Perception & representation of stakeholders

WP3: ASSESSING SOCIO-ECONOMIC CO-BENEFITS, BARRIERS, AND INCENTIVES FOR POLLINATOR RESTORATION
TASK 3.1: ASSESS THE PERCEPTION OF POTENTIAL ADOPTERS OF RESTPOLL RESTORATION MEASURES IN CASE-STUDY AREAS

Deliverable D3.1

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RestPoll
Restoring Pollinator habitats across European agricultural landscapes based on multi-actor participatory approaches

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Abstract

Pollinators play a crucial role in many aspects of daily life, often without us fully realizing it, by providing a non-market service. However, populations of wild pollinators are declining, and this decrease could lead to higher economic costs than previously anticipated. The RestPoll project aims to implement actions to preserve these pollinators. Before deploying these actions on a European scale, it is essential to conduct tests and obtain feedback.

The study was conducted in the Gers department, where a questionnaire was administered to assess Willingness to Pay (WTP) using the Discrete Choice Experiment (DCE) method. The results revealed a WTP of €52.80 per year for the existence value of pollinators. More specifically, farmers showed a higher WTP, amounting to €72.38 per year. Furthermore, the DCE indicates that individuals would be willing to dedicate up to 17 hours per month to the preservation of wild pollinators.

The results of the study suggest that the aesthetic impact of pollinators is not perceived as being more important than their contribution to food production or even their intrinsic existence. This data can be integrated into the future design of the Payment for Ecosystem Services (PES) associated with this project, in order to improve the acceptability of this initiative among farmers, who are the main beneficiaries of the PES. By taking into account the identified perceptions and preferences, it will be possible to develop more effective strategies for the conservation of pollinators and the sustainable management of natural resources.

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1. Introduction

Insect pollinators are essential actors in ecosystems, playing a critical role in plant reproduction. By facilitating pollination, they contribute significantly to agricultural production; approximately 35% of the global crop tonnage depends on pollinators, and 80% of flowering plants are pollinated by animals (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, IPBES, 2016). Bees, butterflies, and flies, among others, are responsible for pollinating flowering plants, fruit trees, and food crops such as vegetables, fruits, and oilseeds. About 75% of global crops depend, at least in part, on pollinators (Klein et al., 2007). Pollinators facilitate plant fertilization and reproduction, with the resulting seeds and fruits providing nourishment for numerous animals, including humans. These pollinator insects are vital for agricultural and semi-natural habitats within the agricultural landscape. Wild bees, unlike domesticated bees, are often better suited to specific plant species, thereby increasing biodiversity and the resilience of agricultural systems. The diversity of pollinators is crucial, as it contributes to more effective and stable pollination.

However, studies reveal that in Europe, populations of bees and butterflies have drastically declined over recent decades (Potts et al., 2010). This decline significantly affects socio-ecological balances and has become a major environmental issue worldwide. In Europe, it is estimated that one-third of bee, butterfly, and hoverfly populations are threatened (IPBES, 2019; Potts et al., 2010). This decline has notable ecological, food security, and economic consequences. From an agricultural perspective, the reduction in pollinators leads to decreased production of many crops (such as fruits, vegetables, and oilseeds) and a reduction in yield stability. Ecologically, it threatens the biodiversity of wild plants and the food chains that depend on them. Small farms, where crop diversity is significant, are particularly vulnerable (Kleftodimos et al. 2021). Consequently, this decline raises issues related to food security, agricultural resilience (with associated economic losses), and the loss of ecosystem services. The causes of this decline are numerous, but human activities are largely responsible. The anthropogenic transformation of natural habitats reduces the availability of flowering plants for foraging (Vasconcelos et al. 2024). Additionally, pollution and climate change contribute to altered living conditions, resulting in earlier emergence of certain pollinators that must adapt to changing flowering patterns that vary from year to year.

In response to this alarming situation, public authorities at both national and European levels are beginning to take initiatives to curb the decline of pollinator insects. Recently, the European Union has considered introducing a public mechanism aimed at encouraging rural stakeholders, particularly farmers, to adopt practices compatible with the conservation of wild pollinator populations. This mechanism is known as Payments for Environmental Services (PES). Its purpose is to compensate farmers or landowners for the ecological services they provide (Engel et al., 2008). These services include the preservation of natural habitats for pollinators, the reduction of pesticide use, and improved water management (Aguilar-Gómez et al., 2020). PES represents an incentive-based approach to promote more environmentally friendly agricultural practices (Wunder et al., 2008). Instead of applying the "polluter pays" principle, it offers a "reward" to individuals engaging in desirable and beneficial practices. Through financial incentives, it aims to encourage reduced pesticide use and the maintenance of natural habitats for wild bees.

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To more precisely determine the practical modalities for implementing a pollination PES, the European Commission has decided to fund a large-scale field study in various regions of northern and southern Europe. The execution of this study has been entrusted to a group of experts and scientists specializing in pollination issues, and it is part of a research-action project called RestPoll (Restoring pollinator habitats across European agricultural landscapes based on multi-actor participatory approaches; https://restpoll.eu), which also encompasses the work conducted in this study. The RestPoll project combines scientific research with local actions, collaborating with farmers to implement biodiversity-friendly practices. It focuses on creating suitable habitats, reducing harmful practices (such as pesticide use), and raising awareness among the stakeholders such as farmers. This four-year project began in October 2023 and involves approximately twenty territories across Europe, incorporating multiple academic, private (Innocent Drinks, etc.), and local (ADASEA, etc.) stakeholders organized into "living labs." The current phase of the project is testing public policy acceptability in these various locations in order to scale up the implementation.

This deliverable is thus part of the RestPoll project. It specifically aims to analyse the perceived impact of pollinator decline to establish a Payments for Environmental Services (PES) scheme. To achieve this, the value attributed to pollinators is estimated through a willingness to pay approach. This study seeks to provide initial answers to three questions:

- What is the average willingness to pay to preserve wild pollinators?
- To what extent can the establishment of a PES incentivize farmers to adopt biodiversity-friendly practices?
- How can this type of incentive mechanism be adapted to the specific ecological, social, and economic context of a territory?

The Gers region in France was chosen as the framework for this economic study. This choice is deemed pertinent for two primary reasons. Firstly, it is predominantly a rural and agricultural area characterized by significant (bio)diversity, including viticulture, grain production, mixed farming, and large-scale crops. Moreover, it remains relatively natural and minimally urbanized, with no highways crossing it, providing a varied landscape. Secondly, this territory already has innovative collective experiences aimed at protecting the natural environment. It benefits from a program funded by the European Union's Financial Instrument Lever (LIFE), which supports innovative projects, both private and public, in the fields of environment and climate. The Association for Development, Planning, and Services in Environment and Agriculture (ADASEA) is one of the main operators of this program (see Box 1 for more details). The present study was conducted in close partnership with this organization.

In the following sections, we will begin by presenting the method used to evaluate the willingness to pay. We will then outline the main results obtained and finally discuss these findings.

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Box 1: ADASEA

The local actor, ADASEA (Association for Development, Planning, and Services in Environment and Agriculture), actively participates in the establishment of hedges and flowering meadows by providing support to farmers and conducting species inventories on plots to assess the effectiveness of measures. They facilitate a connection between farmers and funding requests, particularly for agro-environmental and climate measures. The association works directly with farmers through interventions on their land and plots. They have also participated in events such as meeting and demonstration days (haymaking, hillside festivals, etc.). Thus, ADASEA supports farmers in transitions related to flora, water management, or soil erosion, while maintaining good economic practices. They also assist local authorities in developing their urban planning and green and blue infrastructure.

2. Method

2.1. JUSTIFICATION FOR THE USE OF A DISCRETE CHOICE EXPERIENCE (DCE)

We have set up a questionnaire whose aim is to establish a link between declared knowledge and scenarios in order to obtain a willingness to pay. In this declarative framework, a questionnaire is the natural choice, inspired by Uwingabire et al. (2022).

Economic value of ecosystem services is traditionally measured in terms of marginal utility people benefits from the (material and/or immaterial) production from the ES. The total benefits derived from the pollination service constitute what is known as Total Economic Value (TEV), which is made up of use and non-use values (Figure 1).

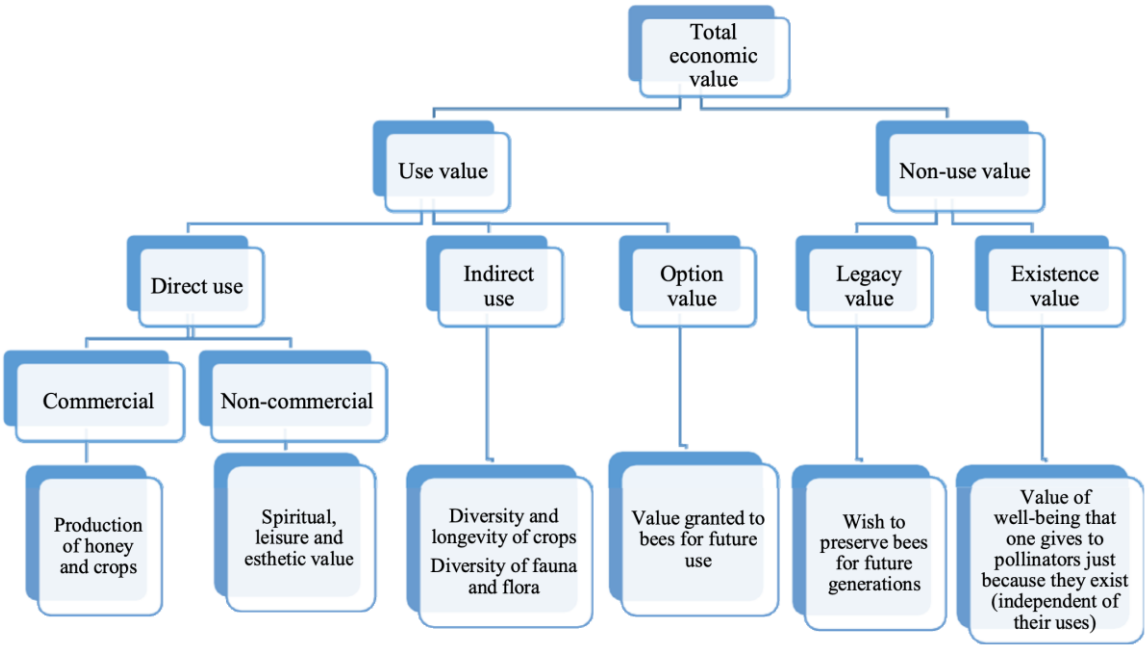

Figure 1 – Total Economic Value representation of pollination services (adapted from the IPBES report, 2016)

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Thus, pollination services, through the multiple benefits they render, are essential to social well-being. Yet the preservation of this service is under threat today, not least due to the massive use of systemic insecticides such as neonicotinoids and pyrethroids (Crenna et al., 2017). These threats weigh not only on honey bee populations, but also on those of other pollinating insects (wild bees, butterflies, etc.) whose role in pollination is now widely reassessed (IPBES 2016). Breeze et al. (2011) have shown that two-thirds of the total pollination services in Great Britain result from the activity of wild insects. Other studies have highlighted the lower efficiency of honeybees compared with wild pollinators (Garibaldi et al., 2013). The situation for wild pollinators is all the more problematic in that, unlike honeybees and bumblebees, they are not the product of breeding. They are therefore irreplaceable. In order to capture these values, there are several methods in economics. The first one is based on the market value, which is the price set by the confrontation of supply and demand for a specific good. However, as seen in the Figure 1, not all benefits from pollination service are marketed as for example spiritual, leisure and esthetic value. For these non marketed values, economists use methods based on the revealed or declared preferences of individuals. In the first case, the individual has already made their choice, often on a market, which makes it possible to estimate an equivalent or substitutable good (replacement cost).

Free pollination

Pollination can be the result of a contract (oral or written) between a beekeeper and a farmer. This contract is based on common interests between the farmer, who is looking for bees to pollinate his fields, and the beekeeper, who is looking for flowers providing nectar for the production of honey and other hive products. In some cases, these exchanges lead to payment. This may be in kind (e.g. the beekeeper gives honey to the farmer to thank him for giving him access to the flowers in his field and/or the farmer gives crops to the beekeeper). In other cases, payment is made in cash. A price per hive or colony is agreed on by both parties. This is how we are able to estimate the market value of pollination by honey bees, i.e. the value of renting a hive. In France, for example, it varies from 0 to 150 euros (excluding tax), with an average price of 39 euros per colony (Decourtye, 2018). In the United States, this price averaged 136 US dollars (125 €) in 2006 (Sumner and Boriss, 2006). Another source proposes prices from $50 to $135 for pollination services (https://www.honeybeecentre.com/services/pollination-services/, consulted on 31.07.2024).

But for all other situations, pollination is considered a non-market service, i.e. a service provided free of charge. These situations may include pollination by honeybees in neighboring fields and/or wild meadows. But also pollination by all other wild species in these fields or meadows. So pollination, when it is not due to a rent, is a service “offered” by nature, and therefore non-marketable.

