Deliverable 3.3: The impact of ACTRIS on society: outcome of a Contingent Valuation study

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1. Introduction

ACTRIS Research Infrastructure (ACTRS RI) is a pan-European initiative that unites the observations and related research on aerosols, clouds, and trace gases (both from in-situ and remote sensing) to provide high-quality research infrastructure services to a wider user community. Integrating European ground-based stations equipped with advanced atmospheric probing instrumentation, ACTRIS will have the essential role to support building of new knowledge as well as policy issues on climate change, air quality, and long-range transport of pollutants. The ESFRI Roadmap 2021 lists ACTRIS as a landmark in the pan-European research infrastructure landscape for the European scientific community. With ESFRI-status now established in Q2 2023, ACTRIS shall further develop its organizational and operational framework, and long-term strategic goals. In this context, the ACTRIS Implementation Project (ACTRIS IMP) aims at taking ACTRIS into a new level of maturity and will set the needed structures for the implementation actions, both at the national and European level. ACTRIS IMP builds on three main pillars: securing the long-term sustainability, implementing ACTRIS functionalities and positioning ACTRIS in the national, European, and international science and innovation landscape.

In general, ACTRIS, as any other research infrastructure, creates positive socio-economic effects through different impact pathways:

- At consortium level, as research institutes, universities, companies, etc., involved in the development, maintenance and operation of the infrastructure in question will benefit through knowledge creation, technological developments, human capital enhancement, creation of new jobs, etc.
- To the wider research community, as research teams, organizations and programs utilizing the outcomes provided by ACTRIS will improve their modelling, satellite data calibration / validation and atmospheric climate services and products.
- To the society, as local authorities, environmental protection agencies, industries, ministries, international organizations, weather services, etc., will utilize ACTRIS outcomes to optimize their environmental strategies and improve their decision-making processes.

The socio-economic impacts associated with ACTRIS implementation and operation, were initially estimated in the context of the preparation phase of ACTRIS research infrastructure (project ACTRIS PPP). The analysis undertaken provided a set of Key Performance Indicators (KPIs) to facilitate the effective monitoring and quantification of various type of socio-economic impacts, including those on human capital creation, scientific activity, innovation, economy and society[1]. The work plan envisaged in the context of ACTRIS IMP aims at updating and further investigating selected types of the above-mentioned societal impacts, focusing on the impacts to the society.

In a technical note drafted in December 2021 the macroeconomic impact analysis of ACTRIS infrastructure was updated using the most recent EU and Member States data as regards the expenditures envisaged

[1] Please see the Deliverables D8.1, D8.2, and D8.3 of the ACTRIS PPP project. Available online at https://www.actris.eu/how-are-we-funded/actris-ppp-documents

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for the development and operation of ACTRIS infrastructure, together with the ACTRIS cost book on the required costs.

The present report attempts an initial quantitative analysis of the societal benefits associated with ACTRIS RI by providing to local, regional, national and international authorities and organizations, information on atmospheric composition pertinent to air quality, emission sources management and risk assessment, towards increasing public awareness and designing appropriate policies and measures to minimize the negative impacts of air pollution and climate change, and to maximize social welfare. Quantification, and to the extent possible, monetization of the societal benefits of ACTRIS RI will provide useful insights for evaluating the social return of the investment required for developing and maintaining ACTRIS infrastructure, specifying the appropriate level of development of the infrastructure in question through a cost-benefit analysis, providing guidance on the pricing of the services provided, etc. To this end, a Contingent Valuation (CV) study is implemented aiming at recording the importance and finally estimate the value that citizens attribute to the development of research infrastructures that allow the provision of the aforementioned information and services. The CV is a well-known technique used widely to value non-market environmental and social goods through the formulation of hypothetical markets, in the frame of which the potential "consumer" or "user" is asked to express his/her preferences and to evaluate the potential changes in the supply of the examined good. Through this survey, the value of retaining/expanding ACTRIS for society can be obtained by aggregating the individuals' willingness to pay (WTP) for the whole population.

In general, the implementation of a CV study presents significant methodological challenges, and the design of the survey should be done appropriately in order to avoid potential biases in the final outcomes. These difficulties may be even greater attempting to value research infrastructures, as the results from their operation are not directly perceived by citizens and therefore, they may have difficulties in valuing them. In other words, what drives citizens to support financially basic science projects? Besides, very few attempts performed up to date for the economic evaluation of the social benefits attributed to research infrastructures, so the experience exist for such valuation is rather limited (see for example Florio and Giffoni, 2020). Therefore, the research and the valuation undertaken in the context of this analysis aims to: (i) provide a first, indicative value of the benefits arising for the society due to the operation of ACTRIS research infrastructure, and (ii) gain experiences and derive useful background information that will allow in the future the implementation of a more detailed and structured research at pan-European level with a view to value the societal benefits of the ACTRIS research infrastructure more precisely.

Recognizing the pilot nature of this study, the research was carried out only in two countries of the ACTRIS network, namely Greece and Finland (i.e., two countries with different economic, cultural and societal conditions), with a view to investigate and clarify a number of methodological issues that will help to design and implement at a later stage a pan-European study aiming to value the societal benefits associated with ACTRIS RI. By carrying out the research in two countries with radically different economic and societal conditions, the range of the values attributed to societal values of ACTRIS is also estimated.

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2 Methodological Framework

2.1 The Contingent Valuation Method

As already mentioned previously, in the context of this study, a CV study is implemented in Greece and Finland aiming to estimate the value that citizens in two countries with different economic, social and cultural characteristics attribute to the development and operation of ACTRIS RI.

CV is one of the most widely used techniques for valuing non-market environmental and social goods (Arrow et al., 1993; Bateman et al., 2002; Venkatachalam, 2004; Carson and Hanemann, 2005). It aims in the formulation of hypothetical markets for environmental / social goods considering that the potential consumer is asked to express his/her preferences and to evaluate the potential changes in the supply of the examined good (Hanley et al. 1997). More specifically, through a survey people are asked to express what they would be willing to pay for a quality improvement in a particular environmental/social attribute or to prevent a further deterioration of this attribute. The individuals are asked to to complete appropriately designed questionnaires and answer to questions about how they value environmental/social changes. Indicatively the basic question asked in these surveys could be:

"Would you be willing to pay €xxx to improve the quality of the environmental or social attribute?"

Through this type of questions, the value of the examined environmental/social good is estimated by aggregation of the individuals' willingness to pay.

Its simplicity as well as the capability of valuing both use and non-use values of the examined environmental/social goods are the main advantages of the method. Although several criticisms have been raised regarding the reliability of the obtained results, the review of the method by the National Oceanic and Atmospheric Administration in the US through a special panel of experts led by two Nobel Prize-winning economists, concluded that the CV gives a very useful initial estimate of the value of environmental/social goods in question and provided specific guidelines for improving the reliability of the obtained results (Arrow et al., 1993).

The main steps for the effective application of a Contingent Valuation study include:

1. *Clarification and definition of the valuation problem and its characteristics as well as specification of the population affected*. In the context of the present work, the good for valuation is the services provided to the public by the development and operation of the ACTRIS research infrastructure, with a view to estimate the financial resources that are socially acceptable to be allocated for its development and operation. The entire European population may be affected by the effective operation of this infrastructure in question, however due to limitations in available resources the study focuses on recording the people perceptions in Greece and Finland as regards the importance of ACTRIS RI and its supporting services on their quality of life. Given that the per capita Gross Domestic Product (GDP) in these two countries differ significantly, the results of the analysis could be a proxy of the range of the value that European citizens attribute to the ACTRIS RI.
2. *Determination of the characteristics of the survey that will be carried out*. This includes the design of the survey, the size of the sample, the profile of the respondents, the technique that will be

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used for conducting the survey, etc. The design features of the survey carried out in this work are presented in detail in Chapter 3.

