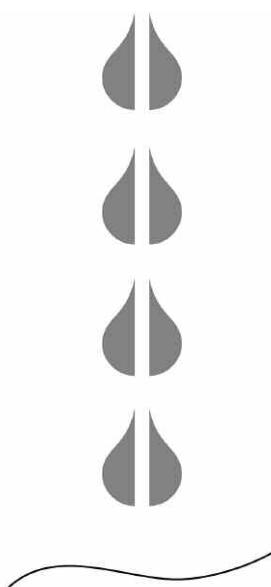


*Api-tourism as a Regenerative Tourism  
Modality against Rural Depopulation  
in Spain*



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## ***Api-tourism as a Regenerative Tourism Modality against Rural Depopulation in Spain***

### ***Highlights:***

1. Api-tourism initiatives positively correlate with increased biodiversity preservation and employment opportunities in sparsely populated areas
2. Api-tourism, as a regenerative tourism model, exhibits greater resilience against climate change.
3. The implementation of api-tourism practices can contribute to the retention and growth of rural populations.

*Abstract:* The study presents api-tourism as an opportunity to promote rural development within the new paradigm of regenerative tourism by promoting sustainable and reparative values and practices. It shows how api-tourism can influence on the preservation of biodiversity, employment, and population in areas of very low population density, such as the *Serranías de Interior* in Spain. A region that covers a vast area of 65,489 km<sup>2</sup> that is highly depopulated, representing 13 % of the country's territory. The text uses the methodological triangulation approach, which involves a bibliographic and bibliometric review of the neologism "api-tourism" and related tourism modalities. The research also analyses the related econometric variables through case studies, in-depth interviews, and participant observation of agritourism operations dedicated to api-tourism. This approach leads to the characterization of a novel regenerative tourism model that strengthens ecosystems' health and contributes to the retention of rural populations. This model is proposed for its greater resilience against climate change, from a social, human geography, and ecological perspective.

*Keywords:* Sustainability, Beekeeping Tourism, Entomotourism, Countryside Development, Multispecies approach.

## ***El apiturismo como modalidad turística regenerativa contra la despoblación en España***

### ***Ideas clave:***

1. El apiturismo beneficia la biodiversidad y empleo en áreas poco pobladas, impulsando iniciativas sostenibles y económicas.
2. El apiturismo, como modelo de turismo regenerativo, muestra una mayor resiliencia frente al cambio climático.
3. La implantación del apiturismo puede contribuir al mantenimiento y crecimiento de la población rural.

*Resumen:* El estudio presenta el apiturismo como una oportunidad para promover el desarrollo rural dentro del nuevo paradigma del turismo regenerativo mediante la promoción de valores y prácticas

sostenibles y reparadoras. Muestra cómo el apiturismo puede influir en la preservación de la biodiversidad, el empleo y la población en zonas de muy baja densidad demográfica, como las *Serranías de Interior* en España. Una región que abarca una vasta superficie de 65.489 km<sup>2</sup> muy despoblada, y que representa el 13 % del territorio del país. El texto utiliza el enfoque metodológico de triangulación, que implica una revisión bibliográfica y bibliométrica del neologismo "apiturismo" y de las modalidades turísticas relacionadas. La investigación también analiza las variables econométricas relacionadas a través de estudios de caso, entrevistas en profundidad y observación participante de explotaciones agroturísticas dedicadas al apiturismo. Este enfoque conduce a la caracterización de un novedoso modelo de turismo regenerativo que fortalece la salud de los ecosistemas y contribuye al mantenimiento de las poblaciones rurales. Este modelo se propone por su mayor resiliencia frente al cambio climático, desde una perspectiva social, de geografía humana y ecológica.

*Palabras clave:* Sostenibilidad, Turismo apícola, Entomoturismo, Desarrollo rural, Enfoque multiespecies.

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## 1. *Introduction*

New forms of alternative and proximity tourism, such as api-tourism, align with the regenerative tourism paradigm, which has gained prominence due to the current climate, ecological, and socio-economic crises. This paradigm takes a relational, ontological, and analytical approach to understanding connections between species and their environment. It is underpinned by a holistic perspective that recognises the interconnectedness and the impact of human behaviour on shaping the world around us. By analysing these relationships, api-tourism can help promote more regenerative forms of tourism that prioritise environmental and social well-being, and in the case of countries like Spain, such forms of tourism are significantly alleviating problems such as aging and depopulation in rural areas (Red Rural Nacional, 2022).

The rapid recovery of international tourism demand has exceeded the expectations of decarbonisation processes and continues to contribute to the growing emission of greenhouse gases. The impact of travel, and particularly air travel, is once again becoming increasingly significant for ecosystems. Authors such as Lenzen et al. (2018) argue that emissions related to tourism activity have not yet been reliably measured and quantify the global carbon footprint produced by tourism activities in 160 countries between 2009 and 2013, demonstrating that it increased from 3.9 to 4.5 GtCO<sub>2</sub>e, four times more than had been estimated in previous studies. This

represents 8 % of the total global greenhouse gas emissions, with transportation, shopping, and food being significant contributors, and with the richest countries being the most polluting. This is not considering the premises about how climate change will eventually affect the survival of many habitats, including tourism destinations and activities, as it is already influencing investments, plans, operations, and the demand for the sector (Scott & Gössling, 2022).

Hence the importance of deepening our understanding of regenerative forms of travel, not only for their impact on ecosystems but also for their potential as a transformative agent within the tourism industry. This is particularly significant in the context of addressing production and consumption habits. Within this context, beekeeping, specifically the activities that promote it, such as api-tourism, are increasingly being recognised as a reparative mode of travel aligning with the principles of a circular economy. Api-tourism correlates with sustainability principles by showcasing environmentally conscious beekeeping practices. The efficient management of resources is discernible in their inception, application, and regeneration within the framework of circular economy processes, given that sustainable beekeeping maximises various products and contributes to essential ecosystem services. Moreover, nurturing local communities, particularly in regions facing significant depopulation, such as the geographical areas sampled in this study, and fostering awareness through educational experiences, contribute to its alignment with the principles of the circular economy. These practices are crucial in accommodating an ecologically conscious form of tourism that addresses the urgent need to conserve bees and their habitats for the survival of terrestrial ecosystems.

The implications of this study on api-tourism extend beyond its regenerative impact on the environment. By providing alternative economic opportunities and promoting sustainable livelihoods, api-tourism can help revitalise local economies and mitigate the challenges posed by depopulation. The symbiotic relationship between api-tourism and rural development presents a holistic approach to address pressing issues related to biodiversity loss, sustainable development, and the preservation of cultural heritage.

