Norwegian University
of Life Sciences

Master's Thesis 2023 30 ECTS
School of Economics and Business
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Valuing the Benefits of Preserving Agricultural Landscapes: A Meta-Analysis of Stated Preference studies

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Abstract

Agricultural landscapes provide us with multiple ecosystem services, including provisioning services like crops; regulatory services like pest control, nutrient cycling, water quality management and pollination as well as cultural services like recreation, aesthetic beauty and habitats for wildlife. Many of these include non-market goods and services which are not traded in the market and lack market prices. Thus, environmental valuation studies using Revealed (RP) and Stated Preference (SP) methods are needed to value them, which can then provide the right incentives for optimal economic management of these landscapes. This thesis reviews and analyzes published SP studies worldwide in the last 15 years (2007-2022) that have used either Choice Experiment (CE) or Contingent Valuation (CV) methods to value agricultural landscapes. A meta-analysis of 17 primary SP studies with 189 estimates of willingness to pay (WTP) for agricultural landscapes across Europe, Asia, Oceania, and North America was performed to see what characteristics of the landscape, the valuation method used and the affected population determine people's (WTP) for preserving agricultural landscapes. It was also compared to an existing meta-analysis of older studies (1982 – 2008) to see whether the drivers of WTP had changed in the last 15 years. Results indicate that society's willingness to pay (WTP) for agricultural landscapes is influenced by the size of the valued changes in landscapes, recreational services, the choice experiment (CE) valuation method, current condition of the landscape and other relevant variables. Landscape attributes such as the scarcity of agricultural lands, the direction (i.e., avoiding degradation or getting improvements) and their ecosystem services strongly influence people's preferences and WTP. Contrary to the existing meta-analysis, no significant results indicated that GDP per capita influences people's willingness to pay for agricultural landscapes. The findings provide valuable insights into the complex factors shaping people's preferences for agricultural landscapes.

Acknowledgment

Firstly, I would like to express my heartfelt gratitude to my supervisor, Ståle Navrud, Professor at the Norwegian University of Life Sciences (NMBU). I appreciate the tremendous help and time you devoted to me, as well as providing me with the necessary feedback throughout the semester. Secondly, I would like to thank my co-supervisor, Abinet Tilahun Aweke, Research assistant at NMBU, for your unwavering support, motivation, and guidance throughout my entire journey of writing this dissertation. Both of your expertise, encouragement and valuable insights have been instrumental in shaping my research and academic growth.

I am also profoundly grateful to my friends and family for their constant encouragement. Your belief in me kept me motivated during the challenging times, and I am thankful for your love and support throughout this journey.

I would like to extend my gratitude to all the individuals I have crossed paths with during the two years at NMBU. Your contributions, discussions, and interactions have enriched my learning experience and made it truly memorable.

It has been both thrilling and challenging at the same time to write my master's thesis. During the process, I have acquired knowledge of new theories and methods, as well as improving my data analysis skills.

Thank you, everyone, for being a part of my journey and for making this achievement possible. Your support has been invaluable, and I am immensely grateful for all the love and encouragement that helped me reach this milestone.

Siam Kibria

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Abbreviations

CE	Choice Experiment
CPI	Consumer Price Index
CV	Contingent Valuation
ES	Ecosystem Services
GDP	Gross Domestic Product
MA	Meta-Analysis
MEA	Millennium Ecosystem Assessment
RP	Revealed Preference
SP	Stated Preference
SWF	Social Welfare Function
TEV	Total Economic Value
UAA	Utilized Agricultural Area
WTP	Willingness to Pay

1 Introduction

Agricultural lands play a crucial role in supporting biodiversity and ecosystem services that sustain our planet's ecosystems. When discussing agricultural lands, people commonly refer to lands used for farming or livestock grazing. These types of lands cover a significant portion of the Earth's surface, with agriculture alone accounting for half of it. However, there is an increasing understanding of the additional services they offer beyond mere production. Landscapes play a vital role in preserving biodiversity, providing habitats for wildlife, supporting biological pest control, nutrient cycling, water quality control, and pollination, while also offering recreational opportunities and maintaining rural and cultural traditions (Arriaza et al., 2004; Fleischer & Tchetchik, 2005).

Land has been a source of numerous ecosystem services for mankind throughout history. These services comprise the benefits that are obtained from nature. For centuries, forests, grasslands, and agricultural fields have supplied mankind with public goods such as food security, fiber, landscape, environment, biodiversity and fuel (Pavel & Sergio, 2011). Public goods are non-excludable and non-rival in nature. In simple, customers cannot be prevented from taking advantage of their benefits, and the presence of additional consumers does not necessarily mean that consumers who already benefit from them have less access to them.

In addition, ecosystems play a vital role in maintaining the quality of water and air. Forests are particularly important as they store carbon and help prevent climate change. Bees and butterflies, which rely on natural habitats, are essential for pollination and the survival of many crops and wild plants. Wetlands and forests help with soil formation and nutrient recycling, which are important for plant growth. Plant life also protects infrastructure, reduces soil erosion, and keeps streams clear of sediment. Understanding how land has provided these ecosystem services in the past is critical for preserving them for future generations.

One of the primary causes of landscape changes is agricultural intensification. Large sections of natural habitats have been converted into cultivated lands over the last few decades by agricultural expansion. A loss of biodiversity and insect outbreaks are made more likely when naturally existing plant communities are transformed into monocultures (Dong et al., 2020). These changes have also led to several environmental issues such as soil erosion, deterioration of water quality, loss of biodiversity & fragmentation of habitat (Kleijn et al., 2009). Reduced variety is also caused by farming specialization, giving up on old methods, converting grasslands to crops, expanding fields, destroying nonproductive agricultural habitats, fragmenting ecosystems, and losing natural habitat (Ruiz & Domon, 2009). Aside from intensive agricultural practices, other human activities such as deforestation, urbanization, and the construction of roads, buildings, and dams can also modify the landscape of agricultural areas. Natural causes such as variation in climate causes changes in temperature and prediction patterns, affecting crop yields and soil quality. Floods and coastal erosion alter the hydrology of agricultural landscapes and productivity of agricultural lands (Berger, 2008).

As a result of the consolidation of farm enterprises and the decline in the number of farmers in rural areas, communities have emerged where majority of the population does not engage in agriculture yet enjoys the benefits of the environment because they chose to live there. Due to this, there is a demand for agricultural products that contribute to the creation of both aesthetically pleasing living spaces, particularly in "everyday" landscapes, as well as food production (Brady, 2006). Rural communities place great significance on a wide variety of landscape features, from open views, a variety of crops, fascinating architectural features, a variety of land uses, and a varied topography to more individualized characteristics like sentimental links, ancestry, daily experiences, and local knowledge.

According to (OECD, 2000) landscape has three key elements: i) Landscape structures, ii) Landscape functions, iii) Landscape values. The landscape structures include environmental features such as habitats, types of land (crops); landscape functions include places to live, work and providing various ecosystem services; landscape values concern for the costs that farmers face in order to maintain landscapes and how the society as a whole value agricultural landscapes as recreational or cultural good. Policymakers need to determine the right provision of landscape and identify the key features of a landscape that society appreciates because they are often undervalued. It's important to comprehend how human actions and ecological processes interact within the landscape to improve ecosystem services and encourage sustainable land use practices that benefit both people and the environment.

Landscape is a non-tradable commodity, and conventional economic methods cannot be used to determine its monetary value. As a result, researchers use Stated Preference (SP) methods, which entails survey techniques, to determine peoples' willingness-to-pay (WTP) for agricultural landscape preservation.

The objective of this study is to conduct a comprehensive meta-analysis of the environmental significance of individuals' willingness to pay to preserve agricultural landscapes. This will help develop value functions that can be used for benefit transfer to assess the economic worth of conserving these types of landscapes. This study focuses on the WTP estimates derived from diverse types of stated preference studies, which yield a broad spectrum of values. This analysis is based on the study "Valuation of EU Agricultural Landscape" by (Pavel & Sergio, 2011), which serves as the foundation for the meta-analysis. The main distinction is that their research included studies up to 2008, whereas this analysis will provide updated studies until May 2023. Also, they assessed mainly studies within Europe (but included some studies from USA, Canada and Taiwan), whereas this study aims at covering studies worldwide. The primary purpose of conducting this meta-analysis of newer studies is both to compare it with the existing meta-analysis and to provide the basis for a future effort to updating and expanding the existing meta-analysis. In this way it can be observed how the willingness to pay (WTP) for agricultural landscapes has changed in response to the current state of the landscape, present income level, education level, age, type of respondents and other relevant factors.

1.1 **Problem Statement**

The agricultural landscape plays a significant role in providing humankind with a diverse range of goods and services, making it an essential aspect of the environment. These include cabins, crop lands, grazing lands, recreational areas and more. While these non-traded goods are crucial, they often lack direct economic benefits for landowners and visitors, making their valuation challenging (de Groot et al., 2002). Most published studies address valuation of specific agricultural landscape on specific location using either Choice Experiment (CE) or Contingent Valuation (CV) methods; or some use a combination of both. By the end of this meta-analysis, it will be possible to identify the key characteristics of agricultural landscapes that influence peoples' WTP to preserve it. This is an area that the primary studies were not able to cover.

1.2 Research Questions & Hypothesis

1. **RQ1:** How do characteristics of the agricultural landscape/i.e., the environmental good affect peoples' (willingness to pay) WTP to preserve agricultural landscapes?
   - **H.1.1:** Reported WTP estimates for a large improvement in the landscape are higher than for a small improvement (Scope test).
   - **H.1.2:** Reported WTP estimates for the improvement of the landscape are smaller than for avoiding degradation/loss (Loss aversion test).
2. **RQ2:** How do characteristics of the affected peoples' WTP to preserve agricultural landscapes?
   - **H.2.1:** Increased income leads to higher WTP to preserve agricultural landscapes.
   - **H.2.2:** Reported WTP estimates for recreational services will be significantly higher compared to non-recreational services.
3. **RQ3:** How the characteristics of the Stated Preference methods are used to elicit WTP to preserve agricultural landscapes affected WTP?
   - **H.3:** Choice Experiment (CE) will result in significantly lower values of WTP estimates compared to other valuation methods.
4. **RQ4:** What aspects of the good or change in good affects peoples' willingness-to-pay?
   - **H.4.1:** Reported WTP for the preservation of landscapes that are at risk or well-maintained is higher than for restoring ruined landscapes.
   - **H.4.2:** Scarcity in agricultural land area leads to a higher WTP (The higher the UAA, the lower the WTP)

2 Background

Agricultural landscapes benefit human society in numerous ways, including by supplying food, assisting in pollination of natural habitat, protecting against erosion, flooding, and carbon sequestering. It also offers us eccentric views, recreational opportunities, and occasionally a location of contentment for many individuals (Malinga et al., 2018).

The need for food, fiber, and animal feed has only risen over time as population around the world has risen. To meet this rising demand, agricultural areas have been increased, farming practices have evolved, and crop production has improved dramatically due to the increased use of pesticides, fertilizers, and irrigation. When land is solely utilized for food production, it accelerates production and reduces costs, but it also poses a risk (Foley et al., 2011; Tilman et al., 2001). The degradation of the soil has led to soil erosion, water pollution, and other problems due to overuse of resources such as freshwater, the cultivation of the same crops in the same locations, and greater use of pesticides, fertilizers, machines, and irrigation (Bennett et al., 2021).

Agricultural landscapes are non-market environmental goods that are not traded in the market. To measure the value of these goods, researchers and policy makers generated an idea of putting a dollar value on them. Researchers and decision-makers came up with the idea of assigning a monetary value to these items to evaluate their worth. In our daily lives, we make decisions that have alternatives, and in the end, we pick the option that is best for us. Choice can be defined as a decision-making process that entails making a trade-off between using money for one good and forgoing another (Champ et al., 2017). Policy makers can decide whether to allocate public funds to preserve agricultural landscapes or to assess the loss that people will experience if the lands deteriorate by gathering and analyzing people's preferences regarding their use.

A market is a place where goods and services are being bought and sold. However, no market exists for environmental goods which is why they are referred to as non-market goods. The lack of a market for non-market goods in a market-based economy creates problems in resource allocation by underproviding. For this reason, individuals or firms will not have the incentive to supply those goods as they will not receive any payments to cover the associated costs. This creates a market failure for non-market goods.

3 Literature Review

Meta-analysis offers several benefits in basic research, including the ability to analyze and synthesize data, identify patterns, improve statistical power, and aid in the development of hypotheses and study designs (Mikolajewicz & Komarova, 2019). Using this methodology to conduct studies can also present challenges, particularly concerning availability and quality of data. As the method relies exclusively on published studies, this might result in publication bias. Additionally, identifying similar studies of relevance requires a thorough analysis that takes some time.

Pavel and Sergio (2011) addressed the importance of valuing agricultural landscapes and their public goods, such as environment, biodiversity, and food security. They delve into how market failure occurs in the agricultural sector as a result of the non-market nature of these goods and emphasize the importance of government support programs. They performed a meta-analysis of 34 existing valuation studies (performed within 1985-2008) of landscape benefits to determine the value of EU agricultural landscapes by applying a benefit transfer function based on the meta-regression analysis. Based on the analysis, they found the main factors that significantly influence landscape values are income level and landscape type. Additionally, they observed that different methodologies used in studies can significantly impact the valuation results. Their findings indicate that the willingness to pay (WTP) for EU landscape ranges from €134 to €201 per hectare, with an average value of €149 per hectare in 2009. The estimated total value of EU landscape in 2009 is between €24.5 and €36.6 billion per year. However, the study had limitations such as lack of adequate studies for certain regions and landscape types. Possible biases may have resulted from the overrepresentation and underrepresentation of certain countries in the sample. Additionally, the paper highlights the importance of addressing the comparability of results between studies and recommends considering different valuation scenarios to provide a more accurate estimation of the value of EU's agricultural landscape.

Huber and Finger (2020) highlights the significance of recognizing the value of grassland ecosystem services within the European agricultural industry. Through a meta-analysis of 32 research papers, the study examines the willingness to pay for cultural ecosystem services from grasslands in Europe. The results indicate that the average willingness to pay for cultural ecosystem services from grasslands in Europe is €38 per person per year, factoring in purchasing power. The research also identifies the impact of changes in grassland, cultural ecosystem services, methodological variables, and case study-related variables on the variability in reported willingness to pay estimates. Switching from cropland to grassland resulted in a decrease in WTP by €90. Conversely, adopting less-intensive land-use practices in mountainous areas lead to an increase in WTP by €53. The paper fails to delve deeper into the cultural ecosystem services that were considered in the valuation exercise, such as aesthetic, heritage, or recreational values. It also lacks a comprehensive analysis of the limitations of the meta-analysis approach and the potential biases present in the research papers that were included. Furthermore, there is no mention of the implications of the findings for the management of grasslands and policymaking in the European agricultural sector.