3. *Deign of the questionnaire*. Its basic structure includes: (a) introductory questions aiming in understanding the interviewee's familiarity with the environmental/social good under consideration as well as his/her priorities and perceptions regarding this good, (b) informative material about the good under valuation, (c) description of the scenario that will be evaluated including the envisaged changes through specific interventions as well as the payment and the timing regarding the amount that respondents are willing to pay in order to improve or avoid deterioration of the valued good, (d) the economic question about the willingness to pay, which can be set in various formats such as open-ended question (how much are you willing to pay for the examined environmental good or service), dichotomous choice questions, payment cards or bidding game, and (e) questions for the socio-economic characteristics of the respondents. More detailed information on the questionnaire designed and used in this study is again given in Chapter 3, while the willingness to pay was investigated through an open-ended type question.
4. *Conduction of the survey*. The respondents who will be asked to complete the questionnaires are randomly chosen from the reference population by applying appropriate statistical sampling techniques according to the design of the survey.
5. *Statistical analysis*. The last step of the method is the processing of the results of the questionnaires using appropriate statistical techniques. The design of the economic question as well as the number of positive answers in the economic question specify the type of the required statistical analysis. Specifically, in open-ended questions, such as those used in the present study, very often regression analysis is used for relating the WTP with quantitative and/or qualitative factors determining the perception and attitude of the respondents regarding the examined environmental/social good and their socio-economic characteristics.

Very often, the WTP is calculated through multiple regression models using the following equation:

$$WTP_i = f(Q_i, Y_i, S_i)$$

Where WTP_i is the declared payment amount, Qi the quantitative and/or qualitative indices characterizing the perceptions of the respondents, Y_i the specified income, and Si other socio-economic factors of the respondents, including parameters that describe geopolitical conditions.

The mean WTP is calculated, using the coefficients of the regression model and the mean values of the parameters incorporated as independent variables, based on the data collected through the survey.

In cases where the sample includes several zero WTP values a Tobit model may also be implemented. More generally, the Tobit model, also called a censored regression model, is designed to estimate linear relationships between variables when there is either left-or right-censoring in the dependent variable (also known as censoring from below and above, respectively). Censoring from above takes place when cases

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with a value at or above some threshold, is considered as equal to the value of that threshold, so that the true value might be equal to the threshold, but it might also be higher. In the case of censoring from below, values that fall at or below some thresholds are censored.

Alternatively, it is possible to use non-parametric statistical techniques for estimating willingness to pay such as the Kaplan-Meier estimator. The **Kaplan-Meier estimator** is a non-parametric technique of estimating and plotting the survival probability as a function of time. It is often the first step in carrying out the survival analysis, as it is the simplest approach and requires the least assumptions. The Kaplan-Meier survival curve is defined as the probability of surviving in a given length of time while considering time in many small intervals. There are three assumptions used in this analysis. *Firstly*, the event of interest is unambiguous and happens at a clearly specified time. *Secondly*, the survival probability of all observations is the same, it does not matter exactly when they have entered the study. *Thirdly*, censored observations have the same survival prospects as observations that continue to be followed. In real-life cases, we never know the true survival function. That is why with the Kaplan-Meier estimator, we approximate the true survival function from the collected data. The estimator is defined as the fraction of observations who survived for a certain amount of time under the same circumstances and is given by the following formula:

$$\widehat{S}(t) = \prod_{i:\, t_i \leq t} \left(1 - \frac{d_i}{n_i}\right)$$

The Kaplan-Meier curve is a graphical representation of the survival function. It is a non-parametric estimate of the survival function that does not make any assumptions about the underlying distribution of the data. The Kaplan-Meier curve is used to estimate the survival function from data that are censored, truncated, or have missing values. It shows the probability that a subject will survive up to time t. The curve is constructed by plotting the survival function against time.

Regardless to the statistical technique used for estimating the WTP of individuals, the total economic value of the environmental/social good in question is calculated by multiplying the mean WTP estimated with the reference population affected and is represented in the analysis through the sample used in the survey.

2.2 Benefit Transfer

The results of the CV study undertaken in Greece and Finland for valuing the ACTRIS RI are used as basis to proxy through benefit transfer the value of the research infrastructure under consideration in other European countries.

Benefit transfer is defined as the adaptation and use of existing economic information for environmental and social goods derived for specific sites under certain resources and policy conditions to new contexts or sites with similar resources and conditions (Rosenberger and Loomis, 2001). Benefit transfer techniques are used in cases that policy analysts cannot afford the design and implementation of original valuation studies, given the considerable human and economic resources required. It is therefore obvious that the

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implementation of benefit transfer techniques for the economic valuation of environmental or social goods, generates results with higher levels of uncertainty compared to the implementation of original valuation techniques, particularly in cases that the environmental/social good under consideration presents unique characteristics (e.g., a historic monument). On the other hand, provided that the original studies exploited in a benefit transfer approach are of high quality, the results obtained using appropriate transfer techniques may be very satisfactorily. In any case the exploitation of benefit transfer techniques for economic valuation of environmental/social goods should be considered as the "second best" option and should be used in cases that the elaboration of original valuation studies is impossible.

Several factors can be identified that affect the reliability and validity of benefit transfers. Based on a systematic analysis of these factors made by Rosenberger and Loomis (2001), the following may affect the reliability of our estimates regarding the value of ACTRIS RI in various European countries based on the results of a CV study undertaken in Greece and Finland:

- The quality of the original study greatly affects the quality of the benefit transfer process;
- The limited number of studies investigating a specific environmental/social good restricts the pool of estimates and studies to compare and draw information.
- The limited documentation of data collected and reported, increases the difficulty of estimation and benefit transfer.
- The fact that most primary research is not designed for benefit transfer purposes.
- Different statistical methods for estimating models can lead to large differences in values estimated. This also includes issues such as the overall impact of model misspecification and choice of functional form.
- There are different types of values that may have been measured in primary research, including use values and/or passive- or non-use values.
- Characteristics of the study site and the policy site may be substantially different, leading to quite distinct values.

All the above listed factors can lead to bias or error in and restrict the robustness of the benefit transfer process.

There are four types of benefit transfer approaches, which can be used depending on the valuation problem examined (European Commission 2005; Navrud, 2004):

- *Simple transfer of a value*: this is the simplest transfer approach and is based on taking an estimate from a single relevant study-site or a range of point estimates, if more than one study is considered relevant, and applying it directly to the specific problem under consideration. A basic limitation of this approach is that the socio-economic characteristics (income, education, etc.) of the individuals in the study-site(s) (i.e., the site(s) that the original valuation studies were conducted) may differ from those characteristics of the individuals at the policy-site (i.e., the site that the results of the original studies are attempted to be transferred), affecting thus their preferences. Therefore, Navrud (2004) concludes that this approach should not be used for benefit transfer between countries with different income levels and costs of living.

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- *Adjusted value transfer*: this approach assumes that the value of the environmental/social good at the policy-site can be estimated by adjusting the corresponding value in the study-site(s) on the basis of the different income levels in both sites, the income elasticity of demand for the environmental/social good, the time of the elaboration of the original studies, etc. More general, the adjustments are based on judged differences between the original study and the situation under consideration. Hence, the approach takes account of any biases that are believed to exist. Most studies assume GDP per capita as proxies for income in international benefit transfers and income elasticity of demand equal to 1 (European Commission, 2005b). However, Navrud (2004) argues that it is more appropriate to use PPP estimates of per capita GDP instead of GDP per capita.
- *Function transfer*: this approach relies on the transfer of a relationship from the study-site instead of a value, derived using appropriate valuation techniques, which relates WTP to a set of characteristics of the study-site population and the environmental/social good in question. Data from the policy-site are then applied to this relationship to obtain the value of the environmental good under consideration. The advantages of this approach rely on the fact that more information can be taken into account in the transfer process. On the other hand, parameters that are statistically significant in one case-study may be of less importance in other case studies.
- *Meta-analysis*: it is an advanced function transfer approach. Specifically, meta-analysis attempts to statistically measure systematic relationships between reported valuation estimates for an environmental good or service and attributes of the studies that generated the estimates including valuation methods, human population and sample characteristics, and characteristics of the good or service itself (Bergstrom and Taylor, 2006). Usually, a regression is used in order to explain the variance in estimates of the coefficients across studies. The regression has the welfare measure of the environmental/social good under consideration as dependent variable, while as explanatory parameters are considered the characteristics of the environmental good and the population affected as well as methodological elements of the original studies.

In the context of this study, the *adjusted value transfer* technique has been implemented in order to obtain rough estimates of the value of ACTRIS in different European countries. As a first step, the various European countries were matched either to Greece or to Finland based on their GDP per capita. Then, the mean WTP values estimated in the context of the CV study undertaken in Greece and Finland for valuing the ACTRIS infrastructure, were adjusted to other European countries based on the variation of the per capita GDP using purchasing power parities between Greece/Finland and other European countries. By using this simple approach, which takes into account the spatial dimension of the transfer, a first and rough approximation of the value of ACTRIS RI was derived for all European countries.