## *2. Api-tourism as an agritourism model within the paradigm of regenerative tourism*

### **2.1. The paradigm of regenerative tourism and its indicators**

The paradigm of regenerative tourism is presented as an innovative approach that aims to transform the way the travel industry is developed by promoting the regeneration of the environment, local culture, and economy of tourist destinations (Pollock, 2019; Tham & Sharma, 2023). Unlike conventional tourism focused on economic growth and increased visits, regenerative tourism seeks a balance between the negative impacts of tourism while simultaneously enhancing the positive outcomes at the same time as generating benefits and improving the quality of life of local communities through sustainable business practices and local community empowerment in development processes. According to Pollock (2019), it is important to note that, unlike sustainable tourism, regenerative tourism promotes the repair and improvement of ecosystems, local culture, and the economy, which is a crucial point as it focuses on improving the quality of life and entails long-term benefits for both the environment and local communities. In addition, as pointed out by Bellato et al. (2022), it enhances tourism innovations by integrating practices in local communities, promoting indigenous ancestral knowledge, and ecological processes that enhance the well-being of both human and non-human entities, in addition to addressing regenerative approaches such as climate change, urbanisation, justice, and inequality. As Cave and Dredge (2020) add, regenerative tourism must explore post-capitalist economic forms that do not focus solely on the exploitation of resources, but rather on a social and environmental need to regenerate these systems to prevent their disappearance. In short, the paradigm of regenerative tourism is based on the argument that tourism should be used to ensure that the development of receptive functions proceeds in harmony with interconnected socioeconomic and environmental systems and that these systems are improved and transformed rather than just sustained over time.

It is worth highlighting the importance of indicators in measuring the social, economic, and environmental impact of regenerative tourism, such as increasing the quality of life of the local population and promoting the conservation and protection of the region's cultural heritage. According to Hussain & Haley (2022), indicators should include aspects such as soil and ecosystem health, biodiversity conservation,

the use of clean energy, and the retention of the local population in the area. Additionally, it is also important to include aspects such as the creation of local jobs, the promotion of culture and traditions, the participation of local communities in tourism planning and decision-making, sustainable use of natural resources, and the reduction of the carbon footprint. Becken and Coghlan (2022) add that landscape regeneration and improving water quality are fundamental aspects in measuring regenerative tourism. For these authors, it is vital that the indicators include the restoration of coastal ecosystems, which in turn will promote the development of more responsible tourism (Hussain & Haley, 2022).

All of this leads to tourism planning that maximises and conserves resources, thanks to a disciplinary phase of tourism that has been achieved today, with a public vocation and a holistic perspective such as that advocated by Jafari (2005), recognising the complexity of tourism and the interdependency among its various social, cultural, economic, and environmental facets. Thus, regenerative tourism indicators serve to measure positive impacts and should promote more sustainable and responsible tourism, considering environmental and social aspects, and promoting fair and equitable economic development.

## ***2.2. Api-tourism as a regenerative form of agritourism and the application of the multispecies approach***

The term api-tourism first appeared in academic literature in 2005 (Horn, 2005), and there have been various theoretical approaches to its definition, with Wo (2014) highlighting the concept as a tourism model that connects the traditional art of beekeeping and hive products (ecological, gastronomic, and medicinal) with the visitor. Porter (2020) takes a more global perspective, considering this form of travel - local, regional, national, or international - as having the purpose of interacting with bees and the culture that surrounds them in natural spaces or sustainable settlements such as ecovillages (González-Arnedo et al., 2022) or urban areas. It positions itself as a niche of economic activity and a clear example of what has recently been called regenerative tourism, due to its triple regenerative perspective - environmental, socio-cultural, and socio-economic. Additionally, it is a receptive modality, combined with others that contribute to rural development, such as agritourism, nature tourism, or adventure tourism. These have great incentives for other very strong modalities during periods of health and socio-economic crisis, such as proximity, gastronomic or cultural routes.

Api-tourism fits in the dynamic of an agritourism model within the spectrum of rural tourism, where the tourist offer refers to the activity that takes place in agricultural exploitations, providing visitors with accommodation, food, and the opportunity to become familiar with agricultural work (Barrera, 2006); although the concepts of rural tourism and agritourism are often confused in the description of offers (Constabel et al., 2008). Agritourism is a more modern model within the rural tourism product (Lane & Kastenzholz, 2015) and its central axis of activity offerings are those related to rural agricultural exploitations, such as harvesting, milking, animal care, etc. (Phillip et al., 2010). On the other hand, rural tourism privileges enjoyment and contact with communities, without expressly including agricultural practices in the offer. However, Constabel et al. (2008) add that both modalities are fully complementary and interconnected, providing "rural experiences" and creating opportunities for tourists to have direct contact with agricultural practices in rural areas, such as beekeeping (Appendix, Table 1) or practices such as *World Wide Opportunities on Organic Farms (WWOOFING)* (Lane & Kastenzholz, 2015) where volunteer stays are carried out in rural environments, promoting wellness tourism currently on the rise by combining spa products in high ecological value rural areas.

The socio-economic benefits of agritourism have been studied by authors such as Sayadi & Calatrava (2001) and include: 1) income diversification; 2) job creation and rural settlement promotion; 3) contributing to enrich the role of women and youth in the agri-tourist company; 4) valuing cultural and environmental heritage; 5) promoting the commercialisation of primary production and its direct sale, adding value; 6) promoting associationism; 7) having a direct and indirect impact on various establishments; and 8) expanding local tourism offerings. Etxegarai-Legarreta and Sánchez-Famoso (2022) add that certain types of agricultural activity, and in particular beekeeping and api-tourism, incorporate important environmental benefits, as bees, considered as a supra-organism, provide the vital ecosystem service of pollination, and play a crucial role as bioindicators of disturbances in ecosystems and the environment, making beehives the most precise indicators that exist in the face of current major climate changes and trends.

Thus, there is a relevant consensus in the growing interest in agritourism for the development of rural areas (Gramond et al., 1998; Disez, 1996; Sayadi & Calatrava, 2001; Hall, 2012). Different models of agritourism arise as solutions for the socio-economic and environmental regeneration of rural areas affected by depopulation and desertification (Getz & Page, 1997; González-Arnedo et al., 2022). Their mere presence constitutes a factor of socio-economic survival and resistance against great marginalisation in several rural areas, and development in agricultural activities such as agriculture, beekeeping,



forestry activity, etc. That allow the conservation of landscape, crops and exploitations, cultural heritage of trades and architectures. And likewise, as Sayadi & Calatrava (2001) add, agriculture and livestock have provided since ancient times an abundant ethnological heritage (tools, agricultural machinery, trades and artisan workshops, forging), which in turn serves to create a cultural tourist attraction, and to promote the implementation and survival of traditional trades such as beekeeping, in sustainable coexistence projects such as ecovillages, a minority model of rurality in Spain, and much more the use of beekeeping in these (González-Arnedo et al., 2022).

Another relevant factor of tourism and one that agritourism delves into is the diffusion of native brands and products with *Protected Designation of Origin* (PDO); with the tasting of products extracted and elaborated on the own exploitation being a common activity (Pardellas, 2008), thus obtaining a meeting point between gastronomy, tourism (Boniface, 2003), and culture, while the production, preparation, and consumption of food create identity and cultural heritage claims at the local, regional, national, and international levels (Brulotte & Di Giovine, 2016).

Above all, it is worth highlighting complementary employability, which helps farmers and ranchers diversify their activities within and outside the farm; a way of recovering investments (Getz & Page, 1997). Highly beneficial for the survival of beekeeping activities, which requires a moderate investment and can achieve high profits. Although these are suffering major restrictions in Spain, due to invasive *hymenopteran* species pests such as the Asian wasp, mites such as varroa, viruses such as chronic paralysis, pesticides, and the effects of climate change, highlighting the urgency for the promotion of beekeeping activities.