Another study by Žáková Kroupová et al. (2016) evaluates the contribution of agriculture to the value of European mountain landscapes and ecosystems, as well as the differences in their values. The study utilized a meta-analysis of 22 studies that evaluated the value of mountainous landscapes in various European countries. The only thing that sets our study apart from this one is that we are placing a value on agricultural landscapes. The results of the study showed that the average value of European mountain landscapes is €3,068 per hectare per year and €3.91 per person per day. The study also explored how the position of agriculture in the national economy affects the value of the mountain landscape and how insufficient public support provided to farmers affects the cost of landscape services they provide. However, the study had some gaps, including a limited number of studies included in the meta-analysis and a lack of specific policy recommendations on how to ensure the preservation and sustainability of these landscapes and ecosystems.

In contrast to the three studies mentioned above, this study focuses on the estimation of people's willingness to pay to preserve agricultural landscapes on a global scale. In previous studies, European countries were primarily concentrated on, whereas countries outside of Europe are included in this analysis, providing a broader perspective on landscape valuation. Additionally, the studies utilized in the meta-analysis are new and updated, offering the latest information and insights into the valuation of agricultural landscapes. Moreover, this study is a follow-up to previous studies, utilizing the latest data and findings to further develop their groundwork. The updated findings will allow for a comprehensive understanding of the current state of landscape valuation and its implications for various regions worldwide. This study offers a more comprehensive and global perspective on the value of agricultural landscapes and their associated ecosystem services by expanding the scope to include non-European countries and incorporating up-to-date research. This approach will help contribute to a better understanding of the economic and environmental importance of preserving agricultural landscapes on a global scale, with greater nuance and information.

4 Theoretical Framework

4.1 Ecosystem Services (ES)

Ecosystem services are those goods that are provided for free by nature. These services can be used directly or indirectly. Direct use of ES includes things that are directly derived from the environment which could be consumptive or non-consumptive. Some examples include living on land, harvesting wood from the forests, collecting water, hunting animals. The utility comes from direct interaction with that substance. Even recreational use of land such as hiking, fishing, camping or just enjoying scenic views are also direct benefits. On the other hand, indirect use of ES includes use of environmental resources in an indirect way, for example: pollination of bees helps growth of corps, mangrove forests preventing soil erosion to protect water sources from pollutants, taking impact of storms to save locality nearby, protecting fish habitat etc. Water retention capacity of soil helps prevent flooding and stores water in place to reduce the harm caused by droughts at a later time. Trees provide shade, accelerate carbon sequestration, and reduce temperature by converting the energy from the sun into water that evaporates into the air.

4.1.1 Classification of Ecosystem Services

It is a prerequisite to categorize ecosystem services in order to measure, map or value them and to share transparent results (Roces-Diaz et al., 2017). Various methodologies have been used to categorize ecosystem services, but a significant UN-backed approach known as the Millennium Ecosystem Assessment (MEA) was developed to assess the impact of human actions on ecosystem and human well-being. These are:

i. **Provisioning Services**

   These include services that are mostly found in nature and provided for free such as fruits, vegetables, fish, livestock, plants etc. Other types of services such as timber, natural gas, petroleum, drinking water which can be extracted from nature and used directly. Provisioning services are essential for human survival and are the most recognizable ecosystem services.

ii. **Regulating Services**

   Indirect services of the ecosystem such as water purification, erosion, pollination, flood control and carbon regulation and storage fall into this category. For example, plants intake CO_2 and in return provide us with oxygen and clear air, filter water, soil decomposes wastes, bees pollinate flowers, tree roots prevent soil erosion. Regulating services help maintain the balance and stability of ecosystems, and their loss can lead to negative impacts on human health and well-being.

iii. **Cultural Services**

Nature has been playing a big part in how human societies developed culture, social development, and intellectual properties. This traces back to the ancient times when people used to draw their day-to-day incidents on cave walls, depicting their hunts, tradition, and weather patterns etc. A cultural service supports the growth of human culture by fostering knowledge, recreation, and the creativity that results from interactions with the natural world. These are the non-material benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experiences.

iv. Supporting Services

Nature provides us with many ecosystem services which we mostly overlook because they have been going on and on for a prolonged period that we take for granted. Supporting services are necessary for the production of all other ecosystem services. An ecosystem would not sustain if not for the underlying natural processes for example, nutrient cycling, photosynthesis, soil creation and water cycle. These are core processes that have been in motion since the birth of the planet to sustain life form. Supporting services are so integral to the ecosystem that the absence of this will lead to the extinction of the previously mentioned services.

4.2 Welfare Economics

Welfare economics is a branch of economics that studies how the allocation of resources and goods affects social welfare. Using tools such as cost-benefit analysis and social welfare functions, it aims to assess the costs and benefits of economic changes and direct public policy towards maximizing societal well-being (Perman et al., 2003). Welfare economics aims to improve society's overall well-being by providing tools for guiding public policies to achieve beneficial social and economic outcomes for all.

The social welfare function (SWF) is a measure of the overall well-being of a society, taking into account the individual utility of each member (Pindyck & Rubinfeld, 2017). If the SWF is maximized, resources are allocated efficiently, and economists refer to this as Pareto efficiency. This means that no individual can be better off without someone else being worse off (Singh, 2007).

In order to depict the scenario, we can use a production possibility frontier and an indifference curve that represents the social welfare function. We assume that society manufactures two goods

- a private good referred to as 'x' and a public good referred to as 'q'. Figure 1.1 represents the efficient allocation of both goods. The best solution is achieved when the slope of the social welfare function's indifference curve is equal to the slope of the production possibility frontier (Mitchell & Carson, 1989). This implies that the optimal production of private and public goods is 'x*' and 'q*', respectively.

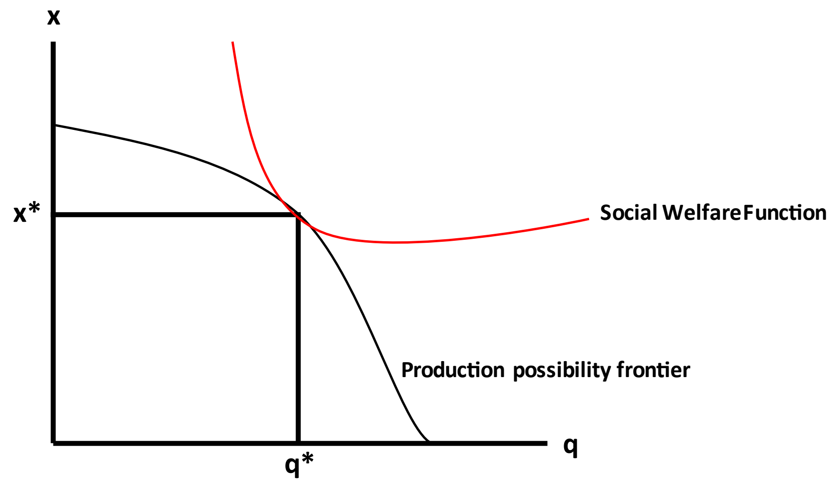

Figure 1: Maximized Social Welfare

It is imperative to assess the current solution and determine if it is truly optimal. There may be room for improvement that benefits all parties involved without making anyone worse off (Mitchell & Carson, 1989). This is referred to as a Pareto improvement and is a more efficient way to allocate resources within society. In order to determine if a Pareto improvement can be achieved, policymakers must thoroughly evaluate the costs and benefits of their proposed policies. If the benefits outweigh the costs and those who may be negatively affected can be compensated, the policy should be implemented. This is commonly known as the Kaldor-Hicks criterion and is a crucial tool in achieving a Pareto improvement (Boardman et al., 2018).

Welfare economics offers a framework for evaluating agricultural landscapes and determining the economic value of their ecosystem services. It involves using methods like stated (SP) and revealed preference (RP) methods to assess the monetary value of non-market ecosystem services. By valuing these services, policymakers and stakeholders can make well-informed decisions regarding managing and preserving agricultural landscapes (Bartkowski et al., 2020). Additionally, it can highlight cases of market failure, where the market fails to consider the total value of ecosystem services provided by agricultural landscapes, resulting in inadequate investment (Gowdy, 2004).

4.3 Utility Maximization

The concept of utility maximization theory is a fundamental principle in economics. According to this theory, both individuals and organizations strive to achieve the highest level of satisfaction from their economic decisions. The foundation of this theory is based on the idea that people have their own preferences, and therefore, they make choices that will maximize their sense of utility or satisfaction.

The formula for utility maximization theory involves comparing the marginal utility of different choices and selecting the one with the highest total utility. It can be expressed as follows:

$$MUx/_{Px} = {}^{MUy}/_{Py} \tag{4.1}$$

Assume, when considering purchasing goods X and Y, one should take into account their marginal utility (MUx and MUy) and the prices of each item (Px and Py). By doing so, individuals can allocate their limited resources towards the goods that provide the most marginal utility per dollar spent. The goal of this utility maximization is to find the optimal combination of goods and services within one's financial constraints, ultimately leading to the highest level of satisfaction or utility.

In Figure 2, assume the x_{max} y_{max} line represents the total amount of money available to purchase goods y and x. x_{max} displays the maximum amount of x that can be bought if all income is spent on x, while y_{max} shows the maximum amount of y that can be bought if all income is spent on y. The line's slope indicates the price ratio of X and Y, or the cost of one unit of X in terms of Y. To optimize satisfaction or utility, one must determine the best affordable combination of X and Y based on their income. This is represented by point b on the UU* indifference curve. At this point, the budget line intersects the indifference curve, indicating that satisfaction cannot be increased without additional spending. Points to the left (a) or right (c) of b on x_{max} y_{max} would provide less satisfaction, while points above x_{max} y_{max} are unattainable with current income. Point b is unique because the slope of the indifference curve is equal to the price ratio, implying that the additional satisfaction gained from consuming a little more x is equivalent to the extra cost of that x in terms of y.

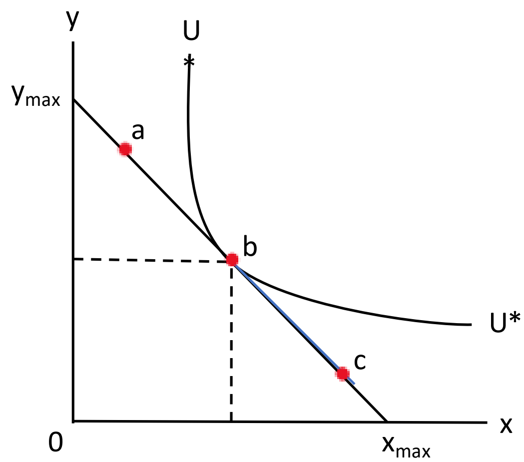

Figure 2: Utility Maximization

When it comes to valuing agricultural landscapes, utility maximization plays a crucial role in understanding how people assess and prioritize the benefits they receive from various landscape attributes and ecosystem services (Kreitler et al., 2014). People may consider many factors when valuing agricultural landscapes, including scenic views, flora and fauna diversity, cultural heritage, recreational opportunities, and the landscape's ability to provide provisioning and regulating services. Each of these attributes contributes to the overall utility that people derive from the landscape.

The individual's budget constraint is another important aspect of utility maximization. It sets the limit on the amount of money available for spending on different features and services. To get the most out of their budget, an individual will allocate it in a way that maximizes their satisfaction, given the prices of the different features and services. For example, let's consider someone who enjoys both scenic views and cultural heritage experiences. They have a limited budget for visiting different agricultural landscapes, and the prices for accessing scenic areas and cultural heritage sites are different. In order to maximize their satisfaction, this person will choose the combination of features that provides the highest utility within their budget constraint. Individuals may choose to allocate more of their budget towards scenic views if the cost to access them is relatively lower. It's essential to recognize that preferences may change over time due to factors such as changes in income, prices, or personal circumstances. For instance, if an individual's income increases, they may opt to spend more on cultural experiences and recreational activities, resulting in adjustments to their choices for maximizing satisfaction.

To determine the value of agricultural landscapes, one can use utility maximization theory to identify the key attributes that contribute to an individual's satisfaction, measuring the marginal utility of each attribute, and comparing them to determine the best allocation of resources. By using this approach, policymakers can make informed decisions that maximize the overall satisfaction of individuals and society.

4.4 Preference

Preference is a situation where an individual is confronted with a choice between at least two options that are either mutually exclusive or one option/commodity has to be traded off for the other. These choices incur a cost. There are two types of preference methods used: revealed preference (RP) and stated preference (SP). Stated preference surveys are collected and used in our meta-analysis as SP methods are ideal for valuing landscape (Pavel & Sergio, 2011), as they can capture both use and non-use values and get preferences and value estimates for several possible landscape change scenarios.

4.4.1 Stated Preference (SP)

Stated preference is one of the methods for evaluating the preference for environmental goods based on surveys and questionnaires among individuals. The data may come from surveying individuals making decisions in everyday situations and real-world contexts when they are faced with the actual effects of their choices. If Willingness to Pay (WTP) is assessed, the information may also derive from people's reactions to hypothetical questions when they are asked to estimate the financial value of hypothetical changes in the levels of a particular annoyance (Denant-Boemont & Hammiche, 2019). This is a smart approach to evaluate non-market values such as ecosystem services because well-designed surveys can avoid many of the potential problems and limitations because, surveys are often the most effective way to understand people's preferences (Champ et al., 2017). Theoretically, this approach gives a suitable Hicksian measure for valuing landscape in contrast to the hedonic and travel cost approach (Revealed Preference Method), which only offers a less precise Marshallian measure. There are two types of stated preference methods: Contingent Valuation method (CVM) and Choice Experiments (CE).

4.4.2 Contingent Valuation Method (CVM)

The Contingent Valuation method is frequently utilized to determine an individual's willingness to pay for non-market goods, such as preserving the environment or mitigating externalities like pollution. This approach is used for assessing the value of resources and services that do not have a market price, such as clean air, groundwater, scenic views, and biodiversity (Champ et al., 2017).

The contingent valuation method involves surveying individuals to determine the value of ecosystem services. Specifically, people are asked how much they would be willing to pay to protect agricultural landscapes or other types of ecosystem services. This method has been extensively utilized in research studies to evaluate the necessity of agricultural public goods and to determine courses of action related to environmental management and conservation (FAO, 2000).