3. Design of the survey

As already mentioned previously, this study aims at estimating the economic value that citizens attribute to the development of ACTRIS research infrastructure. The economic valuation of a research infrastructure presents significant methodological difficulties, since the associated benefits are not directly and easily

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understood by the society, while many of them are ultimately received by the public in the long run and possibly only under emergency situations. All European citizens can benefit from the ACTRIS RI, as parts of this infrastructure are located across the European continent, while societal benefits can also accrue globally. As it is the first time that the valuation of the societal benefits attributed to the ACTRIS RI is attempted, the survey focused on two European countries, namely Greece and Finland, with different economic and cultural characteristics. Through the research, it was sought to draw some preliminary but useful conclusions about how people with different economic, educational, and cultural profiles evaluate the research infrastructure in question as well as on the difficulties of such an evaluation, with a view to be taken into account in the future in a wider pan-European research on the ACTRIS infrastructure.

In Greece the survey was conducted between March and December 2022, through personal interviews (50% of the sample) and online survey. The promotion for this research was carried out through social media, word-of-mouth marketing (WOM), digitally via a platform. The main advantages of digital research are low cost, large sample size, flexibility, more honest responses and convenience. On the other hand, the drawbacks are the large amounts of unanswered questions, the on line limitation and also there is no interviewer, so big response bias. All questionnaires were anonymous and moreover the respondents gave their permission for the use of the data by signing a consent form. Furthermore, the Crowdsignal page that was used for the on line survey, has built a GDPR Access Tool in order to allow data subjects access to their data. Using this tool it is possible to view survey and poll responses that are associated with a particular email address. This tool allows polls, quizzes and surveys to be queried. Ratings are by their nature anonymous and cannot by identified. After confirming their email address, any survey or poll response found will be shown. The user can then request a zip file containing this data, or request that the data be deleted. At the point, totally 210 questionnaires were collected (among which 200 were considered valid) from inhabitants of the whole Greek territory, not belonging in the same household. A stratified sampling method was applied for developing the sample taking into consideration age and gender as recorded in 2011 census. The proper stratification of the sample was ensured through various measures. First, the researchers were informed for the proper stratification of the sample and the criteria that should be used to control it through a training course. In addition, a protocol was established for monitoring the composition of the sample on a regular basis over the survey in relation to the targeted stratification. In case of discrepancies, researchers applied specific guidelines for the selection of the participants with the appropriate profile that will result in improving the representativeness of the sample. After the quality assurance and quality control, only 200 questionnaires were used for further statistical analysis.

In Finland the survey was held in February 2023 (through internet), 114 questionnaires were collected and all of them were used for further analysis. Certainly, it would be more appropriate if the age of the Finnish participants was consistent with the latest population census.

In both surveys (i.e., in Greece and Finland) the same questionnaire was used, which is presented in the Appendix. The only differences concern the addition in the Finnish questionnaire of one extra option in the payment card, namely “EUR60” as well as the option of “I don’t want to say” in the question asking the income of the respondent. As the period of designing the questionnaire and running the survey in Greece coincided with the applied restrictions due to the COVID pandemic, an effort was made to keep

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the questionnaire relatively simple in structure and short, thus facilitating its circulation and completion through the internet.

The questionnaire developed for undertaking the research consisted in three different sections. In the first part, seven introductory questions were included aiming at investigating the sensitivity of the respondents in relation to various environmental problems and their degree of awareness in relation to what extent specific environmental aspects addressed by ACTRIS RI are related to public health, climate change and safety issues. Also, the respondents expressed their preferences on the bodies that should be responsible for air monitoring.

A crucial survey design issue was how to describe ACTRIS, its research activity and the possible ways particle research at ACTRIS can impact on society. An attempt was made to include at the questionnaire information on the capabilities of ACTRIS RI. Then, the Contingent Valuation (CV) scenario was established where the respondents had the opportunity to specify their WTP for developing a new fund that will be used to finance the development of full operationalization of the ACTRIS RI. Specifically, the CV scenario is presented to the respondents as follows:

In recent years, climate change and the impact of air pollution on public health have emerged as the most important environmental problems worldwide, motivating governments, citizens, the media, etc. Despite the indisputable progress of science in understanding these phenomena, important questions about their mechanisms still remain unresolved hindering their effective treatment. The ACTRIS (Aerosol, Clouds and Trace Gases Research Infrastructure, www.actris.eu), developed in recent years at pan-European level, plays a crucial role in this effort. Aiming at the development of infrastructure and techniques for analyzing the chemical composition of the atmosphere, particularly for short-lived compounds (aerosols, trace elements, smoke). This enables us to:

- *Improve the existing climate models by producing more reliable simulations of future climate conditions.*
- *Monitor the development of air pollution incidents in real time and to understand directly the sources that contribute to the atmospheric pollution events such as industrial activities, traffic, fires, technological accidents, etc., providing direct information to decision makers and the society.*
- *Monitor in real time the evolution of natural phenomena in the atmosphere, such as dust transport or volcanic ash in cases of volcanic eruptions, and to inform the bodies responsible for taking measures.*
- *Identify key pollutants that are not systematically measured so far, by developing protocols for their systematic monitoring in the future.*

As the ACTRIS research infrastructure is still under development, would you agree to pay an additional amount to your annual tax in order to complete its development and make its capabilities fully operational? If yes, please indicate the additional amount in your tax that you are willing to pay annually for the next 5 years.

The economic question was presented in an open-ended format, combined with a payment card to facilitate on-line filling of the questionnaires. In the literature, there is no consensus about the appropriate

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form of the valuation question (Whitehead, 2006). Each elicitation method has specific advantages and disadvantages (Heinzen and Bridges, 2008), while hypothetical bias can be triggered both in open-ended or dichotomous choice elicitation formats (Whitehead, 2006). The open-ended format is considered as a more straightforward approach for the estimation of the actual value of the examined environmental/social goods helping to avoid the biases of starting point and the anchoring effect, which are usually found in bidding processes and in dichotomous choice questions (Green et al., 1998; Whitehead, 2006; Grutters et al., 2009). On the other hand, an open-ended format creates difficulties to respondents to answer the economic question and increases the possibility to obtain missing values. Furthermore, the phenomenon of free riding is likely resulting in more protest and zero responses (Whitehead, 2006). The main reason for the selection of the open-ended format in our case was its simplicity, as a number of questionnaires were filled via internet (discrete choice models require more complex questionnaires that increase the risk of negative responses especially in online surveys). Furthermore, among the available CV formats, the open-ended usually leads to more conservative estimates of WTP and the corresponding economic value of the examined environmental goods or services (Frew et al., 2004; Lunander, 1998).

The questionnaire includes an additional question exploring the reasons that some people declare zero or unwillingness payment, as special emphasis should be given on the identification and manipulation of protest and zero responses. In the context of this study, and for the parametric analysis the protest responses are excluded from the analysis because they do not depict the true value of an environmental/social good, while the zero bidders are taken into account, as they can be considered as a true reflection of preferences (Strazzera et al., 2003; Atkinson et al., 2012). Specifically, the following options the following answers were considered as protest:

- I do not believe in the effectiveness of public structures and I would not want them to manage additional resources.
- I need more information to fund these activities.

Finally, in the last part of the questionnaire, 8 questions have been included to demonstrate the demographic and socioeconomic characteristics of the respondents, ensuring the representativeness of the sample and to explore how a range of socioeconomic factors can affect the willingness to pay.

The questionnaire was pre-tested in order to check its clarity and ease of completion. This led to a rescheduling of the introductory part of the questionnaire and information was provided regarding the impacts of air pollution and climate change on public health and flights' safety.

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4. Results and discussion

4.1 Results of the survey

Concerning the socioeconomic characteristics of the sample in the survey conducted in **Greece**, about 59% of the respondents were female and 41% male. As presented in Fig. 1, the mean age of the respondents was 42.2 years and follows the normal distribution. Respondents with a high education level (i.e., at a least a university degree) were more than 75%. It should be noted that this was a parameter that did not used in evaluating the representativeness of the sample. On the other hand, the high education level of the majority of the respondents may resulted in better understanding the impacts of the research infrastructure in question, partially counterbalancing the weakness of providing additional explanations as a significant part of the survey was undertaken online. The distribution of respondents according to the annual income was 51.5% in the lower category of "less than EUR 17,000"; 9.5% earned between EUR17,000 and 22,000; 14% between EUR 22,000 and 27,000 and 24% was in the highest category "more than EUR 27,000".