In response to these issues, the multispecies perspective, as a relational ontology, can be used in api-tourism to understand the interactions between bees, other living beings, and the environment in which they develop. It has been conceptualised by authors such as Kirskey and Helmreich (2010) as a relational, ontological, and analytical approach that seeks to analyse the relationships and connections between different species and their environment. Likewise, authors such as Van Dooren et al. (2016) define it as a theoretical and methodological approach that considers the influence of social, cultural, and political factors and seeks to analyse how different species interact and how these interactions influence life and behaviour of the species involved. This approach is based on the idea that species cannot be understood in isolation but must be understood in relation to other species and their ecological environment. Haraway (2008) adds that this approach recognises the need to understand the coexistence between species and humans in an interconnected world where diseases and species quickly come into contact.

One way to apply the multispecies approach in api-tourism is to observe and analyse the interactions between bees, humans, and the environment in which they develop. This analysis involves studying how apicultural practices affect the behaviour and health of bees, and how the preservation of their natural habitat affects the biodiversity of the area and the sustainability of api-tourism and rural tourism itself. In turn, it can be observed how beekeeping can be integrated into the local community in a sustainable way, and how apicultural practices can contribute to the development of the area without compromising the health of bees and ecosystems. Following a holistic epistemology, which focuses on understanding the whole rather than the parts and recognises that things cannot be understood in isolation, but in relation to others and the environment in which they develop (Morton, 2010), api-tourism is integrated into regenerative tourism with a multi-species approach, as it involves recognising the importance of bees and their role in ecosystem regeneration. In this sense, tourism can promote more regenerative practices by promoting apiculture not only for the mere production of honey and other bee products, but as a crucial species that contributes to plant pollination, afforestation, and biodiversity. In this way, its promotion and full harmony in the coexistence between humans and bees are encouraged.

### 3. *Methods*

The primary aim of this investigation is to substantiate that api-tourism, along with tourism activities specifically oriented towards this motivation, constitutes a nascent tourism product with the potential to make a substantial contribution to the development of sparsely populated geographic regions such as the *Serranías de Interior* in Spain. Thus, a deductive method was used based on the theory derived from holistic tourism paradigms for the analysis of an extensive literature review of terms such as "agritourism," "api-tourism," and "regenerative tourism". After conducting a literature review, a bibliographic analysis was carried out to find an interrelation between the keywords and see their relationship with other forms of sustainable tourism. EndNote was used as a data collector from the search sources *WoS*, *Scopus*, and *Google Scholar*. Following a search parameter with the query: "api-tourism" or "beekeptour" And "tour\*" or "sustaintour" or "regenerat\* tour\*" or "agritour\*" or "rural tour\*", *WoS* showed 42 results, and *Scopus* showed 11. The instructions in *Google Scholar* were different since it does not follow the same search parameters. The

selected search period was from 2015 to 2022, as, based on the literature review, this is where more articles are found relating this term to other terms. For the type of analysis and counting method, co-occurrence analysis was chosen, and the unit of analysis was keywords with a minimum number of occurrences of a keyword of 3, so out of the 41 keywords found, five of them met the requirements.

Although these terms are still scarce in academic literature, bibliometric analysis techniques were used using data collection platforms such as *Web of Science*, *Scopus*, and *Google Scholar*, with the purpose of quantitatively examining and evaluating the existing scientific production in this field. The *VOSviewer* software was used to eliminate duplicates, and a keyword co-occurrence analysis was conducted which allows for identifying thematic relationships and related areas of research. Subsequently, the research applied a combination of inductive reasoning, empirical data collection and analysis, and comparative analysis to investigate the research topic opting for participant observation of api-tourism farms using with in-depth interviews (Table 1), attending courses and visits to beekeeping sites, and choosing three Spanish mountain ranges (Madrid-Segovia, Cuenca, and Guadalajara) known for their difficulty in maintaining a young population, thus allowing for a deeper understanding of the strategies in this regard.

*Table 1.*  
*Technical interview sheet*

Typology of interviewed	Case 1	Case 2	Case 3
Owners	1	2	1
Local people	2	1	2
Experts in the field	2	2	1
Visitors	3	2	1
Total number of interviews	8	7	5

Source: Own elaboration

Although there was a scripted set of questions to guide the conversation, this script could adapt to the long dialogue with the interviewee. The topics varied based on the expertise of the interviewee. For instance, questions posed to beekeepers were more aligned with concerns regarding bee loss and its causes, the management of their apiaries, and their interest in complementary touristic activities. Questions to

farmers and local residents focused on their interest in the presence of bees and apiaries nearby, as well as api-tourism activities and visitor engagement. In contrast, questions directed to visitors were more centred around their experience in the participated activity, their concerns, whether they would recommend it, or if they had ever heard about it before. According to Decrop (1999), employing multiple research methods enhances credibility and reliability. Triangulation allows for comparing qualitative and quantitative data, reflecting participants' perspectives, fostering intellectual interaction, and providing methodological flexibility.

Thus, this study utilised various methods, including first hand data collection from apiaries and api-tourism businesses, along with in-depth interviews with stakeholders (see Appendix, Table 2). This comprehensive approach facilitated a thorough understanding of the subject matter and it will serve as a valuable tool for testing the hypothesis asserting that Api-tourism and associated activities can play a pivotal role in fostering economic development and sustainability in sparsely populated regions, exemplified in this study by the *Serranías de Interior* in Spain.

## 4. Results

### 4.1. Geographical context of the Case: *Serranías de Interior*

Spain faces an alarming rural exodus that has led to depopulation rates of inland villages in favour of large cities such as Madrid, Barcelona, or Valencia. This has resulted in numerous studies since the early 21st century (Burillo et al., 2019; Pinilla and Sáez, 2017; De la Torre, 2019), highlighting the significant population concentration in large cities and coastal areas. This phenomenon hinders the equitable distribution of resources and social services as well as the development of the country.

The term '*Empty Spain*' is used to describe the inland territory, as titled in Del Molino's (2016) work (see Figure 1), which includes the autonomous communities of Extremadura, Castilla León, Castilla-La Mancha, Aragón, and La Rioja. It covers an area of 268,083 km<sup>2</sup>, which is 53 % of the total area of the country (504,642 km<sup>2</sup>), with a population of 7,317,420 inhabitants (15 % of the total population). This means that 15 % of the total population in Spain lives in just over half of the entire territory (53 %) (Table 2).

Table 2.  
Area/Population

Country	Area (km <sup>2</sup> )	Population (mill)	Population/km <sup>2</sup>
Spain	504,645	47.4	94
France	551,685	68	123
Italy	301,336	60.5	196
Germany	357,021	83	233
United Kingdom	242,900	67	275

Source: Own elaboration (data from Instituto Nacional de Estadística de España, 2022).

In other words, 84.4 % of Spaniards live in 47 % of the total area of Spain. Within this 'Empty Spain', authors such as Burillo et al. (2019) characterise another vast area they call the 'Celtiberian Mountains', also known as the 'Southern Lapland', which is a mountainous and cold territory that extends across the provinces of Guadalajara, Teruel, La Rioja, Burgos, Valencia, Cuenca, Zaragoza, Soria, Segovia, and Castellón (Appendix, Table 3). After Lapland, it is the most sparsely populated territory in Europe.

Figure 1.  
Map of "España vacía"



Source: Del Molino, S. (2016, p. 38)

According to the study by Burillo et al. (2019), this area contains up to 1,355 municipalities, of which 631 have fewer than 100 inhabitants, and only six of these have more than 5,000 inhabitants. This results in a global density of 7.34 inhabitants/km<sup>2</sup> (less than 10 is considered a "demographic desert"). The population imbalance and concentration of inhabitants in very few points in Spain (not so much in Portugal) is evident in the country's night-time view (Figure 2) and in the distribution of per capita income, which penalises rural areas in terms of aging population, services, and employment. This, in turn, has led to a higher incidence of wildfires, deforestation, and desertification.