While using the Contingent Valuation Method (CVM), there are certain methodological issues that need to be addressed. These include selecting the appropriate survey instrument design, choosing a relevant sample population, and accounting for hypothetical bias. The survey instrument design should align with the study objectives and reflect the preferences of the respondents in the target population. Hypothetical bias should also be taken into account as respondents may exaggerate their willingness to pay or accept compensation in hypothetical situations (OECD, 2018).

4.4.3 Choice Experiments (CE)

Another popular method used for estimating the economic value of environmental goods is the Choice Experiment. This method involves presenting hypothetical market scenarios to consumers, who are then asked to choose between different alternatives based on their preferences. Each choice set includes two or more options with varying levels of ecosystem services and costs. By trading off the attributes of each option, respondents select their preferred alternative (Champ et al., 2017).

The choice experiment approach aims to provide an understanding of how people value various ecosystem services. This method is considered to be more accurate than other survey methods, like the Contingent Valuation (CV) method, in gauging people's appreciation for ecosystem services (Wallace et al., 2023). The choice experiment method is employed to calculate the economic value of ecosystem services and to guide environmental management and preservation policy decisions.

While using the Choice Experiment (CE) method, there are several factors that need to be considered. One of these is the number of choice sets presented to each respondent. This can have an impact on the quality of data collected and the cost of data collection (Bech et al., 2011). It is also essential to carefully select the design attributes of the choice sets to ensure they are relevant to the study objectives and reflect respondents' preferences. Finally, it is important to consider the types of people that influence choice response certainty to ensure that the results accurately represent the target population.

In short, the contrast between these two SP methods is that CVM method places importance on a particular public good and provides information on people's preferences for the entire good rather than just one aspect of it. On the other hand, the CE approach breaks down the public good into various attributes and evaluates people's preferences over these attributes (Pavel & Sergio, 2011).

4.5 Meta-Analysis

Meta-analysis is a way of systematically combining previously established quantitative or qualitative research data from numerous selected studies to generate a single conclusion with greater statistical significance due to the increased number of respondents, greater variety among them, or cumulative effects and outcomes (Meta-Analysis, 2019).

Potential advantages of meta-analyses include improved precision, the ability to answer questions not addressed by individual studies, and the potential to resolve controversies arising from conflicting claims. The opportunity to answer topics that individual studies have not addressed and the chance to resolve disputes resulting from competing claims are just a few of the possible benefits of meta-analyses. In other words, a meta-analysis attempts to determine the impact of a program or treatment based on all the relevant studies conducted to date (What researchers mean by Meta-analysis, 2007). In order to obtain a meaningful summary of the results of the analysis, it is necessary to focus on a group of studies that are homogeneous in terms of participants, interventions, and outcomes.

Numerous studies have highlighted several drawbacks linked to the use of meta-analysis. It has been noted that this approach is vulnerable to bias, such as publication bias, methodological inconsistencies, data irregularities, and selection bias. These factors can ultimately result in misleading outcomes (Ahmed et al., 2012; Egger et al., 1997). Data dredging should also be avoided, which involves searching for significant results without a clear purpose, leading to inaccurate interpretations. The number of studies included in a meta-analysis affects its statistical power. To ensure accurate results, random effects meta-analyses should include at least five studies (Jackson & Turner, 2017). An important factor that affects statistical power is the expected effect size. If the effect size is small, it will require more evidence to support it compared to a larger effect size (Mikolajewicz & Komarova, 2019). Meta-analyses should not be used to establish causal inference. Although exploratory analyses can explore different criteria for causality, it is best to avoid making causal claims, and focus on associative outcomes instead (Weed, 2010).

This study creates a new database by looking for relevant data in studies that use Stated Preferences (SP) methods, such as Contingent Valuation (CV) and Choice Experiments (CE).

4.6 Benefit Transfer

Benefit transfer is often used in environmental economics when primary research isn't feasible due to time and resource constraints (Navrud & Ready, 2007). This involves using data from similar study sites with comparable conditions to make estimations (Johnston et al., 2015). It's a simple and cost-effective method that provides information, but it can lead to debates and challenges about its accuracy and validity.

Benefit transfer allows researchers to apply values or benefit functions from previous studies to new sites or policy contexts. However, there are challenges and limitations to this approach. Geological differences, population variations, and scale differences make it challenging to ensure the accuracy of benefit transfer (Johnston et al., 2015). Although researchers have developed protocols and criteria to improve the validity of benefit transfer, there is still a need for widely accepted guidelines for its use.

Benefit transfer is a useful and efficient method for analysts or policymakers with limited resources to conduct their studies. It utilizes existing studies and pre-existing benefit values or functions, saving time and costs compared to primary research. However, there are some drawbacks to this method. There are concerns about the reliability of the estimates due to differences in conditions between source and target sites, populations, and frames. Criteria proposed by Boyle and Bergstrom (1992) suggest that benefit transfer is only valid when the source and target sites, populations, and welfare measures are identical. However, it can be challenging to meet these criteria due to variations between sites and populations. Improper applications of benefit transfer can lead to invalid and inaccurate results (Johnston et al., 2015).

There are two primary types of benefit transfer: Unit Value Transfers and Function Transfers.

4.6.1 Unit Value Transfer

Unit transfer involves transferring a single number or set of numbers from pre-existing primary studies. These values can be used as they are or adjusted by considering income or purchasing power differences. This transfer method assumes that the benefit an average person at the study site gets from an environmental good is the same as what an average person at the policy site would get. Therefore, the average willingness-to-pay (WTP) estimate can be directly transferred from the study site to the policy site (Navrud & Ready, 2007). Although unit value transfers are straightforward, they may not be as accurate as benefit function transfers.

4.6.2 Function Transfer

Benefit function transfer method utilizes a benefit function derived from a primary study or set of prior studies to calculate a welfare estimate for a policy site. Benefit function transfers require a parameterized function that can calculate the empirical outcome of interest based on observable conditions at the policy site (Johnston et al., 2015). The transferred function is adjusted to the policy site's context using information on variables specific to the site. Benefit function transfers provide more accurate estimates and can account for differences in variables between the study and policy site, but site similarity remains an important factor for accuracy (Navrud & Ready, 2007). Meta-analysis is also a kind of function transfer technique, which is used in this study. Estimating a benefit function:

$$WTP_{yx} = f(A_x, B_y) \tag{4.2}$$

where WTP_{yx} represents how much a household y is willing to pay for the preservation of agricultural landscape at site x. A_x refers to the specific features of the agricultural landscape at site x, while B_y represents household y's characteristics. The benefit function can also estimate the average WTP for preserving the agricultural landscape for the entire population at site x using aggregate household characteristics information, B_y.

Although challenges remain, benefit transfer remains a widely used tool in policy analysis around the world. There are ongoing efforts to improve its accuracy and make it more accessible to policy analysts.

5 Data & Method

5.1 Literature Search and Database

The meta-analysis database comprises monetary value assessments obtained through the stated preference approach, which encompasses the contingent valuation and discrete choice experiment methods. A thorough search for primary studies that report on willingness to pay estimates for agricultural landscape was conducted in several stages. Firstly, the paper on Landscape Valuation in Europe by Pavel and Sergio (2011) was referred to in order to get an idea of the characteristics of the landscape that were considered relevant. In further text, this study will be referred to as the "reference study". Publicly accessible databases such as EVRI, EAERE as well as several online search engines like Google Scholar, JSTOR, Scopus and Semantic Scholar were used to find relevant papers on the valuation of agricultural landscape. Specific terms for searching studies included: valuation method, landscape type, landscape characteristics & others. Terms on each category are:

- Valuation method: value, valuation, economic value, preference, stated preference, choice experiment, choice modeling, contingent valuation, dichotomous contingent valuation;
- Landscape type: agricultural landscape, farmland, rural landscape, arable land, irrigated agriculture;
- Landscape characteristics: aesthetics, recreation, soil fertility, biodiversity, cultural heritage, quality products;
- Others: willingness to pay, ecosystem services, environmental valuation.

The quality of our primary studies was meticulously ensured by collecting information from multiple credible sources, including peer-reviewed journals, esteemed research institutions, renowned universities, and esteemed conference papers. In total, 21 studies were collected for our database. An overview of the studies in our database can be found in Table 5.1.1. However, after cross-checking the data, four papers had to be excluded. One paper did not provide information on willingness to pay (WTP) for agricultural landscapes (Novikova & Vaznonis, 2017), and the other three were very old studies already included in the analysis of the reference study. This database covers studies from 2007 till 2022, while our reference study includes data from 1982 until 2008. Ultimately, 17 primary studies from around the world were included, resulting in a total of 189 entries for our current meta-analysis. Many of these studies have multiple entries observations due to the valuation of different landscape attributes, different elicitation formats, and diverse types of sample populations. The study with the highest number of value observations, at 37, was taken from Hasund et al. (2011).

Differences can be noted between our meta-analysis and the reference study in several aspects. One notable aspect is that estimates for different ecosystem services and landscape characteristics, including scenic views, soil fertility, and cultural heritage, are recorded & kept track of in our database. Since these diverse characteristics of agricultural landscapes offer numerous benefits to people, it is crucial for the attributes to be connected to their corresponding ecosystem services to obtain more precise WTP values. Furthermore, the geographical scope of the valued agricultural landscape has been expanded beyond Europe in this meta-analysis by incorporating additional studies from Asia, Oceania, and North America.

Table 5.1.1 Summary table of reviewed Stated Preference (SP) studies: Contingent Valuation (CV) and Choice Experiments (CE), valuing agricultural landscape

Author	**Country**	**Survey Method**	**Year of Survey/ Sample Size**	**Type of landscape valued**	**Payment unit**	**Survey Type**
Rocchi et al. (2022)	Lithuania	CE	2019/ 143 members of the general population	Agricultural landscape	Euro per person per year	Face to face
Castro et al. (2011)	Spain	CV Open Ended	2008/ 340 members of local and visitor population	Semiarid landscape	Euro per person per year	Face to face
Bernues et al. (2014)	Spain	CE	2013/ 402 members of the general population 102 members of local population	Cultural landscape	Euro per person per year	Face to face & Online Survey
Bernues et al. (2015)	Norway	CE	2013/ 240 members of local population	Agricultural landscape	Euro per person per year	Face to face & Online Survey
Bernues et al. (2019)	Spain, Norway, and Italy	CE	Spain: 2013/ 402 members of local population Norway: 2014/ 240 members of local population Italy: 2016/ 402 members of local population	Agricultural landscape	Euro per person per year	Online Survey
Campbell (2007)*	Ireland	CE	2004/ 600 members of the general population	Rural landscape	Euro per person per year	Face to face
Baskaran et al. (2012)	New Zealand	CE	2005/ 761 members of the general population	Pastoral landscape	NZD per household per year	Mail
Garla et al. (2012)	United States	CV Dichotomous	2006/ 1374 members of the general population	Windbreak aesthetics	USD per person per year	Mail
Derek & Verburg (2014)	Netherlands	CV Payment Card	2011/ 115 members of the general population	Agricultural landscape	Euro per person per year	Face to face
Grammatikopoulou et al. (2012)	Finland	CE	2008/ 380 members of local population (LCA Model) 540 members of local population (CL Model)	Agricultural landscape	Euro per person per year	Mail

Hasund et al. (2010)*	Sweden	CE	2008/ 770 & 700 members of general population (Survey for linear and point field elements of arable land) 581 & 576 members of general population (Survey for permanent meadows and pastures)	Agricultural landscape	SEK per person per year	Mail
Hynes et al. (2011)	Ireland	CE & CV Payment Card	2009/ 1005 members of general population	Traditional grazing landscape	Euro per person per year	Online Survey
Luo et al. (2022)	Canada	CE	2019/ 643 members of local population	Farmland	CAD per household per year	Online Survey
Vivithkeyoonvong et al. (2016)	Thailand	CE	Not mentioned, which is why it was assumed to be the same year. / 131.28, 61.44, 41.04 & 6.24 members of farmer & local population	Rural landscape	THB per household per year	Face to face
Takatsuka et al. (2011)	New Zealand	CE & CV Dichotomous	2004/ For CVM: 163 members of local population 160 members of general population For CE: 391 members of local population 334 members of general population	Agricultural land used for arable farming	NZD per household per year	Mail
Sayadi et al. (2008)	Spain	CV Open Ended	2002/ 163 members of local population	Agricultural landscape	Euro per person per year	Face to face
Bielski et al. (2020)	Poland	CE	2019/ 353 members of local population	Agricultural landscape	Euro per household per year	Face to face

Note: Contingent Valuation Method: CV; Choice Experiments: CE

Studies with an asterisk (*) are included in Pavel and Sergio (2011)

5.2 Data description & coding of variables

During this study, a coding pattern closely resembling the one outlined in the reference study was followed.

In order to accurately analyze the data, Willingness to Pay (WTP) was portrayed as the dependent variable, having the currency of each respective country where the study was conducted. However, due to the fact that the primary studies reported their results in various currencies and were conducted in different years, we had to transform the extracted values of WTP into a standard monetary unit. To achieve this, we converted the WTP value of each study into USD the year of the study, using Purchasing Power Parity (PPP) - adjusted exchange rates from both the OECD (OECD, 2023) & The World Bank (World Bank, 2023f) data sites. Additionally, we adjusted the USD values of the study year to May 2023 for all primary studies to obtain 2023-USD values; using the Consumer Price Index (CPI) in the US according to the U.S Bureau of Labor Statistics using their CPI Inflation Calculator (USBLS, 2023).

Socio-economic variables were included as explanatory factors, such as GDP per capita, average age of respondents, percentage of female participants, percentage of individuals with higher education, average household size, households with children, and average household and individual income in our analysis. Most of the primary studies analyzed either reported the average income of individuals or households across different income levels. This led to a limited number of observations in the income variables; therefore, GDP per capita was used as a proxy for income levels. GDP per capita was calculated from the study year until 2022 using data from The World Bank (World Bank, 2023c). Some studies also reported the average age, household size, and households with children. For education level, WTP of respondents who had completed at least a university/college degree was recorded. While certain studies presented the percentage of female respondents, other studies provided the percentage of male participants. In those cases, percentage of female participants was derived from that information.

Methodological variables were categorized based on the type of stated preference method they used, such as choice experiment (CE) and contingent valuation (CV) methods. It was also noted whether the contingent valuation was conducted in dichotomous, open-ended, or payment card approach. To differentiate the studies, categorical variables were created for each of these valuation formats. A value of 1 in the variable indicated that the study used that specific valuation technique.

