scenario), an exhaustive description is made.

As for the social situation, the population of Rincón de Ademuz shows a clear regression. And the bulk of the population resides in the municipality of Ademuz. If we talk about the structure of the population there is an ageing of the population, with a minimum birth rate and a negative vegetative growth.

In relation to the level of studies about 13% of the population has no studies and 2% is illiterate.

The economic situation is very different among the municipalities of Rincón de Ademuz, mainly because to budget availability and economic activity. Due to the greater population size and administrative importance, Ademuz has the largest number of companies and establishments.

Both the activity rate and the employment rate are higher in men than in women. And the unemployment rate is around 15.5%, which is also higher in women than in men.

There is a difference in municipal budgets between the localities under study. The municipality of Ademuz, despite having a larger population size, managing more services and housing more population, has a per capita budget much lower in relation to Puebla de San Miguel or Riodeva

If we talk about the environmental situation, we must bear in mind that 80% of the territory corresponds to forest areas, with natural vegetation and open spaces, 19% of the territory is agricultural and artificial surfaces, urban centre and their surroundings are concentrated in urban nuclei and have little representation.

Next to the project area is the Puebla de San Miguel Natural Park. There are 2 Sites of Community Importance (SCI) and a Special Protection Area (SPA). In addition, there are two Municipal Natural Sites.

For further information see **Annex I. TECMINE´S SOCIOECONOMIC CONTEXT**.

TECMINE´S STAKEHOLDERS GROUPS

In terms of the stakeholders groups, three large groups have been identified either by the role they play in the development of the project or by the impact they receive from it. These groups are: population, administration and private sector and research.

The population group includes the local population and the interested public. The local population will benefit most from the environmental services derived from the restoration, the stabilization of the land and the installation of new ecosystems.

The group of Public Administrations refers to both Autonomous and State Administrations, as both are responsible for developing policies that integrate mining activity, forest management and the environment conservation. The Administration will also benefit from the training activities provided by the LIFE TECMINE project and the results, as it will generate tools to evaluate restoration projects, as well as greater knowledge of new techniques and whether these report more efficient results.

The last group refers to the private sector and research. The private sector related to mining operations and its restoration including; mining companies, consultancies, forestry and mining engineering, industry and mining associations, professional associations. And, the scientific sector regards to universities, research centres, environmental and industrial agencies that work on forest restoration related fields.

For further information see **Annex II. TECMINE'S STAKEHOLDERS GROUP.**

METHODOLOGY

Socioeconomic Impact Assessment (SEIA) is a systematic analysis to identify and evaluate potential social, economic and environmental impacts.

To carry out the study, 3 main stages have been followed which this document consist on:

1) Firstly, activities of the project that generate impacts are describe with special mention to the causes and consequences of those impacts.

2) Next, the description of the impacts including the suitable indicators are provided.

3) Finally, the assessment of the impacts is included by comparing the baseline scenario and the scenario at the end of the project.

1) ACTIVITIES GENERATING IMPACT

The activities that has generated impacts identified in the TECMINE project are:

- A1. Local activities/events
- A2. Visits to the project area
- A3. Restoration works
- A4. New interpretative path
- A5. Communications and disseminations events at national and international level
- A6. Social network
- A7. Raise awareness in academic communities

The activities are described below.

A1. LOCAL ACTIVITIES/EVENTS

The TECMINE project includes a set of activities at local level with the goal of disseminating project's purpose, actions and results as well as to involve local stakeholders in the project. These activities have a positive impact on the area´s socio-economy related to an increase in activity as well as a potential increase in the area for tourism.

These activities imply the participation and collaboration of local stakeholders to better select the most interest talk and gather local demands related to this kind of project. Besides, our presence in the local events has allowed local population to know about the mine area and the project. Most of people were not aware about this before. With this, it is expected to increase the feeling of territorial relevance and increase awareness with respect to the mining activity, the natural resources affected and the restoration process.

Activities that have taken place are:

- Project presentations. One of them at the beginning of the project (June 2018) at the Ademuz City Council, before starting the works. Another at the Rincon de Ademuz (July 2019) having already finished the works.

Photo 1. Project presentation in Ademuz.

Photo 2. Presentation at the Summer University in Ademuz.

- Presence in the local festivities and activities. A stand has been placed with information about the TECMINE. We took advantage of the summer festivities because in this the period, the number of people is much higher than during the rest of the year.

Photo 3. Craft fair (Casas Bajas).

Photo 4. Apple party fair (Ademuz).

Photo 5. Cycling day (Riodeva).

- Organizing 4 thematic talks about botany, mining, wetlands and ornithology with the collaboration of a council and other local stakeholders. Talks took place in Riodeva (Teruel) and then people visited the TECMINE itinerary.

Photo 6. Mining talk.

Photo 7. Ornithology talk.

Photo 8. Botany talk.

Photo 9. Wetlannds talk

- Presence in activities related to environmental days for increasing awareness (at local and regional level) such as two open door days, geolo and paleo day and world wetlands day.

Photo 10. 1st Open door day

Photo 12. 2nd Open door day.

Photo 11 Geolo Day.

Photo 13. Fair of the regions.

Photo 14. World wetlands.

Photo 15. Tree planting day.

A2. VISITS TO THE PROJECT AREA

As a result of the activities described in the Communication Plan and the contacts generated during the development of the project, visits have been made to make the project known and reach as many people as possible of identified groups (population, companies, research and administrations).

These activities have a positive impact on the socioeconomics of the area related to increased activity (mainly hotel and catering industry). It wants to give visibility, influence the dynamiza-

tion of the territory and as a result generate a possible increase in tourism in the area. In addition, experts, professionals and students regarding mining and forest restoration fields have visited the project area to better understand and learn about the implemented project techniques and the results. This encourage transferability and capacity building that at the end, guarantee the impact of the project at long term.

Different approaches for different target audience are considered:

- Mining companies, forestry and mining consulting companies, associations, public administration; science community related to ecological restoration. Of this group seven visits have taken place.

- Local population, companies and associations, NGO's focused on environmental protection and conservation and general public sensitized of environmental problems. Six visits have taken place in this group.

Photo 16. Master in Ecosystem Restoration Complutense University of Madrid.

Photo 17. Swiss mining company (LKAB).

Photo 18. Professional College of East South Mine Technical Engineers.

Photo 19. Course: New technologies applied to forest restoration.

A3. RESTORATION WORKS

A series of positive and negative social and environmental impacts occur during restoration work.

The negative environmental impacts originate during the executions of the works, consequence of the use of the machinery. Impacts such as noise pollution, air pollution (CO_2 emissions and other polluting gases) as well as the generation of waste during the work.

In return, there are positive environmental impacts that largely offset the negative impacts generated. The carbon stock increases due to sequestration by plants and soil, increases the restored area, increases the biodiversity and reduces the risk of flooding and erosion (for further information see the Life Cycle Assessment of the project).

In order to carry out the restoration work, a series of technical actions have been developed:

- **Morphology restoration** by the implementation of different techniques such as GeoFluv™, with focus on identifying and replicating a reference scenario and managing water flows in order to reduce erosion.

Photo 20. Remodeling supervision.

Photo 21. GeoFluv model construction.

- **Rock slopes landscape integration** by techniques based on identifying instabilities and acting on them to eliminate long-term risks by seeking the geotechnical stability of the strata.

Photo 22. Organic blanket placement.

Photo 23. Rought and loose technical.

- **New top soil creation:** by mixing the material available in the mine (i.e. sand, clay and colluvium) and adding organic matter.

Photo 24. Storage of organic matter and biomass.

Photo 25. Application of the colluvion.

- **Site preparation** for plants by new Microcatchment to maximize water availability for plants which is the main limiting factor in ecological restoration in Mediterranean region.

Photo 26. Technique Microcatchment.

Photo 27. Vegetable strings.

- **Plantation** of 9.000 plants of 32 different species and creation of 8 new habitat types (3 priority habitats: 9530, 9560 and 6220)

Photo 28. Acclimatization of the plants in the nursery.

Photo 29. Plantation.

A4. NEW INTERPRETATIVE PATH

As part of the activities described in the Communication Plan of the project, an interpretative path has been built. This route of easy access has a distance of 1.500 meters and 6 interpretative panels; the details of this innovative European project are explained in an easy way.

In addition, the interpretive route connects with another path within the Natural Park Puebla de San Miguel, a geological itinerary which shows us the geology of the area.

This path has a positive impact on the socioeconomy of the area related to increased accessibility. It can influence the dynamization of the territory and as a result, generate a possible increase in tourism in the area. Besides, the route and the panels has a relevant value to support educational and research activities.

The interpretative route has been published in the following media wikiloc and it's also possible to follow the path virtually via google maps.

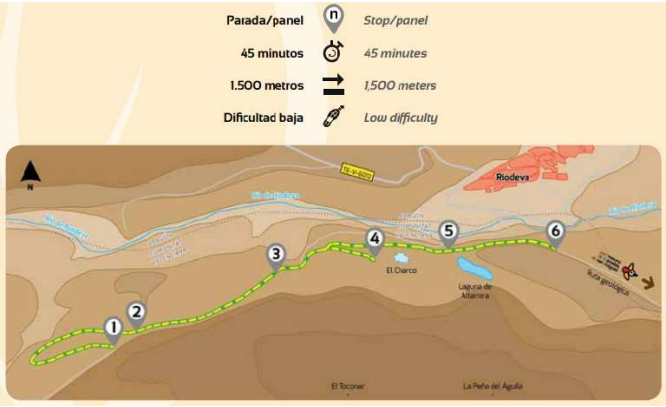

Photo 30. TECMINE Itinerary layout.

A5. COMUNICATIONS AND DISSEMINATIONS EVENTS AT NATIONAL AND INTERNATIONAL LEVEL

One of the objectives contemplated in the LIFE TECMINE project is to transfer knowledge both nationally and internationally. Transmitting as a message, the need to implement new techniques in mine restoration.

The activities aim to reach mining companies, forestry and mining consulting companies, professional associations, public administration and the scientific community related to ecological restoration.

The activities carried out are the following:

- Technical conferences: Four technical courses have been organized for public and private sectors with a total of 127 assistance. Besides different conferences has taken place where TECMINE partners have described the methodology used in TECMINE and have shown the techniques through a field visit too.

Photo 31. Visit of the professional association of mining engineers.

Photo 32. Course of new technologies applied to the restoration of mining operations.

- Scientific documents: includes scientific articles in national or international journals and the participation in scientific forums such as Quarries Alive 2018 (Évora, Portugal), V National Congress of Aggregates (Santiago de Compostela, Spain), the 13th International Conference on Mine Closure (Australia), and the IUCN WORLD CONSERVATION CONGRESS 2021 (Marseille, France), among others.