*Figure 2.*  
*Night-time image from the Iberian Peninsula.*



Source: Google Earth. Night Earth. 28 November 2022.

On the other hand, despite the significant depopulation and absence of human life in extensive territories, Spain has a very diverse and abundant fauna and natural wealth, with 16 National Parks and nearly 2,000 Protected Natural Areas. It is the country in the European Union with the most biodiversity and spaces included in the Natura2000 Network (Ministerio para la Transición Económica y el Reto Demográfico [MITECO], 2023). This, together with its coasts, makes it the second country in inbound

tourism behind France, with 71.5 million arrivals in 2022 (UNWTO, 2022). In terms of ecological attractions, a recent study by Iglesias et al. (2021) shows that the northwest area of Galicia (2,900km<sup>2</sup>) is home to one of the world's largest populations of wolves (*Canis lupus*), with an estimated density of (4.99-11 ex. /100km<sup>2</sup>). Enterprises like *Duxemiel* with their "*Iberian Lynx Route + Beekeeper for a Day*" promote api-tourism activities to be combined with other natural activities such as wildlife watching and preservation of endangered Iberian fauna. In addition, current international projects like *Rewilding Europe* (2022) have focused on the *Spanish Highlands* with the purpose of educating the local population and turning it into a sanctuary by trying to reintroduce endangered native fauna such as the Spanish imperial eagle, the Bonelli's eagle, the peregrine falcon, the Iberian lynx, the Iberian wolf, and the brown bear. Livestock and agriculture continue to have a strong presence, but the high levels of biodiversity and low levels of human presence make it an opportunity for nature tourism and wildlife watching throughout much of the extensive territory of these mountain ranges.

At a global scale, apiculture, derived from the Latin words (*Api* - bee, *cultus* - to cultivate), is the result of the need to utilise the products resulting from beekeeping, and it is gaining attention due to the widespread concern about the high mortality of bees. Its causes are very diverse, such as parasites and diseases derived from the *Varroa destructor* mite and the *Nosema ceranae* fungus, indiscriminate use of pesticides in crops, intensive monocultures, desertification, loss, and fragmentation of habitats (Monzón-Lopez, 2020). To these factors, it must be added the abandonment of the countryside, leaving behind a depleted land, ploughed for generations, and plagued by uncontrollable fires, and abandonment traditional trades. Estimates by Greenpeace (2013) suggest that, in the last winters, bee mortality in Europe has been an average of 20 %, with a wide range from 1.8 % to 53 % in different countries.

The archaeological remains of beekeeping are remarkable, such as the rock paintings found in Spain, in the *Cueva de la Araña* in Bicorp, Valencia, which are estimated to date from the Mesolithic period (10,000 BC – 5,000 BC), when, according to several authors (Sepúlveda-Gil, 1986; Roffet-Salque et al., 2015; Kritsky, 2017), beekeeping emerged. It is estimated that the global market for natural honey will register a compound annual growth rate (CAGR) of 5.4 %, with the North American market being the fastest-growing and the Asia-Pacific market being the largest, with China and Turkey currently the main honey producers, while Germany and Japan are among the main importers (Mordor Intelligence, 2022).

Spain has a valuable beekeeping tradition. According to the latest beekeeping census of the European Union (EU) for the period 2020-2022, Spain has a total of 28,786 beekeepers, accounting for 4.4 % of the total (Ministerio de Agricultura, Pesca

y Alimentación [MAPA], 2023). Regarding the hive census, as of April 2022, the total number of hives is 3,097,647, representing a slight decrease of 1.4 % compared to 2021. (Ministerio de Agricultura, Pesca y Alimentación [MAPA], 2023). Of these, 80 % belong to professional beekeepers (Table 3) - in Spain, a beekeeper is classified as professional when managing over 150 beehives, as per the European Parliament's widely accepted definition, reflecting industry standards for larger-scale production management. Spain has 36,494 beekeeping operations representing a 0.6 % increase compared to the previous year. Approximately 17 % of these operations are classified as professional. The number of beekeeping operations in Spain has increased by approximately 52 % during the period 2010 to 2022. The high level of professionalization in Spanish apiculture is noteworthy, as it is the highest in the EU.

*Table 3.*  
*Number of professional beekeepers in Spain*

	Total	Professionals	Non-Prof.	% Prof.	% Non-Prof.
Beekeepers	28,786	6,480	22,306	22.51 %	77.49 %
Beehives	3,097,647	2,426,871	670,775,8	80 %	20 %
Apiaries	36,494	5,880	30,614	17 %	83 %

Source: Ministerio Agricultura, Pesca y Alimentación [MAPA] (July 2023).

Latest data from the European Commission, as of 03/01/2021, indicated that Spain held the foremost position in the number of beehives, holding 2,953,000 beehives, constituting 15 % of the total beehive census in the European Union for the year 2021 (Ministerio de Agricultura, Pesca y Alimentación [MAPA], 2023). Following Spain were Romania with 2,353,000 beehives (12 %) and Poland with 2,013,000 beehives (9.3 %). Examining the distribution of beehives per autonomous community in 2021, Extremadura emerged as the region with the highest beehive count, encompassing 22 % of the national population. Subsequent regions included Andalucía (20 %), Castilla y León (14 %), and Castilla-La Mancha (7 %) (Ministerio de Agricultura, Pesca y Alimentación [MAPA], 2023). These statistics underscore the substantial presence of professionals engaged in beekeeping in Spain, particularly in the regions pertinent to this study.



The honey production in Spain reached 34,065 tons in 2021 (latest available data from the Ministerio de Agricultura, Pesca y Alimentación [MAPA], 2023). Following a gradual recovery in production until the year 2015, a downward trend was re-established until the upturn in 2018. However, during the 2019 and 2020 campaigns, the downward trend in Spanish honey production resumed. It rebounded in 2021 with an 11.6 % increase in recorded production compared to the previous year. Lack of official data for the 2022 campaign has led to reports from industry sources indicating a decline in production. This decline is attributed to multifactorial issues affecting the apiculture sector in Spain. The decrease is primarily due to adverse weather conditions and the poor condition of beehives at the beginning of the productive stage.

As can be observed, there are numerous benefits derived from apiculture, with Spain standing out as a significant player in this sector. Nevertheless, it is worth noting that, as indicated by Daberkow et al. (2009), 90 % of the services rendered by these insects to populations revolve around the crucial ecosystem service of pollination. While honeybees (*Apis mellifera*) have been "domesticated" for honey production since the Mesolithic period, Kritsky (2017) posits that it is in recent decades when beekeeping has transitioned into a professional pursuit. Hence, both apiculture and api-tourism assume vital significance in this context.

#### **4.2. Bibliographic review and bibliometrics of api-tourism**

The results of the bibliographic review show a limited sample of academic articles that address the concept of api-tourism, although there is a high consensus on the topics addressed. The offer of api-tourism worldwide has been reflected in studies in line with *entomotourism* (i.e., tourism focused on insects) and the observation of *micro-fauna* within a framework of activities related to nature tourism, rural tourism, and agritourism (Horn, 2005; Hall, 2012; Shiffler, 2014; Wo , 2014; Thapa et al., 2018; Lemelin et al., 2019; Valdiviezo, 2019; Lemelin, 2020; Torres et al., 2020).