Evaluating free goods

Not being able to look at the quantities and prices exchanged, how can we measure what is not on the market? There is a way of measuring the value people place on ecosystem services, known as Willingness To Pay (see TEEB, 2010). To find out, we can take the state of an existing market and look at the price at which the good is traded. The WTP is then demanded through a questionnaire in which this existing marketed is described. By

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responding, the participants reveal the price, and he shows his consent. Thus the buyer reveals their buying preference, which corresponds to their “revealed preferences”. Conversely, as in any conversation, you can declare your preference without any real consequences. For example: would you rather have infinite money but no free time, or all the time you want without money? Answering this question won't change you instantly. You're just expressing your preference between two resources: time and money, taken to extremes here. Willingness to pay here is aimed at a population that isn't necessarily in the farming business and so wouldn't rent a beehive, so there are no revealed preferences available.

In the case of pollinators, their service is non-market, although hives can be rented for domestic pollinators, and substitutable goods (hand pollination, drones, etc.) are not equally effective. We are therefore interested in stated preferences, using the Discret Choice Experiment method (Nick Hanley and Susana Mourato, 2001).

The difficulties of estimating revealed preferences led us to design a hypothetical market for the sale and purchase of wild pollinators. To know the selling price, this market is located in a world that may be composed of pollinators with few fruits, vegetables and flowers, and in which a tax has been introduced. Whereas another may have few pollinators and an abundance of fruit. These scenarios are hypothetical, as to create these worlds would be too costly, so we leave them hypothetical as a whole, with real characteristics. Within this framework of uncertainty, it is possible to use either contingent valuation or a Discrete Choice Experiment (DCE).

Why did we choose the DCE method according to Louviere et al. (2010)?
This method is useful for measuring a non-market service or good. DCE is based on random utility theory. The individual would decompose the same product, which in this case is a scenario whose characteristics have already been decomposed into attributes. An attribute refers to a specific characteristic or feature of a product, service, or decision context that participants must evaluate when making their choices. Each attribute represents a dimension that can vary and influence a person's decision. In a DCE, respondents are presented with a series of hypothetical scenarios, each containing different combinations of attributes, and they are asked to choose their preferred option.

For example, in a study about transportation choices, attributes could include:

- Cost (e.g., ticket price),
- Travel time (e.g., duration of the journey),
- Comfort level (e.g., seating space), and
- Environmental impact (e.g., CO2 emissions).

Each of these attributes can have several levels (e.g., high, medium, low), and the purpose of the DCE is to determine how changes in these attributes influence respondents' preferences and choices. By analyzing the data, researchers can estimate the relative importance of each attribute and the trade-offs participants are willing to make between them.

Thus, the decomposition of attributes and levels is done upstream by the experimenter. The individual would establish a hierarchy between attributes in order to facilitate his or her choice (concept of this theory).

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We say “random” because we assume that the reasons for an individual's choices have two components: one that is directly observable and another that is not (the random side is discrete). This unobservable component is the latent variable. If the individual actually makes his or her choice according to these attributes, we could have found the latent variable of the situation.

Thanks to the DCE, we can estimate the values of existence, indirect use and direct non-market use. Existence value is the price attributed to the mere existence of wild pollinators. Indirect use is measured by the benefit that individuals derive from the pollinators' intervention: the production of fruit and vegetables is not a direct activity of the pollinators, but a consequence of their work, of their lives. The direct non-market use is made up of aesthetics, which we use directly through the beauty of landscapes and visuals. Each of these values represents an attribute in the DCE (see below).

In the DCE, on the other hand, we present the subject directly with the possibilities of the world in which they may find themselves. Indicating their preference between different choice options, presented as “scenarios”. Scenarios are visual presentations of “worlds” with different attributes defined by the experimenter. These attributes are associated with the good to be evaluated: cost, travel time, comfort for a new tramway; road quality, traffic flow, number of lanes, price for a new freeway, for example.

2.2. QUESTIONNAIRE AND TOOLS USED

A four-part questionnaire was created for these surveys. This is Milestone 9: "Wild pollinator survey: Questionnaire validated by the Advisory Board" (Gallai, Nicola et al., 2024), which was issued in April 2024. We explain the four parts in more detail below.

2.2.1. PART 1: SELF-DECLARED KNOWLEDGE

The questionnaire begins with questions about the participants' place of residence and certain subjective knowledge, such as the pollinator insects they are familiar with. Participants are also asked to rank the benefits provided by these pollinators. We anticipate that participants will prioritize ecosystem services based on their relevance to them. Individuals declare their knowledge, and we assume a shared baseline level of knowledge among them. All participants have access to the same visual materials, including two laminated posters: one depicting various pollinators and the other illustrating their habitats.

The pollinators presented were selected for their "common" status, which increases the likelihood that individuals will recognize them. For example, bats were excluded as they fall outside the scope of study since there are no bats in the field site study. The images of the insects were carefully chosen online, with angles that allow for clear identification of each species. Participants could indicate which pollinators they recognized, without necessarily naming them, knowing that common names may vary (e.g., the carpenter bee is sometimes referred to as the black bee or blue bee).

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The second poster features three types of habitats: soils, forest edges, and flowering meadows. Participants were asked to indicate whether wild pollinators could inhabit one or more of these environments. After their responses, they were informed that these insects are present in all three types of habitats.

This section of the questionnaire aims to assess the level of self-reported knowledge by participants regarding pollinators and their habitats.

2.2.2. Part 2: Individual behaviours and perceptions

The second part of the questionnaire focuses on the actions of individuals, notably their civic commitment (e.g. if they are elected representatives or involved in associations) or their personal practices, such as tending a garden. These actions are specifically linked to pollinators. In addition, this section explores their perceptions of flora, a crucial aspect of the pollination process. Given the distinction between wild and domestic pollinators, participants are asked about their views on the possibility of compensating for the decline in wild pollinators by introducing domestic pollinators.

Participants' interest in flora is measured using Likert scales. Although validated environmental scales, such as the Environmental Satisfaction Scale (Pelletier et al., 1996), can be used, this scale, which has few items, does not add a significant time burden to the questionnaire. The use of such a scale would make it possible to link individual actions to a validated assessment of their relationship with the environment.

The aim of this part of the questionnaire is to understand individuals' concrete actions towards pollinators and flora, as well as their perceptions on a personal scale.

2.2.3. Part 3: Discrete Choice Experiment (DCE)

Attributes of the DCE

We selected five attributes for the study: food diversity, floral diversity, the proportion of wild pollinators, the number of volunteer hours per month, and an annual tax (representing the price). The first two attributes have two levels (low, high), while the attributes related to volunteering and tax each have four levels (0, 2, 4, 6 hours for volunteering, and €0, 5, 10, 15 for the tax). These regular intervals were chosen in accordance with the requirements of an unlabeled Discrete Choice Experiment (DCE).

Indeed, in an unlabeled Discrete Choice Experiment (DCE), the options or alternatives presented to respondents are described only by their attributes, without any identifying labels or names. The alternatives are defined solely by the specific levels of these attributes, making them more neutral and preventing the respondents from being influenced by preconceived notions tied to specific labels.

For example, in a study about transportation choices, a labeled DCE might present alternatives such as "train," "bus," and "car," whereas an unlabeled DCE would simply

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describe the attributes like cost, travel time, and comfort for each option, without specifying if it's a train, bus, or car.

The main purpose of using an unlabeled DCE is to focus on the attribute levels themselves and avoid biases that might arise from brand names, preconceptions, or other identifying labels. This method allows researchers to capture how the different attributes and their levels influence decisions, without interference from the identity of the options.

We then explained the relevance of these attributes. Pollination has a direct impact on food diversity, with approximately 87% of cultivated plants partially depending on pollinators (Van Der Sluijs and Vaage, 2016). This attribute is represented at two levels, corresponding to food diversity of 50% or 100%, symbolized by images of fruits and vegetables.

Regarding floral diversity, IPBES (2016) estimates that 90% of flowers depend on pollinators. We proposed two levels: one image illustrating complete floral diversity (100%), and another showing a reduction in diversity to 70%, represented by a less varied colour palette.

For the wild pollinators attribute, we assumed a scenario where these pollinators experience a 50% decline. This scenario serves as a general annotation, and while it may be somewhat unrealistic, it aims to highlight the importance of these pollinators in the ecosystem. It is important to note that some species of wild pollinators are specific to certain plants (e.g., the fig wasp), while others, like halictids, pollinate multiple species. A scenario with a high proportion of wild pollinators could, however, result in low food and floral diversity, and vice versa.

The number of volunteer hours per month was included as a complementary attribute to the tax. This unpaid volunteer time can be converted into a monetary value by cross-referencing it with the annual income data in the demographic section. This allows for an analysis of the substitutability between time and money, with a maximum of 6 hours per month.

To assess the willingness to pay, we integrated a "tax" attribute into each of the proposed scenarios. This attribute, which has four levels (€0, 5, 10, and 15), was designed to estimate individuals' willingness to pay for the protection of ecosystem services related to pollinators. The levels were defined based on the estimated value of pollination in France (approximately €5.3 billion) and the population size, which equates to about €80 per person. Since a large portion of food comes from animal sources and certain individuals (such as children) do not pay directly, these amounts were adjusted downward.

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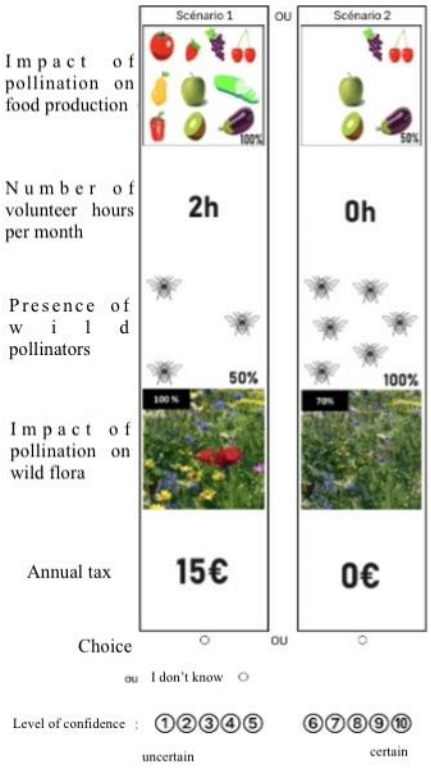

Figure 2 - Example of a choice card.

In the set of choice cards proposed (Appendix 2), two alternative scenarios were presented, as well as an option allowing participants not to choose or to express their indecision. This option makes it possible to model situations where no scenario is preferred (see Figure 2 for an example). A sixth attribute had initially been considered, namely the time taken to implement the scenario, in order to assess the discounting of the value of services over time. However, its inclusion would have significantly increased the number of scenarios required to maintain the validity of the protocol. In addition, the temporal variability of taxes would have introduced biases that would have been difficult to interpret.

The images used to illustrate the attributes were carefully selected. For instance, the wild pollinators attribute was represented by an image of an insect resembling a bee, displayed in black and white, with either three instances (to represent 50%) or six instances (to represent 100%). The tax attribute was simply illustrated by a visible number within the image, while the volunteer hours were similarly represented.

Images related to floral and food diversity were sourced from the work of Del Corso et al. (2022). Some parts of these images were modified to depict a reduction in food diversity to 50%, without removing the same type of food in each version. This approach maintained a balance in the display of food items while differentiating the levels of diversity.

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Despite this, four additional questions were asked after the DCE to assess participants' temporal preferences. Subjects were asked to indicate how much they would be willing to pay today to protect wild pollinators, according to two temporal scenarios: a disappearance in one year or in twenty years. Possible amounts were €0, €5, €10 or €15, with only one amount to be paid, to avoid longer-term scenarios being perceived as more costly.

The number and presentation of scenarios

Participants were presented with pairs of scenarios, simplifying their decision-making by limiting the number of attributes to evaluate simultaneously to five. None of the 15 choice sets proposed shared the same attributes. Among these 15 sets, a "test" set was introduced (see situation 15 in Appendix 2), where it was expected that all participants would select the same option. The generation of the choice sets was accomplished using the Stata command "dcreate," and subsequently validated with SAS software, employing a fractional design. This process reduced the number of scenarios from 16,256 (2^3 * 4^2 = 128, and 128*127 = 16,256) to a more manageable number for each participant.

We utilized the criterion of D-efficiency to assess the effectiveness of the design generated by the software. This criterion, which optimizes the precision of parameter estimates, is particularly relevant to our study, as we focus on the diversity of attributes within the scenarios to better evaluate the substitutability between different factors. Additionally, we examined G-efficiency, which measures error minimization, and A-efficiency, which evaluates variance minimization, although D-efficiency was prioritized in our analysis.

After each choice set, participants were asked to indicate their degree of certainty or confidence regarding their decision, reflecting their perception of the reliability of their choice (metacognition). This approach helps to understand the intensity of their preferences and to identify the scenarios they genuinely prefer. However, some participants utilized the scale in a limited manner, being either very confident or very uncertain. Normalization of these certainty levels may be considered to refine the analysis.

Thus, this portion of the protocol aims to evaluate participants' willingness to pay and to identify whether a particular attribute plays a predominant role in their preferences.