According to the obtained results, more than 86% of the respondents in the Greek survey stated that the protection of natural environment is very important. Regarding the importance of the various environmental problems faced by the Greek society, marine pollution and fires (both forest and non-forest) are characterized as very important by 84% of the sample, followed by the issues of climate change and air pollution which are characterized as very important by the 73% of the respondents (Fig. 2). Furthermore, 60% of the sample supported that air pollution negatively affects public health and the quality of life, while 46% considers that climate change negatively affects public health, income of households, and the daily lives of citizens. In addition, 57% of the respondents agreed that is very important to develop infrastructures allowing the systematic monitoring of the atmosphere thus providing data and real time information (available to all citizens) about emergencies that may be due to either natural phenomena (e.g., Sahara dust transport, volcanic eruptions) or anthropogenic activities (e.g., technological accidents).

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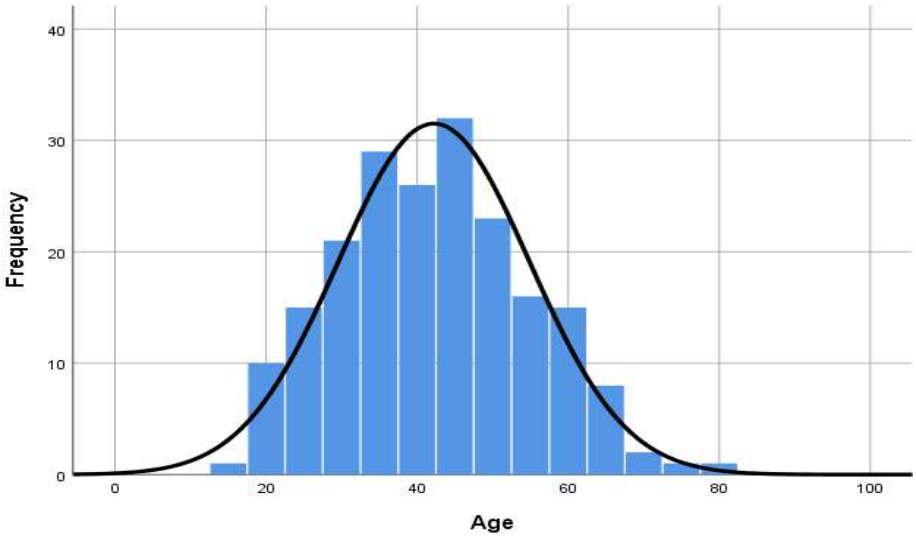

Figure 1: The age distribution of the Greek sample.

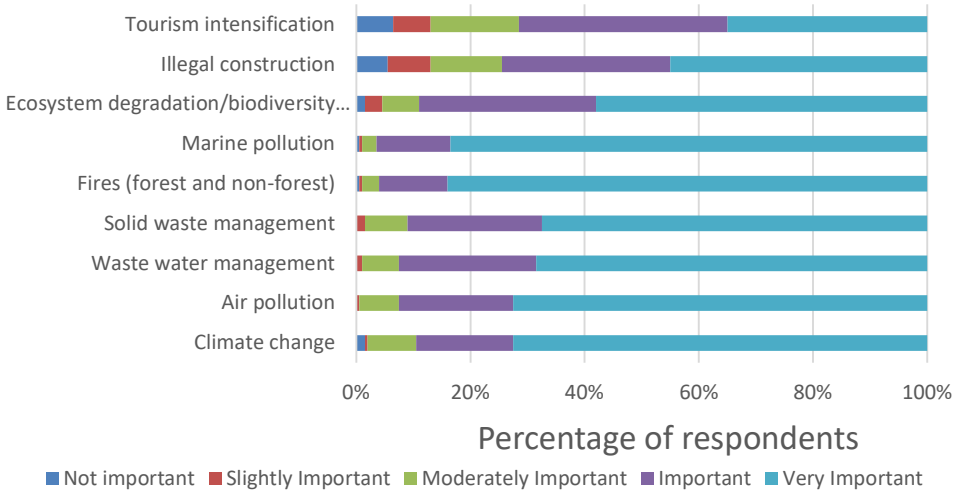

Figure 2: Assessment of the importance of the various environmental problems based on the Greek survey.

On the other hand, in the survey conducted in **Finland**, the sample consists of 48% female and 52% male with mean age of the respondents 49.1 years, as presented in Fig. 3. Respondents with a high education level (i.e., at a least a university degree) were more than 77%. Furthermore, conforming to the annual income, the distribution of respondents was 12% in the lower category of "less than EUR 17,000"; 5% earned between EUR17,000 and 22,000; 3.5% between EUR 22,000 and 27,000 and 60.5% was in the highest category "more than EUR 27,000" (with 18% unwilling to answer). According to the obtained results, the issues of marine pollution with 54% and climate change with 52% are very important as

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presented in Fig. 4. Also, 38% of the sample agreed that is very important to exist infrastructures allowing the systematic monitoring of the atmosphere thus providing data and real time information about emergencies that may be due to either natural phenomena or anthropogenic activities.

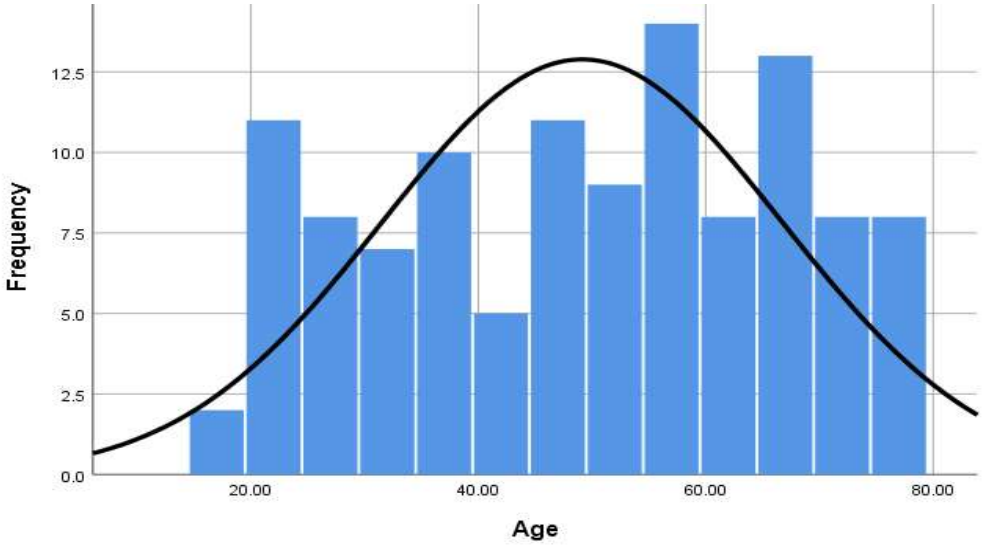

Figure 3: The age distribution of the Finnish sample.

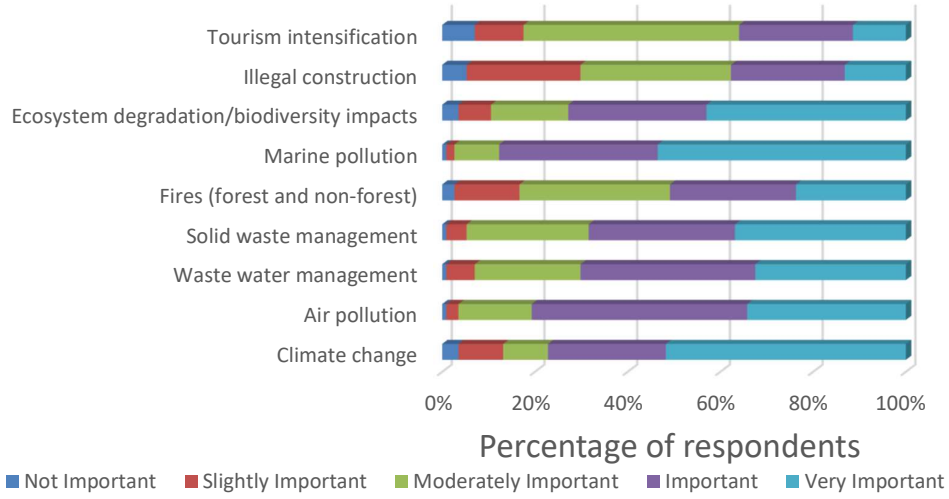

Figure 4: Assessment of the importance of the various environmental problems, based on the survey conducted in Finland.