Photo 33. Quarries Alive 2018 (Evora, Portugal).

Photo 34. Conference on Mine Clousure 2019 (Autralia).

Photo 35. Congreso UICN (Marseille, France).

- Project Network. Although all the dissemination activities have an impact in the project network, specific meetings have taken place too increase this such as the 1st meeting between life projects (2019), the participation in other projects networking events, exchange and visit to other LIFE projects (Life ECORESTCLAY, ECOQUARRY, RIBERMINE,

The Green Link, Newest) and the FINAL CONFERENCE (2022). The purpose of these meetings is to transfer and exchange knowledge and experiences. participating in LIFE InfoDays (2021).

Photo 36. 1st meeting between Life Projects.

Photo 37. Networking NEWEST.

Photo 38. MEETING between TECMINE and RIBERMINE.

A6. SOCIAL NETWORK

Other objectives of the project are: to sensitize the academic communities, transfer the knowledge acquired on restoration techniques, increase the accessibility to information and the interest of public administrations. Consequently, induce an increase in Public Administrations involvement.

One of the main tools to achieve these objectives are social networks with which all sectors of society involved can be reached.

Today the use of social networks is one of the most common and popular forms of communication. Since a form of immediate, close and fluid communication. One of the great advantages of this tool is that the message can be directed to a specific audience and achieve a greater impact.

For dissemination we have used the following channels, where we have informed about the events, news and open-access documents that we have provide in TECMINE:

- Website: Central element of this activity. It serves as a dissemination tool, offers direct information, publications and materials generated are available. And the updated project calendar is available.

- Facebook: It is a social network to share information, news, audiovisual content and create events. It also has an interactivity component. The users used it daily basis, belong to very di-verse sectors of society and with very wide age ranges.

- Twitter it is a two-way, fast, simple and free communication network. It has a self-publishing character in which experiences are shared as they happen.

- LinkedIn: It is a social network for professionals, oriented to make professional connections and be part of discussion groups. It allows to publish data, experiences and recommendations and to establish contact with members of a specific professional field.

Photo 39. Website.

Photo 40. Twitter.

A7. Activities for educational community.

One of the objectives of the project is to raise awareness among academic communities through educational activities and the provision of teaching materials.

The activities that have been carried out in accordance with this objective have been divided by type of training into the following groups:

- Universities and Training centres: seminars and visits to the project area were carried out where 462 students attended.

The project foresaw the realisation of workshops with the local educational centre, but due to the covida, these have been substituted by the following Didactic Units.

- Didactic Unit Infant Cycle.

- Didactic Unit Primary Cycle.

- Didactic Unit ESO Cycle.

The three didactic guides are documents that can be downloaded from the project's website and can be used in all Spanish schools, in this way it is hoped to significantly increase the impact that the workshops that were initially going to be carried out would have had.

These guides serve to raise awareness among the younger population of the need for sustainable mining for the development of society.

For their implementation in classrooms, a training course for teachers is planned by CEFIRE (Centre de Formació Innvocació i Recursos per al professorat), part of the Conselleria de Educación.

Photo 41. Educational units for schools

Photo 42.Tecnhical talk at IES Pare Victoria (Alcoi).

Photo 43.Visit of IES Chelva to CIEF.

Photo 44.Visit of IES Ademuz to LIFE TECMINE project.

2) IDENTIFICATION OF IMPACTS

The activities described above generate both positive and negative impacts, which are analysed in this section.

In the vast majority of cases, the impacts are connected and interrelated, so for their better understanding it is necessary to frame them in a context. The same impact can have repercussions in the social, economic and environmental spheres, as well as affect one or more of the identified stakeholders groups (population, Public Administrations and the private sector and research).

For that reason, **eight groups of impacts** have been established for the study. These groups in turn are related to one or more of the activities described above and have a set of indicators that quantify them. Indicators are the tools used to quantify the identified impacts. Each impact is different and affects a different level. Understanding as a local, national and international scale, so the frequency and method of measurement are different for each one. The values of the measurements can be consulted in **Annex III Matrix of Impacts.**

The groups, impacts and indicators defined to carry out the socioeconomic study are listed below.

IMPACT GROUPS

- G1. Dynamization of the area
- G2. Feeling of territorial relevance
- G3. Awareness raising
- G4. Increase accessibility in the area
- G5. Technical knowledge transfer
- G6. Foster cooperation
- G7. Foster innovation
- G8. Environmental impacts (LCA)

G1. Dynamization of the area

It is an impact closely related to the increase in activity in the area, derived from the implementation of all the LIFE TECMINE actions, therefore, affected by all the mentioned activities bus particularly those that implies the visits to the project area and works (visits, restoration works, etc.).

This group of impacts takes special importance due to the progressive decrease in the population as well as in economic activity, the latter consequence of the cessation of mining activity.

Group 1 considers social and economic impacts, and each impact is measured by indicators:

- **Social impact**:
    - Increase overall activity
        - Indicators: residents in the project area, visitors to the project area, number of local activities, number of followers on Facebook, local groups that are part of our network, number of virtual visits to the TECMINE route.

G.2. Feeling of territorial relevance

The Project´s area of influence is in the geographical area known as the Celtiberian Serrania, whose main characteristics are; low population density, continuous loss of census assets, lack of public investment, poor development of infrastructure and limited productive sectors. This indicates zero growth at all levels.

For this reason, the European project LIFE TECMINE, wants to provoke in the population an important feeling of visibility. It wants to convey the feeling that they are being put on the Spanish and European map, that public and private institutions are looking at them and giving them the importance, they deserve.

Therefore, group G2, Territorial Relevance, considers social impacts and is measured through the following indicators:

- **Social impact:**
    - Increases the sense of relevance of the territory
        - Indicators: % of people who perceive the project as an opportunity to make themselves known as a territory or population
    - Increases the interest of administrations in the area
        - Indicators: number of interested administrations

G.3. Awareness raising

This is another of the Project´s outstanding impacts focuses on the three sectors, i.e. mining sector, administration and society.

To increase awareness about two key questions; (1) importance of mining. Society, in part, is not aware of the need of mining in their lives, the products that use minerals such as technology, building, furniture, etc. Moreover, many people in Spain and in the Valencia Region did not know that there are mines in our territory, and what happen after the extractions of minerals. (2) The need to improve the restoration results. Society and Public Administrations are demanding more efficient restoration project to the mining companies and currently that is possible thanks to the science advances. Dissemination and training activities has been focus on this.

This group G3, Information and Awareness, considers only social impacts and is measured by the following indicators

- **Social impact:**
    - Improved image of mining activity
        - Indicators: % of people who consider mining positive and/or necessary, % of technicians who believe that this project can contribute to the opening of new mines
    - Improved image on mining restoration
        - Indicators: % of people who believe that mines are restored, % of technicians who consider that current restorations are deficient
    - Improved image on public administration
        - Indicators: % of people who see it as positive that public administrations lead these projects.

G.4. Increase accessibility in the area

This increased accessibility in the area is a direct consequence of the recovery of the territory and the creation of a pedestrian route in the restoration area.

Positive social impacts can be generated due to the opening and conditioning of accesses, giving rise to new opportunities to enjoy nature and its resources. This can translate into economic impacts, if existing or new companies take advantage of the recovered space, incorporating the itinerary and the restored area within the tourist offer.

Group G4, Increased accessibility in the area, considers social impacts and is measured by the following indicators:

- **Social impact:**
    - New opportunities to enjoy nature and resources in the area
        - Indicators: number of accesses; number of people visiting the mine, No. of visits to google and wikiloc.

G.5. Technical knowledge transfer

The transfer of technical-scientific knowledge has had a positive impact on the private sector, the administration and the technical-scientific community. During the project activities under this goal have been organized where up to 128 professionals of 36 companies and 16 administration have participated.

Knowledge in restoration techniques adapted to the Mediterranean climate improve technical training. Particularly, 2 Training course where conferences addressing the disciplines that are involved in mine restoration project (i.e. morphology, hydrology, soil, vegetation) have been

carried out with more than 100 participants. In addition 14 people has received certificated training in GeoFluv and the project has been also presented in other courses organized by other entities. Additionally, some indicators from the website and social media supports also the outreach of the project.

As project outputs, 2 scientific articles and 2 guidelines have been published to serve as a guide for future projects.

With the transfer of knowledge under TECMINE, another achieved objective has been to bring the positions between the private sector, the scientific community and the Administration closer together.

In fact, one of the replica has been carried out by a mining company with the support of the beneficiary UCM and the Administration in that region has shown its approval for this solution that implied a change in the original project of the mine site. Working together has allowed the company to gain confidence and it may facilitate the openness of new mines in that region.

Group G5, Transfer of technical / scientific knowledge, considers social and economic impacts and is measured with a series of indicators

- **Social impact**
    - Increase knowledge about restoration techniques
        - Indicators: number of events where the TECMINE has been presented, number of people who have attended, number of web visits
    - Increased training
        - Indicators: number of courses where the techniques have been explained, number of people who have received training
    - Increased technical documentation available
        - Indicators: number of technical documents, number of downloads of documents
- **Economic impact**
    - Increased restorations with these techniques
        - Indicators: number of replicas

G.6. Foster cooperation

This project aims to promote cooperation between the social sectors involved, such as: mining companies, the Administration, companies and professionals in the field of restoration, as well as the scientific community. With the TECMINE activities focused in this aim, it is hoped that new opportunities for dialogue are established from now on, which will result in optimum and more effective results in restoration techniques.

TECMINE consortium and the fact that the Public administration coordinates the project is a good example of cooperation between these sectors.

The G6 group, Fostering Cooperation, considers social impacts and the measurement indicators are:

- **Social impact:**
    - Assessment of cooperation between private sector, administration and science
        - Indicators: % of people who consider cooperation positive, number of companies asking for collaboration (i.e. for replicability)

G.7. Foster innovation

The project has an innovative character that seeks a paradigm shift in restoration techniques and open new channels of dialogue. The aim is to integrate this innovation into future projects and to ensure that professionals consider it necessary to advance in these techniques. It must be taken into account that the mining sector and the administration may consider that these techniques imply an increase in costs and execution times and this leads, sometimes not to take the risk of innovation.

G7 group, Foster innovation, considers social impacts and the following indicators are used for their assessment

- **Social impact:**
    - Innovation assessment
        - Indicators: % of people who consider to advance in new techniques necessary
    - Uncertainty of innovation
        - Indicators: % of people who consider that innovation can lead to an increase in terms/costs

G.8. Environmental impacts (LCA)

In this group, the impacts are closely related to the works to carry out the restoration. During the execution of the **works**, a series of social and environmental impacts are produced.