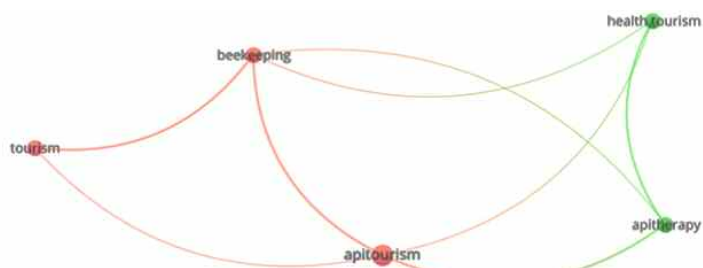
The activities related to this tourism activity have a common denominator of creating awareness about the vital importance of these insects for humanity (Wo , 2014; Schouten et al., 2019; Patel et al., 2020; González-Arnedo et al., 2022). There are several activities found in academic literature on this type of tourism, with Slovenia currently offering the most (Arih & Korosec, 2015), and a growing trend of api-

experiences in other countries such as Turkey and Ukraine (Topal et al., 2021), which some categorise as creative tourism (Cesur, 2021), whether it is local (Lemelin, 2020) or international (Porter, 2020). The most recognised activity is visiting and participating in an apiary and observing beekeepers at work (Wo , 2014; Shiffler, 2014; Arih & Korosec, 2015; Porter, 2020). In addition, there are a variety of activities such as visiting apiculture museums (Spevak, 2012), scientific events, apiculture safaris (Horn, 2005), observing the risky honey collection method in countries like Nepal (Thapa et al., 2018), famous honey routes such as Slovenian *ApiRoutes* (Arih & Korosec, 2015; Slovenian Tourism Board; 2022) or the *La Ruta de la Miel* in Chile (Shiffler, 2014), and large events and festivals such as the *International Apiculture Fair in Pastrana*, Spain or *The Logan Honey Festival* in Taiwan (Lin & Yeh, 2013).

Several authors claim that the development of api-tourism presents an important opportunity to activate rural areas that are at risk of depopulation in many cases, create job opportunities for young people, and promote the culture and tradition of the region in question (Wo , 2014; Lemelin, 2020; Torres et al., 2020). In addition, as Wo (2014) and Ghosh et al. (2020) point out, it provides important educational, touristic, pro-well-being, and social value. As more recently demonstrated by González-Arnedo et al. (2022), it presents a regenerative factor. As Šuligoj (2021) and Yapici (2021) add, it represents a type of tourism linked to tradition, sustainability, and responsibility, making it fully compatible with the three fastest-growing tourism trends today: well-being, health, and sustainability.

Co-occurrence results derived from the bibliographic analysis show a higher number of links with other keywords within the selected time with terms such as Api-tourism, beekeeping, apitherapy, health tourism, and tourism. (Figure 3). Thus, from an academic perspective, these findings could reveal a research gap indicating a need for greater attention and exploration in this area. They could also highlight a lack of understanding regarding the benefits, impacts, and challenges associated with api-tourism, which may motivate scholars to investigate and develop robust conceptual and theoretical frameworks in this emerging field. From a practical standpoint, the findings could underscore the need to promote and support further research on api-tourism, in order to provide a solid knowledge base for tourism professionals and stakeholders involved in the planning and management of sustainable and regenerative forms of tourism.

Figure 3.  
Map of co-occurrence of keywords in VosViewer



Source: Own elaboration.

#### 4.3. Case studies of api-tourism farms in the 'Empty Spain'

For the selection of the three case studies, the following considerations were taken into account: 1. *Location*: the municipalities that carry out these activities had to be within the study area, the interior mountain ranges; 2. *Representativeness*: these localities had to be a representative sample of the total sample, meet the high levels of depopulation mentioned, and conform to a series of landscape characteristics such as altitude and abundant flora and fauna; 3. *Distance and accessibility*: the distance in kilometres to the nearest airport/port/train station and accessibility by road/path to the apiaries were considered; 4. *Distinction*: The three case studies have different characteristics, although all three are located in towns at a high altitude above sea level - *Braojos de la Sierra*: 1,192 meters above sea level; *Valverde de los Arroyos*: 1,255 meters above sea level; *Buenache de Alarcón*: 817 meters above sea level. The towns of *Braojos* and *Valverde* have a more mountainous landscape and culture, which is reflected in their people, customs, climate, and cuisine, while *Buenache de Alarcón* has a more moulded terrain with a milder climate and different customs. These differences in the case studies are of interest to this study, as they represent a useful method for analysing different tourist experiences, their problems, identifying strengths and weaknesses, and proposing strategies for improvement.

In the cases studied in Spain and a good part of other territories within the mountain ranges of the interior of the peninsula, professionals working in api-tourism have acquired their knowledge from teachings and experiences with their grandpar-

ents, perfecting the activity of beekeeping with modern technology and adding to this and api-tourism, a global education thanks to the ease of accessing other experiences through the Internet. They are often employed in multiple occupations such as education and other services, diversifying their activities in the beehive, promoting this ancestral profession, and promoting the natural attractions of the area by conducting tourism activities – api-tourism.

The first case study during the mid-tourism season, during the last week of September 2022, took place in the town of *Braojos de la Sierra*, a municipality located in between the Community of Madrid and Segovia, which in 1930 had a population of 454 inhabitants (INE, 2022) and which has decreased to a total of 218 in the latest data offered in 2021. The population consists of pensioners, livestock farmers, and young people who work in neighbouring populations. Despite its stagnant population, the municipality's companies have increased from 14 to 17 in recent years, according to data from the National Institute of Statistics. Unemployment has gone from 17 % in 2012 to 6 % in 2022.

The api-tourism company *Miel El Bardal de Braojos* offers experiences for both adults and children. During the tour, tourists visit the cultural centre of the town where they are first given an educational talk about the world of bees, also adapted for younger children, and then transported to the apiary (Figures 4 and 5). Once there, visitors put on the beekeeping suit and through participant observation, they interact with the beekeeper and discover this artisanal profession. Visitors participate live in the tasks and help maintain the apiary. This part lasts approximately one hour. The tour then takes visitors back to the cultural centre, where they will be given a tasting and the possibility of acquiring bee products. Access to the space where the activity takes place is by road, with connections by highway from Madrid (approx. 50 min). Once in the town, visitors walk to the apiary and in the case of disabilities, the beekeeper provides transportation.

Figures 4 (left) and 5 (right).  
Beekeeper working at the apiary and tourists observing.



Source: Own elaboration (Authors, 2022).

The second case study took place in the town of *Buenache de Alarcón* and fieldwork was carried out in high season during the first week of September 2022, in the province of Cuenca. It is a municipality in the community of Castilla-La Mancha, which in 2022 had a population of 454 inhabitants (7.47 inhab/km<sup>2</sup>). However, despite this low population density that exceeds the minimum to be considered a desert area, the unemployment figures have improved considerably in the last ten years, going from 26.44 % in 2012 to 16.23 % in 2022, a 10 % decrease, with 31 unemployed people. Maintaining its economic activity with only one company less than ten years ago (35 registered according to INE data).