A significant part of the sample in both surveys (58% in Greece and 46.5% in Finland) is positive to pay an amount of money to their annual tax in order to create a fund that will finance further development of ACTRIS RI and full operationalization of its features. Fig. 5 and Fig. 6 present the corresponding distribution

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of the amounts of the willingness to pay reported by Greek and Finnish participants, including the people saying zero willingness to pay due to poor economic situation. In Greece almost 87% of the sample is willing to pay amounts lower than 50 EUR/year, while in Finland a significant part of the sample offers greater amounts, reaching up to 500 EUR/year. At the same time, Fig. 7 and Fig. 8 present respectively the main reasons that led almost 42% of the Greek participants and 53.5% of the Finnish participants in the survey to refuse paying a certain amount for further developing the research infrastructure under consideration. The respondents from both countries believe that Governments and local authorities should finance such initiatives from their existing budgets, while a significant part of the sample particularly in Finland declares that they have already paid enough.

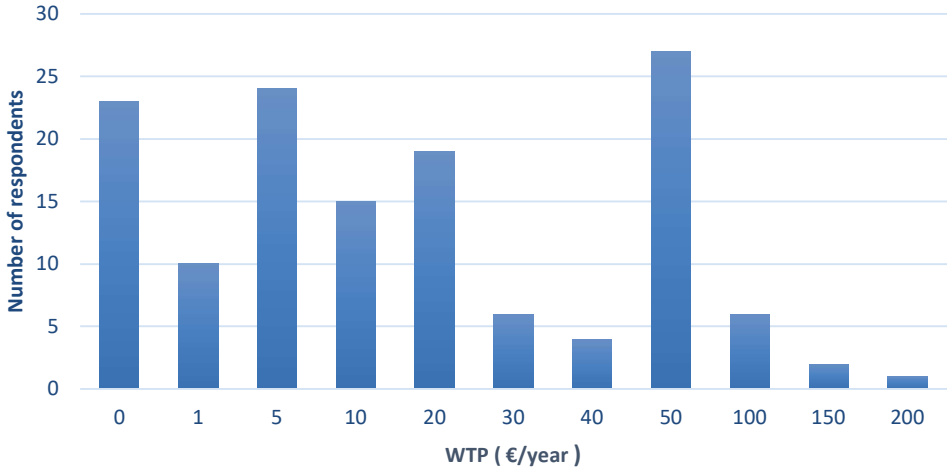

Figure 5: Distribution of willingness to pay specified by the Greek respondents

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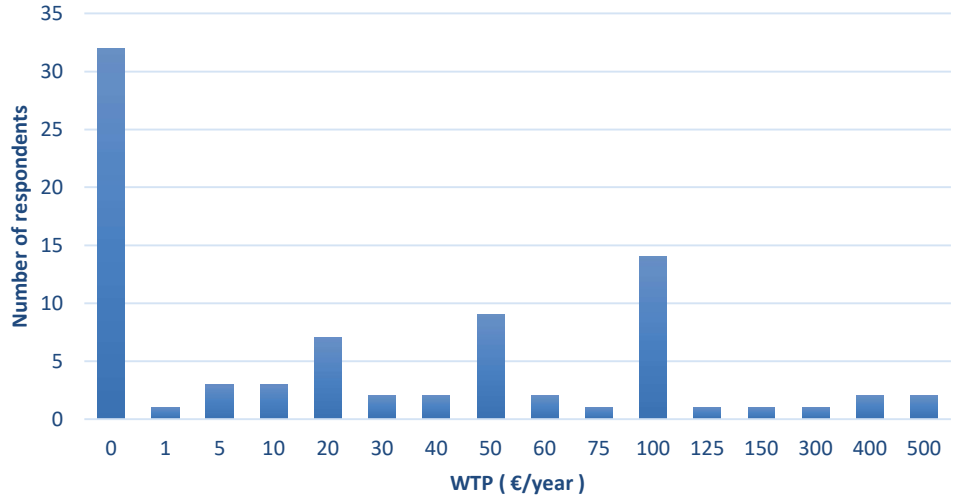

Figure 6: Distribution of willingness to pay specified by the Finnish respondents.

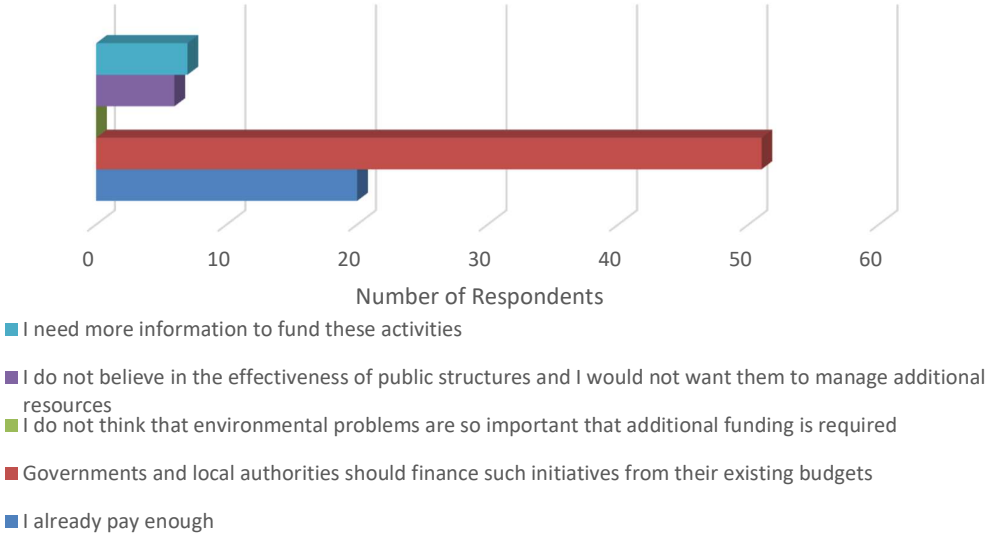

Figure 7: Reasons reported by Greek respondents to justify their unwillingness to pay.

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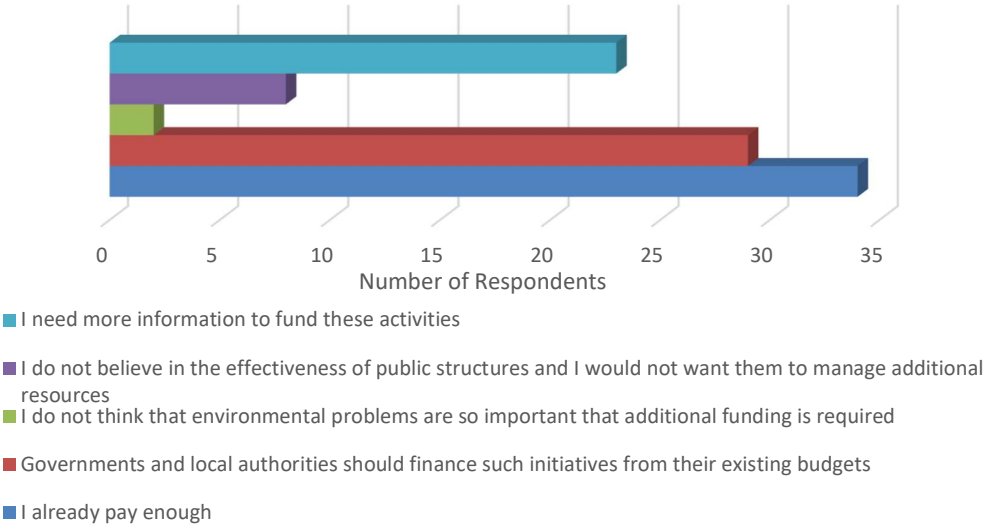

Figure 8: Reasons reported by Finnish respondents to justify their unwillingness to pay.