2.2.4. PART 4: ACTIONS TO BE TAKEN

One of the objectives of Section 4 of the questionnaire is to examine whether an individual willing to pay for the preservation of pollinators would also be inclined to engage in more concrete protective actions due to their involvement, or conversely, whether they would limit themselves to a financial commitment while reducing their direct actions.

In this section, participants are asked about the actions they believe are necessary to ensure the preservation of pollinators. These responses are then cross-referenced with

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their general perceptions of the natural environment. A specific view is also presented to them, upon which they must formulate a judgment. In the medium term, this project aims to lead to the establishment of a payment for ecosystem services (PES) program. The effectiveness of an environmental tax has been addressed to evaluate its acceptability among participants and to gather their proposals and reactions regarding this measure.

The section concludes with a series of questions concerning actions that individuals themselves could undertake to protect pollinator populations, as well as initiatives that other actors, both public and private, could implement for the same purpose.

Thus, this part of the questionnaire aims to identify the preferred protective actions of participants and to better understand their willingness to act in favour of pollinator preservation.

2.2.5. PART 5: DEDICATED TO FARMERS

The Payments for Ecosystem Services (PES) program envisaged as a result of Task 3.1 of the European RestPoll research project is intended to benefit farmers in particular. Thus, a fifth section of the questionnaire was specifically dedicated to them. Farmers were asked questions about various aspects of their farms, such as plot size, crop types and farming practices. These practices are presented in a table, and farmers were asked to assess, for each of them, its positive or negative impact on pollinators, specifying the mechanisms by which this impact is generated.

This fifth section concludes with ordinal questions, in which farmers are asked to rank on a 4-point scale the reasons for their current practices. They are also asked to rank the obstacles preventing them from adopting new practices, and to indicate under what conditions they would be willing to adopt or reinforce pollinator-friendly practices.

The aim of this section was to gain a better understanding of farmers' perceptions of the impact of their practices on pollinators, as well as the factors that influence their decision-making in terms of farm ecosystem management.

2.3. DATA COLLECTION

2.3.1. QUESTIONNAIRE ADMINISTRATION: FACE-TO-FACE AND ON THE MOVE

It was decided not to administer the questionnaire online for several reasons. The first concerns the dropout rate, which is a significant issue in long surveys. There is no guarantee that individuals contacted online will complete the questionnaire in its entirety. With a minimum duration of 20 minutes, the risk of abandonment is high, especially since even 5-minute questionnaires do not always yield complete responses. According to Hoerger (2010), the average dropout rate is 10%, increasing by 2% for every additional 100 items. Given that our questionnaire contains 526 items in the "Discrete Choice Experiment" (DCE) section, we anticipated a cumulative dropout rate of at least 20%. Additionally, the presence of open-ended questions increases this risk by 2.5 times, according to Peytchev et al. (2009), which could raise the dropout rate to 50%. Moreover, simply asking for sensitive information, such as the household's annual income, leads to

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a non-response rate of 8.15% (Tourangeau and Yan, 2007). Combined with other factors, this could have resulted in a total estimated dropout rate of 58.15%. Without this information, it would have been challenging to draw a precise link between willingness to pay and disposable income.

Furthermore, we had no direct contact with local stakeholders in Gers, although some contacts could have been obtained through internet groups, social networks, or databases like Google Maps. However, ADASEA was able to provide some contacts. Online surveys for farmers might not be ideal due to several challenges. First, internet connectivity can be limited in rural areas, making it difficult for farmers to participate. Second, farmers often have busy schedules and may prefer face-to-face interactions, where they can ask questions and clarify doubts. Additionally, older farmers might not be familiar with digital tools, reducing response rates. Lastly, the complexity of some questions, especially in technical surveys, may require more personalized explanations, which online surveys cannot easily provide.

The questionnaire included unfamiliar exercises, which sometimes required rephrasing to ensure understanding. For example, some ranking questions were not always perceived as preference questions (see Question 10 in the questionnaire, Appendix 1). In this case, we added a podium diagram in subsequent versions to clarify the concept of ranking. Additionally, the "Discrete Choice" part was a relatively unfamiliar exercise for most participants. While written explanations could complicate matters, oral presentations simplified the instructions by stating simply, "You have two scenarios presented; choose the one you prefer." This approach, although applicable in writing, is clearer when presented verbally.

Thus, interacting directly with producers and local stakeholders increases the likelihood of completing the entire questionnaire.

Face-to-Face Interview Modalities

A paper copy of the questionnaire was distributed if participants wished to follow the questions simultaneously. The interviewer presented this method as the simplest option. For questions requiring ranking, a pencil was provided so that participants could easily erase and modify their answers. When multiple participants were interviewed at the same time, each person was given a pencil. This ensured that they could not discuss or influence each other, as they were focused on writing their own answers independently without engaging in conversation. This method helped to maintain the integrity and individuality of each respondent's input.

A standardized introduction was used: "Hello, I am X from ENSFEA... There are no right or wrong answers..." When the survey was conducted face-to-face, the interviewer entered the responses directly into the computer to save time during transcription.

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The distinction between domestic bees and wild pollinators was introduced after a few questions. When presenting the pollinator cards, two boxes were used: one for domestic pollinators and the other for wild pollinators. However, this presentation was not always understood by everyone, with some individuals thinking that wild pollinators lived in hives.

When the questionnaire was administered to multiple participants simultaneously, each received a paper format to avoid mutual influence. The interviewer responded openly to questions and ensured that the provided answers were complete, intervening when additional clarifications were needed.

The "Discrete Choice Experiment" (DCE), being a relatively unfamiliar exercise for most participants, sometimes required further explanations. The interviewer did not hesitate to use comparisons to clarify misunderstood concepts. However, participants generally seemed to understand this visual exercise, which facilitated decision-making. The interviewer also observed that individuals found it easier to respond to the DCE when it was presented as a "visual task" rather than as a "scenario."

A "test" situation was included, in which all individuals were expected to choose the same scenario. Unexpectedly, another scenario (scenario 9) was consistently selected by participants, even though it had been generated randomly via Stata's "dcreate" command. Thus, two "test" scenarios were indirectly formed. The interviewer frequently presented one or the other of these scenarios as the first, and the order of subsequent presentations was random. The laminated boards were shuffled and turned so that scenarios did not follow each other predictably. However, including a "test" scenario at the beginning of the questionnaire proved too obvious, even with random mixing of the boards.

In the DCE, no distinction was made between wild and domestic pollinators. The attribute used was simply the "presence of wild pollinators." Initially, a differentiation into four levels was considered (low or high presence of domestic and wild pollinators), but this option was discarded to maintain the validity of the DCE. This would have required a shorter questionnaire, compromising some information, or significantly increasing the number of participants. Nevertheless, the interviewer believed that this differentiation would have strengthened the validity of the DCE, given the growth of domestic bee populations alongside the decline of wild pollinators, even though the latter are more numerous, effective, and diverse.

In the future, it is recommended to represent both domestic and wild pollinators within the same attribute (or in the form of two attributes at two levels). Wild pollinators could be represented by an insect, thereby avoiding the use of wasps, which inspire fear of stings, or butterflies, whose elegance could bias responses. This approach is similar to that of some organizations, like WWF, which promote "attractive" animals (flagship species) to maximize donations. Indeed, less aesthetically pleasing species, such as the blobfish, may receive less financial support (Williams et al., 2000).

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2.3.2. A VARIETY OF SURVEY LOCATIONS

In order to build up the widest possible panel of stakeholders, the interviewer visited a variety of locations: local markets, various shops, cooperatives, local festivals and events, as well as the homes of local residents identified through fieldwork or Google Maps.

As individuals not working in the agricultural sector were more available in the evenings or on weekends, the time organization of the research was adjusted accordingly. The interviewer also contacted town halls to solicit the opinions of local public decision-makers. The final objective was to gather a wide variety of perspectives in order to analyse the convergences and divergences of viewpoints on pollinator preservation among different stakeholders.

The study aimed to determine whether the various stakeholder groups identified the same causes for pollinator decline, whether they envisaged similar solutions for their safeguard, and whether they were willing to commit, both individually and collectively, to protective actions.

2.4. DATA ANALYSIS

The DCE implemented is based on the Random Utility Theory (RUT) developed by Thurstone (1927) and supplemented by the work of various economists, such as McFadden (1975). According to this theory, the so-called latent (i.e. unobservable) utility associated with a choice alternative comprises: a systematic component (explicable by attributes and co-variables) and a random component (unidentified choice factors). The basic axiom of RUT is as follows (Dachary-Bernard, 2007):

$$U_{in} = V_{jn} + \varepsilon_{in}$$

$$V_{jn} = A_i + \beta_n{}' X_{in}$$

Where : U_{in} is the utility of individual (n) for alternative (i), V_{jn} the systematic component of utility, and ε i the random component of utility. Systematic utility itself is explained by the variable X_{in} and by a constant specific to alternative (i), denoted Ai.

This axiom is used here to examine individuals' preferences via their willingness to pay (WTP) for the wild insect pollination service. Our hypothesis is that each individual seeks to optimize the benefits derived from this service.

Thus, we posit that the probability of choice that maximizes individual n's utility is alternative i, if :

$$P_{in} = P\ (\ U_{in} > \ U_{jn} \forall j \neq i \ \in C\ )$$

To take account of the heterogeneity of the respondents, we have mobilized a logit model, in which the stochastic components follow any type of statistical distribution. As a result, the IIA (Independence of Irrelevant Alternatives) assumption is not necessary. Hence, the probability of an individual choosing scenario i becomes:

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$$P_{in} = \frac{e^{\beta_n{}' x_{in}}}{\sum_{j=1}^{J} e^{\beta_n{}' x_{jn}}} ;$$

Where: x_{in} represents the attributes and β_n' the marginal utility of each attribute. The levels of the non-monetary attributes "less advantageous" and "advantageous" are coded as 0 and 1 respectively; all else being equal, they are deemed to positively influence the probability of choosing alternatives. The coefficients of this econometric model were extracted using STATA software. Following Hanley et al. (2001), we thus note the marginal utility of an attribute A (WTP_A):

$$WTP_A = \frac{-\delta_A}{\delta_{WTP}}$$

Where δ_A is the coefficient of attribute A and δ_{WTP} the marginal utility of an annual monetary contribution per household to finance actions to protect wild pollinators.

Initially, we applied a conditional logit because it is not the characteristics of the individuals but the various attributes that we modified that are the source of the choices.

When it comes to personal characteristics, we used a multinomial logit, as personal data is often categorical qualitative and not ordinal.

3. Results

3.1. DESCRIPTIVE STATISTICS FOR THE SAMPLE

The final sample consists of 216 subjects, after eliminating 25 participants who did not fully complete the Discrete Choice Experiment (DCE) or who provided incorrect answers during the test situation.

Table 1 presents the various socio-demographic characteristics of this sample. The sample is 51% male. The most represented age group is 60-74 years old (30%), followed by 30-44 years old (28%) and 45-59 years old (27%). Those aged 16-29 and over 75 represent 10% and 4% of the sample, respectively (one individual refused to provide their age).

Compared to the Gers population in 2021, the age distribution is more homogeneous in the department. According to INSEE, 16-29-year-olds represent 13% of the population, 30-44-year-olds 15%, and 45-59-year-olds 21%, which is 7 points less than in our sample. Those aged 60-74 and over 75 account for 22% and 14% of the Gers population, respectively (INSEE, 2021). However, INSEE also includes those under 14, who represent 15% of the population. By redistributing these percentage points across the five age categories with appropriate weighting, each category should have increased by a few points. To obtain a truly representative sample of the population, we should have included 15% of 16-29-year-olds, or 31 individuals, 18% of 30-44-year-olds, 25% of 45-59-year-olds, 26% of 60-74-year-olds, and 16% of over 75-year-olds. A chi-square test was conducted to assess the representativeness of our sample compared to the Gers

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population. The test yielded a result of 38.05, which allows us to conclude, with a 5% risk of error, that the age distribution in our sample is statistically different from that of the Gers population.

Regarding sectors of activity, 45% of respondents work or have worked in the agricultural sector (primary), 4% in industry and energy (secondary), and 51% in services (tertiary). This distribution was deliberately designed to not be representative of the general population. Indeed, in Gers, only 4.5% of salaried jobs are related to agriculture, forestry, and fishing, while overall agricultural employment reaches 12% (Guichet CPTS Occitanie, 2019). Although the initial objective of the manuscript concerned only willingness to pay, the project aimed at setting up a PES (payment for ecosystem services) mainly intended for farmers, so it was necessary that they make up a significant proportion of the respondents.

Other socio-demographic characteristics of the sample, summarized in table, are as follows:

- The majority of respondents reside in their main residence and live in the department of Gers.
- Most participants are married and live in a couple.
- The predominant level of education is a high school diploma or below.
- 34% of participants work in the agricultural sector, followed by 21% of retirees and 14% of skilled employees.
- More than half of the sample reports an annual income of less than €22,000, while 18% report an income of more than €30,000.
- The majority of respondents grew up in rural areas.
- A third of participants are farmers or own land that they do not fully exploit themselves (often through an arrangement with their spouse or by farming with other farmers).
- A quarter of participants hold elected office, particularly at the municipal level.