Moreover, it was noted whether the willingness to pay (WTP) was measured per household (=1) or per person (=0) and whether it was a one-time payment (=0) or a payment per year (=1). Different types of payment vehicles, such as tax, donation, and others were noted down, and coded as yes (=1) or no (=0). Similarly, study-specific variables such as whether the sampling was random or not and whether the survey was face-to-face, online, or mailed were recorded.

To further differentiate the studies, sample populations of different types of respondents were recorded. General population, locals, visitors, farmers, and others were coded as a binary yes (=1) or no (=0) code. Finally, the number of respondents and observations from each study were included.

In addition, spatial variables were collected like the country of the study, size of agricultural area (World Bank, 2023b), Consumer Price Index (CPI) from study year until May, 2023 (World Bank, 2023d), number of people per square kilometer (World Bank, 2023e), and utilized agricultural area per person (World Bank, 2023a). These variables were obtained from The World Bank.

Lastly, information about the study specific variables being evaluated were recorded. If any of the ecosystem services such as provisioning, regulating, cultural, or supporting are valued in the study, they were categorized as valued (=1) or not valued (=0). Different attributes of agricultural landscapes such as scenic view, flora, and fauna, farm infrastructure and services, soil fertility, specialty products, biodiversity, recreation, aesthetics, cultural heritage conservation, and improvement were also categorized. These variables were similarly coded as valued (=1) or not valued (=0). Furthermore, different features of the agricultural landscape such as the valuation of specific landscape features, multifunctionality, mountain, lowland, grassland, permanent crops, and whether the agricultural area was within a protected region or not are categorized. The variable protected region consists of landscapes in specific areas such as national parks, Nature 2000 areas, or other protected regions. For the variable “Improvement” a value of 1 indicates that the valued goods are associated with the improvement of the landscape, while a value of 0 indicates otherwise. Similarly, for the variable "Avoid Degradation" a value of 1 signifies that the valued goods help avoid degradation of agricultural landscape, while 0 indicates the opposite scenario. Afterwards, dummy variables were created for several landscape characteristics. For example, the change in quantity or quality of the goods (scenario large change) valued as small (=0) or large (=1) was coded. The current status of the landscape was also recorded as maintained (=0), vulnerable (=1), or ruined (=2). Additionally, different types of farming areas such as natural land (=0), abandoned land (=1), dry farmland (=2), or irrigated land (=3) are categorized. Finally, the slopes of the study area were recorded as steep (=0), intermediate (=1), or gentle (=2). Table 5.2.1 presents the descriptive statistics of the variables used in this study.

Table 5.2.1 Description of Variables

Variable Name	**Description**
Dependent Variables	
wtp	Willingness to Pay (price level of the study year in local currency)
wtp_usd_2023	Willingness to Pay in USD with adjusted inflation (Price level May 2023), Round figure
Methodological Variables	
payment_per_hh	= 1, if WTP was per household = 0, if WTP was per individual
payment_frequency	Cycle of payment = 0, if one-time payment = 1, if payment per year
tax_pv	= 1, if tax was used as a payment vehicle = 0, otherwise
donation_pv	= 1, if donation was used as a payment vehicle = 0, otherwise
ce	= 1, if the study was conducted using a Choice Experiment methodology = 0, otherwise
cvm_dichotomous	= 1, if the study was conducted using a Contingent Valuation Dichotomous methodology = 0, otherwise
cvm_payment_card	= 1, if the study was conducted using a Contingent Valuation Payment Card methodology = 0, otherwise
cvm_open_ended	= 1, if the study was conducted using a Contingent Valuation Open Ended methodology = 0, otherwise
Socio-Economic Variables	
higher_education	Percentage of people completing university
gdp	GDP per capita in 2022 USD
Spatial Variables	
uaa	Utilized agricultural area per person
area	Size of the agricultural area in 'Hectares'
Study Specific Variables	
provisioning_es	= 1, if Provisioning Ecosystem service is valued = 0, otherwise
regulating_es	= 1, if Regulating Ecosystem service is valued

	= 0, otherwise
cultural_es	= 1, if Cultural Ecosystem service is valued = 0, otherwise
supporting_es	= 1, if Supporting Ecosystem service is valued = 0, otherwise
biodiversity	= 1, if Biodiversity is valued = 0, otherwise
recreation	= 1, if Recreational services are valued = 0, otherwise
aesthetics	= 1, if Aesthetics is valued = 0, otherwise
scenic_view	= 1, if Scenic view is valued = 0, otherwise
flora_and_fauna	= 1, if Flora and Fauna are valued = 0, otherwise
farm_infrastructure_&_services	= 1, if Farm Infrastructure and services are valued = 0, otherwise
soil_fertility	= 1, if Soil Fertility is valued = 0, otherwise
speciality_products	= 1, if Specialty/Quality products are valued = 0, otherwise
cultural_heritage_conservation	= 1, if Conservation of Cultural Heritage is valued = 0, otherwise
cultural_heritage_improvement	= 1, if Improvement of Cultural Heritage is valued = 0, otherwise
scenario_large_change	The change in quantity or quality of the goods valued: = 0, Small change (e.g., some action, parcel consolidation; preservation of landscape in general, intensification/extensification) = 1, Large change (e.g., a lot of action, production abandonment)
improvement	= 1, if valued goods lead to improvement (i.e., if scenario change leads to improvement) = 0, otherwise
avoid_degradation	= 1, if valued goods help avoid degradation (i.e., if scenario change leads to avoiding degradation) = 0, otherwise
current_status_landscape	Present status of the landscape: = 0, Maintained = 1, Vulnerable/ at risk for degradation = 2, Ruined

5.3 Method

The meta-analysis (MA) of previous valuation studies will be conducted by performing regression analysis using the database created to explain the variation in reported willingness to pay estimates. More specifically, the aim is to identify the effects of the type of attributes valued, Ecosystem

Services (ES), methodological and socio-economic variables. Several specifications were estimated of the following regression model:

$$WTP_i = b_0 + b_1X_i + b_2Y_i + b_3Z_i + \varepsilon_i \qquad (5.1)$$

Where WTP_i represents the identified Willingness to Pay (WTP) estimates from the primary studies. X, Y, and Z are vectors of the explanatory variables & ε_i is an independently and identically distributed (i.i.d.) error term that explains the variation in WTP across valuation studies. X_i is the characteristics of the landscape/ecosystem service valued – such as provisioning, regulating, cultural and supporting ecosystem services (ES), or different attributes of landscape such as scenic view, flora and fauna, farm infrastructure and services, soil fertility, cultural heritage, biodiversity, recreation, aesthetics, current status of landscape etc. Y_i depicts the valuation method used Contingent valuation (CV) or Choice Experiment (CE), type of payment vehicle used (Income tax, municipal charge, donation etc.) and survey type. Z_i represents the socio-economic characteristics of the respondents (age, gender, higher education, income, Gross Domestic Product (GDP) per capita, household size, utilized agricultural area etc.). After recording data for X, Y & Z variables from the primary studies gathered for the meta-analysis, the Ordinary Least Squares (OLS) method for regression analysis was used due to time limitations. While it is becoming increasingly common to use a Meta-Regression Analysis (MRA) for such purpose, this study opted for the OLS method given the constraints on available time and resources. MRA has specific characteristics and assumptions that align well with metadata, but the choice of OLS was a practical decision in the context of the study's time constraints.

While recording the WTP of the primary studies, some discrepancies were noticed. The study by Castro et al. (2011) estimated different mean of WTP for several types of respondents. To adjust the WTP values with other studies, Weighted Average (WAVG) of the WTP was calculated by taking the values of the number of each type of respondent and deriving the percentage value. After that the recorded WTP was multiplied with the percentage value to get the desired WTP. The WTP of the workers had to be disregarded as other studies didn’t record it. Two specific studies by Hynes et al. (2011) & Takatsuka et al. (2009) conducted both choice experiment & contingent valuation methods. For these two studies, the methods and the WTP were recorded separately. Challenges arise while recording the change in quantity or quality of the goods variable using the variable scenario large change. Careful consideration was taken while recording small and large changes in the quantity or quality of the goods valued within the agricultural landscape. In some studies, the Total Economic Value (TEV) was also calculated by summarizing the different use and non-use value components, in order to get a more complete benefit estimate to be used in e.g., Cost-Benefit project evaluations.

According to a study conducted by Grammatikopoulou et al. (2012) people's WTP for the variable "Buildings torn down" were negative; meaning they did not show a willingness to pay for the removal or demolition of buildings, as it was viewed as a negative value or disutility. Instead, they may seek compensation for any damages or loss of value they experience. To address this, the negative value was converted into a positive value, indicating that they are willing to pay to preserve buildings that are considered as cultural heritage.

During the analysis of correlations between various variables, there were issues with collinearity. To test for any remaining potential problems of multicollinearity, we calculated the Variance Inflation Factors (VIF) of selected variables (Fox & Monette, 1992) after running the regressions. After thorough checking, variables that had potential multicollinearity problems were separated and used in different regression models. For example, the variables "Cultural Ecosystem Services" & "Biodiversity" are correlated, which makes sense as natural heritage and biodiversity can be seen as a part of cultural ecosystem services. The same goes for the income variables (average household income, average individual income) & GDP per capita. Also, while running regression with "recreation", variables such as "scenic view", "aesthetics" and "cultural ecosystem services" were dropped due to severe presence of multicollinearity. By separating these variables into different models, we avoid issues concerning multicollinearity.

6 Results and Discussion

6.1 Results

This section presents the results from estimated meta-regression models, starting by estimating eight models using the database created. The WTP variable (wtp_usd_2023) was used as the dependent variable and tested with different sets of independent variables. Several models were estimated with and without including the variables "Scenario Large Change" that depicts the change in quantity or quality of the goods valued as well as "Avoid Degradation". Correlation between the independent variables were tested to avoid the multicollinearity issue. It is also important to note that some primary studies did not talk about "scenario large change", which reduced the number of observations in models using this variable from 189 to 174. Table 6.1.1 & 6.1.2 were created by compiling different regression models; the only difference being that one doesn't include the "Recreation" variable and the other one does, respectively.

Table 6.1.1 Regression analysis of peoples' willingness to pay for agricultural landscape

	Without scenario large change				With scenario large change			
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Flora & Fauna	-2.804	-0.0356			16.24^{+}	20.61**		
	(17.14)	(15.81)			(11.05)	(10.08)		
Scenic View	4.799	6.541			33.73***	31.27***		
	(14.01)	(13.14)			(11.27)	(9.771)		
Farm Inf. & Serv.	-18.27	-33.50			7.769	-16.75		
	(50.40)	(48.25)			(30.41)	(29.78)		
Soil Fertility	8.937	15.19			71.64***	68.85***		
	(28.95)	(27.22)			(17.95)	(17.23)		
Specialty Products	147.5***	142.9***			66.35***	55.40***		
	(20.00)	(19.35)			(14.16)	(14.03)		
Cult. H. Conservation	-19.07	-8.211			4.924	-4.205		
	(25.49)	(21.12)			(18.50)	(14.58)		
Cult. H. Improvement	-4.665	4.976			33.06^{+}	27.72^{+}		
	(27.93)	(24.45)			(20.18)	(17.99)		
GDP per capita ($)	0.000223		0.000440		-0.000299		0.0000154	
	(0.000369)		(0.000353)		(0.000230)		(0.000211)	
Choice Experiment	1.561	-0.473	33.43^{+}	20.72	13.15	39.56**	2.112	41.00**
	(24.58)	(20.41)	(22.74)	(19.68)	(25.87)	(16.88)	(26.10)	(17.04)
Crnt. Sts. Lndscp.	-15.88		-4.383		-13.78*		-2.535	
	(13.15)		(13.55)		(8.148)		(7.815)	
Utilized Agricultural Area		-0.346		-0.441		0.714***		0.692***
		(0.329)		(0.323)		(0.235)		(0.224)
Provisioning ES			123.0***	114.9***			64.24***	66.82***
			(19.46)	(17.94)			(12.46)	(11.38)
Regulating ES			37.98**	34.95**			68.43***	62.70***
			(18.16)	(16.76)			(10.89)	(10.28)
Cultural ES			28.10^{+}	26.39*			56.48***	54.99***
			(17.15)	(15.68)			(10.83)	(9.577)
Scenario Large Change					68.60***	53.88***	68.95***	65.60***
					(17.43)	(13.65)	(16.93)	(12.94)
Avoid Degradation					27.60^{+}	25.46*	-14.64	-8.377
					(17.25)	(14.38)	(16.30)	(13.84)
Constant	43.19	50.51*	-33.24	13.16	14.33	-56.10**	-20.80	-80.43***
	(35.14)	(28.01)	(34.43)	(29.22)	(32.12)	(22.12)	(31.08)	(22.23)
Adjusted R^2	0.263	0.236	0.210	0.187	0.390	0.350	0.419	0.392
N	169	189	169	189	118	138	118	138

Standard errors in parentheses
+ $p < 0.15$, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Model 1 presents a basic model examining the relationship between the dependent variable (WTP) with variables related to characteristics of valued good, socio-economic & methodological variables. The adjusted R-squared value, which accounts for the influence of the number of predictors, stands at 26.3%. Thus, the regression model explains 26.3% of the variation in reported WTP in the studies. The F-statistic assesses the overall statistical significance of the regression model. With an F-value of 7 (see Appendix, Table 9.2.1) and a corresponding p-value less than 0.001, the model is deemed significant. If the coefficient is significantly different from zero, the coefficient estimates represent the effect of each independent variable on the dependent variable and the associated p-values indicate the statistical significance of them. For the only significant variable "Specialty Products", the coefficient is 147.5 in this model. This indicates that respondents are willing to pay an additional $147.5 if the valued good included "Specialty Products", compared to if it did not. The p-value for this variable is 0, showing that it is significantly different from zero at the 1% level; and thus, also a predictor of the dependent variable at the 5% significance level which is most common to use. Due to the low number of observations in this MA, the significance levels of 0.10 and 0.15 are also shown. Other variables such as "scenic view", "soil fertility", "Choice Experiment" & "GDP per capita" although having a positive sign, are not statistically significant in Model 1.