4.2 Statistical analysis

In the context of this study, we have carried out both parametric and non-parametric statistical analysis of the willingness to pay data.

Based on non-parametric analysis, the average WTP in the sample of 200 Greek participants was estimated at 17.25 EUR, however the same statistical analysis in 114 Greek participants that state a positive willingness to pay, was 30.26 EUR per year and household, for 5 years and the corresponding survival curves are shown in Fig.9 and Fig.10 (approximated by the Kaplan-Meier estimator).

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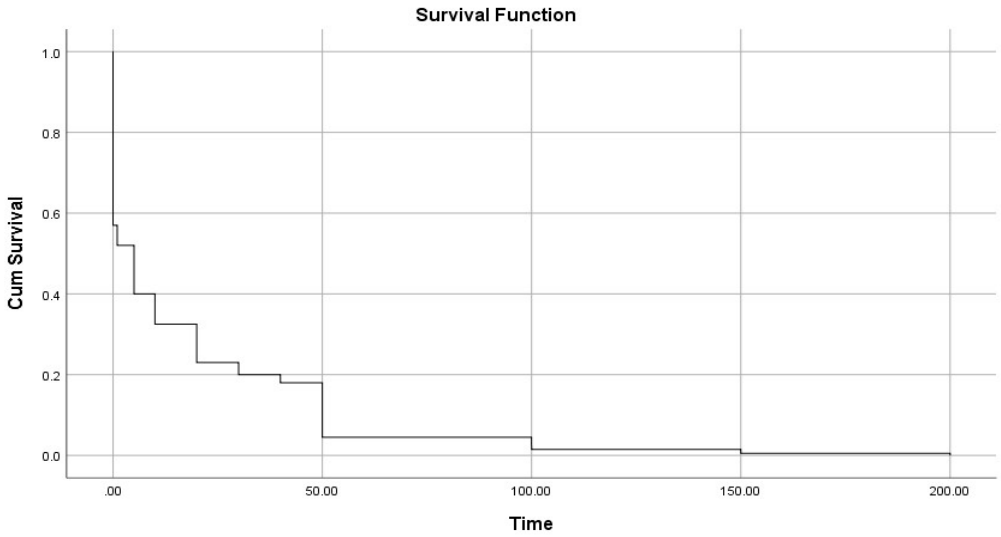

Figure 9: The Greek WTP empirical survival function according to the Kaplan-Meier estimator.

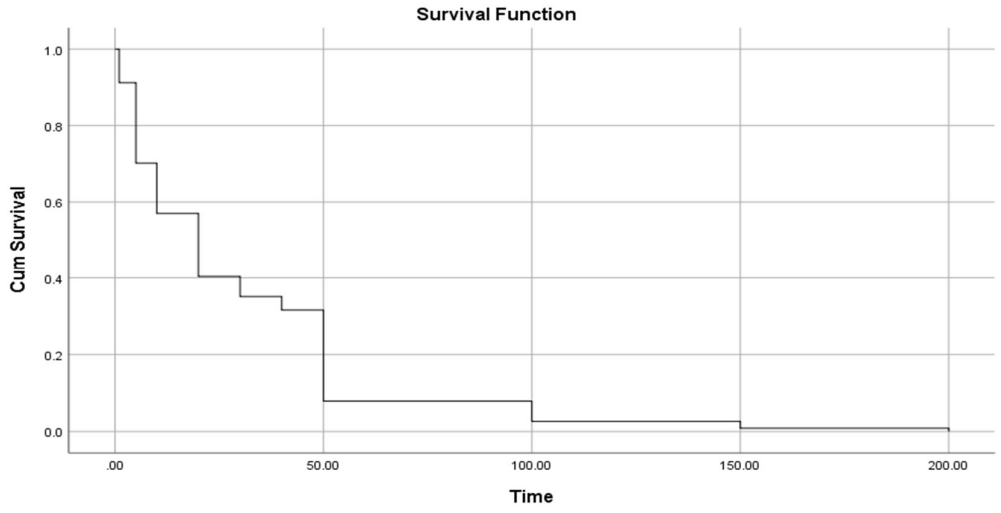

Figure 10: The Greek WTP empirical survival function according to the Kaplan-Meier estimator considering only the positive WTP values.

The same non-parametric analysis was implemented in a sample of 114 Finnish participants (the whole sample) as well as in a sample of 90 participants that state a positive willingness to pay, resulting in a mean WTP of 41.63 EUR and 89.55 EUR respectively, per year and household, for 5 years. The corresponding survival curves are shown in Fig.11 and Fig.12.

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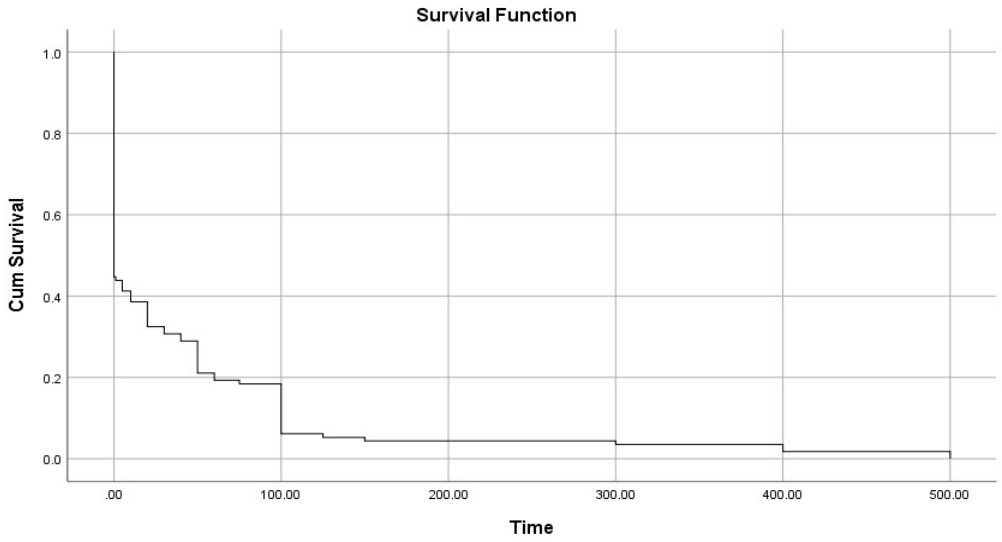

Figure 11: The Finnish WTP empirical survival function according to the Kaplan-Meier estimator.

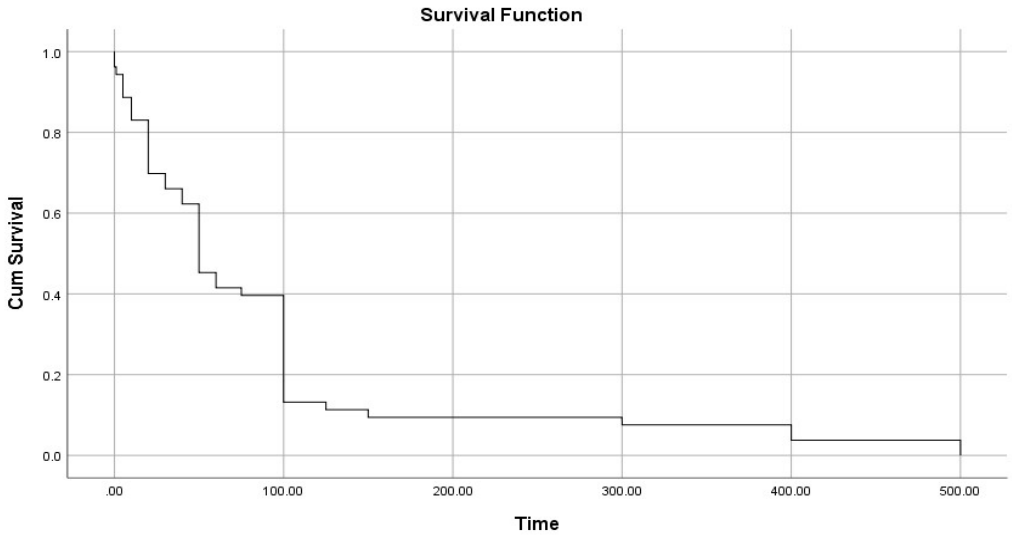

Figure 12: The Finnish WTP empirical survival function according to the Kaplan-Meier estimator considering only the positive WTP values.