On the one hand **negative impacts** such as noise pollution, increased dust in suspension, increased pollution, and emissions from machinery, among others.

On the other hand, **positive impacts** related to the regulation of the water cycle (minimization of the risk of floods and increased aquifers recharge), the regulation of erosive processes (clogging of channels, mud runoff and reduction of the risk of landslides and landslides), increase of C stock with planting and soil recovery, increase biodiversity, among others.

Restoration projects must be considered as **mitigating and compensating tools for the resulting impacts**. Therefore, even if there are a series of negative environmental impacts in the execution, these are amply compensated. In addition, with the control of environmental risks, the costs derived from the control and repair of the damage caused will be reduced, having a positive impact on the economy.

Group G8, Environmental Impacts are assessed in a specific study for, the **Life Cycle Assessment (LCA)** (available in the website: https://agroambient.gva.es/en/web/life-tecmine/documents-projecte).

3) IMPACT ASSESSMENT METHODOLOGY

As already indicated, in the socioeconomic study identifies the impacts caused during the execution and development of the project. These impacts are measured or quantified by means of indicators. In turn, each indicator is independent in its method and frequency of measurement.

The measurement and evaluation of the indicators has been carried out in 3 phases: Phase 1 corresponding to the Baseline; Phase 2 for those indicators measured during the project implementation and Phase 3 corresponding to the project's end.

PHASE 1: (Baseline, year 2018)

It has taken place during the first 12 months of the project, during the execution of the preparatory actions (Actions A). In this phase, the following actions were carried out:

- Bibliographic study of the socio-economic and environmental status. Through official statistics, data provided by Local Development Agents and territorial analysis through geographic information systems.

- Description of the social, economic and environmental context of the project area, as well as its influence area.

- Identification and evaluation of impacts in each of the phases of the project (execution of the works, establishment of the restoration, dissemination of the project and awareness) and analysis for each of the strata susceptible to suffer impact (social, economic and environmental).

- Surveys of the general population, to assess the social perception of mining, the project impact and assess the landscape.

- Surveys of the mining sector, researchers and public administrations related to mining and environment, to identify the current perception of the activity and its restoration and the need for information and knowledge.

PHASE 2: 2019 – 2020

The objective is to analyse the evolution of the impacts identified in the project once the works have been completed and during the two years of monitoring.

During the monitoring period, environmental quality indicators considered in group 8 are measured. These indicators are those used in the Life Cycle Assessment (LCA) and Carbon Footprint.

The indicators related to communication actions (people reached, events, etc.) have been measured during the project and have been included in the progress reports. This has made it possible to evaluate the scope of the project and the need or not of the actions that have been implemented.

FASE 3: YEAR 2021

Phase at the end of the project in which the overall impact of the project has been evaluated by comparing the baseline and the final phase. In this phase, all indicators have been measured, including surveys of the population and the most professional target group.

Timeline for qualitative indicators

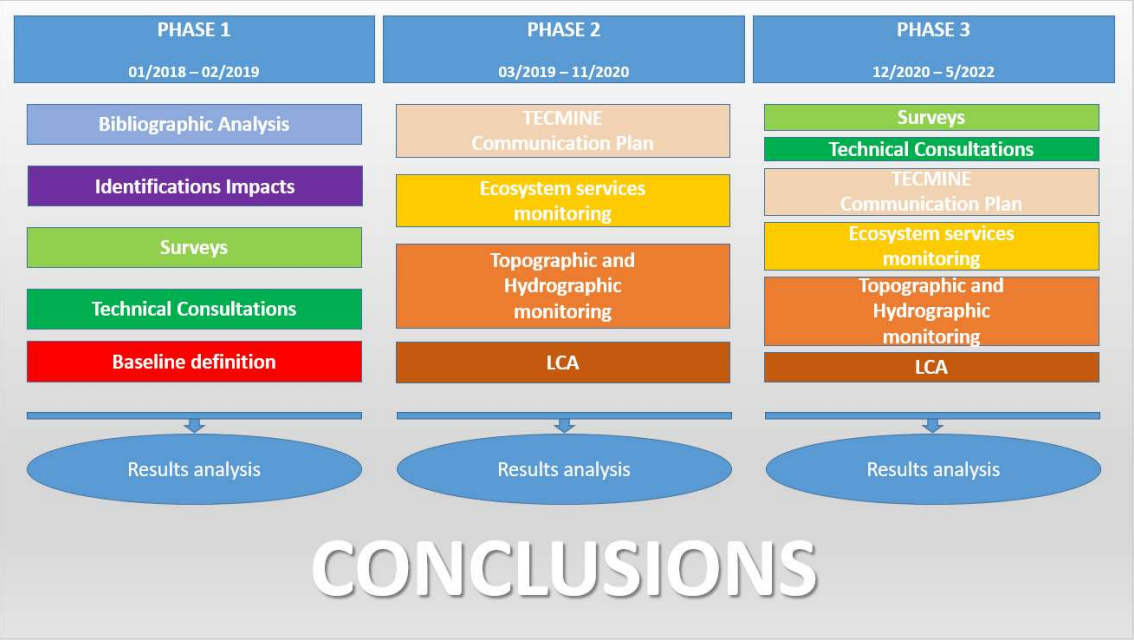

Figure 1: Phases and measuramernt methods in the socioeconomic study. Self elaboration.

Methods of Measurement

The methodology for measuring the indicators is not the same for everyone. There are indicators measured quantitatively and others qualitatively. The tools used to measure the indicators as well as the source are listed below:

- *Qualitative indicators:*
  - Surveys
  - Scientific technical consultations
  - Communication Plan records
  - Social networks (Twitter, Facebook, web project and LinkedIn)
- *Quantitative indicators:*
  - Data from Monitoring Actions C
  - Life Cycle Assessment (LCA)
  - Communication plan records

PHASE 1 BASELINE

This phase is the starting point and it is necessary to describe and analyse the base scenario.

For this purpose, on the one hand, a description of the social and environmental context of the project area has been carried out (see Annex I). The information was obtained from bibliography and statistics on the area.

On the other hand, a series of surveys have been carried out in the sectors involved, which aim to be a reference analysis in the feeling and perception of mining in general and of the project in particular by society, administration, companies and universities. The following table show the surveys carried out in each case.

Table 1. Number of surveys carried out.

	Local population	Administration	Company and University
No. of surveys	41	34	23

Description of the surveys: The surveys include a series of questions related to knowledge of the project, impact on the local economy and the sector, perception of mining, assessment of the project and assessment of the fact that the project is led by a public administration.

They were conducted in January 2019 once the project had started, but before implementing the planned Communication Plan.

Results of the surveys:

From the surveys carried out with the local population in the municipalities of Ademuz, Riodeva and Puebla de San Miguel it can be concluded that **12%** have perceived an **increase** in the demand for their **business** since the beginning of the Project, **68%** agree that the TECMINE project can contribute in the area to make itself known as a territory. **92%** consider that **mining** is both **necessary** for the development of society and positive because it creates jobs. But only 52% are aware that mines are being restored and have an obligation to be restored.

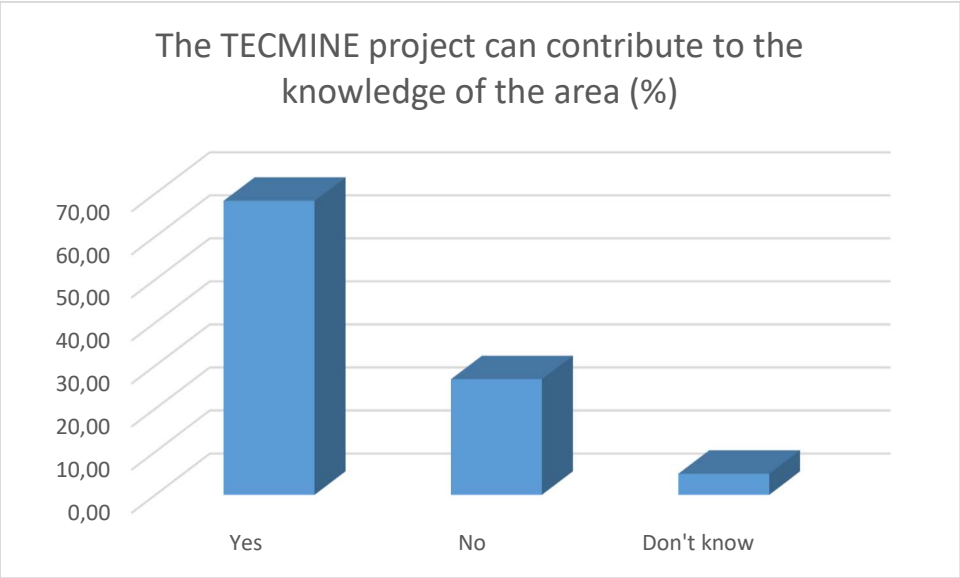

Figure 2. Population surveys. Self elaboration.

On the other hand, from the surveys carried out to the administration, company and university, it is deduced that there is a fairly general feeling (83%) that mining activity is necessary and positive, as long as restoration is guaranteed. In relation to the compatibility with the environment, 78% of the administration agrees that the observed restorations do not always correct the impact produced. Considering 58% of those surveyed that the restorations are mostly deficient.

Almost everyone agrees that cooperation between administration, company and science is necessary (97% in administration and 91% in company and science), and that this innovation proposed in the TECMINE project is also necessary. Only 3% of those surveyed consider this innovation risky. And 30% say that the techniques used can contribute to the opening of new mines.

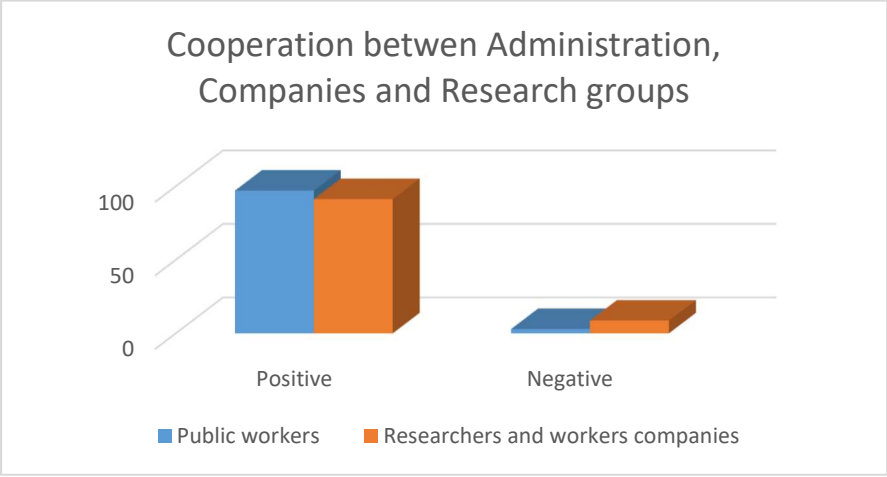

Figure 3. Administration, Company and University surveys. Self elaboration.