On the other hand, when the change in quantity or quality of the good valued (scenario_large_change) is taken into consideration, running the same model shows interesting results in Model 5. Here, for the significant variable "Scenic View", the coefficient is 33.73. This means that respondents are willing to pay an additional $33.73 if the valued good included "Scenic View", compared to if it did not. Other variables such as "Soil Fertility", "Specialty Products and "Scenario Large Change" are significantly different from zero at the 1% level. This indicates that respondents are willing to pay an additional $66.35 if the valued good included "Specialty Products", compared to if it did not. The same can be said for the attribute "Soil Fertility" that respondents are willing to pay an additional $71.64 if the valued good included this attribute. The coefficient of "Scenario Large Change" 68.60, is statistically significant at the 1% level, indicating a larger change in the quantity/quality of the valued landscape leads to a higher "WTP" of $68.60. This can be seen on all the models where "Scenario Large Change" is present. "Current Status

Landscape” has a negative coefficient but is statistically significant at the 10% level implying this relationship is unlikely to have occurred by chance and has a meaningful impact on people's willingness to pay for its preservation or improvement. This indicates that the degraded or vulnerable condition of the landscape is associated with a lower willingness to pay (WTP) for its preservation or improvement compared to a well-maintained landscape. Remaining variables did not show any statistically significant relationship to the dependent variable.

Same characteristics can be seen when looking at Model 2 and Model 6, using the variable “Utilized Agricultural Area” (uaa), dropping both “current status landscape” & “GDP per capita” due to multicollinearity. In Model 2, only “Specialty products” are significantly different from zero at the 1% level having a coefficient value of 142.9. Again, adding “scenario large change” and generating Model 6 results in “specialty products” along with “Flora & Fauna”, “Scenic View”, “Soil Fertility”, “Specialty Products”, “CE”, “UAA” & “Scenario Large Change” being significant at different levels with a positive coefficient. “Flora and Fauna” and “CE” are significant at 5% level, “Avoid Degradation” is significant at 10% level and rest of the variables mentioned are statistically significant at 1% level. Results imply that respondents are willing to pay an additional $20.61, $31.27, $68.85 & $55.4 if the valued good included “Flora & Fauna”, “Scenic View”, “Soil Fertility” & “Specialty Products” attributes, respectively. The variable "Choice Experiment" has a p-value of 0.021, indicating it is statistically significant at the 5% level, having substantial impact on the dependent variable "WTP". The coefficient of the variable indicates an increase of $39.56 in “WTP” when the survey is conducted using the Choice Experiment method. “UAA” is significant at 1% level with a coefficient value of 0.714 indicating, a unit increase in the "Utilized Agricultural Area" would lead to a $0.714 increase in people’s WTP. “Scenario Large Change” has a coefficient value of 53.88, that is statistically significant at 1% level (p-value 0.000). This again indicates, a larger change in the quantity/quality of the valued landscape leads to higher “WTP” of $53.88. “Avoid Degradation” has a positive coefficient and is significant at 10% level indicating people are willing to pay more if it is for avoiding landscape degradation as opposed to improving it. This is the only model where this particular variable is significant.

Model 3 and Model 7 explore the relationship among the “WTP” variable with the ecosystem services valued and “Current Status Landscape” in addition to other study specific variables.

Model 3 exhibits a coefficient value of 123 for the “Provisioning ES” & is also statistically significant from zero at the 1% level. This indicates that respondents are willing to pay an additional $123 if the valued good included “Provisioning Ecosystem Services”, compared to if it did not. Same goes for the variable “Regulating ES” which exhibits a coefficient value of 37.98 and is statistically significant at 5% level, meaning respondents are willing to pay an additional $37.98 if the valued good included “Regulating Ecosystem Services”. Model 7 was generated by adding the variable “Scenario Large Change” and using the same variables as Model 3, while considering multicollinearity. “Provisioning ES”, “Regulating ES” and “Cultural ES” all three independent variables have a positive coefficient of 64.24, 68.43 and 56.48 respectively. These variables are also statistically significant at the 1% level. This meant respondents were willing to pay an additional $64.24, $68.43 and $56.48 if the valued good included “Provisioning ES”, “Regulating ES” and “Cultural ES” respectively, compared to if it did not. “Scenario Large Change” is again significant at 1% level, indicating higher “WTP” when there is a large change in the quantity/quality of the valued landscape.

Model 4 and Model 8 explore the relationship between the WTP variable with the ecosystem services valued and “Utilized Agricultural Area” in addition to other study specific variables. Model 4 exhibits a coefficient value of 114.9 for the “Provisioning ES” & is also statistically significant from zero at 1% level. This indicates that respondents are willing to pay an additional $114.9 if the valued good included “Provisioning Ecosystem Services”, compared to if it did not. Coefficients of “Regulating ES” exhibit a value of 34.95 and is statistically significant at 5% level, meaning respondents are willing to pay an additional $34.95 if the valued good included “Regulating Ecosystem Services”. The “Cultural ES” has a coefficient value of 26.39, which is statistically significant at 10% level, implying respondents have an additional “WTP” of $26.39 if the valued good included this ecosystem service. On the other hand, Model 8 was generated by adding the variable “Scenario Large Change” and using the same variables as Model 4, considering multicollinearity issues. In this model “Provisioning ES”, “Regulating ES” and “Cultural ES” all three independent variables have a positive coefficient of 66.82, 62.7 and 54.99 respectively. These variables are also statistically significant at the 1% level meaning respondents are willing to pay an additional $66.82, $62.7& $54.99 if the valued good included “Provisioning ES”, “Regulating ES” and “Cultural ES” respectively, compared to if it did not. “Choice Experiment” is statistically significant at 5% level with a positive value indicating an increase of $41 in “WTP” when the survey is conducted using the Choice Experiment method. "UAA" and "Scenario Large Change" both have a positive coefficient and are statistically significant at the 1% level. This means a unit increase in the "Utilized Agricultural Area" would lead to a $0.692 increase in people's WTP. Finally, the model indicates an increase in people's WTP of $65.6 when there is a large change in the quantity/quality of the valued landscape.

The adjusted R-squared values indicate how well each model explains the dependent variable's variation. Models 7 and 8 have the highest adjusted R-squared values (0.419 and 0.392), suggesting they provide the best fit to the data. Models 5 and 6 also perform well with adjusted R-squared values of 0.390 and 0.350, meaning the regression model explains 39% & 35% of the variation in reported WTP in the studies, respectively. In contrast, Models 1 to 4 have lower adjusted R-squared values, indicating that they may not effectively capture the dependent variable's variation.

Table 6.1.2 Regression analysis of peoples' willingness to pay for agricultural landscape providing recreational services

	Without scenario_large_change				With scenario_large_change			
	Model 9	Model 10	Model 11	Model 12	Model 13	Model 14	Model 15	Model 16
Flora & Fauna	-8.045	-4.236			18.35*	21.74**		
	(17.25)	(15.87)			(10.89)	(10.08)		
Farm Infrastructure & Services	-7.569	-21.24			-31.88	-55.39*		
	(50.56)	(48.78)			(31.26)	(30.94)		
Soil Fertility	8.339	17.47			66.72***	63.39***		
	(28.71)	(27.11)			(17.70)	(17.30)		
Specialty Products	143.9***	139.7***			61.87***	50.30***		
	(19.74)	(19.07)			(14.03)	(14.14)		
Cultural Heritage Conservation	-14.61	0.500			-11.69	-21.16		
	(25.53)	(21.83)			(18.37)	(15.55)		
Cultural Heritage Improvement	-3.542	9.962			28.71	15.15		
	(27.76)	(24.56)			(19.88)	(18.17)		
Recreation	-20.57^{+}	-19.87^{+}	-9.664	-7.570	39.94***	35.04***	49.81***	42.06***
	(14.13)	(13.46)	(15.32)	(13.78)	(11.32)	(10.72)	(11.06)	(9.905)
GDP Per Capita ($)	0.000364		0.000532^{+}		-0.000318		-0.000155	
	(0.000367)		(0.000364)		(0.000227)		(0.000219)	
Choice Experiment	-4.190	-5.928	28.91	12.38	10.68	32.13*	4.538	28.03^{+}
	(24.37)	(19.74)	(23.26)	(19.66)	(25.50)	(16.71)	(26.77)	(17.83)
Current Status Landscape	-14.86		-8.212		-17.50**		-15.47**	
	(13.06)		(13.40)		(7.907)		(7.779)	

Utilized Agricultural Area		-0.538*		-0.625*		0.611***		0.478**
		(0.320)		(0.319)		(0.232)		(0.232)
Provisioning ES			107.6***	100.7***			54.55***	54.19***
			(18.60)	(17.05)			(12.66)	(11.63)
Regulating ES			18.24	19.04			53.13***	48.92***
			(16.40)	(15.57)			(10.28)	(10.15)
Scenario Large Change					81.67***	64.86***	84.33***	71.48***
					(17.20)	(13.14)	(17.51)	(13.54)
Avoid Degradation					16.17	13.85	-24.75+	-20.80
					(16.47)	(13.83)	(16.68)	(14.49)
Constant	53.29+	72.59***	-1.930	50.23*	24.41	-40.24*	14.74	-40.61*
	(34.23)	(25.37)	(31.54)	(26.22)	(31.37)	(21.06)	(31.31)	(21.55)
Adjusted R^2	0.272	0.244	0.199	0.176	0.408	0.352	0.389	0.331
aic	1982.6	2205.9	1995.0	2218.3	1264.6	1481.4	1264.9	1482.1
bic	2017.0	2238.3	2016.9	2237.8	1300.6	1516.6	1289.8	1505.5
N	169	189	169	189	118	138	118	138

Standard errors in parentheses
+ $p < 0.15$, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6.1.2 is a compilation of another 8 regression models where the key difference between the previous table is that this one includes the "Recreation" attribute of the landscape. Before running the regression, variables such as "Scenic View", "Aesthetics" & "Cultural ES" were dropped due to multicollinearity. Here it is also noticeable that adding the change in quantity or quality of the goods valued results in better WTP on most aspects as Table 6.1.1. Apart from the attributes & ecosystem services of the landscapes, the variable "Recreation" is statistically significant at 1% level from Model 13-16. This indicates that respondents are willing to pay an additional amount of $39.94, $35.04, $49.81 & $42.06 respectively if the valued good included "Recreational Services" provided by agricultural landscapes.

In this table, Models 15 (38.9%) and 13 (40.8%) have the highest adjusted R-squared values, reflecting strong explanatory power. Models 14 (35.2%) and 16 (33.1%) also perform well. Conversely, Models 1 to 4 have lower adjusted R-squared values (ranging from 17.6% to 27.2%), suggesting they may not capture the data's variability as effectively. Overall, Models 5-8 provide the best fit to the data.

6.2 Discussion

H.1.1 states WTP estimates for a large improvement in the landscape are higher than for a small improvement. Looking at the regression models 5-8 & 13-16 from Table 6.1.1 and 6.1.2 it is evident that people are more willing to allocate their financial resources for larger improvements compared to small improvements. All the coefficients have a positive sign and are statistically significant at 1% level.

The respondents associate a more significant improvement in the landscape with a greater impact on their well-being, preferences, or needs, leading to a higher reported willingness to pay. This could be due to factors such as increased aesthetic appeal, enhanced recreational opportunities, improved environmental quality, or greater benefits to local communities. Their preference for a higher willingness to pay (WTP) for a significant improvement can be attributed to their recognition and appreciation of changes that contribute to a more desirable and valuable landscape. This aligns with the principles of consumer choice and utility maximization, where individuals are willing to pay more for goods and services that provide greater utility or satisfaction.

Moreover, the findings may also be connected to the idea of the "Scope Test," which implies that individuals may be more willing to pay for greater improvements because they perceive significant benefits from such changes. This aligns with the theory that individuals consider the marginal utility gained from a larger improvement to outweigh the marginal cost incurred through higher WTP. The results support the hypothesis & have a similar outcome as the reference study.

H.1.2 states the WTP estimates for the improvement of the landscape are smaller than for avoiding decrements/loss. In model 6 the significant coefficient of "Avoid Degradation" suggests a positive relationship between WTP for landscape and preference to avoid losses. A positive coefficient value of 25.45 indicates that people are willing to pay more to avoid landscape degradation instead of improving it. In other words, respondents are willing to pay more for landscape improvements that prevent or mitigate potential losses or decrements.

Since the coefficient is significant at the 10% level, it suggests that there is a relationship between WTP and the preference to avoid decrements or losses, which is unlikely to be due to a random chance. Although the significance is weaker than the common 5% significance level, it still indicates that the findings are relatively robust and deserve consideration for further research. Results can also be linked with the theory of “Loss Aversion” by Tversky and Kahneman (1992).

Loss aversion describes how people favor avoiding losses over acquiring gains of the same magnitude. It means people may be more willing to pay to avoid potential deterioration in the landscape than to improve it, which is also the case in this study. So, the results support this hypothesis. The reference study used the variable "Scenario Large Change" to assess significant improvements in the landscape. In contrast, this study recorded both "Improvement" and "Avoiding Degradation" of the landscape separately to better understand the respondents' preferences.

H.2.1 In all the regression models the coefficients associated with "GDP per capita" are positive but not statistically significant, meaning that the relationship between increased income and higher WTP to preserve agricultural landscapes may not be robust or strong enough to support the hypothesis. Although the positive coefficients indicate that, on average, as income increases, WTP tends to increase, the lack of statistical significance (p-value > 0.05) means that the relationship observed could have occurred by random chance. It is important to consider other factors that could influence WTP and explore possible reasons why the relationship between income and WTP may not have emerged as statistically significant in this analysis. Results reject the hypothesis. On the other hand, the reference study showed a highly significant and positive coefficient for GDP per capita indicating a strong relationship between people's income and WTP.

H.2.2 Hypothesis 2.2 states that WTP estimates for recreational services will be significantly higher compared to non-recreational services. When recreational services are added to the regression in Model 13-16, the coefficients of the variable had positive signs and were statistically significant at 1% level. The positive coefficients indicate that the presence of recreational services has a positive effect on WTP estimates. In other words, respondents are willing to pay more to preserve agricultural landscapes that offer recreational services. The statistical significance at the 1% level means that the observed relationship between recreational services and higher WTP estimates is unlikely to have occurred by random chance alone. The p-values associated with these coefficients are very low (less than 0.05), providing strong evidence that the observed positive relationship is indeed present within respondents. In other words, the results indicate that respondents value the presence of recreational services within agricultural landscapes and are willing to pay a premium to ensure their preservation. The results support this hypothesis. This could be valuable information for policymakers and stakeholders interested in prioritizing and promoting the preservation of agricultural landscapes that offer recreational benefits. In contrast, the reference study assessed the agricultural land's value as a whole and did not consider the recreational services provided by the landscape separately.