For the parametric analysis three different regression models have been developed (Linear model, Tobit model and Interval model) in each survey, taking into account the whole sample excluding the portion with payment reluctance (however, the people saying zero willingness to pay due to poor economic situation or other reason, which is no characterized as protest answer, are included in the sample).

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The parametric analysis for the survey carried out in Greece, has been based on 184 responses and the results of the analysis are summarized in Tables 1-3.

The linear regression model developed found a positive correlation of the WTP with people considering that climate change is an absolutely essential environmental problem and also with the age of the respondent. On the other hand, the WTP is negatively correlated with the income and with people declaring that Governments and local authorities should finance the development of such infrastructures. The estimated mean willingness to pay of those who agree to provide financial support for further developing and operationalize ACTRIS RI (including the zero bidders which are not attributed to protest reasons) was estimated at 18.75 EUR per year and household for a period of 5 years, very close to non-parametric analysis considering the whole sample.

As the sample used for parametric analysis includes a significant number of zero bidders (38% of the sample) we also tested a Tobit model for estimating the WTP. The WTP was found to be correlated positively with those considering that climate change is an important environmental issue, the number of their family members between 18-65 years of age and negatively with the number of their family members under 18 years of age and the income. The mean WTP with the Tobit model was estimated at 11.92 EUR per year and household for a period of 5 years, slightly lower compared to the linear model.

Almost all respondents used the payment card included in the questionnaire, and thus the stated willingness to pay was, to some extent, influenced by the amounts mentioned on this payment card. This, combined with the fact that the economic question was asked in an open-ended format, may have influenced the final WTP. Thus, in the context of the present analysis, an attempt was made to formulate an interval regression model where the WTP is considered to vary between the amount declared and the immediately following price in the payment card. The model developed shows that WTP is positively correlated with the age of the respondents and those considering that air monitoring infrastructure should be developed at European level, and negatively with the size of their household. The mean WTP was estimated at 22.51 EUR per year and household for a period of 5 years, significantly higher compared to the other models examined.

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Table 1: Results of the linear regression model implemented in the Greek survey.

Variables	Coding	Coefficients	t	P	Standard Deviation
Climate Change	1: absolutely essential 0: otherwise	6.02	1.30	0.19	4.61
Governments and local authorities should finance such initiatives from their existing budgets	0: no, 1: yes	-26.02	-5.68	5.38E-08	4.58
Age		0.28	1.73	0.09	0.16
Annual gross income		-7.02	-1.65	0.1	4.24
Constant		12.37	1.47	0.14	8.42
R^2					0.19
Adj. R^2					0.17

Table 2: Results of the Tobit regression model implemented in the Greek survey.

Variables	Coding	Coefficients	t	P	Standard Deviation
Climate Change	1: not significant at all to 5: absolutely essential	11.62	2.42	0.02	4.81
Number of your family members (including yourself) under 18 years of age		-7.37	-2.00	0.05	3.69
Number of your family members (including yourself) between 18-65 years of age		4.67	1.78	0.08	2.62
Income		-14.46	-2.11	0.12	6.87
Constant		-46.87	-2.02	0.05	23.17

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Table 3: Results of the Interval regression model implemented in the Greek survey.

Variables	Coding	Coefficients	z	P	Standard Deviation
I already pay enough	0: no, 1: yes	-31.5	-7.14	0.00	4.75
Governments and local authorities should finance such initiatives from their existing budgets.	0: no, 1: yes	-33.92	-1.63	0.00	4.33
Income		-7.04	-4.38	0.10	7.18
Constant		37.79	12.14	0.00	3.11

The same three types of regression models have been developed based on the survey conducted in Finland, taking into account the whole sample excluding the portion with payment reluctance (however, the people saying zero willingness to pay due to poor economic situation or other reason, which is no characterized as protest answer, are included in the sample). Specifically, the parametric analysis for the survey carried out in Finland, is based on 83 responses and the results of the analysis are summarized in Tables 4-6.

The linear regression model developed found a positive correlation of the WTP with people considering that the protection of natural environment is absolutely essential, and with those considering that the air pollution negatively affects public health. On the other hand, the WTP is negatively correlated with the income of the participants. The estimated mean willingness to pay of those who agreed to provide finance for further developing and operationalize ACTRIS RI (including the zero bidders which is not attributed to protest reasons) was estimated at 57.16 EUR per year and household for a period of 5 years, very close to non-parametric analysis considering the whole sample.

As the sample used for parametric analysis includes a significant number of zero bidders (39% of the sample) we also tested a Tobit model for estimating the WTP. The WTP was found to be correlated positively with those considering that climate change is an important environmental problem, with those considering that the air pollution is negatively affects public health, the age of the respondent and the size of his/her household. Again it is negatively correlated with the income of the participants. The mean WTP with the Tobit model was estimated at EUR 10.17 per year and household for a period of 5 years, significantly lower compared to the linear model.

Almost all respondents used the payment card included in the questionnaire, and thus the stated willingness to pay was, to some extent, influenced by the amounts mentioned on this payment card. This, combined with the fact that the economic question was asked in an open-ended format, may have influenced the final WTP. Thus, in the context of the present analysis, an attempt was made to formulate an interval regression model where the WTP is considered to vary between the amount declared and the

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immediately following price in the payment card. The model developed shows that WTP is positively correlated with those considering that climate change is an important environmental problem and that the air pollution strongly affects public health but correlated negatively with the income. The mean WTP was estimated at EUR 62.07 per year and household for a period of 5 years, slightly higher compared to the linear regression model developed.

Table 4: Results of the linear regression model implemented in the Finish survey.

Variables	Coding	Coefficients	t	P	Standard Deviation
Protection of natural environment	1: not significant at all to 5: absolutely essential	27.11	2.34	0.02	11.59
Air pollution negatively affects public health	1: very little at all to 5: strongly	24.18	2.18	0.03	11.11
Income		-5.69	-1.58	0.11	3.60
Constant		-94.01	-1.75	0.08	53.63
R^2					0.23
Adj. R^2					0.19

Table 5: Results of the Tobit regression model implemented in the Finish survey.

Variables	Coding	Coefficients	t	P	Standard Deviation
Climate Change	1: absolutely essential 0: otherwise	79.52	2.34	0.02	33.93
Air pollution negatively affects public health	1: very little at all to 5: strongly	56.38	3.31	0.00	17.03
Number of your family members (including yourself) under 18 years of age		47.82	2.15	0.04	22.52
Income		-9.5	-1.72	0.08	5.51
Constant		-182.35	-2.37	0.02	77.09

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Table 6: Results of the Interval regression model implemented in the Finish survey.

Variables	Coding	Coefficients	t	P	Standard Deviation
Climate Change	1: absolutely essential 0: otherwise	28.56	11.95	0.02	11.59
Air pollution negatively affects public health	1: very little at all to 5: strongly	25.76	11.38	0.02	11.11
Income		-6.01	3.69	0.10	3.60
Constant		-98.11	-1.78	0.08	55.06

4.3 Estimating a WTP for ACTRIS for people leaving in all EU Member States

The implementation of the two surveys in Greece and Finland, as well as the statistical analysis followed, gave a rough approximation of the value attributed to the societal benefits associated with the ACTRIS RI in these two countries. The results of these two surveys are summarized in Table 7.

Table 7: Results of all models implemented in both surveys.

Method	WTP (EUR) - Greece	WTP (EUR) - Finland
Kaplan-Meier (total sample)	17.25	41.63
Kaplan-Meier (only positive WTP)	30.26	89.55
Linear Regression	18.75	57.16
Tobit Regression	11.92	10.17
Interval Regression	22.51	62.07
Median	18.75	57.16

In this section, an approximate estimation of the value attributed to the societal benefits of ACTRIS RI in all European Union countries was attempted by utilizing these results. The implemented approach comprises the following steps:

First, we split the rest 25 countries of the EU (i.e., all EU member states apart from Greece and Finland) into two groups based on their GDP at purchasing power parity per capita. Specifically, using a threshold of $43,344.5, we created two groups of countries, one including the countries with a GDP (PPP) per capita lower than $43,344.5 and another with those having a GDP (PPP) per capita greater than this threshold. For the former we have used the results of the Greek case study as a basis for estimating the mean WTP in each country, while for the later the Finish case study has been used as reference. The data for GDP (PPP) per capita for 2021, from The World Bank (https://www.worldbank.org/en/home), have been used for this analysis.