Table 1 - Sociodemographic table and characteristic of respondents

Variable	Characteristics	Quantity	Percentage	% cumulated	Population of Gers
Place of residence	Permanent	210	97,67	97,67	89
	Secondary	5	2,33	100	11
Sex*	Male	110	50,93	50,93	48
	Female	106	49,07	100	52

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Age	16 – 29	22	10,23	10,23	14,73[1]
	30 – 44	61	28,37	38,60	18,04
	45 – 59	58	26,98	65,58	25,04
	60 – 74	65	30,23	95,81	25,79
	75 et plus	9	4,19	100	16,40
Family status *	Single	46	21,60	21,60	23,2
	In a relationship	47	22,07	43,66	11,6
	Civil union	20	9,39	53,05	6,2
	Married	96	45,07	98,12	43,6
	Other	4	1,88	100	15,4
Number of individuals in household	1	32	15,02	15.02	37
	2	90	42.25	57.28	+ 31,3
	3	40	18.78	76.06	+ 21,5
	4	35	16.43	92.49	
	5	11	5.16	97.65	
	6	1	0.47	98.12	
	7	4	1.88	100.00	
Number of dependent children *	0	127	52,62	59,62	58,8[2]
	1	37	17,37	77	19,7
	2	37	17,37	94,37	16,3
	3	9	4,23	98,59	4,1
	5	3	1,41	100	- de 1,1
Education level *	Highschool or less	88	41,51	41,51	72,3
	Highschool + 2 years	63	29,72	71,23	11,3
	Highschool + 3 years	29	13,68	84,91	9,1
	Highschool + 5 y and more	33	15,09	100	7,3
Working area	Agriculture (primary)	97	45,12	45,12	10,7
	Industry (secondary)	10	4,65	49,77	10,3
	Services (tertiary)	108	50,23	100	79
Profession	Executives, managers	19	8,80	8,80	- de 20,9
	Agriculture, craftsmen	73	33,80	42,59	7,3
	Intellectual and scientific	7	3,24	45,83	
	Skilled salaried employees	31	14,35	60,19	
	Skilled salaried workers	6	2,78	62,96	15,5
	Low-skilled employees	20	9,26	72,22	- de 27
	Armed forces	.	.	//	
	Retired	45	20,83	93,06	27,6
	Looking for work	5	2,31	95,37	
	Student, in training	6	2,78	98,15	
	Don't wish to answer	4	1,85	100	

[1] The percentages only take into account individuals aged 16 and over. Thus, of the Gers population aged 16 and over, the 16-29 age group represents 14.73%. The percentage shown on the INSEE website is smaller, as it includes the 0-14 age group.
[2] INSEE includes all children under the age of 25 in the household. This does not exclude the situation where the child is older and dependent.

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Annual income*	Moins de 16 000 €	72	34,12	34,12	Median
	16 000 ~ 22 000 €	47	22,27	56,40	Gers : 22110
	22 000 ~ 30 000 €	54	25,59	81,99	€
	30 000 ~ 40 000 €	24	11 ,37	93,36	
	40 000 ~ 54 000 €	6	2,84	96,21	
	Plus de 54 000 €	8	3,79	100	
Childhood *	Large city, downtown	32	15,02	15,02	
	Suburbs, outskirts	27	12,68	27,70	
	Rural area	154	72,30	100	
Farmers	No	143	66,20	66,20	92,7
	Yes	73	33,80	100	7,3**
Elected	No	159	73,61	73,61	
	Has responsibilities	57	26,39	100	

*One individual only indicated their sex without providing any other variables. The 'income' variable has data for 211 individuals. The 'education level' variable is based on 212 subjects. The 'Childhood' variable is based on 213 subjects, as is the 'Situation and Number of dependent children' variable. When a variable is not indicated, it refers to all 216 individuals.

**The percentage of jobs in the socio-professional category "farmers" varies from 5 to 13%. This needed clarification as it does not represent the proportion of farmers in the total population of Gers.

3.2. THE GLOBAL WTP

Table 2 summarizes the results of the conditional logit analysis assessing the significance of the attributes. All three of our attributes are significant: variety and quality of fruits and vegetables, diversity of wildflowers, and maintenance of pollinator populations. Thus, the probability of choosing a particular alternative is positively influenced by an improvement in their level.

We also observe that the two payment attributes, whether through a tax or volunteer hours, are also significant. This allows us to estimate the Willingness to Pay (WTP) and the willingness to volunteer of respondents for all environmental attributes.

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Table 2 - Conditional logit of the entire sample. The column "Choix1" represents the 5 attributes analysed: FL are fruits and vegetables, H are the hours, Pollini are the wild pollinators value, Flore are the esthetic value and Taxe are the taxes.

```
                                                Number of obs     =      6,480
                                                LR chi2(5)        =    2410.91
                                                Prob > chi2       =     0.0000
Log likelihood =  -2821.278                     Pseudo R2         =     0.2994
```

Choix1	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
FL	1.936907	.066767	29.01	0.000	1.806046	2.067768
H	-.1165515	.0285215	-4.09	0.000	-.1724526	-.0606504
Pollini	1.993399	.0670753	29.72	0.000	1.861934	2.124864
Flore	1.342132	.0649068	20.68	0.000	1.214917	1.469347
Taxe	-.0377528	.0052536	-7.19	0.000	-.0480496	-.027456

The WTP are summarized in Table 3. Thus, in the sample, individuals agree to pay €52.80 per year to maintain the existence value of wild pollinators. The Willingness to Pay of flora is €35.55 and that of fruits & vegetables is €51.30.

Table 3 - The different willingness to pay (WTP) in taxes and volunteer hours

Attribute	WTP	Hourly WTP
Fruits and vegetables	51,30 €	16,62
Wild pollinators	52,80 €	17,10
Floral diversity	35,55 €	11,51

The willingness to pay (WTP), measured in terms of volunteer hours, reveals that individuals would be willing to dedicate 17.10 hours per month to preserve wild pollinators at 100%. This suggests that, in general, they would be willing to invest their time to maintain pollination services. This result attests to the importance they attribute to the existence of wild pollinators, granting them a positive existence value. Moreover, individuals express their willingness to invest time to ensure a high level of availability of fruits and vegetables as well as an abundance of flowers, thus assigning a positive value to the non-market aesthetic dimension of these ecosystem services (Figure 1).

The conditional logit analysis shows that the second levels of volunteering and taxation are not significant compared to the first level which was used as a reference (see Appendix 3). The third level of volunteering is only significant at the 2% threshold. In this questionnaire, individuals seem to attach greater importance to pollinators, followed by the availability of fruits and vegetables, while the presence of wildflowers is the attribute to which they assign the least value. However, the socio-economic characteristics of individuals may differentiate their preferences, which is one of the hypotheses explored. This is why the sample includes farmers and local elected officials.

The analysis of willingness to pay was conducted using a multinomial logit model, with the individuals' choices as the dependent variable, using the mlogit command in Stata. The different willingness to pay values are presented in the following paragraph.

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3.3. WILLINGNESS TO PAY OF FARMERS AND ELECTED OFFICIALS

Table 4 - Willingness to pay for farmers and elected officials in euros

Categories | Membership	No	Yes
Farmer	45.50 €	72.38 €
Elected	56.74 €	42.52 €

Farmers present a willingness to pay (WTP) of €72.38 for the preservation of pollinators, indicating their willingness to spend this sum annually to encourage a greater presence of pollinators. In comparison, the non-elected have a WTP of €56.74. Elected officials and non-farmers show a lower willingness to pay.

Table 4 does not, however, take into account the potential interactions between the different categories of individuals, in particular those who can combine the status of farmer and elected official, or who partially belong to one of these categories without necessarily being part of on the other.

3.4. WILLINGNESS TO PAY AND INTERACTION BETWEEN ELECTED FARMERS AND NON-ELECTED FARMERS

Figure 3 presents the interaction between the statuses of farmer and elected official. It appears that the elected individuals, whether they are farmers or not, display a willingness to pay (WTP) of between €40 and €43.47. The interaction becomes notable when the farmer is not elected, with a WTP amounting to €92.59 per year for the conservation of pollinators. This sum represents the highest value observed in this study.

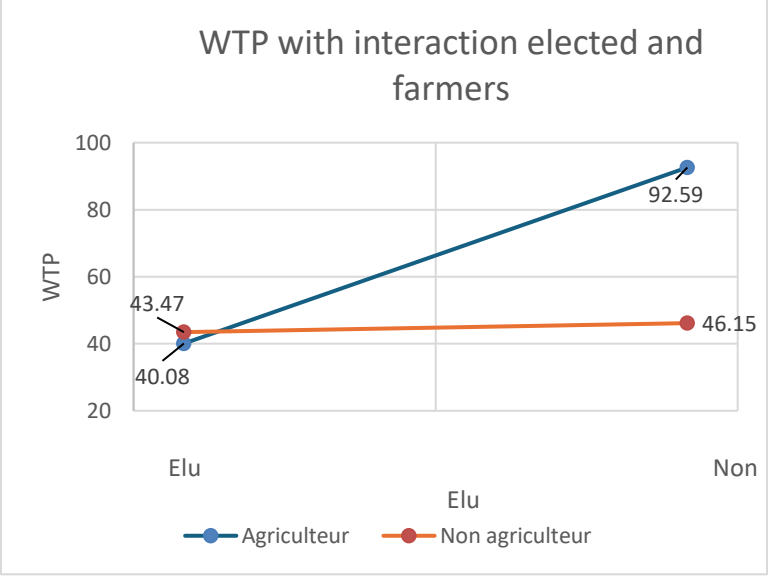

Figure 3 - The interaction of farmers' and elected officials' willingness to pay (WTP)

3.5 WILLINGNESS TO PAY AND PREFERENCES ACCORDING TO SOCIO-DEMOGRAPHICS

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Table 5 present the willingness to pay (WTP) for the different attributes according to sex, age and income. Women and men differed in their WTP, with men willing to pay more for wild pollination (p-value = 0.09) and diet diversity. Women show a preference for dietary diversity, followed by pollinators, then floral diversity. Individuals aged 30 to 44 were willing to pay the highest for pollinators (€49.49), followed by dietary diversity, then floral diversity. With age, individuals tend to attach greater importance to dietary diversity rather than the presence of pollinators. A drop in willingness to pay is observed for individuals aged 30 to 44, which marks a transition phase (Table 5). Individuals with a lower income were willing to pay the most for pollination (€52.04), while conversely, individuals with the lowest WTP (€28.86) are those declaring an annual income greater than €54,000.he WTP of individuals who declared having income between €30,000 and 40,000 annually is not included as the results were not significant. On the other hand, all other willingness to pay for which the p-value is not indicated have a significance threshold of 10% or 1%.

Table 5 - Table of different WTP according to personal attributes. When there is no sign associated with the WTP, the p-value is < .01. The highlighted value is the highest in the row.

Characteristic	Membership category	Wild pollination	Diet diversity of fruits and vegetables	Floral diversity
Sex	Woman	43,94	48,91	39,01
	Man	62,11	52,75	29,80
Age	16 – 29	.	.	.
	30 – 44	49,49	40,63	34,64
	45 – 59	35,91	38,22	26,02
	60 – 74	53,62	63,29	36,72
	75 and more	.	.	.
Income	Less than 16 000 €	52,04	44,29	35,28
	16 000 ~ 22 000 €	40,15	40,43	30,31
	22 000 ~ 30 000 €	46,60	50,39	34,04
	30 000 ~ 40 000 €	.	.	.
	40 000 ~ 54 000 €	46,20	25,99	21,24
	More than 54 000 €	28,86	24	15,96

Overall, pollinators and dietary diversity are consistently found in first or second place in preferences, while floral diversity always ranks third.

4. Discussion

4.1. RESULTS FROM DISCRETE CHOICE EXPERIMENT (DCE)

In this study, a Discrete Choice Experiment (DCE) was conducted to estimate the values attributed to pollinators based on three main dimensions: the indirect use value, related to their essential role in agricultural production, particularly in the pollination of fruits and vegetables, which is crucial for agriculture. The existence value (or non-use value), which refers to the utility derived simply from the presence of pollinators, regardless of any direct interaction. The non-market value, associated with the aesthetics of nature, linked to the beauty and floral diversity promoted by pollinators.

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The results of the experiment show that the sum of the willingness to pay (WTP) for these three dimensions amounts to approximately €139.65 per year (€51.30 + 52.80 + 35.55; Table 2). The DCE also allowed us to estimate the amount of volunteer time respondents would be willing to provide to maintain these three benefits associated with pollinators. On average, individuals would be willing to volunteer between 11 and 17 hours per month, depending on the expected ecological benefits.

The analysis was further deepened by considering the socio-economic variables of the participants. For example, the existence value of pollinators, estimated at €52.80, varied if people are farmers or not and elected or not. Among farmers, this value reached €72.38, which is consistent with their dependence on pollinators to ensure crop productivity. Some farmers, particularly market gardeners, rely on pollinator rentals or manual pollination, especially for plants like zucchini. These practices require both financial- and time-investments. However, this dependence on pollinators varies depending on the type of crop. For example, corn production, which is self-pollinating and does not require cross-pollination, does not rely on pollinators.