H.3 With a positive coefficient value of 39.56 & 32.13, Model 6 and Model 14 are statistically significant at 5% and 10% level respectively. This indicates that respondents' WTP estimates were higher when using the "Choice Experiment" method compared to other valuation methods (likely Contingent Valuation) used in the analysis. This result contradicts our hypothesis, suggesting that the "Choice Experiment" method led to higher WTP estimates, rather than lower, as anticipated. Factors such as the specific attributes of the scenarios presented in the choice experiment, the framing of the valuation questions, or respondent preferences and biases may have contributed to the observed difference in WTP estimates. There were some instances when the WTP consisted of negative coefficients but were not statistically significant. Further analysis and investigation into the underlying reasons for this result could provide valuable insights into the effectiveness and validity of different valuation methods. Results reject the hypothesis. Comparing it to the reference study, their analysis resulted in Choice Experiments (CE) being the method that led to lower WTP values.

H.4.1 states that WTP for the preservation of landscapes that are at risk or well-maintained is higher than for restoring ruined landscapes. Coefficients related to the variable “Current Status Landscape” are negative and some are statistically significant at 5%. This indicates that respondents are willing to pay less for the restoration of ruined landscapes compared to landscapes that are at risk or well-maintained. The significance of the coefficients indicates that this relationship is not likely due to random chance, but rather suggests a meaningful pattern in the data. The negative and significant coefficients support the hypothesis. In contrast, the current state of the landscape was not used in the reference study.

H.4.2 Models 6,8, 14 and 16 show positive coefficients for the variable “Utilized Agricultural Area (UAA)” and are statistically significant. It suggests that this relationship is not likely due to random chance. These coefficients related to the variable representing scarcity in agricultural land area (UAA) indicate that an increase in UAA is associated with a higher willingness to pay (WTP) for the preservation of agricultural landscapes. In other words, respondents are more willing to pay to preserve agricultural landscapes when there is scarcity in agricultural land area. In Model 10 and

12 two negative and significant coefficients at the 10% level may indicate a different relationship between that specific variable and WTP. Since it is at a 10% significance level (p-value > 0.05), which weaker than the common 5% significance level it is important to exercise caution in interpreting this result and consider potential limitations in the data or the model. Results support this hypothesis indicating the higher the UAA, the lower the WTP. This was not the case in the reference study as the variable was not statistically significant indicating a weak relationship with people's WTP for agricultural landscapes.

7 Conclusion and Recommendations

This study aims to update a meta-analysis of consumer preferences and willingness to pay for preserving agricultural landscapes. The analysis of existing valuation studies provided insights into the factors influencing consumer preferences, the economic significance of preserving these landscapes as a whole and as a provider of recreational services. The scope of the previous research was expanded beyond Europe by synthesizing studies from diverse regions and providing updated estimates.

Findings of the study accentuate the importance of agricultural landscapes beyond their traditional role in food production. The diverse ecosystem services and cultural values associated with these landscapes have a significant impact on consumer preferences and their willingness to pay for its preservation. Results indicate that consumers place value on agricultural landscape attributes and are willing to pay for their preservation and enhancement. The meta-analysis revealed that consumer preferences are highly influenced by the attributes and ecosystem services provided by the landscape along with scarcity in agricultural land area, and large changes in the quality/quantity of the good valued.

In comparison to the reference meta-analysis study, this study yielded consistent results with the hypothesis for H.1.1 (scenario large change). However, for H.2.1 and H.3, H.4.2 the findings differed from the reference study. This study did not find a significant relationship between increased income and WTP (H.2.1), while the reference study reported a strong positive relationship. Additionally, this study contradicted the expectation that the Choice Experiment (CE) method would yield lower willingness to pay (WTP) values (H.3), while the reference study supported this hypothesis. Scarcity in agricultural land (H.4.2) significantly impacted the WTP, whereas it was not statistically significant in the reference study. They also did not incorporate

H.1.2 (Avoid Degradation), H.2.2 (Recreational Services) & H.4.1 (Current Status Landscape) in its analysis. These variations emphasize the complexity and context-dependency of consumer preferences and WTP for agricultural landscapes.

However, it is also important to acknowledge the limitations of this meta-analysis. Although caution was taken to tackle the issues of heterogeneity in methodologies of the primary studies, several flaws remain. The representativeness of regional coverage, local specificity of valued landscapes and potential publication bias might influence the generalizability of the findings. Additionally, variations in elicitation methodologies and valuation scenarios across the reviewed studies may introduce biases and affect the comparability of results. Also, due to time limitations this study used Ordinary Least Squares (OLS) regression method instead of Meta-Regression Analysis (MRA) which is more commonly used for these kinds of studies.

The study estimates the value of agricultural landscapes by conducting a meta-analysis of existing studies on landscape valuation. It provides information on the societal value of these landscapes and the resources allocated to conserving rural nature in policy making. The study analyzes changes in people's willingness to pay for preserving agricultural landscapes and its recreational services within and outside Europe. The research also examines methodological and case study variables that affect reported estimates.

Future research should address the abovementioned limitations and advance the understanding of consumer preferences and willingness to pay for agricultural landscapes. Some recommendations for further studies include:

1. Additional studies should be conducted in underrepresented regions and landscape types to ensure a more comprehensive understanding of the value of agricultural landscapes within and across the European context.
2. Standardizing methodologies and valuation scenarios can enhance the comparability and accuracy of estimated values across studies.
3. Investigating how consumer preferences and willingness to pay evolve over time, while examining the influence of shifting societal values, economic factors, and environmental concerns.

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9 Appendices

9.1 Appendix 1

Description of variables used in the study

Table 9.1.1 Dependent Variables

Variable Name	Description
wtp	Willingness to Pay (price level of the study year in local currency)
wtp_usd(ppp)	Willingness to Pay in USD (price level of the study year)
wtp_usd(ppp)_round	Willingness to Pay in USD (price level of the study year), Round figure
wtp_usd_adjusted_inflation	Willingness to Pay in USD with adjusted inflation (Price level May 2023)
wtp_usd_2023	Willingness to Pay in USD with adjusted inflation (Price level May 2023), Round figure

Table 9.1.2 Methodological Variables

Variable Name	Description
payment_per_hh	= 1, if WTP was per household = 0, if WTP was per individual
payment_frequency	Cycle of payment = 0, if one-time payment = 1, if payment per year
tax_pv	= 1, if tax was used as a payment vehicle = 0, otherwise
donation_pv	= 1, if donation was used as a payment vehicle = 0, otherwise
other_pv	= 1, if any other kind of payment vehicle was used = 0, otherwise
ce	= 1, if the study was conducted using a Choice Experiment methodology = 0, otherwise
cvm_dichotomous	= 1, if the study was conducted using a Contingent Valuation Dichotomous methodology = 0, otherwise
cvm_payment_card	= 1, if the study was conducted using a Contingent Valuation Payment Card methodology = 0, otherwise
cvm_open_ended	= 1, if the study was conducted using a Contingent Valuation Open Ended methodology = 0, otherwise
sampling_technique	= 1, if sample population was random

	= 0, otherwise
f2f_interview	= 1, if data was collected through face-to-face interview = 0, otherwise
online_survey	= 1, if data was collected through online survey = 0, otherwise
other_datacol_method	= 1, if data was collected through other methods = 0, otherwise
general_public_sample	= 1, if sample was taken from the general population = 0, otherwise
visitor_sample	= 1, if sample was taken from the visitors = 0, otherwise
farmers_others_sample	= 1, if sample was taken from the farmers and others who depend of farmlands = 0, otherwise
local_sample	= 1, if sample was taken from the local population = 0, otherwise
other_sample	= 1, if sample was taken from any other population = 0, otherwise
no_of _observations	Number of observations in the study
no_of_respondents	Number of respondents in the study

Table 9.1.3 Socio-Economic Variables

Variable Name	**Description**
higher_education	Percentage of people completing university
average_age	Average age of respondents
female	Percentage of female respondents in the sample
hh_with_children	Percentage of households with Children
hh_income	Average income of household (Monthly)
ind_income	Average income of individuals (Yearly)
avg_hh_size	Average number of people living in the household
gdp	GDP per capita in 2022 USD

Table 9.1.4 Categorical Variables

study_type	= 1, if published in a referred journal = 2, if PhD thesis = 3, if Master thesis = 4, Report series from research institute/universities = 5, if conference paper = 6, if consultancy report = 7, if other

Table 9.1.5 Spatial Variables

Variable Name	**Description**
country	country of the study
currency	Currency used to portray WTP in the study
cpi	CPI in USD (From study year till May 2023)

area	Size of the agricultural area in ‘Hectares’
population_density	Number of people per square ‘Kilometers’
uaa	Utilized agricultural area per person

Table 9.1.6 Study Specific Variables

Variable Name	Description
provisioning_es	= 1, if Provisioning Ecosystem service is valued = 0, otherwise
regulating_es	= 1, if Regulating Ecosystem service is valued = 0, otherwise
cultural_es	= 1, if Cultural Ecosystem service is valued = 0, otherwise
supporting_es	= 1, if Supporting Ecosystem service is valued = 0, otherwise
biodiversity	= 1, if Biodiversity is valued = 0, otherwise
recreation	= 1, if Recreational services are valued = 0, otherwise
aesthetics	= 1, if Aesthetics is valued = 0, otherwise
scenic_view	= 1, if Scenic view is valued = 0, otherwise
flora_and_fauna	= 1, if Flora and Fauna are valued = 0, otherwise
farm_infrastructure_&_services	= 1, if Farm Infrastructure and services are valued = 0, otherwise
soil_fertility	= 1, if Soil Fertility is valued = 0, otherwise
speciality_products	= 1, if Specialty/Quality products are valued = 0, otherwise
cultural_heritage_conservation	= 1, if Conservation of Cultural Heritage is valued = 0, otherwise
cultural_heritage_improvement	= 1, if Improvement of Cultural Heritage is valued = 0, otherwise
scenario_large_change	The change in quantity or quality of the goods valued: = 0, Small change (e.g., some action, parcel consolidation; preservation of landscape in general, intensification/extensification) = 1, Large change (e.g., a lot of action, production abandonment)
improvement	= 1, if valued goods lead to improvement (or, if scenario change leads to improvement?) = 0, otherwise
avoid_degradation	= 1, if valued goods help avoid degradation (or, if scenario change leads to avoiding degradation?) = 0, otherwise

feature_specific	= 1, if the study values only one landscape specific feature (e.g., cultural heritage, wildlife habitats/biodiversity/flora and fauna, hedgerows or stonewalls) = 0, otherwise
multifunctionality	= 1, if the study values multifunctionality of landscape is one of its components = 0, otherwise
feature_mountain	= 1, if the study values mountainous = 0, otherwise
feature_lowland	= 1, if the study values lowland = 0, otherwise
feature_grassland_or_permanent_crops	= 1, if the study values grassland and/or permanent crops = 0, otherwise
protected_area	= 1, if the study area is situated in a protected region (e.g., national parks, Nature 2000 areas and other protected regions) = 0, otherwise
current_status_landscape	Present status of the landscape: = 0, Maintained = 1, Vulnerable = 2, Ruined
farming_type	Type of farming in the study area: = 0, Natural Land = 1, Abandoned Land = 2, Dry Farmland = 3, Irrigated Land
slope	Slope of the study area: = 0, Steep = 1, Intermediate = 2, Gentle

Table 9.1.7 Estimation Techniques

Variable Name	Description
mnl	= 1, if Multinomial Logit was used as the estimation model in the study = 0, otherwise
lca	= 1, if Latent Class Analysis was used as the estimation model in the study = 0, otherwise
mixed_logit	= 1, if Mixed Logit was used as the estimation model in the study = 0, otherwise

Table 9.1.8 Other Variables

Variable Name	Description
c1	Class 1 in Latent Class Analysis
c2	Class 2 in Latent Class Analysis

c3	Class 3 in Latent Class Analysis
c4	Class 4 in Latent Class Analysis
wavg	Weighted Average of Latent Class Analysis

Variable Name	**Description**
study_type	= 1, if published in a referred journal = 2, PhD thesis = 3, Master thesis = 4, Report series from research institute/universities = 5, conference paper = 6, consultancy report = 7, otherwise

Summary Statistics

Table 9.1.9 Dependent Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
wtp in study	189	90.58	130.33	-115.84	850.3
wtp in usd ppp	189	43.9	75.884	-9.1	385.344
wtp in usd ppp round	189	43.9	75.884	-9.1	385.34
wtp usd adj inflat~n	189	58.273	92.839	-11.557	458.555
wtp usd 2023	189	58.273	92.839	-11.56	458.55

Table 9.1.10 Methodological Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
payment per househ~d	189	.296	.458	0	1
payment frequency	186	.892	.311	0	1
tax pv	186	.608	.49	0	1
donation pv	186	.333	.473	0	1
other pv	186	.059	.237	0	1
ce	189	.862	.345	0	1
cvm dichotomous	189	.026	.161	0	1
cvm payment card	189	.032	.176	0	1
cvm open ended	189	.079	.271	0	1
sampling technique	176	.824	.382	0	1
f2f interview	189	.413	.494	0	1
online survey	189	.206	.406	0	1
mailed survey	189	.407	.493	0	1
general sample	189	.614	.488	0	1
visitor sample	189	.042	.202	0	1
farmers others sam~e	189	.106	.308	0	1
local sample	189	.519	.501	0	1
other sample	189	0	0	0	0

Socio-Economic Variables

Table 9.1.11 Socio-Economic Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
higher educ	121	50.326	13.777	30	95.1
average age	114	46.593	6.333	37.09	53.69
share of female re~s	122	53.611	9.72	19	70
share of household~n	20	45.5	9.774	40	62
average household ~e	67	3.348	.686	2.45	4.37
average hh inc m	50	8644.2	9375.94	650	20000
average indv inc y	21	50276.429	12324.51	28761	57000

Spatial Variables

Table 9.1.12 Spatial Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
gdp per capita	189	47210.374	27145.277	6908.8	106148.8
cpi	189	8.768	3.554	5.8	19.7
area	189	9496544.9	20863479	444000	1.577e+08
population density	189	68.72	82.44	4	518
uaa	189	32.627	21.327	2.7	65.5