The tour begins with a meeting at the main square of the town, where visitors are introduced to the world of these insects and the hidden processes of the hive, including their biology, castes, relationship with the environment - through pollination - and interactions within the hive. At the end of the day, a cheese and honey pairing tasting is included. Sometimes, this activity is combined with a guided cultural tour of the nearby town of Alarcón, where the Parador de Alarcón is located, one of the 98 public hotel chains in the Iberian Peninsula. The hotel chain selects establishments located in emblematic buildings for their historical, artistic, or cultural interest, many of which are in inland Spain.

Lastly, the third case was developed in the town of *Valverde de los Arroyos*, Guadalajara. According to the latest census, the town had 92 inhabitants in 2021 (1.89

inhab/km<sup>2</sup>), almost the same as ten years ago, 90. The population has increased its activity rate, going from 8 to 13 more companies in 2022 than in 2012, and from 11 % unemployment in 2012 (19 % in 2013) to 0 % unemployment in 2022. The municipality is located in the *North Sierra of Guadalajara*. It stands out for its lush green valleys, waterfalls such as the *Despeñalagua falls* (120m height), and its high peaks, such as *Pico Ocejón* (2,046 m), as well as the use of black architecture in its constructions, with the use of local materials such as slate. The fieldwork took place on October 1, 2022, during the low season of tourism, covering the *Ruta de la Miel y Flora* that starts from the municipality, showing different types of fauna and flora of the area, as well as centennial apiaries placed along the way. With participant observation of the "beekeeper for a day" experience, where the apicultural universe and tourists were interacted with for several days, conducting twenty in-depth interviews with activity promoters, local people, beekeepers, and tourists.

#### **4.4. Api-tourism in depopulated Spain: profile and elements for regenerative repopulation**

Throughout the different tourist areas and seasons, a sociological profile of visitors (Appendix, Table 2), with a high rate of feminisation, a high level of education, and university-level positions is observed. Visitors engage in proximity tourism, while beekeepers are residents and floating population who come from the same province where the activities have been developed or nearby, not exceeding 150 km of distance. The objectives of the interviewees coincide in most cases, with the main motivation being a greater knowledge of the world of bees (90 %), acquiring more knowledge about flowering and fauna in general (7 %), and other reasons (3 %). It is noteworthy that the main reason for this activity is a great awareness of the role of bees in the conservation of the ecosystem, as well as the local culture and traditions of the place where it takes place.

The results derived from the case studies reported that api-tourism as a regenerative tourist activity represents an effective factor for ecological education and motivation for children, with the participation of children between the ages of 5 and 12 being common. In response to the question posed to the visitors, local people and experts in the field alike, "Do you know about api-tourism? Have you ever practiced api-tourism activities?" (e.g., in the experience "Beekeeper for a Day"), up to 95 % of the interviewees were unfamiliar with the concept but showed sympathy, seeing it as a new and unknown concept, as there are still few companies that offer it.

The passion of beekeepers for what they do and their professionalism in explaining the topics covered has been demonstrated, for example, in the description of the honey extraction process. In response to a question asked of a young beekeeper, 30 years old with a university education, in the municipality of *Buenache de Alarcón* (Appendix, Table 2 - E13):

*"Do you manage your beehives alone, or do you need help?" - "I usually manage my fifteen beehives alone, which sometimes varies depending on the year and the season. In winter, there are usually hive deaths, which we recover in the spring with flowering. In this area, the terrain is cold. My beehives are at an altitude of over 900 meters, and here in Cuenca, winters are long and cold, so I must feed them with artificial food in the coldest months of the year, where there is barely any flowering. I do all this annual maintenance work alone, and I am very satisfied with it. On collection days, another person usually helps me, my father normally assists me the most.*

One of the main concerns expressed by both beekeepers and tourism activity promoters is the lack of knowledge visitors have about bees and related safety issues. Many times, visitors participating in beekeeping experiences are unaware of their potential allergic reactions to bee venom, which can be a problem due to the remote locations of the villages where these activities take place and the distance to nearby hospitals. Surprisingly, visitors seem to show little fear towards these insects and even less so after the experience, regardless of their gender, age, education, or occupation (Appendix, Table 2 - E2, E3, E4, E9, E10, E14, E17, E18) these being as indicated by the question *"Has your fear of these insects, if any, decreased after this experience?"*

Another common concern raised by the question posed to the beekeepers (Appendix, Table 2 - E1, E6, E13, E19, E20) is the high mortality rate of bees, as shown by the question *"What annual percentage of bee mortality do you experience? What is the main cause you have observed?"*. Beekeepers report losing up to 40 % of their bee populations each year. Climate change is also a source of worry for beekeepers, as extreme temperatures such as the ones experienced in summer 2022 in Spain, exceeding 40°C in many inland areas, directly impact desertification of the terrain and flowers and, consequently, the mortality of bees.

However, an opportunity is observed in the fact that visitors show a growing interest in natural environments, large spaces, and non-mass tourism in inland areas, which is also linked to a trend of remote work, where visitors extend their stays and even opt to buy second homes in rural locations. This promotes greater environmental awareness, enhances local businesses that are reinforced by this influx of visitors,

contributes to well-being and healthy living thanks to the products offered by the beehive, and promotes equality between women and men in both the tourism and livestock-apiculture sectors. In addition, beekeepers have emphasised the low initial investment required for apiculture and that the natural honey obtained is a product that does not expire, which represents a great opportunity for local youth entrepreneurship and thus avoiding rural exodus.

Overall, the results suggest that api-tourism as a model of agritourism and nature tourism can be an opportunity to develop a niche of regenerative tourism due to its low intensity and visitor density, thus avoiding large crowds. Additionally, api-tourism is observed to care for and respect the natural environment where it takes place, promoting biodiversity regeneration and re-naturalisation of its environment, and is sustainable over time due to its low waste generation impact and does not alter local ways of life, since it uses endogenous resources and reinforces its culture by using local accommodation and food. This in turn makes areas in danger of abandonment, such as the study villages, have another opportunity to be revitalised by attracting both tourists and beekeepers of both sexes. Interviews with farmers working in the village (Appendix, Table 2 – E5, E11, E15) using open-ended questions such as "*Do you think that beekeeping improves the quality of fruits and vegetables?*" also showed a positive factor in implementing api-tourism businesses in the area, as their fruit and vegetable production will be increased thanks to pollination, leading to an increase in their profits.

Therefore, findings suggest that api-tourism and related activities can play a pivotal role in the economic development and sustainability of sparsely populated regions such as the *Serranías de Interior* in Spain. This study unveils significant positive impacts of beekeeping and related tourism activities in these regions. A noticeable surge in local activity was observed, coupled with an increase in job creation within the cases exemplified. Environmental preservation also received a boost, with sustainable practices adopted by beekeepers and heightened environmental awareness among visitors. Additionally, close ties were identified between local residents and visitors, contributing to a more cohesive community. Participation in api-tourism activities exhibited a growing interest and acknowledgment of this form of tourism. Concerns related to bee loss and apiary management were common themes discussed among interviewed beekeepers. Furthermore, the results underscore the positive perception of visitors toward the experience, with a high recommendation rate and an increasing awareness of the significance of apiculture and environmental preservation.



Thus, the results suggest that api-tourism, as a regenerative tourism model, has a triple beneficial factor - environmental, socio-economic, and cultural - contributing to the regenerative development of natural, cultural, and human heritage, in addition to being complementary to other local production modes and services related to agriculture, livestock farming, forestry, and artisan trades.