PHASE 3 RESULTS

This is the final phase of the project, once the project has been implemented and the work has been executed, it is necessary to analyze and compare the current situation with the baseline scenario.

During this period, the dissemination work has continued and despite circumstances caused by the Covid-19, expectations have been exceeded.

As a result of the Communication Plan implementation, the TECMINE project was presented at more than 70 events. The project has been explained at congresses, in talks aimed at technicians and professionals, students and the local population.

In terms of social media, the project has increased its expectations through social networks and the project website, with more than 18.630 visits to the website and more than 11.340 downloads of content.

In social networks we have 715 followers and 1.300 publications on Twitter and Facebook.

In order to continue with the transfer of knowledge and with the horizon set beyond the end of the TECMINE project, VAERSA is and will be coordinator of the first Network of Mine Restoration created under the TECMINE activities. This forum, will allow disseminate the project and will serve as a forum for debate and feedback with the contributions of the members of the group. This group is made up of technicians and researchers working in the fields of restoration and mining with more than 130 members (updated on March 2022).

In this phase, surveys carried out at the beginning with the sectors involved (local population, public administrations, companies and universities) are repeated to be able to measure the change.

The following table shows the number of surveys carried out under this period.

Table 2. Number of surveys carried out.

	Local population	Administration	Company and University	Total
No. of surveys	69	37	45	151

Surveys have allowed to gather information on the perception that both experts and the population have about mining activity, its impact and its restoration. In this sense, the restoration model of the LIFE TECMINE project is more highly valued than other traditional methods.

From the surveys carried out among the local population, it is concluded that, although mining is still perceived as an activity that produces great impacts on the environment, the majority of those surveyed, 85%, consider that it is a necessary activity, due to the creation of employment in sparsely populated rural areas. Furthermore, 91% of those surveyed believe that TECMINE project can contribute to the knowledge of the territory and its revitalization.

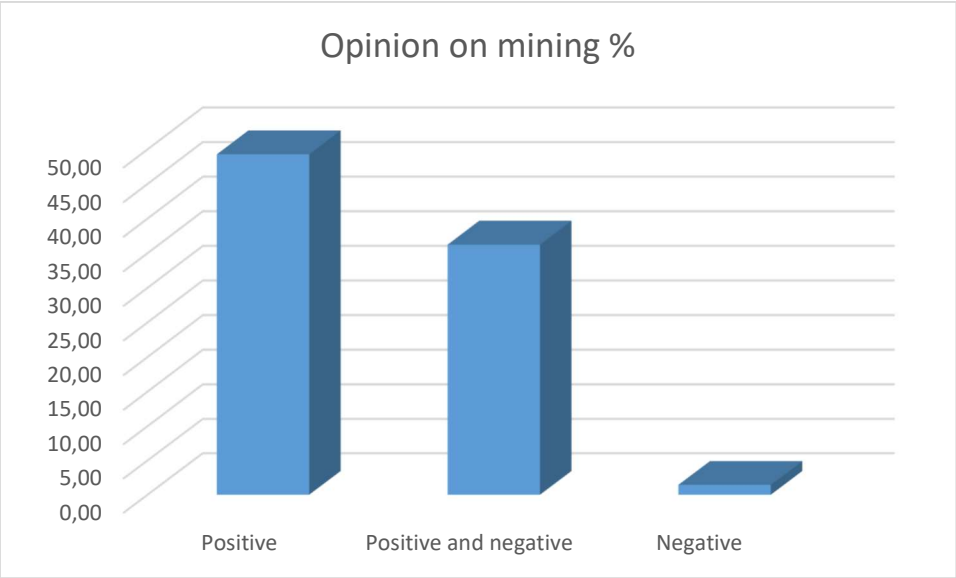

Figure 4. Opinion on mining. Self elaboration.

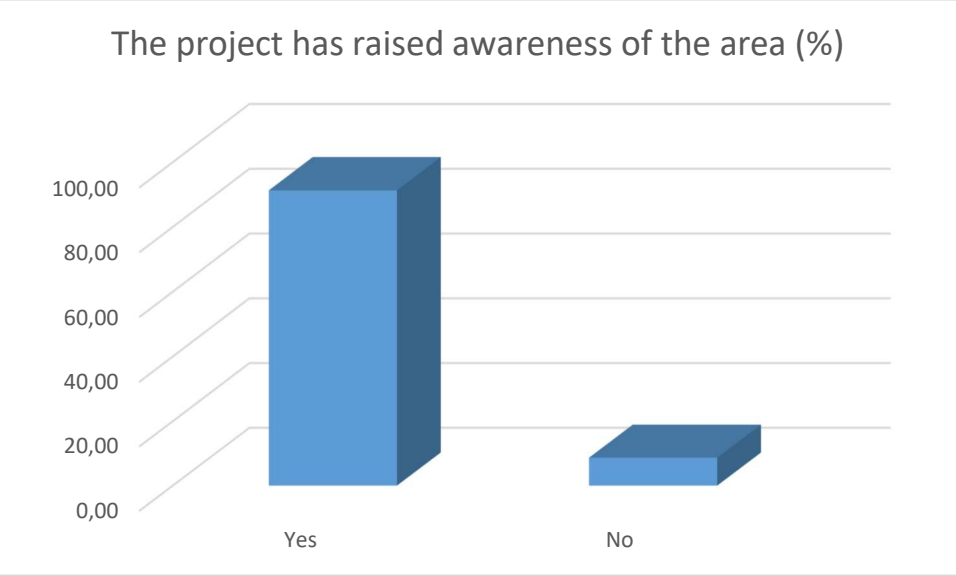

Figure 5. Territorial relevance. Self elaboration.

In the surveys carried out with the administration, companies and universities, after 4 years of dissemination, we observed that 65% of the private sector technicians and researchers surveyed and 81% of the public administration staff are aware of the project. In addition, 73% of respondents from the administration and almost 50% of technicians and researchers state that the LIFE TECMINE project has changed their perception and consider that these techniques result in more successful restorations. In addition, 89% of the respondents value positively that the administration coordinates this type of projects.

The fact that the project is led by a public administration. (See Annex VI. Attached survey)

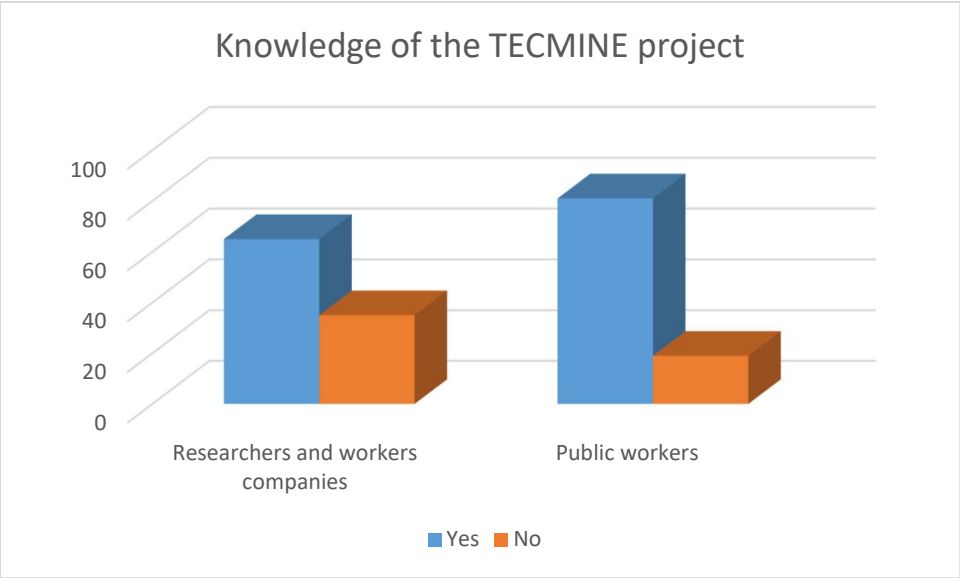

Figure 6. Technical and administrators surveys. Self-elaboration.

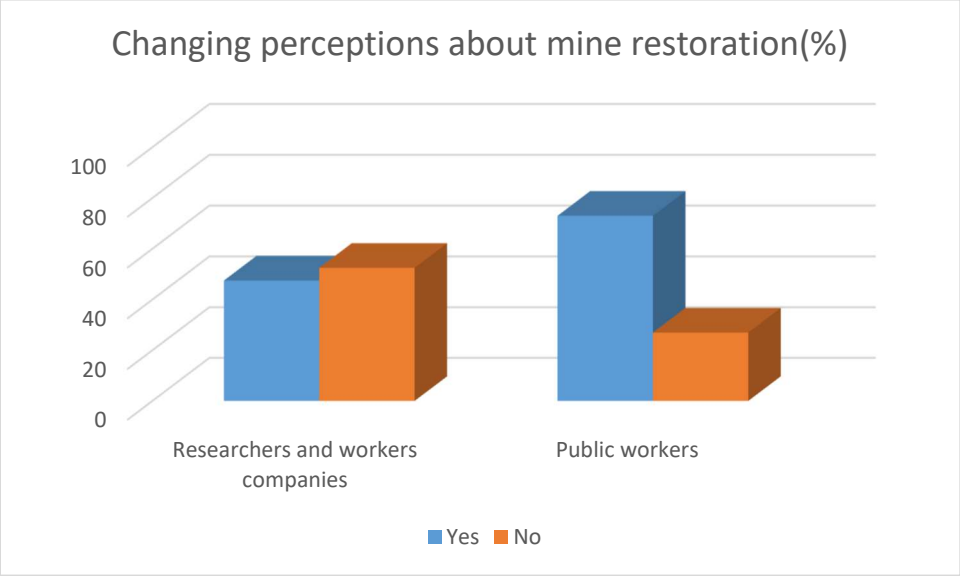

Figure 7. Technical and administrators surveys. Self-elaboration.

CONCLUSIONS AND FURTHER CONSIDERATION

Before explaining the conclusions, it should be noted that some of the economic indicators are difficult to measure at the scale of the LIFE TECMINE project. However, it can give us an idea or approximation of to what extent it has been able to influence its execution.