Elected officials expressed a willingness of €42.52 to pay for pollinator conservation. This willingness differs from that of non-elected farmers, whose WTP reaches €92.59 per year, the highest value observed in this study. This difference can be attributed to the situation of non-elected farmers, who do not have local levers of action, such as decision-making power within communities, to fund initiatives in favor of pollinators. Consequently, these individuals are forced to contribute directly and personally. It should be noted that 43% of non-elected farmers surveyed had an annual income of less than €16,000, an income category often associated with a higher willingness to pay. Moreover, 60% of them are men, a group that, in this study, generally has a higher WTP than women, which could explain this strong willingness to pay. The heterogeneity of the agricultural sectors represented, ranging from large-scale crops to cattle farming, suggests that this willingness is not linked to the direct dependence of a specific crop on pollinators.

Conversely, individuals reporting the highest incomes exhibited the lowest WTP, at €28.86 per year. This raises questions about the relationship between income and environmental priorities.

Among the attributes considered in the DCE, the presence of pollinators and food diversity were consistently ranked highest in individuals' preferences. Moreover, it appears that the older the individuals are, the more importance they attach to food diversity. Conversely, the higher the individuals' incomes, the more they prefer the presence of pollinators.

Regarding participation in volunteer activities, a small proportion of respondents indicated a willingness to engage in such activities. A majority of individuals justified this lack of engagement by citing a lack of time, as evidenced by the responses to the direct question following the DCE: "How many volunteer hours would you be willing to dedicate per week to protect pollinators?" However, there are disparities within the population.

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For example, elected officials reported a greater willingness to volunteer than farmers, as indicated by the Mann-Whitney test (z = -2.027).

These results offer interesting perspectives for the design of incentive mechanisms to promote pollinator conservation, while highlighting the limitations and variations in willingness to pay according to individuals' socio-economic characteristics.

4.2. CONTRIBUTION OF THE STUDY

The study provides an estimate of the willingness to pay to protect wild pollinators in this agricultural department. It can be stated that, overall, individuals are not indifferent to this issue, as they are willing to pay. They are mostly aware of the negative impact of pollinator decline on the natural environment and their well-being. However, there are disparities and no unanimity among individuals' perceptions of pollinators.

The study explains some of the preferences where, in the current context, individuals prefer food diversity over pollinators when they cultivate fruits and vegetables, as they feel directly concerned by the risk of pollinator decline, as if they were going to run out. While those who do not cultivate fruits and vegetables declare a stronger preference for pollinators than for food diversity. Perhaps they do not have a notion of the shortage or loss caused by this decline. Thus, the study allows for a comparison of the substitutability of attributes and thus which one is most important in the eyes of the sample.

Meeting directly with stakeholders and farmers made it possible to remove a filter and thus they were able to directly discuss what pollinators represent, what problems we do not see and whether we have the capacity to act. Their different representations are qualitative data that have not been fully processed in this study. However, it is possible to affirm that individuals care about this issue, as interviews often lasted longer than expected, which may indicate a certain awareness of the subject. Meeting with farmers also made it possible to react and thus to better prepare for future surveys. I was able to compare one with the other (while maintaining anonymity) and thus provided credibility. I believe that face-to-face meetings sometimes brought reliability.

4.3. LIMITS OF THE STUDY

4.3.1. BIAS AND QUESTIONNAIRE DESIGN

Several methodological biases may have influenced the survey results. In face-to-face interviews, a sense of empathy may develop between the interviewer and the respondent, potentially leading the latter to provide socially desirable answers. While the length of the questionnaire precluded a direct measure of social desirability bias, it is reasonable to assume that when individuals explain and justify their choices, they are less likely to succumb to this bias. However, the possibility remains that individuals may exaggerate or convince themselves of their responses, leading to an overestimation of their willingness to pay.

Additionally, a representativeness bias may have occurred regarding the pricing of pollinator services. It is more abstract for participants to quantify the monetary value of pollinators than to imagine the disappearance of products from supermarket

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shelves. Visualizing missing products is more concrete than spending money on insects whose activity remains largely invisible.

Regarding the order effect in ranking questions, this was mitigated by creating two versions of the questionnaire with different orders. Nevertheless, for greater robustness, it would have been ideal to have more than a dozen different orders, given that question 10 contained eleven items to rank.

Another possible bias is anchoring. Participants tend to respond solely based on the options provided, neglecting the "other" category, which requires additional effort to articulate. For example, when asked why they cultivate certain fruits and vegetables, some may simply say "it's just the way it is" without providing further details. However, as other options emerge throughout the questionnaire, they may refine their answers, such as by stating "oh yes, I grow them because they taste better."

Similarly, question 25, related to prices (€0, 5, 10, 15), could have limited responses, with some individuals simply choosing "the maximum" without further explaining their intentions. Although this question includes a contingent valuation component to confirm the DCE results, since pollinator services are often perceived as free, participants may be tempted to answer "0." However, in the presence of the interviewer and after becoming aware of the importance of the issue, it would be bold to declare a refusal to pay. In the rare cases where participants answered "0," they justified their response by stating that, "since they are going to disappear, paying won't bring them back." Asking the same question twice on different sheets would not be a solution, as participants would remember their previous answer and, for the sake of consistency, would likely choose the same option.

This consistency bias can occur at any point in a declarative questionnaire, making analysis difficult. Individuals may exhibit high internal consistency in their responses, even with low variance, without necessarily having high consistency. One solution would have been to include contradictory or more diverse questions to neutralize this bias. This was partially done, for example with the last question (question 34), where participants were asked which actions would be most effective and if they were willing to volunteer hours. The interaction between the answers can reveal inconsistency: an individual stating they are willing to volunteer 2 hours (question 32) should logically answer "yes" to the question about the effectiveness of associations (question 34).

The questionnaire underwent minor adjustments during the survey weeks, primarily in the form of reformulations to clarify questions for participants. The goal was to simplify the respondent's experience and avoid cognitive fatigue, especially when individuals are caught off guard by a 30-minute survey on a subject they are unfamiliar with.

It is possible that this first draft of the questionnaire included an excess of questions. However, it was preferable to collect more data than to miss out, allowing for

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better reorientation later. The age and income brackets were established in accordance with INSEE classifications, with each bracket representing an equitable proportion of the population.

European and legislative elections

The surveys took place concurrently with the European elections, before, during, and after the legislative elections. This may have hindered the ability to meet with certain public actors who were involved in their campaigns. However, it also provided an opportunity: individuals were able to open up about their concerns, the changes they hoped for, the causes, and how to address them.

Limitations of the method

1. **Declarative:** We rely on the respondents' self-reported answers, not on observed behaviors. This can call into question the reliability of the responses. Individuals may understand the purpose of the DCE.

In a declarative survey, individuals' responses are based on what they say rather than on observations of their actual behavior. This type of data is called "self-reported data" or "stated preferences." In the absence of concrete decisions to make or direct consequences, participants may express intentions or preferences that would not materialize in real-world situations. This lack of correspondence between stated preferences and revealed preferences (derived from observable behaviors in real-world contexts) is a significant limitation for the reliability of the responses in this type of survey.

In the context of a Discrete Choice Experiment (DCE), participants may, consciously or unconsciously, understand the underlying expectations of the survey. Consequently, some may adopt biased responses to conform to what they perceive to be the expected answers, or to present themselves in a favorable light (social desirability bias). This can introduce bias into the collected data, affecting the validity of the conclusions drawn from these stated preferences. Thus, while the DCE is a powerful method for exploring individuals' preferences, it is essential to acknowledge this potential limitation and keep in mind that stated preferences may differ from actual behaviors in a concrete situation.

2. **The sample:** The current direction of the future PES is aimed at farmers, yet all types of actors in the territory were interviewed. This remains consistent with the scope of the manuscript.

The payment for ecosystem services (PES) program targeted by the project is primarily designed to benefit farmers, as they are the primary land managers and play a key role in preserving ecosystems. However, the survey was expanded to a more diverse panel of actors, including people from various sectors (inhabitants, businesses, public decision-makers, etc.), in order to gather a broader view of the opinions, perceptions, and

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attitudes of the various stakeholders in the territory. This approach allows for capturing a diversity of perspectives on the preservation of ecosystem services, although the sample is not limited to farmers alone.

While this may seem to deviate from the primary target of the future PES which aims to examine local actors' perceptions of ecosystem services. By taking into account the perspectives of all stakeholders in the territory, including non-farmers, the study makes it possible to better understand the social and economic dynamics that influence the preservation of pollinators and other ecosystem services. This broader approach helps identify convergences and divergences of views between different groups of actors, which could help refine the PES mechanisms so that they are accepted and effective throughout the territory.

4.4. PERSPECTIVES

It is proposed to establish a feedback mechanism to inform individuals about the potential use of their willingness to pay. A significant portion of the population may refuse the introduction of a tax due to the perception that there are already enough taxes in France, as well as a lack of trust in taxation and a perceived lack of interest in contributing financially, a trend that seems to be more deeply rooted in the collective consciousness. On the other hand, other individuals may consider such a tax to be effective, as it would directly affect those concerned and generate funds. The effectiveness of the feedback would be increased if it was not limited to biodiversity, but also emphasized income, specifying the costs avoided now and in the future thanks to the conservation of pollinators, although the discounting of future losses may be influenced by biases.

In the future, willingness to pay could serve as a reference for evaluating the value of pollinators, while taking into account the specificities of populations and their practices. It is conceivable that farmers' willingness to pay patterns could be replicated in other study contexts. However, it is essential to recognize that age profile may be specific to the society of origin of the sample, as well as intergenerational relationships. The diversity of willingness to pay levels across different age groups in the agricultural sector, particularly in the Gers and more broadly in France, is not surprising, given the heterogeneity of ages within this sector.

To encourage conservation actions, it is suggested to implement support. In France, it seems that the state has a social responsibility, having to intervene for the well-being of its population, suggesting that individuals may not act on their own initiative, but would be inclined to respect the rules. This dynamic can create a sense of "disenfranchisement," where individuals feel that it is not up to them to take the necessary initiatives, or that the state should ban certain products or promote other practices.

The results show that willingness to pay is higher among farmers, partly corroborating the work of Agossou et al. (2023), which indicates that farmers show a significant willingness to pay for improvement. However, this study seems to diverge regarding the capacity for action of farmers, who are not significantly less inclined to act. This research, lacking DCEs and involving diverse populations, highlights this nuance.

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It would be counterproductive to try to impose change through constraints or additional regulations, as individuals seem to feel limited in their freedom of choice. Farmers, the main beneficiaries of Payments for Ecosystem Services (PES), are subject to monitoring through TelePAC[3], which limits their ability to practice their profession freely. Feelings of discontent have been expressed, and the tensions observed at the beginning of the year in France could resurface.

4.4.1. Application of Payments for Ecosystem Services

Payment for Ecosystem Services (PES) represents a tool aimed at influencing behaviours. It is defined as a payment equivalent to the difference between the value of the activity implemented and the value of the degraded ecosystem service or good. The maximum value of PES corresponds to a set of costs, including the loss of different virtues (such as pollination) and emissions associated with the new activity (Engel et al., 2008).

The question arises as to whether we can influence the level of willingness to pay. The principles of marketing illustrate that a good perceived as desirable sees its value increase, which could also apply to PES. The latter compensates for harmful behaviours while rewarding beneficial behaviours, thus being perceived as a form of positive reinforcement, a concept borrowed from behavioural psychology that highlights that rewards increase the likelihood of repeating a behaviour. Unlike negative reinforcement, which works through punishment, positive reinforcement promotes the adoption of desirable behaviours.

Willingness to pay can be interpreted as a missed opportunity for gain. Individuals who invest more in pollination services would benefit from increased services and could access PES, thus reducing their costs. On the other hand, fearful or opportunistic individuals could adopt "free rider" behaviours. Consequently, increasing the cost-benefit ratio of pollinators could increase willingness to pay.

In the French context, it would be relevant to highlight the economic and well-being benefits offered by pollinators. This study advises against imposing actions on individuals, while emphasizing that a soft approach could be considered. The attribute related to volunteering does not always prove significant, and when it is, its perceived cost is low.

A major obstacle is the mistaken perception that pollination services are free. In reality, these services are integrated into the price of goods consumed. The absence of these services could lead to increased production costs, due to the need for manual pollination, or, through the reduction of product diversity, a decrease in the prices of certain goods to the detriment of variety.

[3] Telepac is a French online platform managed by the Ministry of Agriculture. It allows farmers to manage and submit various agricultural declarations and requests, particularly those related to European subsidies, such as the Common Agricultural Policy (CAP) payments. Farmers can use Telepac to declare their crop areas, environmental measures, and manage their direct payments. It streamlines administrative processes by enabling digital submission, reducing paperwork, and improving communication between farmers and the administration.
The platform is essential for ensuring farmers comply with agricultural policies and receive the support they are entitled to.

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It might be wise to mobilize a portion of the population, especially those with a high score on the pro-environmental behaviour scale, or already engaged in concrete actions. This minority could influence the majority, promoting changes. Modest behavioural changes are generally easier to adopt. Some actors do not need formal contracts and rely on good faith agreements, such as installing beehives in fields. This cooperation is mutually beneficial, but mutual trust is crucial.