Table 9.1.13 Study Specific Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
scenic view	189	.487	.501	0	1
flora and fauna	189	.196	.398	0	1
farm infrastructur~s	189	.016	.125	0	1
soil fertility	189	.053	.224	0	1
speciality products	189	.116	.322	0	1
cultural heritage ~n	189	.116	.322	0	1
cultural heritage ~t	189	.069	.254	0	1
provisioning es	189	.164	.371	0	1
regulating es	189	.233	.424	0	1
cultural es	189	.556	.498	0	1
supporting es	189	.058	.235	0	1
recreation	189	.423	.495	0	1
aesthetics	189	.392	.489	0	1
biodiversity	189	.471	.5	0	1
scenario large cha~e	174	.178	.384	0	1
improvement	142	.831	.376	0	1
avoid degradation	142	.183	.388	0	1
feature specific	189	.026	.161	0	1
multifunctionality	189	.974	.161	0	1
feature mountain	189	.259	.439	0	1
feature lowland	189	.603	.491	0	1
feature grassland ~c	189	.519	.501	0	1
protected area	41	.707	.461	0	1
current status lan~e	169	1.047	.606	0	2
type of farming	37	2.568	.929	0	3
slope	11	1.364	.809	0	2

Table 9.1.14 Estimation Techniques

Variable	Obs	Mean	Std. Dev.	Min	Max
mnl	189	.079	.271	0	1
lca	189	.201	.402	0	1
mixed logit	189	.217	.413	0	1

Table 9.1.15 No of Respondents and Observations

Variable	Obs	Mean	Std. Dev.	Min	Max
no of observations	189	2188.794	2133.233	34.32	6890
no of respondents	189	418.074	274.607	6.24	1374

Frequency Tables

Table 9.1.16 Willingness to Pay

Payment Per Household	Freq.	Percent	Cum.
WTP per invidivual	133	70.37	70.37
WTP per household	56	29.63	100.00
Total	189	100.00	

Table 9.1.17 Payment Frequency

Payment Frequency	Freq.	Percent	Cum.
one-time payment	20	10.75	10.75
monthly	166	89.25	100.00
Total	186	100.00	

Table 9.1.18 Scenario Large Change

Scenario Large Change	Freq.	Percent	Cum.
small change	143	82.18	82.18
large change	31	17.82	100.00
Total	174	100.00	

Table 9.1.19 Current Status of Landscape

Current Status Landscape	Freq.	Percent	Cum.
maintained	27	15.98	15.98
vulnerable	107	63.31	79.29
ruined	35	20.71	100.00
Total	169	100.00	

Table 9.1.20 Farming Type

type_of_farming	Freq.	Percent	Cum.
natural land	3	8.11	8.11
abandoned land	2	5.41	13.51
dry farmland	3	8.11	21.62
irrigated land	29	78.38	100.00
Total	37	100.00	

Table 9.1.21 Slope of Landscape

slope	Freq.	Percent	Cum.
steep	2	18.18	18.18
intermediate	3	27.27	45.45
gentle	6	54.55	100.00
Total	11	100.00	

Multicollinearity

Correlation Matrices

Table 9.1.22 Income and Education

Variables	average_hh_inc_m	average_indv_i~y	higher_educ	gdp_per_capita
average_hh_inc_m	1.000			
average_indv_i~y		1.000		
higher_educ	0.958	1.000	1.000	
gdp_per_capita	-0.803	-1.000	-0.558	1.000

Table 9.1.23 Landscape Attributes

Variables	scenic_view	cultural_herit~i	cultural_herit~n	cultural_es	recreation	aesthetics
scenic_view	1.000					
cultural_herit~i	0.043	1.000				
cultural_herit~n	0.028	-0.099	1.000			
cultural_es	0.786	0.192	0.075	1.000		
recreation	0.687	0.257	0.106	0.723	1.000	
aesthetics	0.737	-0.088	-0.047	0.674	0.673	1.000

Table 9.1.24 Ecosystem Services & Attributes

Variables	cultural_es	supporting_es	biodiversity
cultural_es	1.000		
supporting_es	-0.096	1.000	
biodiversity	0.844	-0.053	1.000

Table 9.1.25 Landscape Status Variables

Variables	current_status~e	scenario_large~e	uaa
current_status~e	1.000		
scenario_large~e	-0.123	1.000	
uaa	0.468	0.223	1.000

Table 9.1.26 Income & Payment Related Variables

Variables	gdp_per_capita	average_hh_inc_m	average_indv_i~y	tax_pv	donation_pv	other_pv
gdp_per_capita	1.000					
average_hh_inc_m	-0.803	1.000				
average_indv_i~y	-1.000		1.000			
tax_pv	0.272	0.870	-1.000	1.000		
donation_pv	-0.201	-0.564	1.000	-0.880	1.000	
other_pv	-0.161	-0.426		-0.312	-0.177	1.000

Table 9.1.27 Stated Preference Methods

Variables	ce	cvm_dichotomous	cvm_payment_card	cvm_open_ended
ce	1.000			
cvm_dichotomous	-0.413	1.000		
cvm_payment_card	-0.453	-0.030	1.000	
cvm_open_ended	-0.735	-0.048	-0.053	1.000

Table 9.1.28 Survey Type

Variables	f2f_interview	online_survey	mailed_survey
f2f_interview	1.000		
online_survey	-0.295	1.000	
mailed_survey	-0.695	-0.423	1.000

Table 9.1.29 Respondent Number and Type

Variables	no_of_observat~s	no_of_responde~s	general_sample	visitor_sample	farmers_others~e	local_sample
no_of_observat~s	1.000					
no_of_responde~s	0.598	1.000				
general_sample	0.438	0.524	1.000			
visitor_sample	-0.194	-0.146	-0.265	1.000		
farmers_others~e	-0.301	-0.450	-0.434	-0.072	1.000	
local_sample	-0.513	-0.461	-0.677	-0.008	0.331	1.000

9.2 Appendix 2

Regression Results

Table 9.2.1 Model 1

wtp_usd_2023	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
flora_and_fauna	-2.804	17.136	-0.16	.87	-36.649	31.041	
scenic_view	4.799	14.009	0.34	.732	-22.87	32.468	
farm_infrastructur~s	-18.272	50.4	-0.36	.717	-117.817	81.274	
soil_fertility	8.937	28.948	0.31	.758	-48.237	66.111	
speciality_products	147.49	20.003	7.37	0	107.982	186.997	***
cultural_heritageC~o	-19.069	25.493	-0.75	.456	-69.42	31.281	
cultural_heritage_~t	-4.665	27.929	-0.17	.868	-59.826	50.497	
gdp_per_capita	0	0	0.61	.546	-.001	.001	
ce	1.561	24.576	0.06	.949	-46.979	50.102	
current_status_lan~e	-15.881	13.148	-1.21	.229	-41.849	10.086	
Constant	43.192	35.141	1.23	.221	-26.215	112.599	

Mean dependent var	56.331	SD dependent var	96.949
R-squared	0.307	Number of obs	169
F-test	7.000	Prob > F	0.000
Akaike crit. (AIC)	1984.688	Bayesian crit. (BIC)	2019.117

Table 9.2.2 Model 5

wtp_usd_2023	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
flora_and_fauna	16.244	11.053	1.47	.145	-5.671	38.159	
scenic_view	33.733	11.266	2.99	.003	11.394	56.072	***
farm_infrastructur~s	7.769	30.409	0.26	.799	-52.526	68.064	
soil_fertility	71.641	17.95	3.99	0	36.05	107.232	***
speciality_products	66.354	14.156	4.69	0	38.284	94.423	***
cultural_heritageC~o	4.924	18.501	0.27	.791	-31.76	41.607	
cultural_heritage_~t	33.058	20.181	1.64	.104	-6.957	73.074	
gdp_per_capita	0	0	-1.30	.196	-.001	0	
ce	13.152	25.868	0.51	.612	-38.14	64.444	
current_status_lan~e	-13.782	8.148	-1.69	.094	-29.937	2.374	*
scenario_large_cha~e	68.605	17.43	3.94	0	34.044	103.165	***
avoid_degradation	27.604	17.253	1.60	.113	-6.605	61.813	
Constant	14.329	32.116	0.45	.656	-49.352	78.009	

Mean dependent var	43.275	SD dependent var	63.441
R-squared	0.453	Number of obs	118
F-test	7.242	Prob > F	0.000
Akaike crit. (AIC)	1268.135	Bayesian crit. (BIC)	1304.154

**** p<.01, ** p<.05, * p<.1*

Table 9.2.3 Model 2

wtp_usd_2023	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
flora_and_fauna	-.036	15.815	-0.00	.998	-31.243	31.172	
scenic_view	6.541	13.139	0.50	.619	-19.387	32.469	
farm_infrastructur~s	-33.499	48.249	-0.69	.488	-128.709	61.711	
soil_fertility	15.188	27.217	0.56	.578	-38.519	68.895	
speciality_products	142.868	19.352	7.38	0	104.681	181.055	***
cultural_heritageC~o	-8.211	21.124	-0.39	.698	-49.896	33.474	
cultural_heritage_~t	4.976	24.451	0.20	.839	-43.274	53.226	
ce	-.473	20.409	-0.02	.982	-40.746	39.8	
uaa	-.346	.329	-1.05	.294	-.996	.303	
Constant	50.514	28.013	1.80	.073	-4.765	105.792	*

Mean dependent var	58.273	SD dependent var	92.839
R-squared	0.272	Number of obs	189
F-test	7.442	Prob > F	0.000
Akaike crit. (AIC)	2207.952	Bayesian crit. (BIC)	2240.369

Table 9.2.4 Model 6

wtp_usd_2023	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
flora_and_fauna	20.61	10.083	2.04	.043	.656	40.564	**
scenic_view	31.274	9.771	3.20	.002	11.938	50.611	***
farm_infrastructur~s	-16.751	29.782	-0.56	.575	-75.688	42.186	
soil_fertility	68.854	17.227	4.00	0	34.763	102.946	***
speciality_products	55.395	14.031	3.95	0	27.628	83.162	***
cultural_heritageC~o	-4.205	14.578	-0.29	.773	-33.053	24.644	
cultural_heritage_~t	27.722	17.987	1.54	.126	-7.875	63.319	
ce	39.563	16.882	2.34	.021	6.153	72.973	**
uaa	.714	.235	3.04	.003	.249	1.179	***
scenario_large_cha~e	53.877	13.651	3.95	0	26.862	80.891	***
avoid_degradation	25.458	14.376	1.77	.079	-2.992	53.907	*
Constant	-56.103	22.121	-2.54	.012	-99.88	-12.325	**

Mean dependent var	47.827	SD dependent var	61.791
R-squared	0.402	Number of obs	138
F-test	7.692	Prob > F	0.000
Akaike crit. (AIC)	1481.885	Bayesian crit. (BIC)	1517.012

**** p<.01, ** p<.05, * p<.1*

Table 9.2.5 Model 3

wtp_usd_2023	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
provisioning_es	122.974	19.455	6.32	0	84.555	161.393	***
regulating_es	37.983	18.163	2.09	.038	2.117	73.849	**
cultural_es	28.099	17.153	1.64	.103	-5.773	61.971	
gdp_per_capita	0	0	1.25	.214	0	.001	
ce	33.425	22.738	1.47	.143	-11.476	78.326	
current_status_lan~e	-4.383	13.545	-0.32	.747	-31.131	22.365	
Constant	-33.24	34.428	-0.97	.336	-101.226	34.746	

Mean dependent var	56.331	SD dependent var	96.949
R-squared	0.238	Number of obs	169
F-test	8.452	Prob > F	0.000
Akaike crit. (AIC)	1992.645	Bayesian crit. (BIC)	2014.554

Table 9.2.6 Model 7

wtp_usd_2023	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
provisioning_es	64.238	12.457	5.16	0	39.549	88.927	***
regulating_es	68.434	10.885	6.29	0	46.86	90.008	***
cultural_es	56.477	10.835	5.21	0	35.002	77.951	***
gdp_per_capita	0	0	0.07	.942	0	0	
ce	2.112	26.099	0.08	.936	-49.616	53.84	
current_status_lan~e	-2.535	7.815	-0.32	.746	-18.024	12.954	
scenario_large_cha~e	68.952	16.934	4.07	0	35.39	102.515	***
avoid_degradation	-14.637	16.298	-0.90	.371	-46.94	17.666	
Constant	-20.802	31.077	-0.67	.505	-82.396	40.792	

Mean dependent var	43.275	SD dependent var	63.441
R-squared	0.459	Number of obs	118
F-test	11.563	Prob > F	0.000
Akaike crit. (AIC)	1258.786	Bayesian crit. (BIC)	1283.722

*** *p<.01*, ** *p<.05*, * *p<.1*

Table 9.2.7 Model 4

wtp_usd_2023	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
provisioning_es	114.901	17.945	6.40	0	79.496	150.307	***
regulating_es	34.954	16.759	2.09	.038	1.888	68.02	**
cultural_es	26.389	15.68	1.68	.094	-4.549	57.326	*
uaa	-.441	.323	-1.37	.173	-1.078	.195	
ce	20.716	19.679	1.05	.294	-18.11	59.543	
Constant	13.159	29.217	0.45	.653	-44.485	70.804	

Mean dependent var	58.273	SD dependent var	92.839
R-squared	0.209	Number of obs	189
F-test	9.663	Prob > F	0.000
Akaike crit. (AIC)	2215.743	Bayesian crit. (BIC)	2235.194

Table 9.2.8 Model 8

wtp_usd_2023	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
provisioning_es	66.816	11.378	5.87	0	44.306	89.326	***
regulating_es	62.7	10.279	6.10	0	42.364	83.037	***
cultural_es	54.992	9.577	5.74	0	36.046	73.938	***
uaa	.692	.224	3.08	.002	.248	1.135	***
ce	41.002	17.038	2.41	.018	7.295	74.709	**
scenario_large_cha~e	65.604	12.935	5.07	0	40.013	91.195	***
avoid_degradation	-8.377	13.841	-0.61	.546	-35.759	19.005	
Constant	-80.427	22.228	-3.62	0	-124.403	-36.451	***

Mean dependent var	47.827	SD dependent var	61.791
R-squared	0.423	Number of obs	138
F-test	13.639	Prob > F	0.000
Akaike crit. (AIC)	1468.789	Bayesian crit. (BIC)	1492.207