On the other hand, environmental impact is analysed through the Life Cycle Assessment (LCA) that is available at https://agroambient.gva.es/es/web/life-tecmine/documents-projecte). It should be noted that to date there is no previous reference to this type of analysis for mining restoration. So, the LCA presented in this project can serve as a guide or reference for future projects.

Next, the conclusions have been structured and analysed in two sections, on the one hand the environmental impact and on the other hand the socioeconomic impact.

ENVIRONMENTAL IMPACT

Although the importance of vegetation, soil and topography is always discussed, it is rarely worked together. Research groups are usually very specialized. This project has made the three lines look equally important, so the restorations must be designed with the three components always joined, with more or less weight depending on the starting situation, but never individually.

Herbaceous cover is fundamental in mine restoration. It is something that cannot be done without. The role of vegetation in the early stages to avoid surface erosion is key.

Well-designed mine restorations and a good species selection allow a high degree of naturalness and biodiversity as reflected in the Fundación Tormes reports (available at https://agroambient.gva.es/es/web/life-tecmine/documents-projecte).

Wood strips work well as water and seed collectors, on gentle slopes (low slope and length), or in the areas of longer slopes. If the slope is very long, the lower strips are lost.

GeoFluv, with very high slopes and without substrate, does not work as properly as desired. This is observed in the restoration of the west GeoFluv in the area that flows into the ravine (fishbone).

Plants close to gully receive less water because it is driven through the gully and it develop worse. It is another erosion effect.

The modified **microcatchment** that have been made, have not caused a concentration of rills and, nevertheless, have allowed a greater collection of water. Without a much higher cost than the traditional hole, a greater benefit is obtained. The important thing is not to do them on high slopes.

The **roughloose** technique used on the berm is a good solution to stop strong erosive processes due to large water inlets from roads and high slopes (as is the case with this berm). However, the holes are filled in and can condition the development of the plants. Perhaps in a first phase, not planting could be more advisable.

The erosion of the small east GeoFluv seems to be starting to slow down.

The restoration in general, presents an astonishing natural appearance, in terms of the shapes and for the vegetation cover and the appearance of the soil.

Plants that have not survived in the lagoon are far from the water surface, which may have been the cause of the mortality. When the project started, the water level was much higher.

For future projects, it would be interesting to quantify to what extent the restoration in relation to the vegetation is due to the **quality** of the introduced **plant** as well as its previous acclimatization

THE SOCIOECONOMIC IMPACT

The socio-economic impact has been studied by more or less homogeneous groups, local population, public administration staff and company staff and researchers, the conclusions will be separated by these groups.

Local population

The local population has mixed opinions; on the one hand, they value the results of the TECMINE project very positively in terms of improving the landscape, they also value very positively that investments like this are made in the territory. However, we must not lose sight of the fact that the cessation of mining activity has generated a strong destruction of employment, with the dissatisfaction that this creates in municipalities where mining was their main activity and where there are no alternatives to it.

The socio-economic impact has been more marked in the municipality of Riodeva, where more people were employed in mining activity, and to a lesser extent in Ademuz and La Puebla de San Miguel, where employment is more diversified. If we study the municipal registers, we can see that all the municipalities affected by the project have lost population in recent years, with the sharpest decline in Riodeva, which may be due in part to the cessation of mining activity.

Notwithstanding the above, during the project there has been a certain dynamism in the project area, due to the project activity itself, visits, restoration work, but this has not been reflected in a significant increase in jobs, nor in an increase in the number of residents in the project area. This project is not large enough to significantly increase economic activity in the area.

The LIFETECMINE project, unlike economic activity, has increased the feeling of territorial relevance, as the project has served to raise awareness of the area, as shown by the number of different administrations that have visited the project, as well as those who have attended conferences or various events both nationally and internationally. This fact is reflected in the surveys of the population where more than 90% of those surveyed think that the project has raised awareness of the territory.

Awareness of mining in society has increased significantly among the population, technicians and public administrations, and the project has made several aspects evident.

First, the restorations have much room for improvement. In the surveys of public administration and companies and researchers, the majority believe that the project has changed their perception about mine restoration. Among the population it is perceived that they are willing to accept the negative impacts of mining in exchange for the creation of employment in an area such as the project area, which is heavily depopulated and ageing.

On the other hand, the way in which the collaboration project has been developed between a mining company, public administration and universities has been one of the successes of the project; all those surveyed see the collaboration as necessary for the development of mining activity and its subsequent restoration to be successful.

Public administrations

This group includes all personnel in the service of public administrations working directly and indirectly with mining-related issues, local, self-government and state. This is the group with the highest percentage knowledge of the project, with more than 80% of those surveyed. This sector agrees with the mining sector that mining is necessary, but they believe that the restorations that have been carried out do not always correct the impacts caused and that new techniques should be implemented.

The influence of the project on this group has been high, being the group where the vision on restoration has changed the most when seeing the results of the LIFE TECMINE project. A sector that was more cautious with the results of restoration and that could be more reluctant to open new mines has seen with surprise how by applying the appropriate techniques much more successful results can be seen than in traditional mining restorations where the results are more unsuccessful. The results of this project have raised the standard of restoration for technicians and provide them with new tools to evaluate new restorations and propose new methods for future mine restorations. On the other hand, the fact that the project has been conducted by researchers, companies and public administrations has also been very well received, creating a model of co-operation that is interesting to replicate in mining as well as in other sectors, trying to work for the common good and not in a confrontational way.

Technicians and researchers

In this sector, mining is seen as an essential activity that is compatible with the environment. There is a fairly generalized opinion in the mining sector that without the support of the administration, the sector cannot evolve. In other words, for the restoration of mining areas to be more successful and for more innovative techniques to be used, it must be the administration that gives the impetus to the companies, which is why the fact that this project is coordinated by the Valencian Regional Government and that the consortium is made up of research groups and a mining company has been highly valued.

On the other hand, this project has demonstrated to the companies how, by using these new techniques, faster and more satisfactory results can be achieved with similar costs, which is one of the main concerns of the mining areas. The success of the LIFE TECMINE project can help change the perception of mining activity and, therefore, can help the opening of new mines. In addition, it creates a precedent of collaboration between the administration and companies, which the sector values very positively, as they see a greater involvement of the administration as essential for progress to be made.

The researchers agree with the public administration sector that:

1. The impacts produced by mining are not always corrected, so that the impacts generated should be minimized.

2. Restoration techniques should be improved and that more innovative formulas should be sought than what has been done to date.

3. Restoration should be tackled from the initial planning stage and not start to be planned once the mining operation has been developed.

With regard to the LIFE TECMINE project, the researchers believe that it is a successful restoration and that the project shows that it is possible to carry out other types of restoration. It is

now necessary to encourage mining operations to implement these techniques in their new restoration projects. At this point, the role of the public administrations is key.

In view of future consultations, it would be interesting to separate the surveys of the mining companies from those of the researchers in order to obtain more relevant information, since, although in some aspects their opinions coincide. In the end, mining companies have a more productivity vision. Carrying out restoration is still a compulsory procedure to comply with the law or, in the best of cases, to improve the image of their activity. Yet, it is not their aim as such, while researchers give more relevance to environmental factors and that the restorations fulfil their task of recovering spaces degraded by mining activity.

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ANNEX I. TECMINE´s SOCIOECONOMIC CONTEXT

El proyecto se localiza en la provincia de Valencia, comarca del Rincón de Ademuz y término municipal de Ademuz. Esta comarca se encuentra enclavada entre las comunidades de Aragón y Castilla la Mancha.

Aunque Ademuz esté ligada administrativamente a la Comunidad Valenciana, territorial, geográfica y culturalmente está más próxima a Aragón. Distancia de Valencia, su capital de provincia 146 km y únicamente 44 km de Teruel y 114 km de Cuenca.

El núcleo de población más cercano al área de proyecto es el municipio de Riodeva (provincia de Teruel, Comunidad Autónoma de Aragón), muy próximo se encuentra el municipio de la Puebla de San Miguel el cual pertenece a la Comarca del Rincón de Ademuz.

La zona de influencia del proyecto TECMINE se incluye en la denominada Serranía Celtibérica (área española escasamente poblada), con una densidad de población inferior a 8 habitantes/km^2. Si se compara esta densidad con la media de la Comunidad Valenciana (213 habitantes/km^2) se percibe que es un área predominantemente rural en la que persiste el éxodo de la población hacia los grandes núcleos próximos.

Para la descripción del contexto socioeconómico, se han utilizado dos fuentes. Para la Comarca del Rincón de Ademuz en su conjunto, datos del Instituto Valenciano de Estadística (IVE) actualizados el 1 de enero de 2018 y tanto para Ademuz, Riodeva y la Puebla de San Miguel datos obtenidos a nivel municipal.

Es necesario destacar la diferencia existente entre el tamaño y el peso de las poblaciones que forman parte del área de influencia del proyecto. La capital de comarca es el municipio de Ademuz con lo que alberga mayor número de habitantes y concentra los principales servicios de la zona, como son el Centro de Salud, la agencia de empleo y desarrollo rural, el cuartel de la Guardia Civil, el colegio, el instituto, la escuela de adultos, la oficina de Correos, el Juzgado de Paz y el Registro Civil. Por el contrario, los municipios de Riodeva y la Puebla de San Miguel cuentan con poblaciones muy pequeñas y cuentan con servicios básicos y muy limitados como un consultorio médico una vez por semana, transporte escolar pero no colegio.

Además de la despoblación, la tendencia negativa de índices como el envejecimiento de la población, el número de empresas y la población activa avalan la falta de desarrollo y crecimiento de la zona. Esta tendencia es común a todos los municipios del rincón de Ademuz y las comarcas limítrofes en las provincias de Teruel y Cuenca, en las que está enclavada la comarca.

A continuación, se realizará una descripción del área del proyecto a tres niveles; social, económico y medioambiental.

SITUACIÓN SOCIAL

NUMERO DE HABITANTES Y DENSIDAD DE POBLACIÓN

En las dos últimas décadas la evolución de la población el Rincón de Ademuz presenta una clara regresión (datos del Instituto Valenciano de Estadística, serie de años 1996-2017). En

estos 20 años la población descendió en 724 habitantes, siendo actualmente de 2.289 habitantes según datos del censo de 2017.

Por otro lado, la Comarca del Rincón de Ademuz tiene una extensión de 370,2 km2, siendo la densidad poblacional de 6,2 habitantes/km^2. El grueso de la población reside en el municipio de Ademuz, con 10,7 habitantes/km^2, lo que representa 4,5 puntos y medio por encima de la media de la comarca. Así que el 47% de los habitantes de la Comarca se concentran en el municipio Ademuz.