Awareness of the impact of decisions on future generations could also be a lever. When individuals realize that their choices can harm future generations, they are more likely to preserve the resource.

4.4.2. Recommendations

Analyses by conditional logit show that the second level of taxation, corresponding to 5 euros per year, is not significant, as is the second level of the volunteering attribute (two hours per month). Therefore, it is possible to reduce these attributes. A new DCE, integrating two attributes at three levels, would be more meaningful and interpretable, while maintaining the duration of the questionnaire, thus allowing increased efficiency.

Concerning the DCE, reducing the number of levels for certain attributes and increasing the levels of the "pollinators" attribute by a distinction between wild and domestic pollinators could strengthen the clarity of the results.

Regarding the presentation of the questionnaire, some questions require adjustments. When it comes to identifying natural pollinator habitats, it would be best to take a two-step approach, as respondents tend to give affirmative answers influenced by the initial presentation. Once the first open-ended question has been asked, relevant information should be introduced. In addition, standardization of the questionnaire would facilitate responses and allow comparison with other studies, in particular by integrating a pro-environmental behaviour scale.

4.4.3. Unused Data

The questionnaire, although complete, presents data that has not been used. For example, the data regarding the farming activity has not been analysed yet. This will be done for the task 3.2 on Payment for Environmental Services.

Furthermore, the use of a multinomial logit would have been relevant for certain responses, which were not standardized and were qualitative. A textual analysis could also help identify recurring themes according to the profiles of the respondents.

4.4.4. Perception of Resources

Wild pollinators are currently seen as essential, but often considered free or infinite due to the difficulty of measuring their impact. Awareness of biodiversity is often superficial, with individuals reassuring themselves by observing visible pollinators, such as honeybees. Another explanation can also be put forward, that people do not know the difference between wild and domestic bees.

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The pollination service is a common good, but it suffers from the "tragedy of the commons" described by Hardin (1968), where the author explain that overexploitation is inevitable in the absence of regulations. In the case of pollination services, the tragedy of the commons would not manifest as overexploitation but rather as the overuse of chemical products or the destruction of natural habitats that support wild pollinators. These practices can lead to a decline in pollinator populations, which are crucial for maintaining effective pollination services. As chemical usage increases or habitats are destroyed, wild pollinators diminish, causing a degradation in the quality and availability of pollination services. This, in turn, negatively affects agricultural productivity and ecosystem health, illustrating how unregulated actions can harm shared environmental resources.

Individuals might believe that a tax on pollinators would not be effective, arguing that raising awareness is more crucial than a simple financial measure. Decisions based solely on the nominal value of revenues, without considering associated costs, demonstrate potential inefficiency in resource management.

Ostrom (1990) takes a more optimistic perspective, suggesting that increased communication among resource users could promote more sustainable management. The awareness that individual behaviours can have consequences on peers encourages us to preserve the resource, emphasising that the degradation of the latter generates costs, both economic and emotional, for the negligent individual.

5. Conclusion

This study aimed to assess the willingness to pay (WTP) of a portion of the population in the Gers department, with a particular focus on farmers. The primary objective was to determine how these actors, as potential beneficiaries of a future Payment for Ecosystem Services (PES), might value the services provided by wild pollinators, for which the form and structure of the PES have not yet been defined. To achieve this, a comprehensive questionnaire was developed to gather opinions, representations, and interactions between individuals and their environment regarding these non-market goods.

The questionnaire was designed to facilitate the implementation of a Discrete Choice Experiment (DCE), a methodological tool for analysing individual preferences in a nuanced manner. This approach allowed for the estimation of willingness to pay, which can vary significantly from one population to another. In this study, the analysed sample revealed an average willingness to pay of €52.80 per year among a predominantly agricultural population, with annual incomes generally below €30,000 and a majority of members over 45 years old.

The results obtained provide valuable information that can serve as a foundation for the development of a PES aimed at increasing the acceptability of measures necessary to reverse the current trend of pollinator decline. In particular, the data collected allow for the identification of the most engaging factors for individuals, as well as the terminology

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that elicits a more significant reaction. These insights could guide the development of more effective communication and engagement strategies.

The RestPoll project, which is scheduled to end in a few years, benefits from this study which marked the beginning of a positive dynamic in terms of awareness and engagement. In the future, it would be relevant to apply this methodology to other geographic areas to determine if there are common patterns in the perception and attitude towards pollinators, as well as to assess the potential impact of these services on farmers and, by extension, on society as a whole. Such an approach could foster a collective approach to the conservation and management of natural resources, essential to the sustainability of ecosystems.

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7. Appendix

7.1. APPENDIX 1 - QUESTIONNAIRE

Wild pollinator survey

Name of interviewer:	Date:
Survey location:	Time:

Hello, my name is [...] and I'm a [student or member or staff at ... University or institution ...]. Could you spare me a little of your time to answer a questionnaire about wild pollinating insects. This will take between 20 minutes for citizens and 30 minutes for farmers.

Various scientific studies have shown not knowing enough about these insects, even though they play a crucial role in pollinating agricultural crops, maintaining food diversity and preserving flower biodiversity. These same studies also show that many of these insects are in decline. It is against this backdrop that our study, conducted in partnership with the [name of the Living Labs] and the European Union, aims to gain a better understanding of how the various stakeholders in this region (farmers, elected representatives, members of associations and, more generally, local residents) perceive the role of these wild pollinators and are prepared to protect them. We are going to survey 250 people randomly per living lab in Europe. The results of our survey will be made public and presented to the general public. In particular, they are intended to inform the decision-making of local players in the field of protecting natural environments. It is in this context that we would like to hear your opinion. It will be invaluable to us. No personal data will be collected and of course, your anonymity will be guaranteed. The data will be stored on a protected hard drive and will only be used for scientific production purposes.

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Part 1: Knowledge of pollinators and their environments

We will begin this questionnaire with some general questions about your relationship with the natural environment.

Question 1 Do you live in this (specify depending on the living labs) department or county?

- ○ Yes
- ○ No

Question 2 How would you classify this area?

- ○ Predominantly cities area
- ○ More of a towns and suburban area
- ○ Predominantly rural area

Question 3 Do you think that this area is primarily (Rank the answers):

Description of the area	Rank (from 1 to 4 or 5; 1 being the best)
A recreational area (a place for relaxation and leisure)	
An economically developed area (for example through the development of tourism or agriculture)	
A protected natural area	
A space representative of the region's cultural heritage	
Other: _____	

Question 4 How well would you say you know the following groups of plants and animals in your local area:

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Plants and animals	"I don't know anything about this group"	"I can identify a few common species"	"I know a lot of different species"
Crops			
Flowering plants			
Trees			
Insects			
Birds			
Mammals			
Mushrooms			
Other			

Question 5 Do you know what a pollinator is?

- ○ Yes
- ○ I think so
- ○ I think not
- ○ No
- ○ If it is positive (i.e. "yes" or "I think so"), could you describe?
  _____

Question 6 Did you know that insects can be pollinators?

- ○ Yes
- ○ No

Question 7 On the following poster, could you tell me which pollinators you recognize?

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[Poster pollinators (pg. 1 of pdf)]

Question 8 On the following poster, do you know what natural places wild pollinators live in?

- ○ Yes
- ○ I think so
- ○ I am not sure
- ○ No

[Poster habitats (pg. 2 of pdf]

Question 9 If so, still based on the poster, are you able to tell me where these pollinators live?

_____

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Question 10 Could you rank the different roles of wild pollinators depending on the importance you give to each of the services they offer? (from most important to least important)?

The services provided by wild pollinators are beneficial because…	**Rank (from 1 to 11; 1 being the best)**
they exist, and it makes me happy to know that they exist (pollinator species in their own right).	
they are a web of life support (Wider ecological values of pollinators in ecosystems, faunistic and floristic biodiversity)	
they will pass on all their profits to future generations (responsibility to future generations)	
they are a biodiversity flagship (Pollinators are important to research and education in e.g. ecology, biology)	
they participate to leisure and recreation (Pollination contributes to leisure and recreational activities such as butterfly recording, pollinator friendly gardening, etc)	
they participate to aesthetic (Pollinators contribute to a flower-rich landscapes, to the public and home gardens)	
they participate to art (Pollinators inspire artists (e.g. movies, paintings, etc.)	
they provide varieties of food (The production of certain fruit and vegetables depends on pollination by pollinators (zucchini, strawberries, etc.) contrary to others (lettuce) (Klein et al., 2007). The degradation of pollinators can change the offering of EU grown fruits and vegetables in market stands.)	
they provide nutritional quality and healthy food (Pollinator-dependent crops contribute up to 40% of the world's supply of nutrients and around 90% of Vitamin C in crops is produced thanks to insect pollination (Ellis et al. 2015; Eilers et al. 2011).)	

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they guarantee amount and stability of yield (Insect pollination benefits agricultural yields (about 8 to 10 % of the value of global edible crop production depends on pollinators; Lautenbach et al., 2012))	
they provide seed production (Pollination impacts on seed production)	

- ○ I don't know

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We've just finished with the general part. We're now going to ask you some more specific questions about your relationship with the natural environment, and more particularly with the pollinating insects it shelters.

Part 2: Your perception of wild and other pollinators

Question 11 How many (if any) honey bee hives do you own?

Question 12 Are you a member of any organizations...

- ...that encourage environmental conservation
- ...that represent beekeepers
- ...that represent farmers and other land owners
- ...No

Question 13 Do you usually (from April to August) grow fruit and/or vegetables at home or in a shared garden?

- Yes, at home
- Yes, at a shared garden
- No, I do not grow fruit and vegetables→ 17
- Other: _____

If so, which ones? _____

Question 14 Why do you grow fruit and vegetables? (Several answers are possible)

- For pleasure
- Because the fruit and vegetables I grow are good quality and tasty
- Because I can plant what I want
- As a matter of principle
- Because it's good for my health
- Because I know what products (fertilizers, plant protection products) I'm using.

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- ○ Because it's a way for me to reconnect with the land
- ○ Because my parents did it, it's traditional
- ○ Because it saves me money
- ○ Other:
  _____

Question 15 Do you usually buy local (less than 100km than home) fruit and vegetables between April and August?

More than once a week	Once a week	Once every fortnight	Less than once a month	Never	I don't know

What are the main local fruits and vegetables you buy?

_____

Question 16 Why do you buy local fruit and vegetables? (Several answers are possible)

- ○ Because the prices are attractive
- ○ Because the products are of high quality and tasty
- ○ Because the products are attractive, well-shaped, etc.
- ○ Because the products on offer are very varied
- ○ On principle
- ○ Because it's good for your health
- ○ Because it helps preserve the natural environment
- ○ Because it supports the local economy
- ○ Other:
  _____

Question 17 Do you frequently visit natural areas such as green spaces, forests or woods and the surrounding nature parks?

More than once a week	Once a week	Once every fortnight	Less than once a month	Never	I don't know

Why?

_____

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Question 18 Could you tell me to what extent you agree or disagree with each of these 4 statements? To answer, use a scale from 1 to 4. You will answer 1 if you strongly disagree with the statement and 4 if you strongly agree with the statement.

	Strongly disagree → Strongly agree	I have no idea
In the region's natural areas, you can appreciate the abundance of flowers present	1 2 3 4	
In the region's natural spaces, you can appreciate the diversity (the fact of many different types of) of flowers present	1 2 3 4	

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The current state of the flowers and flora in the region's natural areas gives you cause for concern.		
You are concerned about the future state of the flowers and flora in the region's natural areas.		

Question 19 Have you noticed any changes in the surrounding landscape in recent years?

- ○ Yes
- ○ No
- ○ I don't know

If so, which one(s)?

_____

Question 20 Is leaving the environment in a better condition than it is at present for future generations a key concern for you?

- ○ Yes
- ○ No
- ○ I don't know

Question 21 Would you want to leave this environment to future generations in its current state?

- ○ Yes
- ○ No
- ○ I don't know

Why?

_____

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Question 22 Did you know that the population of wild pollinating insects is highly dependent on the health of the natural environment and landscapes?

- ○ Yes
- ○ I think so
- ○ Not sure
- ○ No

If so, how did you get this information?

- ○ Social media
- ○ Internet
- ○ Training
- ○ Education
- ○ Observation
- ○ Other:_____

Question 23 Did you know that some wild pollinators are in decline?

- ○ Yes
- ○ I think so
- ○ I think not
- ○ No

If so, how did you get this information?

- ○ Social media
- ○ Internet
- ○ Training
- ○ Education
- ○ Observation
- ○ Other:_____

Question 24 Do you think we can compensate for this decline by making greater use of domestic managed pollinators, such as honeybees kept in hives?

- ○ Yes
- ○ No
- ○ I don't know

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[Providing knowledge in order to ensure that all participants answer the questionnaire with at least the same basic level.]

Pollinating insects in general, and wild ones in particular, are in decline around the world. We are here to understand the consequences of this decline for our society. That's why, in the next stage, we're going to present you with different scenarios showing several possible changes in the state of the natural environment. We're going to ask you to compare these different scenarios and choose the one you prefer.

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Part 3: Choice cards (please see Table on page 21)

For each option, the following question will be asked:

Question 25 On a scale from 0 to 10, how certain are you of the scenario you have chosen? In other words, how convinced are you of your choice and are confident you would make this choice if asked again?