**** p<.01, ** p<.05, * p<.1*

Table 9.2.9 Model 9

wtp_usd_2023	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
flora_and_fauna	-8.045	17.247	-0.47	.642	-42.11	26.019	
farm_infrastructur~s	-7.569	50.562	-0.15	.881	-107.434	92.296	
soil_fertility	8.339	28.71	0.29	.772	-48.366	65.043	
speciality_products	143.937	19.735	7.29	0	104.958	182.916	***
cultural_heritageC~o	-14.613	25.525	-0.57	.568	-65.028	35.803	
cultural_heritage_~t	-3.542	27.764	-0.13	.899	-58.378	51.294	
recreation	-20.571	14.128	-1.46	.147	-48.475	7.333	
gdp_per_capita	0	0	0.99	.323	0	.001	
ce	-4.19	24.366	-0.17	.864	-52.315	43.934	
current_status_lan~e	-14.864	13.063	-1.14	.257	-40.663	10.936	
Constant	53.289	34.232	1.56	.122	-14.322	120.9	

Mean dependent var	56.331	SD dependent var	96.949
R-squared	0.316	Number of obs	169
F-test	7.289	Prob > F	0.000
Akaike crit. (AIC)	1982.561	Bayesian crit. (BIC)	2016.990

Table 9.2.10 Model 13

wtp_usd_2023	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
flora_and_fauna	18.354	10.894	1.68	.095	-3.246	39.953	*
farm_infrastructur~s	-31.879	31.263	-1.02	.31	-93.867	30.11	
soil_fertility	66.719	17.697	3.77	0	31.629	101.81	***
speciality_products	61.872	14.027	4.41	0	34.06	89.685	***
cultural_heritageC~o	-11.686	18.372	-0.64	.526	-48.114	24.742	
cultural_heritage_~t	28.71	19.88	1.44	.152	-10.708	68.129	
recreation	39.943	11.319	3.53	.001	17.499	62.387	***
gdp_per_capita	0	0	-1.40	.163	-.001	0	
ce	10.683	25.5	0.42	.676	-39.879	61.246	
current_status_lan~e	-17.496	7.907	-2.21	.029	-33.173	-1.819	**
scenario_large_cha~e	81.668	17.201	4.75	0	47.562	115.774	***
avoid_degradation	16.165	16.468	0.98	.329	-16.488	48.819	
Constant	24.412	31.371	0.78	.438	-37.792	86.615	

Mean dependent var	43.275	SD dependent var	63.441
R-squared	0.469	Number of obs	118
F-test	7.731	Prob > F	0.000
Akaike crit. (AIC)	1264.578	Bayesian crit. (BIC)	1300.597

*** $p<.01$, ** $p<.05$, * $p<.1$

Table 9.2.11 Model 10

wtp_usd_2023	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
flora_and_fauna	-4.236	15.867	-0.27	.79	-35.546	27.075	
farm_infrastructur~s	-21.241	48.776	-0.44	.664	-117.491	75.009	
soil_fertility	17.466	27.115	0.64	.52	-36.039	70.972	
speciality_products	139.681	19.07	7.32	0	102.05	177.312	***
cultural_heritageC~o	.5	21.828	0.02	.982	-42.573	43.572	
cultural_heritage_~t	9.962	24.558	0.41	.685	-38.499	58.423	
recreation	-19.868	13.461	-1.48	.142	-46.431	6.696	
ce	-5.928	19.745	-0.30	.764	-44.891	33.034	
uaa	-.538	.32	-1.68	.095	-1.17	.094	*
Constant	72.586	25.368	2.86	.005	22.526	122.645	***

Mean dependent var	58.273	SD dependent var	92.839
R-squared	0.280	Number of obs	189
F-test	7.736	Prob > F	0.000
Akaike crit. (AIC)	2205.927	Bayesian crit. (BIC)	2238.345

Table 9.2.12 Model 14

wtp_usd_2023	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
flora_and_fauna	21.737	10.079	2.16	.033	1.79	41.684	**
farm_infrastructur~s	-55.39	30.936	-1.79	.076	-116.612	5.832	*
soil_fertility	63.388	17.299	3.66	0	29.153	97.623	***
speciality_products	50.302	14.141	3.56	.001	22.318	78.286	***
cultural_heritageC~o	-21.163	15.555	-1.36	.176	-51.945	9.619	
cultural_heritage_~t	15.149	18.169	0.83	.406	-20.807	51.106	
recreation	35.035	10.716	3.27	.001	13.829	56.242	***
ce	32.125	16.707	1.92	.057	-.937	65.188	*
uaa	.611	.232	2.64	.009	.153	1.07	***
scenario_large_cha~e	64.856	13.142	4.93	0	38.848	90.865	***
avoid_degradation	13.853	13.825	1.00	.318	-13.507	41.212	
Constant	-40.236	21.056	-1.91	.058	-81.905	1.434	*

Mean dependent var	47.827	SD dependent var	61.791
R-squared	0.404	Number of obs	138
F-test	7.755	Prob > F	0.000
Akaike crit. (AIC)	1481.435	Bayesian crit. (BIC)	1516.562

**** p<.01, ** p<.05, * p<.1*

Table 9.2.13 Model 11

wtp_usd_2023	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
provisioning_es	107.611	18.6	5.79	0	70.881	144.34	***
regulating_es	18.241	16.396	1.11	.268	-14.137	50.618	
recreation	-9.664	15.316	-0.63	.529	-39.91	20.581	
gdp_per_capita	.001	0	1.46	.146	0	.001	
ce	28.914	23.265	1.24	.216	-17.027	74.855	
current_status_lan~e	-8.212	13.402	-0.61	.541	-34.678	18.254	
Constant	-1.93	31.537	-0.06	.951	-64.206	60.347	

Mean dependent var	56.331	SD dependent var	96.949
R-squared	0.228	Number of obs	169
F-test	7.960	Prob > F	0.000
Akaike crit. (AIC)	1995.007	Bayesian crit. (BIC)	2016.916

Table 9.2.14 Model 15

wtp_usd_2023	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
provisioning_es	54.545	12.655	4.31	0	29.463	79.628	***
regulating_es	53.126	10.277	5.17	0	32.757	73.496	***
recreation	49.807	11.055	4.51	0	27.896	71.718	***
gdp_per_capita	0	0	-0.71	.481	-.001	0	
ce	4.538	26.767	0.17	.866	-48.514	57.59	
current_status_lan~e	-15.469	7.779	-1.99	.049	-30.887	-.05	**
scenario_large_cha~e	84.326	17.51	4.82	0	49.622	119.03	***
avoid_degradation	-24.747	16.675	-1.48	.141	-57.797	8.304	
Constant	14.737	31.307	0.47	.639	-47.312	76.787	

Mean dependent var	43.275	SD dependent var	63.441
R-squared	0.430	Number of obs	118
F-test	10.292	Prob > F	0.000
Akaike crit. (AIC)	1264.897	Bayesian crit. (BIC)	1289.833

**** p<.01, ** p<.05, * p<.1*

Table 9.2.15 Model 12

wtp_usd_2023	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
provisioning_es	100.695	17.053	5.90	0	67.05	134.341	***
regulating_es	19.041	15.565	1.22	.223	-11.669	49.752	
recreation	-7.57	13.783	-0.55	.584	-34.764	19.624	
uaa	-.625	.319	-1.96	.051	-1.253	.004	*
ce	12.383	19.664	0.63	.53	-26.414	51.18	
Constant	50.228	26.223	1.92	.057	-1.509	101.966	*

Mean dependent var	58.273	SD dependent var	92.839
R-squared	0.198	Number of obs	189
F-test	9.033	Prob > F	0.000
Akaike crit. (AIC)	2218.335	Bayesian crit. (BIC)	2237.785

Table 9.2.16 Model 16

wtp_usd_2023	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
provisioning_es	54.191	11.634	4.66	0	31.175	77.206	***
regulating_es	48.925	10.151	4.82	0	28.842	69.007	***
recreation	42.055	9.905	4.25	0	22.46	61.65	***
uaa	.478	.232	2.06	.041	.02	.937	**
ce	28.033	17.835	1.57	.118	-7.251	63.316	
scenario_large_cha~e	71.481	13.539	5.28	0	44.697	98.265	***
avoid_degradation	-20.797	14.492	-1.44	.154	-49.467	7.874	
Constant	-40.614	21.547	-1.88	.062	-83.242	2.014	*

Mean dependent var	47.827	SD dependent var	61.791
R-squared	0.365	Number of obs	138
F-test	10.685	Prob > F	0.000
Akaike crit. (AIC)	1482.063	Bayesian crit. (BIC)	1505.481

**** p<.01, ** p<.05, * p<.1*

Regression Models

Table 9.2.17 Compiled Regression Results

	Without scenario_large_change				With scenario_large_change			
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Flora & Fauna	-2.804	-0.0356			16.24^{+}	20.61**		
	(17.14)	(15.81)			(11.05)	(10.08)		
Scenic View	4.799	6.541			33.73***	31.27***		
	(14.01)	(13.14)			(11.27)	(9.771)		
Farm Inf. & Serv.	-18.27	-33.50			7.769	-16.75		
	(50.40)	(48.25)			(30.41)	(29.78)		
Soil Fertility	8.937	15.19			71.64***	68.85***		
	(28.95)	(27.22)			(17.95)	(17.23)		
Specialty Products	147.5***	142.9***			66.35***	55.40***		
	(20.00)	(19.35)			(14.16)	(14.03)		
Cult. H. Conservation	-19.07	-8.211			4.924	-4.205		
	(25.49)	(21.12)			(18.50)	(14.58)		
Cult. H. Improvement	-4.665	4.976			33.06^{+}	27.72^{+}		
	(27.93)	(24.45)			(20.18)	(17.99)		
GDP per capita ($)	0.000223		0.000440		-0.000299		0.0000154	
	(0.000369)		(0.000353)		(0.000230)		(0.000211)	
Choice Experiment	1.561	-0.473	33.43^{+}	20.72	13.15	39.56**	2.112	41.00**
	(24.58)	(20.41)	(22.74)	(19.68)	(25.87)	(16.88)	(26.10)	(17.04)
Crnt. Sts. Lndscp.	-15.88		-4.383		-13.78*		-2.535	
	(13.15)		(13.55)		(8.148)		(7.815)	
UAA		-0.346		-0.441		0.714***		0.692***
		(0.329)		(0.323)		(0.235)		(0.224)
Provisioning ES			123.0***	114.9***			64.24***	66.82***
			(19.46)	(17.94)			(12.46)	(11.38)
Regulating ES			37.98**	34.95**			68.43***	62.70***
			(18.16)	(16.76)			(10.89)	(10.28)
Cultural ES			28.10^{+}	26.39*			56.48***	54.99***
			(17.15)	(15.68)			(10.83)	(9.577)
Scenario Large Change					68.60***	53.88***	68.95***	65.60***
					(17.43)	(13.65)	(16.93)	(12.94)
Avoid Degradation					27.60^{+}	25.46*	-14.64	-8.377
					(17.25)	(14.38)	(16.30)	(13.84)
Constant	43.19	50.51*	-33.24	13.16	14.33	-56.10**	-20.80	-80.43***
	(35.14)	(28.01)	(34.43)	(29.22)	(32.12)	(22.12)	(31.08)	(22.23)
Adjusted R^2	0.263	0.236	0.210	0.187	0.390	0.350	0.419	0.392
aic	1984.7	2208.0	1992.6	2215.7	1268.1	1481.9	1258.8	1468.8
bic	2019.1	2240.4	2014.6	2235.2	1304.2	1517.0	1283.7	1492.2
N	169	189	169	189	118	138	118	138

Standard errors in parentheses

+ $p < 0.15$, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 9.2.18 Compiled Regression Results (with recreational services)

	Without scenario_large_change				With scenario_large_change			
	Model 9	Model 10	Model 11	Model 12	Model 13	Model 14	Model 15	Model 16
Flora & Fauna	-8.045	-4.236			18.35*	21.74**		
	(17.25)	(15.87)			(10.89)	(10.08)		
Farm Infrastructure & Services	-7.569	-21.24			-31.88	-55.39*		
	(50.56)	(48.78)			(31.26)	(30.94)		
Soil Fertility	8.339	17.47			66.72***	63.39***		
	(28.71)	(27.11)			(17.70)	(17.30)		
Specialty Products	143.9***	139.7***			61.87***	50.30***		
	(19.74)	(19.07)			(14.03)	(14.14)		
Cultural Heritage Conservation	-14.61	0.500			-11.69	-21.16		
	(25.53)	(21.83)			(18.37)	(15.55)		
Cultural Heritage Improvement	-3.542	9.962			28.71	15.15		
	(27.76)	(24.56)			(19.88)	(18.17)		
Recreation	-20.57^{+}	-19.87^{+}	-9.664	-7.570	39.94***	35.04***	49.81***	42.06***
	(14.13)	(13.46)	(15.32)	(13.78)	(11.32)	(10.72)	(11.06)	(9.905)
GDP Per Capita ($)	0.000364		0.000532^{+}		-0.000318		-0.000155	
	(0.000367)		(0.000364)		(0.000227)		(0.000219)	
Choice Experiment	-4.190	-5.928	28.91	12.38	10.68	32.13*	4.538	28.03^{+}
	(24.37)	(19.74)	(23.26)	(19.66)	(25.50)	(16.71)	(26.77)	(17.83)
Current Status Landscape	-14.86		-8.212		-17.50**		-15.47**	
	(13.06)		(13.40)		(7.907)		(7.779)	
Utilized Agricultural Area		-0.538*		-0.625*		0.611***		0.478**
		(0.320)		(0.319)		(0.232)		(0.232)
Provisioning ES			107.6***	100.7***			54.55***	54.19***
			(18.60)	(17.05)			(12.66)	(11.63)
Regulating ES			18.24	19.04			53.13***	48.92***
			(16.40)	(15.57)			(10.28)	(10.15)
Scenario Large Change					81.67***	64.86***	84.33***	71.48***
					(17.20)	(13.14)	(17.51)	(13.54)
Avoid Degradation					16.17	13.85	-24.75^{+}	-20.80
					(16.47)	(13.83)	(16.68)	(14.49)
Constant	53.29^{+}	72.59***	-1.930	50.23*	24.41	-40.24*	14.74	-40.61*
	(34.23)	(25.37)	(31.54)	(26.22)	(31.37)	(21.06)	(31.31)	(21.55)
Adjusted R^2	0.272	0.244	0.199	0.176	0.408	0.352	0.389	0.331
aic	1982.6	2205.9	1995.0	2218.3	1264.6	1481.4	1264.9	1482.1
bic	2017.0	2238.3	2016.9	2237.8	1300.6	1516.6	1289.8	1505.5
N	169	189	169	189	118	138	118	138

Standard errors in parentheses

+ $p < 0.15$, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

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