El siguiente gráfico muestra la Evolución de la población en los últimos 20 años de la población de toda la Comarca del Rincón de Ademuz y del municipio de Ademuz.

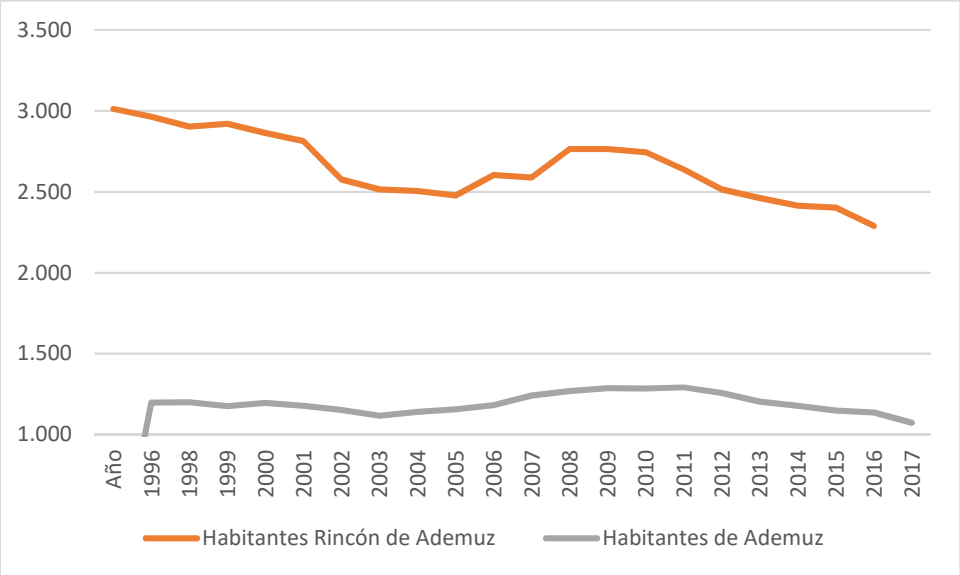


Figura 1: Evolución de la población en la comarca de El Rincón de Ademuz y el municipio de Ademuz. Fuente: IVE, 2017. Elaboración propia.

En la comarca del rincón del Ademuz durante los años 2005 a 2010, se produjo un aumento de población. Fueron los años más críticos de la crisis económica que afectó al país dando lugar a un efecto retorno de la población autóctona y además del asentamiento de nuevas familias procedentes de otros puntos de la Comunidad Valenciana y en menor media de la emigración.

Al igual que para el conjunto de la comarca, se sigue con la tendencia de decrecimiento poblacional, pero este descenso es menos acusado en el municipio de Ademuz.

Para el año 2017 según los datos del Instituto Aragonés y Valenciano de Estadística respectivamente, en los municipios de Riodeva y la Puebla de San Miguel, el número de habitantes es mucho menor, 149 y 62 habitantes respectivamente. Con densidades poblacionales de 6,2 habitantes/km2 para Riodeva y 0,98 habitantes/km2 para la Puebla de San Miguel. La figura siguiente muestra la evolución de la población en los últimos 20 años para los municipios de Riodeva y la Puebla de San Miguel.

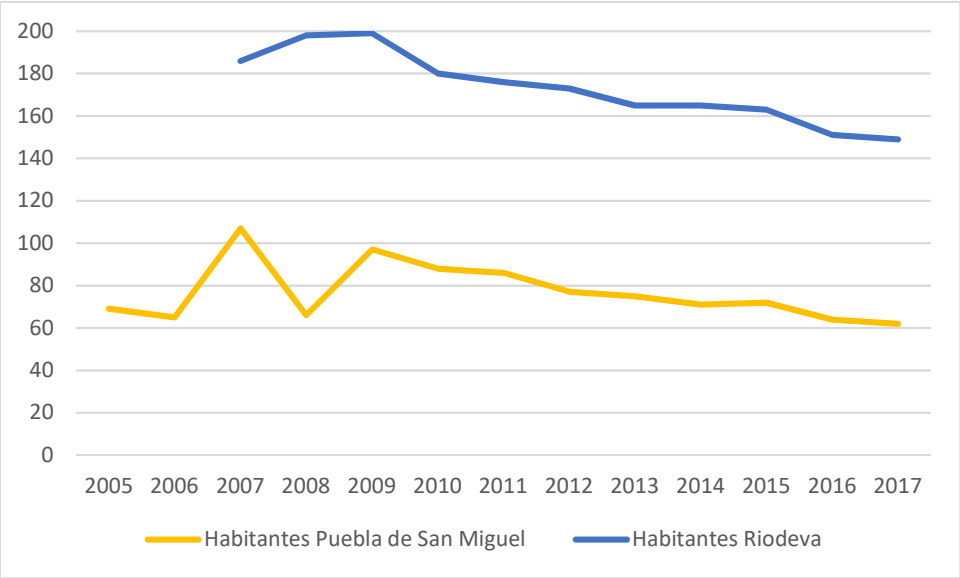


Figura 2: Evolución de la población en los municipios de Riodeva y La Puebla de San Miguel. Fuente: IAE y IVE, 2017. Elaboración propia.

La tendencia poblacional es descendente para los dos municipios. En la Puebla de San Miguel se produjo una brusca variación entre los años 2006 y 2009, momento a partir del cual la población ha permanecido relativamente constante. Se producen más emigraciones que inmigraciones.

ESTRUCTURA DE LA POBLACIÓN

Según los datos estadísticos del 2017, los municipios del Rincón de Ademuz, Riodeva y la Puebla de San Miguel, se produce un **envejecimiento** de la población, con una mínima tasa de natalidad y un crecimiento vegetativo negativo.

Las siguientes figuras muestran la estructura de la población para los tres municipios anteriormente mencionados.

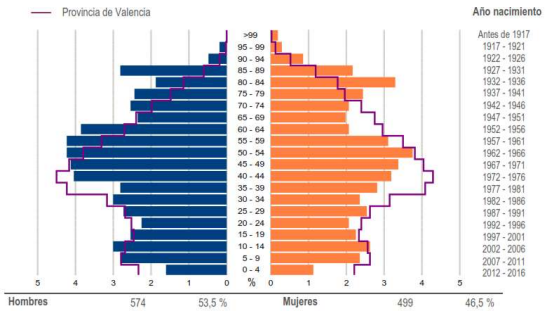


Figura 3: Estructura poblacional en Ademuz a 1/01/2017. Fuente: IVE.

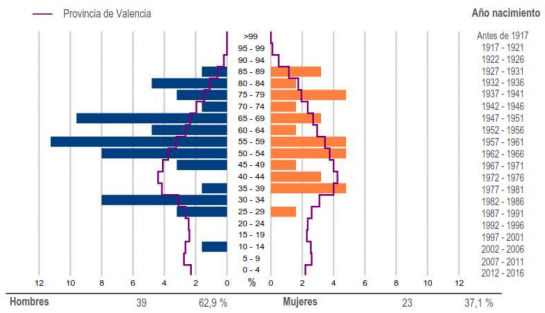


Figura 4: Estructura poblacional en Puebla de San Miguel a 1/01/2017. Fuente: IVE.

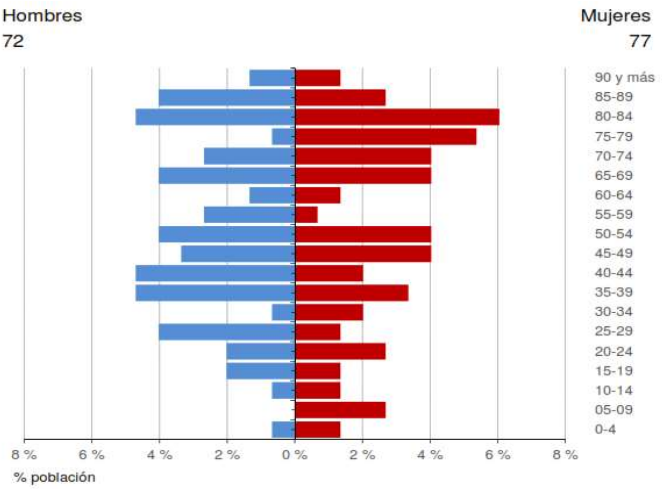


Figura 5: Estructura poblacional en Riodeva a 1/01/2017. Fuente: Instituto Aragonés de Estadística

En Ademuz la **edad media** es de 47 años, en la Puebla de San Miguel 58 y Riodeva 54 años. Si para la Comunidad Valenciana el 18,7% de la población es igual o mayor a los 65 años, en Ademuz el porcentaje es del 26% y del 35% y 41% para la Puebla de San Miguel y Riodeva respectivamente.

El **índice de envejecimiento** para la Comunidad Valenciana es del 116,5%, para la provincia de Valencia del 114,5%. Sin embargo, en Ademuz este índice se establece en 184%, en 2.200% en la Puebla de San Miguel y 726% para el municipio de Riodeva.

Sin embargo, esta tendencia se invierte con la tasa de renovación de la **población activa** ya que es inferior en los municipios de la comarca que en la comunidad autónoma y provincia con porcentajes del 82,5% y del 82% respectivamente, en Ademuz este porcentaje es del 72,3%, y tanto para la Puebla de San Miguel como para Riodeva del 21,4%.

NIVEL DE ESTUDIOS

Según los datos del Censo de Población y Vivienda realizado por el INE en el año 2011, en cuanto a nivel de estudios el 57% de la población posee estudios de segundo grado (EGB completa o ESO, Bachillerato superior, FP de grado medio superior, BUP o COU). Menos del 10% posee estudios de tercer grado (formación universitaria o doctorado). En torno al 13% de la población no tiene estudios y el 2% es analfabeta.

Sin embargo, para el municipio de Riodeva, estos porcentajes empeoran, ya que la población sin estudios aumenta al 57%, siendo el 3% analfabeta. El 28% de la población tiene estudios de primer grado, el 9% ha cursado estudios de segundo grado y únicamente el 3,5% de la población ha cursado estudios universitarios.

NIVEL, CALIDAD Y CONDICIONES DE VIDA

De acuerdo con la Estrategia Europea 2020 en la que se quiere fomentar una economía inteligente, sostenible e integradora, se mide el nivel, calidad y condiciones de vida a través de dos indicadores. Por un lado, el riesgo de pobreza y/o exclusión social conocido como indicador AROPE (At Risk of Poverty and Exclusion) y por otro lado la renta media por unidad de consumo.