0 corresponding to absolutely uncertain and 10 to absolutely certain

0 1 2 3 4 5 6 7 8 9 10

Option number	**Which scenario would you choose?**				**Degree of certainty (between 0 and 10)**	**You have ticked one additional payment per year equal to €0. Why did you make this choice?**
Option	I don't know	Scenario 1	Scenario 2	Scenario 3		
Option	I don't know	Scenario 1	Scenario 2	Scenario 3		
Option	I don't know	Scenario 1	Scenario 2	Scenario 3		
Option	I don't know	Scenario 1	Scenario 2	Scenario 3		
Option	I don't know	Scenario 1	Scenario 2	Scenario 3		

In all your choices, do you consider that you have taken into account all the elements on the choice cards? Let me remind you of these elements: the quantity and variety of fruit and vegetables available on local markets, the diversity of wild flowers, the proportion of species of wild pollinators that have disappeared, the time it takes for the benefits of a scenario to appear.

- ○ Yes
- ○ No

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Question 26 If not, which ones have you omitted?

- ○ Variety and quantity of fruit and vegetables available at local markets
- ○ Wildflower diversity
- ○ Proportion of wild pollinator species available
- ○ Time of occurrence of the scenario
- ○ Volunteer working time
- ○ Type of payment

I would now like to ask you a few questions about the actions you think would be most appropriate to protect the natural environment and the wild pollinating insects it shelters.

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Part 4: Action to be taken

Question 27 Which of the following aerial views of the landscape do you prefer?

Aerial view A Aerial view B Aerial view C None I don't know

Landscape A

Landscape B

Landscape C

Explain why you prefer this Landscape:

- ○ Growing crops
- ○ Recreation
- ○ Esthetic
- ○ Others: _____

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Question 28 Which of these aerial views do you think is most conducive to maintaining or developing wild pollinators?

Aerial view A Aerial view B Aerial view C None I don't know

Question 29 Could you tell me to what extent you agree or disagree with each of these 3 statements?

To answer, use a scale from 1 to 4. You will answer 1 if you strongly disagree with the statement and 4 if you strongly agree with the statement.

	Strongly disagree → Strongly agree				I have no idea
It is important for you to protect the natural environment.	1	2	3	4	
It is important for you to take action against the decline in wild pollinators.	1	2	3	4	
Protection of the environment and wild pollinators is important to the public	1	2	3	4	

Question 30 Do you think that an environmental tax on revenue can help protect wild pollinators?

- ○ Yes
- ○ No

Question 31 Do you think that volunteering with environmental associations can help protect wild pollinators?

- ○ "Yes, and I would be prepared and able to give up some of my time to participate"
- ○ "Yes, but I would not be prepared or able to give up my time to participate"
- ○ "No, I do not think these associations can help protect wild pollinators"

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Question 32 Would you be prepared to get personally involved in protecting wild pollinators?

- ○ Yes
- ○ No
- ○ I don't know

Question 33 If so, how?

- ○ By making a financial contribution (contribution to the funding of an association involved in the preservation of wild pollinators, etc.)
- ○ By contributing my expertise and knowledge (I'm a beekeeper, farmer and I've studied ecology, etc.)
- ○ By providing voluntary help (membership of an association for the protection of wild pollinating insects, involvement in the field, etc.)
- ○ By changing my daily practices (using fewer chemicals, respecting the natural habitats of pollinating insects, etc.)
- ○ Buying pollinator-friendly products
- ○ Other: _____

Question 34 Select three measures do you think would be most effective in protecting wild pollinators?

Measures	
• Integrate the protection of wild pollinators into the management of green spaces by local authorities.	☐
• Encourage residents to plant pollinator-friendly flowers and set up insect hotels in their gardens.	☐
• Reduce the use of chemical products: pesticides, fungicides, insecticides and herbicides.	☐

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- Controlling urban development and encouraging grouped housing. ☐
- Conserve and develop natural habitats for wild pollinating insects: meadows, hedgerows, flower fallow, etc. ☐
- Installing beehives taking into account the habitats of wild pollinators. This means not placing beehives too close to the natural habitats of wild pollinators so as not to create too much competition and put additional pressure on wild pollinators. ☐
- Encouraging a change in farming practices, with greater crop diversification. ☐
- Other (clarify): ☐

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Only for professional farmers

Question 35 How big is your farm?

- ○ less than 10 ha
- ○ 10 - 25 ha
- ○ 25 - 50 ha
- ○ 50 - 100 ha
- ○ 100 - 200 ha
- ○ More than 200 ha

Question 36 What is the farm's main activity?

- ○ Dairy cattle
- ○ Beef cattle
- ○ Mixed cattle
- ○ Tree crops
- ○ Arable crops
- ○ Horticulture, market gardening
- ○ Sheep, other cattle feeding exclusively on plants.
- ○ Multi-crop livestock farming
- ○ Pigs, poultry
- ○ Viticulture

Question 37 What variety or crop or breed of animals do you most often use?

_____

Question 38 Are any of your products labelled? [y / n]

If so, under which label(s) are your products marketed?

- ○ AOC/AOP
- ○ PGI
- ○ Label Rouge
- ○ Traditional Speciality Guaranteed (TSG)
- ○ Organic Farming
- ○ Nature et Progrès
- ○ Ecocert
- ○ LEAF

Question 39 What is the main way you market your products?

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- "direct to consumers"
- "direct to retailers"
- "to wholesalers or marketing boards"
- Long distribution chain

Question 40 Could you tell us:

- Your approximate average annual turnover in euros per year over the last 4 years: .....
- Your average production cost in euros per year over the last 4 years: .....

Question 41 On your farm, have you contracted an Agro-environmental Scheme (AES)?

- Yes
- No

If yes, which one?

_____

Question 42 Approximately how much does it cost you per hectare to implement the environmental practices associated with the Agro-Environmental Scheme (AES) contract?

Question 43 Of the types of practices listed in the table below, can you tell me which ones you actually use?

Question 44 How do you think this AES has impacted wild pollinating insects on your farm and the surrounding landscape, or in the region/country in general?

- Positive
- Negative
- None
- I don't know

If so, in what way?

_____

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Question 45 Please tell me which ones you think have a positive, negative or no impact on:

a. Increasing the total number of pollinators in my farm/the local the landscape

b. Encouraging different types of pollinators in my farm/the local landscape

If so, can you give us more details?

Types of farming practices	Practices actually implemented:	a - Increasing the total number of pollinators in my farm/the local the landscape	b - Encouraging more different types of pollinators in my farm/the local landscape	c- has no effect	Explain the impact
Crop rotation (Diversification)	Number of crops grown on the farm? Are they combined?				
Rotation	Crop rotation: Yes/No Over how many years is the rotation planned?				

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Managing plant protection products	Use of plant protection products: Yes/No Quantity used per year and per hectare by type of product				
Maintaining agro-ecological infrastructure (e.g. the alignments of trees and their grass strips on the edge or in plots, forest edges, hedges, banks, low walls, ditch borders, streams ...; or maintaining wet meadows, orchards, rangelands, wastelands, groves, wetlands ...; or preserving ponds, springs, isolated trees, rocks)	Are there any agro-environmental infrastructures on your farm? Yes/No If yes, explain which one and Approximately what proportion of your UAA (Utilised Agricultural Area) does this infrastructure represent?				
Soil preparation	What type of tillage do you use? Ploughing/semi-tillage/shallow tillage/0 ploughing				
Chemical fertiliser	What type of fertiliser do you use? Mineral fertilisation/Organic fertilisation/Both. If you use chemical fertilisation, what quantities are applied per year?				
Habitat creation/restoration	Flower margins, patches, low input meadows, set aside, scrub, riparian buffer strips etc.				
Habitat management/maintenance	Flower margins, patches, low input meadows, set aside, scrub, riparian buffer strips etc.				
The maintenance and/or management of the existing habitats, in connecting with the habitat creation/restoration	Flower margins, patches, low input meadows, set aside, scrub, riparian buffer strips etc.				

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Question 46 If you use at least one of the agri-environmental practices mentioned above (crop rotation, crop rotation plan, reduction of inputs, simplification of tillage, etc.), could you rank the main reasons why?

Agri-environmental practices	Rank (from 1 to 4 or 5; 1 being the best)
Agronomic (improving soil fertility, combating erosion, etc.)	
Economic (reduced input costs and gains from subsidies, etc.)	
Environmental (helping to preserve the natural environment)	
Professional (greater decision-making autonomy, improved image of my profession, etc.)	
Other: _____	

○ I have no idea

Question 47 If you do not use any of the agri-environmental practices mentioned above (crop rotation, crop rotation plan, reduction of inputs, simplification of tillage, etc.), could you tell the main reasons why?

Reason of not using agri-environmental practices	Rank (from 1 to 6 or 7; 1 being the best)
Lack of time	
Financial cost	
Risk of crop loss and product quality	
Lack of knowledge, training and technical support	

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Administrative constraints	
Close to retirement	
Other: _____	

Question 48 What conditions would be required for you to adopt these practices?

_____
_____

Question 49 Does your farm have any innovative or unusual practices in general? If so, what are these practices?

_____
_____

I'd like to end this interview by asking you a few more personal questions. Of course, your anonymity will be guaranteed. The information gathered will be used primarily to process our data and analyse our results. I would like to remind you that we are surveying 250 people in this area.

Part 5: Personal information

Question 50 Gender

- ○ Man
- ○ Woman
- ○ Transgender man
- ○ Transgender woman
- ○ Cis man
- ○ Cis woman
- ○ Non-binary
- ○ Other

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- ○ I prefer not to disclose

Question 51 How old are you?

16 to 29 years 30 to 44 years 45 to 59 years 60 to 74 years 75 years and over

Question 52 What is your personal situation?

- ○ Single
- ○ In a relationship
- ○ In a civil partnership
- ○ Married
- ○ I prefer not to disclose
- ○ Other: _____

Question 53 How many people (yourself included) live in your household?

Question 54 How many dependent children do you have?

Question 55 What sector do you work in?

- ○ Agriculture and agri-food
- ○ Industry and energy
- ○ Services (trade, tourism, insurance, banking, etc.)
- ○ Other: _____

Question 56 What do you do for a living?

- ○ Farmer
- ○ Beekeeper
- ○ Craftsmen / women
- ○ Shopkeepers and related occupations
- ○ Heads of companies with more than 10 employees
- ○ Liberal professions
- ○ Administrative and technical civil servants
- ○ Professors and higher scientific occupations
- ○ Information, arts and entertainment professionals

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- ○ Managers in administrative and commercial services
- ○ Engineers and technical managers
- ○ Professions in primary and vocational education, continuing education and sport
- ○ Occupations in health and social work
- ○ Ministers of Religion and Consecrated Religious
- ○ Occupations in the public service (administration, security)
- ○ Administrative and commercial occupations in companies
- ○ Technicians
- ○ Supervisors (excluding administrative supervisors)
- ○ Public service administrative employees, service agents and health auxiliaries
- ○ Police officers, military personnel, firefighters, private security guards
- ○ Administrative clerks
- ○ Commercial clerks
- ○ Employees in direct services to individuals
- ○ Skilled industrial workers
- ○ Skilled craft workers
- ○ Transport vehicle drivers, delivery drivers, couriers
- ○ Equipment Operators, Forklift Drivers, Storekeepers and Transport Workers (non-road)
- ○ Agricultural, forestry, fishing and aquaculture worker
- ○ Other worker
- ○ Retired
- ○ Predominantly parental care, or other care
- ○ Looking for work
- ○ I don't want to respond

Question 57 Place of residence:

Do you live in this area all year round? Or are you here only part of the year?

Permanent resident OR Second home

City:_____ Municipality : _____

Question 58 Where did you spend most of your childhood (from 0 to 16)?

- ○ In a major city, in the city center
- ○ In a suburb or on the outskirts of town
- ○ In a rural area

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Question 59 What is your level of education?

- ○ BAC (Highschool) + 5 years and more
- ○ BAC (Highschool) + 3 years or more
- ○ BAC (Highschool), BTS, DUT or equivalent
- ○ BAC (Highschool) level or lower

Question 60 What is your total net annual income?

Less than 9000€	10.000€ to 18 000€	19 000€ to 28 000€	29 000€ to 40 000€	41 000€ to 55 000€	Higher than 56 000€

Question 61 If you are a couple, what is your partner's total net annual income?

Less than 9000€	10.000€ to 18 000€	19 000€ to 28 000€	29 000€ to 40 000€	41 000€ to 55 000€	Higher than 56 000€

We are coming to the end of our survey. Thank you very much for your participation.

Question 62 Would you like to be informed of the results of this survey?

- o Yes, I am interested. Contact (Email, Tel):
  _____
- o No, I am not

Question 63 Do you have any other information to share with us? Any other comments you would like to make?

Focus Groups

I would also like to inform you that in order to complete the study, we have scheduled meetings for groups of 6 to 10 people. These meetings will take place from the beginning of June. Each meeting will last approximately one hour. The aim is to get local stakeholders to discuss the issue of wild pollinators and the local measures that can be taken to protect them more effectively. At the end of each meeting, we will be offering a small snack so that participants can continue their discussions in a convivial atmosphere.