## 5. *Discussion*

Tourism plays a crucial role in diversifying and strengthening local economies to favour repopulation. However, it should be noted that such projects face difficulties such as the terrain, which makes it difficult to access with a very cold climate for many months of the year. In addition, these populations lack educational centres, and students must travel several kilometres each day to municipalities with larger populations where they can receive education at rural training centres. Other variables derived from the population decline include insufficient services such as proximity commerce, regular transportation, banks, workshops, travel agencies, etc., which push inhabitants towards migration to large cities. On the other hand, considering the recent health crisis, a growth in a new permanent population has been detected, opting to reside in rural areas motivated by the trend of remote working, seeking job opportunities more connected with environmental sustainability, or creating a space of tranquillity for those who are approaching retirement. As well as floating, derived from proximity tourism and second homes, lovers of the landscape and natural benefits exemplified by these inland mountain ranges, representing an opportunity for investment and expansion of api-tourism activities. Additionally, the opportunity arises to conduct education and awareness programs about the importance of bees. Visitors participate in educational programs about the importance of these beings, their role in the conservation of local ecosystems, and the importance of this interrelation with humans.

Sustainable practices of tourism and environmental conservation projects generate a beneficial cycle that regenerates local economies and can be a clear example of circular economy processes in inland villages. Furthermore, the results have suggested that api-tourism presents opportunities for creating authentic tourism experiences that enhance employment and reparative tourism development. These activities, based on beekeeping and conservation of bees and the environment, promote a series

of employment opportunities aligned with education, rural life, thematic hiking, farm accommodation and gastronomic products, and natural cosmetics, within the complementary logic of ecological, educational, and proximity tourism (Table 4).

**Table 4.**  
*Activities in Agri-touristic exploitations.*

Educational and cultural heritage preservation	Observation and participation	Recreational
Canning workshops	Observation of agri-industrial processes	Rural wildlife and environment photography
Traditional crafts and trades workshops	Observation and participation in agricultural tasks and crops	Horseback riding tours
Making meals from scratch (cheeses, honey, salads, mushrooms, etc)	Tastings and enjoyment of local gastronomy	Fishing activities
	Meals on farms or livestock farms	

Source: Own elaboration.

Among the opportunities and new business niches related to api-tourism and regenerative tourism, the results show how there is increasing development of tourism products based on beekeeping. Tour operators are starting to collaborate with beekeepers to create tourism experiences that involve sustainable beekeeping practices. As shown, activities include visiting ecologically managed beehives, honey production workshops, creating suitable habitats for bees, promoting sustainable agricultural practices, developing tourism products related to natural cosmetics and gastronomy, supporting bee conservation projects and other apicultural products, and local product tastings. Also, creating thematic hiking trails focused on beekeeping, involving tourism experts, local guides, and beekeepers, can promote exploration of bee habitats and production sites. Examples include the *Ruta de Miel y Flora* in Guadalajara, Spain, and sightings of wild bees, *Honey hunting*, in Nepal. Such activities foster regenerative systems and conservation efforts through organisations like *Fundación Amigos de las Abejas*, *Apimondia*, and citizen networks in natural parks and reserves like *Acortar* in Colombia.

Spain, particularly the region under examination in this study, presents substantial potential for the establishment of sustainable apiculture and activities

related. This potential stems from its expansive tracts of sparsely populated areas, coupled with the professionalisation of the apicultural sector, an abundance of melliferous flowers, and favourable climatic conditions. This unique confluence of factors underscores the significance of api-tourism development in Spain, drawing special attention to the interplay of these elements.

## 6. *Conclusion and future directions*

The literature review and subsequent bibliometric analysis highlight the dearth of studies on api-tourism, with the initial publications being relatively recent. It is indicated that api-tourism holds substantial potential for integration with other forms of tourism, such as wellness activities, nature-based experiences, traditional crafts, farm visits, gastronomic tours, and wildlife observation routes, which have garnered significant attention in academic and professional spheres. The bibliometric analysis, although constrained by the limited availability of articles for analysis, remains an intriguing avenue for exploration due to the discernible trends in relevant terms. While the restricted pool of articles may undermine the overall robustness of this study, the emergence of significant terms related to the research topic provides valuable insights. These terms serve as indicators of prevailing discourse and highlight focal points within the research community. Thus, despite its inherent limitations, bibliometric analysis can still provide meaningful glimpses into the patterns and themes that shape scholarly discussions and contribute to a comprehensive understanding of the subject matter. Also, there are notable limitations stemming from the exploratory nature and the restricted representativeness of both interview and stakeholder samples (20 in total). These constraints underscore the novelty of such activities and the limited participant pool. Furthermore, the study is subject to pronounced seasonality. Progress in this line of inquiry demands more extensive quantitative data, including larger respondent samples from both demand and supply perspectives, and an assessment of the willingness to sustain engagement in these activities.

Regenerative tourism emerges as a promising approach to address the challenge of rural depopulation. This form of tourism seeks not only to promote economic development in rural areas but also to regenerate social and cultural bonds, preserve natural and cultural heritage, and foster sustainable practices. By focusing on the revitalisation of rural communities and the valorisation of local resources,

regenerative tourism has the potential to generate employment, drive the local economy, and improve residents' quality of life. By offering authentic experiences and connecting visitors with rural life, a deeper understanding and appreciation for traditions, nature, and local identity are fostered. In this way, regenerative tourism becomes a powerful tool to combat rural depopulation by strengthening communities and providing opportunities for sustainable development.

Sustainable and regenerative tourism models that respect the environment are becoming essential and of great interest for promoting values and attitudes towards environmental protection and mitigating the effects of climate change. Api-tourism, as a tourism activity, has great potential to contribute to regenerative tourism; similarly, as support for campaigns for the preservation of beekeeping and other activities essential to the health of ecosystems. Furthermore, as shown in this study, api-tourism can play a vital role in population retention. By offering unique and immersive experiences centred around beekeeping, it attracts visitors to rural areas and helps create a sustainable source of income for local communities. This, in turn, helps counter the trend of depopulation by providing economic opportunities and incentivising residents to stay in their hometowns.

Api-tourism not only showcases the importance of bees and their role in the ecosystem, but also highlights the cultural heritage and traditions associated with beekeeping. Through educational activities, visitors gain a deeper appreciation for rural life, fostering a sense of connection and support for these communities. Additionally, api-tourism acts as a catalyst for rural development, revitalising local economies, and contributing to the long-term retention of population in these areas. Thus, this model exhibits significant potential for encouraging population growth and supporting communities in vast territories that are currently grappling with near-complete depopulation, as observed in Spain.

Api-tourism has emerged as a distinct niche market within the tourism sector, presenting significant potential and serving as a valuable complement to agriculture and agro-tourism activities, and as seen in this study, together with beekeeping have the potential to become a factor that contributes to the retention of young population in the most depopulated rural areas, especially in inland mountain ranges, and promote the creation of new infrastructures, providing rural employment and complementary modalities such as proximity tourism, educational and ecological tourism. Nevertheless, further research is essential to ascertain the economic and social viability of this tourism niche as a sustainable solution for depopulated rural areas in Spain. Activities related to api-tourism in all its forms can not only guarantee the maintenance of the environment, thanks to the pollinating function of bees, but

they can also go beyond and promote a regeneration of towns and villages in real danger of abandonment and become a local opportunity that requires little investment and can be related to other modalities of tourism, and furthermore, provide a direct and indirect impact on the economy and rural society.