La tasa de riesgo de pobreza es el porcentaje de personas que viven con una renta por debajo del umbral de la pobreza. Para España esta tasa es del 21,6%, del 25,6% para la provincia de Valencia y para el Rincón de Ademuz del 19,5%. Este riesgo de pobreza afecta especialmente a menores de 16 años, donde el porcentaje aumenta hasta el 29,1%. Sin embargo, si distinguimos por géneros, las mujeres tienen un punto por encima de la media, el 20,5% mientras que los hombres descienden ligeramente al 19,3%.

La renta media por unidad de consumo es un indicador para tener en cuenta la economía de los hogares. Para la comarca del Rincón de Ademuz esta renta media se estima en 15.049€, valor muy similar a la de toda la Comunidad Valenciana, con un valor de 14.365€. Con lo que se observa que el nivel, calidad y condiciones de vida en el Rincón de Ademuz es superior tanto a la provincia como a la Comunidad Valenciana.

SITUACIÓN ECONÓMICA

Del análisis realizado del número de empresas, el mercado laboral y los presupuestos municipales, la situación económica es muy diferente entre los municipios del Rincón de Ademuz, debido fundamentalmente a la disponibilidad presupuestaria y a su actividad económica.

NÚMERO DE EMPRESAS

A fecha 1 de enero de 2018 y según datos del IVE, en Ademuz había un total de 79 empresas activas, sin tener en cuenta el sector primario. De las cuales, 48 pertenecen al sector servicios, 24 a la construcción y 7 a la industria.

Debido a la mayor tamaño poblacional e importancia administrativa Ademuz presenta la mayor oferta de establecimientos turísticos. Existen 4 casas rurales, 1 hostal con 56 plazas y 1 pensión con 23 plazas. En la Puebla de San Miguel, no existen empresas con domicilio fiscal, sin embargo, en 2017 existían 4 casa rurales ubicadas en dicho municipio.

En el caso de Riodeva y según los datos disponibles en el Instituto Aragonés de Estadística para el año 2015, estaban contabilizadas 12 actividades económicas; 7 estaban relacionadas con el sector servicios (hostelería), 1 con las explotaciones agrícolas, 2 con la industria y 2 con la construcción.

MERCADO LABORAL

El análisis del mercado laboral, se lleva a cabo mediante los indicadores de tasas de actividad, tasa de ocupación y tasas de paro, únicamente existen datos a nivel comarcal, pero no a nivel municipal. Al no existir datos específicos, se extrapolan los datos en base a las pirámides poblacionales. Tomando como referencia los datos para la comarca de Ademuz. Sin embargo, para el municipio de Riodeva se utilizan datos de Gobierno de Aragón.

Para la comarca de Ademuz, en los últimos 7 trimestres, desde principios de 2017 hasta el tercer trimestre de 2018, la **tasa de actividad** (población activa como porcentaje de la población en edad de trabajar) se sitúa en torno al 74,1%, con máximo porcentaje en el tercer trimestre de 2018. Esta tasa de actividad es mayor para hombres que para mujeres. Siendo de

79,2% y 68,3% respectivamente. Para el municipio de Riodeva y según el censo de población y viviendas del año 2011, la población activa era del 43,7%

Para ese mismos 7 trimestres, la **tasa de ocupación** (población ocupada como porcentaje de la población en edad de trabajar) se sitúa en torno al 64,7%. Esta tasa también es superior en hombres que, en mujeres, el 68,2% frente al 56,1%. En el caso de Riodeva, esta tasa de ocupación es del 31,6%, y al igual que para toda la comarca de Ademuz, es mayor para hombres (40%) que para las mujeres (23,1%).

Para la comarca del Rincón de Ademuz, en los últimos 7 trimestres, la **tasa de paro** (personas desempleadas como porcentaje de la población activa) se sitúa en torno al 15,5%, siendo el máximo durante el primer trimestre de 2017 con un porcentaje del 18,7%. Existe una tendencia decreciente, hasta alcanzar el 12,6% durante el segundo trimestre de 2018. Siendo esta tasa de paro mayor en las mujeres (17,8%) que en los hombres (13,5%). En el caso de Riodeva la tasa de paro es del 12,1%. Asimismo, la tasa de paro femenino es mayor que la masculina, 14,1% y 10% respectivamente.

PRESUPUESTOS MUNICIPALES

Existen diferencias en los presupuestos municipales entre las localidades objeto de estudio. En la tabla siguiente (X) se reflejan estas diferencias. En las que se puede constatar que el municipio de Ademuz, a pesar de tener mayor tamaño, gestionar mayor número de servicios y albergar a más población, cuenta con un presupuesto por habitante muy inferior en relación con la Puebla de San Miguel o Riodeva.

Tabla 1: Presupuestos municipales en los municipios de estudio del proyecto LIFE TECMINE. Elaboración propia.

	Ademuz (*)	Puebla de San Miguel (*)	Riodeva (**)
Presupuesto (€)	784.265,57	321.389,81	370.500
Superficie (Km^2)	100,42	63,58	34,3
Población (habitante)	1.073	62	163
€/Km2	7809,85	5.054,88	10.801,75
€/habitante	730,91	5.183,70	2.273

(*): Datos del año 2017. (**) Datos del año 2015

SITUACIÓN MEDIOAMBIENTAL

CARACTERÍSTICAS FÍSICAS DEL TERRITORIO

Para conocer la ocupación del terreno y sus características físicas, se ha empleado el CORINE, este proyecto desarrolla una base de datos sobre cobertura y uso del territorio a nivel europeo, a escala 1:100.000, con lo que la unidad de catalogación es de 25ha. Esto implica que determinados usos se pueden ver infravalorados, como las zonas húmedas y superficies de agua.

La tabla 2 recoge los usos de suelo para el área de influencia de la comarca del Rincón de Ademuz y Riodeva.

Tabla 2: Usos de suelo CORINE Land Cover 2012 para el área de estudio. Fuente: SIOSE. Elaboración propia

USOS DE SUELO	EL RINCÓN DE ADEMUZ		RIODEVA	
	Superficie (hectáreas)	%	Superficie (hectáreas)	%
Superficies artificiales	159,2	0,4	65,8	1,9
Zonas agrícolas	7.171,9	19,4	563,4	16,4
Zonas forestales con vegetación natural y espacios abiertos	29.659,2	80,2	2.804,4	81,7
Zonas húmedas	0,0	0,0	0,0	0,0
Superficies de agua	0,0	0,0	0,0	0,0

Se observa la importancia de los sistemas forestales en la zona de estudio. El 80% del territorio se corresponde con zonas forestales con vegetación natural y espacios abiertos. El 19% del territorio es agrícola, incluyendo aquí el curso fluvial del río Turia, que alimenta una extensa zona de huerta de regadío a ambos lados del cauce. Las superficies artificiales, núcleos urbanos y su entorno se concentran en los núcleos urbanos y tienen poca representación (2%).

ESPACIOS NATURALES PROTEGIDOS

Según la Ley 11/1994, de 27 de diciembre, de Espacios Naturales Protegidos de la Comunidad Valenciana, así como en la Ley 42/2007, del Patrimonio Natural y de la Biodiversidad en el área de influencia del proyecto existe distintos espacios protegidos.

Próximo a la zona del proyecto se encuentra el Parque Natural de la Puebla de San Miguel, declarado por el Decreto 81/2007, de 25 de mayo, del Consell. Con una superficie de 6.343,3 ha del término municipal de La Puebla de San Miguel. Y comparte territorio con el Lugar de Interés Comunitario (LIC) “Puebla de San Miguel” con una extensión de 8.796,8 ha en el que se incorporan los entornos naturales de los municipios de Ademuz, Casas Altas, Casas Bajas y Puebla de San Miguel.

Existen otros dos LIC, Ríos del Rincón de Ademuz” en el que se incluyen los terrenos próximos al cauce del río Túria y sus principales afluentes, con una extensión de 1.408,9 hectáreas y el LIC “Arroyo Cerezo” cuya extensión es de 5.387,2 ha, afectando a los municipios de Castielfabib y Vallanca.

Existe una Zona de Especial Protección para las Aves (ZEPA): “Hontanar- La Ferriza”, con una extensión de3.145,28 ha, distribuida en dos áreas geográficas diferentes y con afección a los municipios de Ademuz, Casas Altas, Casas Bajas, Castielfabib y Vallanca.

Existen dos Parajes Naturales Municipales; “Fuente Bellido” en el municipio de Casas Altas declarado en 2007 y con una superficie de 1.000,6 ha y “Muela de los Tres Reinos” declarado en 2014 perteneciente al municipio de Castielfabib y con una superficie de 567,26ha

En el municipio de Casas Altas se localiza el Paraje Natural Municipal “Fuente Bellido”, declarado en 2007, con una superficie protegida de 1.000,6 ha. En Castielfabib se declara en 2004 el Paraje Natural Municipal “Muela de los Tres Reinos”, con una superficie de 567,26 ha.

En la provincia de Teruel, los LIC (Lugares de Interés Comunitario) más próximos al área del proyecto son “Loma de Centellas” de 916,8 hectáreas y la “Sierra de Javalambre” de 53.223 hectáreas. En ambos casos, parte de su superficie se localiza en el propio término municipal de Riodeva.

HÁBITATS DE INTERÉS COMUNITARIO

Alguno de los hábitats presentes en la comarca del El Rincón de Ademuz están catalogados como habitas de interés comunitario de acuerdo con la Directiva 92/43/CEE del Consejo, de 21 de mayo de 1992, relativa a la conservación de los hábitats naturales y de la fauna y flora silvestres. En la siguiente tabla se muestran estos hábitats.

Tabla 3: Listado de hábitats de interés comunitario presentes en El Rincón de Ademuz (Valencia). Dónde (*) Hábitats prioritarios. Fuente ICV. Elaboración propia.

HABITAT	DESCRIPCIÓN
1430	Matorrales halonitrófilos (Pegano-Salsoletea)
8210	Pendientes rocosas calcícolas con vegetación casmofítica
5210	Matorrales arborescentes de Juniperus ssp.
6110	Prados calcáreos kársticos o basófilos del Alysso- Sedion albi
92A0	Bosques galería de Salix alba y Populus alba
6220	Zonas subestépicas de gramíneas y anuales de Thero- Brachypodietea
9340	Encinares de Quercus ilex y Quercus rotundifolia
9560*	Bosques endémicos de Juniperus ssp.
9530*	Pinares (sud-) mediterráneos de pinos negros endémicos
4060	Brezales (y matorrales) alpinos y boreales (y oromediterráneos)
3250	Ríos mediterráneos de caudal permanente con Glaucium flavum
6420	Prados húmedos mediterráneos de hierbas altas del Molinio- Holoschoenion
9540	Pinares mediterráneos de pinos mesogeanos endémicos
4090	Brezales oromediterráneos endémicos con aliaga
92D0	Galerías y matorrales ribereños termomediterráneos

Destacan los bosques endémicos de *Juniperus* ssp (con presencia de sabinas albares y negrales de porte arbóreo) y los pinares (sud-) mediterráneos de pinos negros endémicos (pinares de *Pinus nigra ssp. salzmanii*), están considerados en dicha directiva como prioritarios, por estar amenazados de desaparición y cuya conservación supone una especial responsabilidad para la Comunidad Europea habida cuenta de la importancia de la proporción de su área de distribución natural.