Question 64 Would you be prepared to take part in one of these meetings?

- Yes, I am interested

Phone number: _____

eMail: _____

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- No, I am not

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7.2. APPENDIX 2 – CHOICE CARD SETS

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7.3. APPENDIX 3 - ECONOMETRICS

7.3.1. APPENDIX N°3.1: CONDITIONAL LOGIT FOLLOWING EACH ATTRIBUTE

```
Iteration 0:   log likelihood = -2812.9586
Iteration 1:   log likelihood = -2812.7037
Iteration 2:   log likelihood = -2812.7036

Conditional (fixed-effects) logistic regression

                                                Number of obs     =      6,480
                                                LR chi2(9)        =    2428.06
                                                Prob > chi2       =     0.0000
Log likelihood = -2812.7036                     Pseudo R2         =     0.3015
```

Choix1	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
2.FL	1.958252	.0678528	28.86	0.000	1.825262	2.091241
H						
2	.1339918	.0942547	1.42	0.155	-.0507441	.3187277
3	-.21678	.0887272	-2.44	0.015	-.3906822	-.0428779
4	-.3265338	.0929343	-3.51	0.000	-.5086818	-.1443859
2.Pollini	1.985639	.0676657	29.34	0.000	1.853016	2.118261
2.Flore	1.297575	.0683615	18.98	0.000	1.163589	1.431561
Taxe						
5	-.0427231	.0881758	-0.48	0.628	-.2155444	.1300983
10	-.3504096	.0889624	-3.94	0.000	-.5247727	-.1760465
15	-.6113405	.0849081	-7.20	0.000	-.7777574	-.4449236

7.3.2. APPENDIX 3.2: CONDITIONAL LOGIT GENERAL

```
Conditional (fixed-effects) logistic regression

                                                Number of obs     =      6,480
                                                LR chi2(5)        =    2410.91
                                                Prob > chi2       =     0.0000
Log likelihood =  -2821.278                     Pseudo R2         =     0.2994
```

Choix1	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
FL	1.936907	.066767	29.01	0.000	1.806046	2.067768
H	-.1165515	.0285215	-4.09	0.000	-.1724526	-.0606504
Pollini	1.993399	.0670753	29.72	0.000	1.861934	2.124864
Flore	1.342132	.0649068	20.68	0.000	1.214917	1.469347
Taxe	-.0377528	.0052536	-7.19	0.000	-.0480496	-.027456

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7.3.3. APPENDIX 3.3 : LOGIT MULTINOMIAL FOR NON-FARMERS

```
. mlogit Choix1 FL H Pollini Flore Taxe if Agri01 == 0

Iteration 0:   log likelihood = -2972.0865
Iteration 1:   log likelihood = -2184.8115
Iteration 2:   log likelihood = -2179.2338
Iteration 3:   log likelihood =  -2179.225
Iteration 4:   log likelihood =  -2179.225

Multinomial logistic regression                 Number of obs     =      4,290
                                                LR chi2(5)        =    1585.72
                                                Prob > chi2       =     0.0000
Log likelihood =  -2179.225                     Pseudo R2         =     0.2668
```

Choix1	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
0	(base outcome)					
1						
FL	1.925062	.081701	23.56	0.000	1.764931	2.085193
H	-.0931802	.0350306	-2.66	0.008	-.1618389	-.0245214
Pollini	1.988517	.0817641	24.32	0.000	1.828262	2.148772
Flore	1.272878	.0792631	16.06	0.000	1.117525	1.428231
Taxe	-.0437076	.0064951	-6.73	0.000	-.0564378	-.0309774
_cons	-7.341989	.2552211	-28.77	0.000	-7.842214	-6.841765

7.3.4. APPENDIX 3.4 : LOGIT MULTINOMIAL FOR FARMERS

```
Multinomial logistic regression                 Number of obs     =      2,190
                                                LR chi2(5)        =     880.46
                                                Prob > chi2       =     0.0000
Log likelihood = -1076.8846                     Pseudo R2         =     0.2902
```

Choix1	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
0	(base outcome)					
1						
FL	2.073172	.1186921	17.47	0.000	1.84054	2.305804
H	-.1672052	.0504366	-3.32	0.001	-.266059	-.0683514
Pollini	2.111315	.1197915	17.62	0.000	1.876528	2.346102
Flore	1.555303	.1161677	13.39	0.000	1.327618	1.782987
Taxe	-.0291707	.0091911	-3.17	0.002	-.047185	-.0111565
_cons	-8.100045	.3798518	-21.32	0.000	-8.84454	-7.355549

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7.3.5. APPENDIX 3.5: LOGIT MULTINOMIAL FOR NON-ELECTED

```
. mlogit Choix1 FL H Pollini Flore Taxe if Elubyte ==0

Iteration 0:   log likelihood = -3304.5403
Iteration 1:   log likelihood = -2404.5071
Iteration 2:   log likelihood = -2398.1919
Iteration 3:   log likelihood = -2398.1804
Iteration 4:   log likelihood = -2398.1804

Multinomial logistic regression                 Number of obs     =      4,770
                                                LR chi2(5)        =    1812.72
                                                Prob > chi2       =     0.0000
Log likelihood = -2398.1804                     Pseudo R2         =     0.2743
```

Choix1	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
0	(base outcome)					
1						
FL	1.924336	.0778872	24.71	0.000	1.77168	2.076992
H	-.0956981	.033439	-2.86	0.004	-.1612374	-.0301588
Pollini	2.024303	.0785769	25.76	0.000	1.870295	2.178311
Flore	1.439633	.0765741	18.80	0.000	1.28955	1.589715
Taxe	-.0356771	.0061703	-5.78	0.000	-.0477706	-.0235836
_cons	-7.695294	.2476161	-31.08	0.000	-8.180613	-7.209976

.

7.3.6. APPENDIX 3.6 : LOGIT MULTINOMIAL FOR ELECTED

```
Multinomial logistic regression                 Number of obs     =      1,710
                                                LR chi2(5)        =     654.61
                                                Prob > chi2       =     0.0000
Log likelihood = -857.35639                     Pseudo R2         =     0.2763
```

Choix1	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
0	(base outcome)					
1						
FL	2.113249	.1338989	15.78	0.000	1.850812	2.375686
H	-.1786128	.0565166	-3.16	0.002	-.2893834	-.0678423
Pollini	2.046734	.1326432	15.43	0.000	1.786758	2.30671
Flore	1.157701	.1261879	9.17	0.000	.9103774	1.405025
Taxe	-.0481369	.0103971	-4.63	0.000	-.0685149	-.0277589
_cons	-7.307897	.4107683	-17.79	0.000	-8.112988	-6.502806

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7.3.7. APPENDIX 3.7 : LOGIT MULTINOMIAL FOR NON-FARMERS AND NON-ELECTED

```
. mlogit Choix1 FL H Pollini Flore Taxe if Elubyte ==1 & Agri01 == 0

Iteration 0:   log likelihood = -789.61927
Iteration 1:   log likelihood = -560.15208
Iteration 2:   log likelihood = -557.56218
Iteration 3:   log likelihood = -557.54724
Iteration 4:   log likelihood = -557.54724

Multinomial logistic regression                 Number of obs     =      1,140
                                                LR chi2(5)        =     464.14
                                                Prob > chi2       =     0.0000
Log likelihood = -557.54724                     Pseudo R2         =     0.2939
```

Choix1	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
0	(base outcome)					
1						
FL	2.09875	.1687916	12.43	0.000	1.767924	2.429575
H	-.1830911	.0704859	-2.60	0.009	-.3212409	-.0449414
Pollini	2.263614	.1685814	13.43	0.000	1.933201	2.594028
Flore	1.286706	.159001	8.09	0.000	.9750695	1.598342
Taxe	-.0520714	.0128682	-4.05	0.000	-.0772925	-.0268502
_cons	-7.788923	.5233604	-14.88	0.000	-8.814691	-6.763155

7.3.8. APPENDIX 3.8: LOGIT MULTINOMIAL FOR ELECTED AND FARMERS

```
Multinomial logistic regression                 Number of obs     =        570
                                                LR chi2(5)        =     197.63
                                                Prob > chi2       =     0.0000
Log likelihood = -296.18882                     Pseudo R2         =     0.2502
```

Choix1	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
0	(base outcome)					
1						
FL	2.164495	.2216122	9.77	0.000	1.730143	2.598847
H	-.1772445	.0955021	-1.86	0.063	-.364425	.0099361
Pollini	1.653017	.2173885	7.60	0.000	1.226944	2.079091
Flore	.9362574	.2100182	4.46	0.000	.5246293	1.347886
Taxe	-.0412394	.0177716	-2.32	0.020	-.0760711	-.0064077
_cons	-6.4733	.6678949	-9.69	0.000	-7.78235	-5.16425

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7.3.9. APPENDIX 3.9 : LOGIT MULTINOMIAL WHEN INDIVIDUAL IS NON-ELECTED BUT FARMER

```
. mlogit Choix1 FL H Pollini Flore Taxe if Elubyte ==0 & Agri01 == 1

Iteration 0:   log likelihood = -1122.0637
Iteration 1:   log likelihood = -776.03666
Iteration 2:   log likelihood = -771.86999
Iteration 3:   log likelihood =  -771.8531
Iteration 4:   log likelihood =  -771.8531

Multinomial logistic regression                 Number of obs     =      1,620
                                                LR chi2(5)        =     700.42
                                                Prob > chi2       =     0.0000
Log likelihood =  -771.8531                     Pseudo R2         =     0.3121
```

Choix1	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
0	(base outcome)					
1						
FL	2.05729	.1415037	14.54	0.000	1.779947	2.334632
H	-.1678141	.0598777	-2.80	0.005	-.2851722	-.050456
Pollini	2.315762	.1455479	15.91	0.000	2.030494	2.601031
Flore	1.81315	.1415038	12.81	0.000	1.535808	2.090493
Taxe	-.0250098	.0107987	-2.32	0.021	-.0461749	-.0038447
_cons	-8.812766	.4657619	-18.92	0.000	-9.725643	-7.89989

7.3.10. APPENDIX 3.10 : LOGIT MULTINOMIAL WHEN INDIVIDUAL IS NEITHER ELECTED NOR FARMER

```
Multinomial logistic regression                 Number of obs     =      3,150
                                                LR chi2(5)        =    1127.38
                                                Prob > chi2       =     0.0000
Log likelihood = -1618.7598                     Pseudo R2         =     0.2583
```

Choix1	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
0	(base outcome)					
1						
FL	1.873438	.0936326	20.01	0.000	1.689921	2.056954
H	-.0638152	.0404535	-1.58	0.115	-.1431026	.0154722
Pollini	1.899244	.0937788	20.25	0.000	1.715441	2.083047
Flore	1.272204	.0915482	13.90	0.000	1.092773	1.451636
Taxe	-.0411509	.007538	-5.46	0.000	-.0559252	-.0263767
_cons	-7.210012	.2931039	-24.60	0.000	-7.784485	-6.635539

7.3.11. APPENDIX 3.11: LOGIT MULTINOMIAL WHEN INDIVIDUAL IS A WOMAN

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```
. mlogit Choix1 FL H Pollini Flore Taxe if Sexe ==0

Iteration 0:   log likelihood = -2203.1507
Iteration 1:   log likelihood =  -1508.388
Iteration 2:   log likelihood = -1499.4277
Iteration 3:   log likelihood = -1499.3949
Iteration 4:   log likelihood = -1499.3949

Multinomial logistic regression                 Number of obs     =      3,180
                                                LR chi2(5)        =    1407.51
                                                Prob > chi2       =     0.0000
Log likelihood = -1499.3949                     Pseudo R2         =     0.3194
```

Choix1	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
0	(base outcome)					
1						
FL	2.302329	.1027819	22.40	0.000	2.10088	2.503778
H	-.1470968	.0428918	-3.43	0.001	-.2311631	-.0630305
Pollini	2.067977	.1028774	20.10	0.000	1.866341	2.269613
Flore	1.836131	.1003192	18.30	0.000	1.639509	2.032753
Taxe	-.0470686	.0078983	-5.96	0.000	-.0625489	-.0315883
_cons	-8.729389	.3304974	-26.41	0.000	-9.377153	-8.081626

```
.
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```

7.3.12. APPENDIX 3.12 : LOGIT MULTINOMIAL WHEN INDIVIDUAL IS A MAN

```
Multinomial logistic regression                 Number of obs     =      3,300
                                                LR chi2(5)        =    1112.81
                                                Prob > chi2       =     0.0000
Log likelihood =  -1729.643                     Pseudo R2         =     0.2434
```

Choix1	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
0	(base outcome)					
1						
FL	1.717825	.0901093	19.06	0.000	1.541214	1.894436
H	-.0935192	.0391669	-2.39	0.017	-.170285	-.0167534
Pollini	2.022854	.0900829	22.46	0.000	1.846295	2.199413
Flore	.9706012	.0874546	11.10	0.000	.7991934	1.142009
Taxe	-.0325663	.0072517	-4.49	0.000	-.0467794	-.0183533
_cons	-6.702707	.2776504	-24.14	0.000	-7.246891	-6.158522

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