In a grim outlook, the current extinction of numerous species hangs over our planet. The devastation of ecosystems, habitat loss, and climate change propel us towards a precipice where the diversity of life is at stake. The imperative need to develop regenerative products, adopt sustainable practices, and restore biodiversity across the globe is widely recognised. This article represents a compelling call to authors to develop regenerative solutions that contribute to the restoration of biodiversity, highlighting the imperative nature of these efforts and the potential for transformative change. The example of api-tourism serves as an inspirational model that showcases the feasibility and benefits of sustainable practices, thereby inspiring the emergence of additional initiatives to combat pollution and environmental degradation. The significance of this work lies in its call to action, urging the academic community to adopt a proactive and collaborative approach in the pursuit of solutions that promote biodiversity regeneration and lay the foundation for meaningful and transformative change.

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## Appendix

*Table 1. Activities in api-touristic centres with regenerative character. Own elaboration.*

### **Educational and natural and cultural heritage preservation.**

- Beekeeping workshops for volunteers to raise awareness about reforestation, fighting desertification and climate change.
- Courses for students and tourists on ecosystems, the world of bees, beekeeping, expanding knowledge on biodiversity and resilience and practicing regenerative habitat activities.
- Training in making meals from scratch (honey, mead, pastries, etc.) and derivatives of wax, and other medicinal and cosmetic products with honey, pollen and propolis.
- Occupational and continuing training for jobs related to beekeeping and api-tourism.

### **Observation and participation in experiences and purchases that promote local development.**

- Observation of beehives, bee life and beekeeping.
- Observation and participation in tours that combine apitourism with reforestation to promote bee proliferation and mitigate the carbon footprint in the habitat of tourist activity.
- Tastings and enjoyment of local gastronomy derived from honey and mead.
- Themed establishments, natural interpretation centers and local activities around the value of circular and regenerative economy: bees, recycling, repair and reuse.
- Purchase of products derived from beekeeping and other organic agriculture foods to supply the family basket in proximity tourism.

### **Recreation and recovery of the social and natural environment.**

- Touring honey routes with visits to apiaries, purchase of derived products, and cultural heritage, so that resources and tourist attractions are shared and tourism impact on the environment is reduced.
- Wildlife photography of observation of bees, flora, and fauna (e.g. the Alcarria honey and lavender route).
- Plogging: combining outdoor exercise (hiking, cycling, kayaking, running, etc.) with litter picking to recover the cultural and natural environment.
- Honey harvesting as a spectacle (\*Nepal).

*Table 2.*  
*Characteristics of the interviewed individuals and their work context. Own elaboration*

Code	Gender	Age	Education	Occupation	Municipality of Residence
E1	Male	61	Secondary	Beekeeper	Braojos de la Sierra
E2	Male	45	Secondary	Plumber	Buitrago de Lozoya
E3	Women	40	High School Diploma	Administrative staff	San Sebastian de los Reyes
E4	Women	56	High School Diploma	Administrative staff	Alcobendas
E5	Male	35	High School Diploma	Farmer	Braojos de la Sierra
E6	Women	37	Bachelor's Degree	Beekeeper	Braojos de la Sierra
E7	Women	45	Bachelor's Degree	Teacher	Madrid
E8	Male	37	Master	Engineer	Madrid
E9	Male	49	Secondary education	Publicist	Alcala de Henares
E10	Male	48	Secondary	Waiter	Alcala de Henares
E11	Male	65	High School Diploma	Farmer	Braojos de la Sierra
E12	Women	32	Bachelor's Degree	Administrative staff	Cuenca
E13	Male	30	Bachelor's Degree	Beekeeper	Buenache de Alarcón
E14	Women	63	Secondary education	Administrative staff	Guadalajara
E15	Women	35	Bachelor's Degree	Farmer	Cuenca
E16	Women	36	Bachelor's Degree	Waiter	Guadalajara
E17	Women	37	Bachelor's Degree	Administrative staff	Madrid
E18	Male	38	Bachelor's Degree	Administrative staff	Madrid
E19	Women	39	Bachelor's Degree	Beekeeper	Valverde de los Arroyos
E20	Male	65	Secondary education	Beekeeper	Buenache de Alarcón

**Table 3.**  
*Variation of the population in provinces within Serranías de Interior (data from Instituto Nacional de Estadística de España, 2022). Own elaboration.*

PROVINCE	Total						Men						Women					
	2021	2020	2019	2018	2017	2016	2021	2020	2019	2018	2017	2016	2021	2020	2019	2018	2017	2016
SORIA	88,747	88,884	88,636	88,600	88,903	88,803	44,920	44,927	44,814	44,800	44,986	44,800	43,827	43,957	43,822	43,800	43,917	43,800
ZARAGOZA	967,452	972,528	964,693	954,811	953,486	953,486	473,354	475,602	471,539	466,839	466,357	466,839	494,098	496,926	493,154	487,972	487,129	487,129
GUADALAJARA	265,588	261,995	257,762	254,308	253,310	253,310	134,624	132,839	130,534	128,854	128,341	128,854	130,964	129,156	127,228	125,454	124,969	124,969
TERUEL	134,545	134,176	134,137	134,572	135,562	135,562	68,287	67,975	67,927	68,060	68,684	68,060	66,258	66,201	66,210	66,512	66,878	66,878
CUENCA	195,516	196,139	196,329	197,222	198,718	198,718	98,118	98,430	98,542	98,999	99,821	98,999	97,398	97,709	97,787	98,223	98,897	98,897
VALENCIA	2,589,312	2,591,875	2,565,124	2,547,986	2,540,707	2,540,707	1,267,961	1,269,466	1,256,350	1,248,927	1,246,025	1,248,927	1,321,351	1,322,409	1,308,774	1,299,059	1,294,682	1,294,682
BURGOS	356,055	357,650	356,958	357,070	358,171	358,171	177,920	178,578	178,230	178,337	178,919	178,337	178,135	179,072	178,728	178,733	179,252	179,252
LA RIOJA	319,796	319,914	316,798	315,675	315,381	315,381	157,823	157,835	156,179	155,758	155,508	155,758	161,973	162,079	160,619	159,917	159,873	159,873
SEGOVIA	153,663	153,478	153,129	153,342	154,184	154,184	77,071	77,033	76,813	76,979	77,443	76,979	76,592	76,445	76,316	76,363	76,741	76,741
CASTELLON	587,064	585,590	579,962	576,898	575,470	575,470	291,415	290,799	288,077	286,359	285,467	286,359	295,649	294,791	291,885	290,539	290,003	290,003
TOTAL	5,657,738	5,662,229	5,613,528	5,580,484	5,573,892	5,573,892	2,791,493	2,793,484	2,769,005	2,753,912	2,751,551	2,753,912	2,866,245	2,868,745	2,844,523	2,826,572	2,822,341	2,822,341

## *Authors' contribution*

	Mario Izquierdo Gascón	Ángeles Rubio Gil
Conceptualization	60 %	40 %
Data curation	70 %	30 %
Formal analysis	70 %	30 %
Funding acquisition	0 %	0 %
Investigation	80 %	20 %
Methodology	50 %	50 %
Project administration	60 %	40 %
Resources	50 %	50 %
Software	50 %	50 %
Supervision	40 %	60 %
Validation	50 %	50 %
Visualization	80 %	20 %
Writing – original draft	70 %	30 %
Writing – review & editing	90 %	10 %

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