Riodeva comparte, con el Rincón de Ademuz, la presencia de varios hábitats tales como bosques endémicos de *Juniperus ssp*, los pinares (sud-) mediterráneos de pinos negros endémicos o los matorrales arborescentes de *Juniperus* ssp. Además de estar identificados otros habitas de interés comunitario como son:

Tabla 4: Listado de hábitats de interés comunitario presentes Riodeva (Teruel). Dónde (*) Hábitats prioritarios Fuente MAPAMA. Elaboración propia.

HABITAT	DESCRIPCIÓN
1520*	Vegetación gipsícola ibérica (Gypsophiletalia)
5330	Matorrales termomediterráneos y pre- estépicos
6170	Prados alpinos y subalpinos calcáreos
6210	Prados secos semi-naturales y falcies de matorral sobre sustratos calcáreos (Festuco-Brometalia)

RIESGOS NATURALES

Existen un par de riesgos naturales sobre los que la restauración con la técnica del GeoFluv pueden tener una mayor incidencia como son el riesgo de erosión y el riesgo de inundación

El **riesgo de erosión** es muy elevado debido al tipo de suelo. En la mina se extraían minerales blandos fácilmente disgregables como son el caolín o arcilla blanca. Tras la explotación las condiciones de suelo son muy susceptibles a sufrir erosión. A estas condiciones de presencia de materiales sueltos, modificación del perfil del terreno, ausencia total de vegetación que retenga el suelo, y al régimen de precipitaciones de la región mediterránea con lluvias torrenciales y precipitaciones concentradas en un periodo de tiempo corto aumentan el riesgo de erosión.

Este riesgo de erosión aumenta el **riesgo de inundación**. El material erosionado tiende a sedimentarse en el curso del río, tapona el cauce y como consecuencia aumenta el calado en la llanura de inundación.

Según el PATRICOVA 2015 (*Plan de Acción Territorial sobre prevención del riesgo de inundación en la Comunidad Valenciana)* tiene un riesgo de inundación 3, con una frecuencia de inundación alta (25 años) y un calado bajo (< 0,8 metros). Y también riesgo geomorfológico el cual aumenta aguas abajo.

ANNEX II. TECMINE'S STAKEHOLDERS GROUP

El espectro social del proyecto es muy amplio. Se han identificado tres grandes grupos ya sea por el papel que desempeñan en el desarrollo del proyecto o por el impacto que reciben del mismo. Estos tres grupos son población, administración y sector privado e investigación.

POBLACIÓN

A este grupo pertenecen tanto la población local como el público interesado. Aquella parte de la sociedad a la cual le interesa el uso y disfrute de la naturaleza, la conservación del medio ambiente y el patrimonio natural y/o cultural, como son los clubes deportivos, asociaciones, grupos ecologistas y grupos de custodia del territorio.

La población local es el sector que más se va a ver beneficiada de los servicios ambientales derivados de la estabilización del terreno y la instalación de los nuevos ecosistemas. Ya que son ellos los destinatarios directos de la ejecución de las obras.

Sin embargo, el proyecto repercute el conjunto de la población. Al verse mejorada la imagen de la minería y compatibilizando distintos usos en el territorio.

Hay que señalar que la población local, aun siendo el grupo más afectado, ha tenido escasa intervención en el diseño del proyecto. Al tratarse de un proyecto demostrativo cuyo objetivo es probar nuevas técnicas de restauración que mejoren el control de la erosión, la regulación de los flujos de escorrentía que posibiliten el establecimiento de la vegetación forestal y la integración efectiva de la restauración en el paisaje.

ADMINISTRACIÓN

Este grupo se refiere a las Administraciones públicas tanto Autonómicas como Estatales. Que son las responsables de desarrollar políticas que integren la actividad minera, la gestión forestal y el medio ambiente.

La administración debe asegurar la compatibilidad de la minería con la conservación del medio ambiente, además debe evaluar y aprobar las soluciones técnicas que las compañías mineras proponen para la restauración de las áreas afectadas por la minería.

Concretamente la Administración de la Comunidad Valenciana ha sido la promotora del proyecto LIFE TECMINE, que tiene como uno de sus objetivos la búsqueda de nuevas técnicas que permitan la integración en el territorio y en el paisaje de las explotaciones mineras a cielo abierto.

Este interés de la Administración es consecuencia del trabajo realizado durante décadas del seguimiento de los proyectos de restauración en los cuales se ha podido constatar que los terrenos presentaban signos evidentes de erosión, escasa colonización de la vegetación tanto la introducida mediante revegetación como la espontánea. Dando en general un aspecto de área degradada.

La Administración también va a ser la beneficiaria de los resultados del proyecto LIFE TECMINE, ya que de este se van generar herramientas como guía para la evaluación de los Proyectos de Restauración, así como un mayor conocimiento de las nuevas técnicas y si estas reportan resultados más eficientes.

SECTOR PRIVADO E INVESTIGACIÓN

Este grupo incluye al sector privado relacionado con las explotaciones mineras, la restauración de los espacios degradados como son las compañías mineras, consultorías, ingenierías de montes y de minas, asociaciones de la industria y minería, las asociaciones de profesionales y así como el sector científico como son las universidades, centros de investigación, agencias medioambientales e industriales.

En el caso de proyecto LIFE TECMINE, los socios SIBELCO S.A (empresa minera), la Fundación Centro de Estudios Ambientales del Mediterráneo (CEAM) y la Universidad Complutense de Madrid (UCM) han tenido un papel muy importante en el desarrollo del proyecto. Cuyas funciones abarcan desde el diseño del proyecto, la ejecución directa de las acciones de restauración, la difusión y evaluación de las técnicas empleadas.

Uno de los objetivos del proyecto, es garantizar la transferibilidad y replicabilidad de la técnica del GeoFluv, técnica de restauración geomorfológica. Estando íntimamente ligado a este objetivo el sector privado como la comunidad científica. Ya que mediante el proyecto se dotará de formación técnica y herramientas de apoyo para la identificación de las técnicas más eficientes en la restauración de explotaciones mineras.

En el Plan de Comunicación del proyecto LIFE TECMINE es posible consultar el listado de los agentes implicados.

ANNEX III. IMPACTS AND RESULTS MATRIX

En este anejo se presenta la matriz de indicadores socioeconómicos que se han sido estudiados a lo largo del proyecto. Estos indicadores provienen de las acciones de monitoreo de los socios.

Estos indicadores han sido seleccionados teniendo en cuenta a que es lo que se pretendía estudiar y dar respuesta a los objetivos del proyecto.

Es una matriz bastante extensa y compleja, que ha sido estructurada de forma que se puedan interpretar los resultados de forma general o con más detalle en función de si se pretende obtener conclusiones generales o concretas.

Es por ello que para cada indicador se indica en que **actividad** o actividades de las generadas (6 en total) por el proyecto puede producir impactos. Por un lado, cada indicador pertenece a uno de los 8 **grupos** establecidos y por otro lado está vinculado al **impacto** a medir.

Como información complementaria se explica o recoge el tipo de medido empleado en su medición, la frecuencia en la toma de datos o registros y si el alcance del impacto si es a nivel local, regional, nacional o internacional.

Y por último los resultados obtenidos en las diferentes campañas de muestreo. Destacar que los indicadores son independientes, con lo que no todos han sido medidos en todas las campañas de muestreo.

ANNEX IV. SURVEYS RESULTS

A continuación, se presentan los resultados más destacados de las encuestas tanto de las que están dirigidas a la población cómo las dirigidas a personal de las administraciones públicas y empresas privadas e investigadores.

- Dentro del estudio socioeconómico desde el equipo LIFE TECMINE se han realizado un total de 151 encuestas en la segunda campaña de 2021, estas encuestas se han realizado a la población de la zona, a personal de las administraciones públicas y a técnicos tanto del mundo empresarial como investigadores.

- El 89% de las encuestas valoran positivamente que la administración coordine este tipo de proyectos.

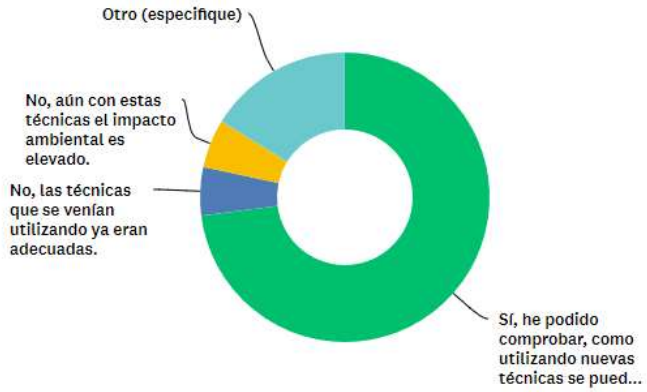
- Un 65% de técnicos e investigadores conocen el proyecto LIFE TECMINE y un 81% de trabajadores de las AAPP

- El 94% cree que este tipo de proyectos dan a conocer la región. La población valora muy positivamente los proyectos europeos, en la anterior era un 68%.

- Tras cuatro años de proyecto, la población valora más las restauraciones del proyecto LIFE TECMINE, frente a las restauraciones tradicionales.

- Muchas personas de las encuestadas entre la población local ya no diferencian las zonas restauradas de las zonas naturales.

- El 73% de los responsables de la administración afirma que el proyecto LIFE TECMINE ha cambiado su percepción, aprecian que estas técnicas dan como resultado restauraciones más exitosas.



OPCIONES DE RESPUESTA		RESPUESTAS	
Sí, he podido comprobar, como utilizando nuevas técnicas se pueden realizar restauraciones más exitosas.		72,97 %	27
No, las técnicas que se venían utilizando ya eran adecuadas.		5,41 %	2
No, aún con estas técnicas el impacto ambiental es elevado.		5,41 %	2
Otro (especifique)	Respuestas	16,22 %	6
TOTAL			37

- El 47,50 % de los técnicos e investigadores afirma que el proyecto LIFE TECMINE ha cambiado su percepción, aprecian que estas técnicas dan como resultado restauraciones más exitosas.