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The median estimate of the WTP from all statistical models developed in both reference countries (i.e., Greece and Finland) have been used. Using these estimates as reference, then the mean WTP was estimated for each European country based on the ratio of the GDP (PPP) per capita in the target country and the GDP (PPP) per capita in the reference country of the respective group of countries. The results of the analysis are summarized in Table 8.

Table 8: Approximate estimates of the mean WTP (in terms of EUR per year and household for a period of 5 years) attributed to societal impacts of ACTRIS infrastructure for all countries of the European Union.

Countries	GDP $_{PPP}$ per capita ($ 2021)	WTP (€)
Austria	59,537.54	61.65
Belgium	59,372.89	61.48
Bulgaria	28,105.97	16.74
Cyprus	44,393.76	45.97
Czechia	45,707.47	47.33
Germany	58,276.02	60.34
Denmark	64,672.23	66.96
Spain	40,591.76	24.17
Estonia	55,203.33	25.24
Finland	55,203.33	57.16
France	50,996.44	52.80
Greece	31,485.89	18.75
Croatia	34,535.02	20.57
Hungary	36,765.04	21.89
Ireland	105,355.2	109.09
Italy	46,373.52	48.02
Lithuania	43,184.99	25.72
Luxembourg	133,329.8	138.06
Latvia	34,257.98	20.40
Malta	48,894.34	50.63
Netherlands	63,741.7	66.00

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Poland	38,125.19	22.70
Portugal	36,037.96	21.46
Romania	36,100.65	21.50
Slovak Republic	33,418.52	19.90
Slovenia	43,804.82	45.36
Sweden	59,222.63	61.32

5. Concluding remarks

The ACTRIS RI is a pan-European initiative that unites the observations and related research of aerosols, clouds, and trace gases amongst European partners to provide high-quality research infrastructure services to a wider user community. Undoubtedly, ACTRIS RI constitutes a major investment and consequently an analysis of the socio-economic outcomes associated with its development and operation is of particular importance.

This report presents a first attempt to value the societal benefits attributed to ACTRIS RI, exploiting techniques of environmental economics. Specifically, two pilot case studies were conducted in Greece and Finland valuing the services provided by ACTRIS RI to the public through a CV study. The results of the analysis in terms of WTP for further developing and enhancing the operation of the ACTRIS RI showed that Greek households can provide between 11.92 - 30.26 EUR per year for a period of 5 years, while the corresponding amount for Finish households was estimated to range between 10.16 - 89.55 EUR. Also, through benefits transfer these estimates were adjusted to all European countries, which benefit from ACTRIS RI operation.

Although the results of the analysis are very useful and give an indication of the values attributed by the society to the services provided by ACTRIS RI, it should be noted that they are characterized by considerable uncertainties, and one should use them with caution.

As ACTRIS RI is a pan-European research infrastructure, in the future a large-scale pan-European survey aimed at assessing its societal benefits should be designed and implemented. Based on the experience gained from this research, one should take into account the following remarks:

- The study should cover all European countries, based on a sufficient and representative population sample. The utilization of a market research company would facilitate the collection and the appropriate filling of the questionnaires.
- The survey should be carried out with personal interviews, as the use of other channels like internet requires the use of a relatively simple questionnaire and limits the capability of providing information about the research infrastructure under consideration.
- The questionnaire should be detailed and the questions, especially in the first introductory part, should have a stricter structure that will allow a better identification of the profile of the

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respondents. This would allow to collect additional qualitative and quantitative data that can be utilized to recognise the respondents' familiarity with certain concepts and topics more clearly and finally to generate more accurate econometric models for estimating the WTP for the public good in question.

- Given the results obtained, the designers of the new study should consider to set the economic question in a different format that may lead to results with less uncertainty. Possibly a double-bounded dichotomous choice format would be more suitable, as very often the respondents do not have a direct perception of the social goods being evaluated. The results of this analysis may be used as the starting point in each country for this bed procedure.

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Appendix

ACTRIS IMP, Horizon-2020 project #871115
Questionnaire of Task 3.3: "Integrated assessment of ACTRIS societal impacts"

SURVEY INFORMATION AND INFORMED CONSENT FORM

Information about this survey

The Research Infrastructure ACTRIS is a pan-European initiative that unites the observations and related research of aerosols, clouds, and trace gases amongst European partners to provide high-quality research infrastructure services to a wider user community. The ESFRI Roadmap 2016 identified ACTRIS as a new important pan-European research infrastructure for the European scientific community. With ESFRI-status, ACTRIS shall further develop its organizational and operational framework, and long-term strategic goals. In this context, the ACTRIS IMP will set up the needed structures for the implementation actions, both at the national and European levels. The analysis of the socio-economic impacts attributed to ACTRIS could provide useful insights regarding the social return of the investment required for the development, operation and maintenance of this research infrastructure and the formulation of the appropriate operational scheme.

In general, ACTRIS creates positive socio-economic effects through different impact pathways:

At consortium level as research institutes, universities, companies, etc., involved in the development and operation of infrastructure will be benefited through knowledge creation, technological developments, human capital enhancement, creation of new jobs, etc.

To the wider research community as research teams, organizations and programs utilizing the outcomes provided by ACTRIS could improve their modeling, satellite data calibration / validation and atmospheric climate services and products.

To the society, as local authorities, environmental protection agencies, industries, ministries, international organizations, weather services etc., could utilize ACTRIS outcomes to optimize their environmental strategies and improve their decision-making processes.

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The purpose of this survey is to explore the socio-economic impacts generated by the ACTRIS from the direct provision of services to users outside the scientific community. The research will help to address the integrated ACTRIS capacity for providing local, regional, national and international authorities and organizations information on atmospheric composition pertinent to air quality, emission management and risk assessment to increase public awareness and to design appropriate policies and measures to minimize the negative impacts of air pollution and climate change, and to maximize social welfare. The detailed analysis will be performed in 2-3 ACTRIS countries and the results extrapolated to the whole Europe of through benefits transfer. This process will allow the estimation of the value that society attributes to ACTRIS.

The deadline for answering the questionnaire is dd/mm/yyyy. Your participation in the survey is voluntary.

Your Participation and Informed Consent

Your participation in this study will consist of a completion of a questionnaire. You will be asked a series of questions which will help us to value the contribution of ACTRIS Research Infrastructure in providing environmental data and information to local regional, national and international authorities and organizations and helping them in decision making process. Your participation in the survey is fully voluntary, and you may pass on any question that makes you feel uncomfortable. You are encouraged to ask questions or raise concerns at any time about the nature of the study or the methods used.

The questionnaires will be anonymous. However, some personal details like gender, age, education level, income, will be asked from you . Insights gathered by you and other participants will be used in writing a research report for the socio-economic impacts of ACTRIS infrastructure. All gathered information will grouped together such that no personal data will be traceable from the end product. The individual answers and informed consent forms will be stored by NOA until the end of the project. All of your information and responses to the questionnaire will be kept confidential.

By signing below I acknowledge that I have read and understand the above information.

Signature_____ Date_____

If you have any questions please contact Prof. Sevastianos Mirasgedis (seba@noa.gr, +30 210 8109190)

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SURVEY FORM

Dear Sir / Madam,

The National Observatory of Athens is conducting a survey to assess the benefits to society of the ACTRIS research infrastructure aimed at monitoring the atmosphere. It would be very helpful for us if you could spend a few minutes to answer some questions.

There is no need for specialized knowledge to answer the questions that follow. There are no right or wrong answers. We're just trying to capture your views on our research.

Thank you very much, in advance, for your help.

INTRODUCTORY QUESTIONS

1) Please note how important for you is the protection of natural environment:

Very Important

Important

Moderately Important

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Slightly Important

Not important

2) Modern societies face diverse environmental challenges. Please evaluate the significance of the following environmental problems (1 = not significant at all, 5 = absolutely essential):

Problem	**Degree of significance**				
	1	2	3	4	5
Climate change					
Air pollution					
Waste water management					
Solid waste management					
Fires (forest and non-forest)					
Marine pollution					
Ecosystem degradation/biodiversity impacts					
Illegal construction					
Tourism intensification					
Other (please specify)					

Based on data recently published by the European Environment Agency (EEA), air pollution can be responsible for over 500,000 premature deaths in Europe per year.[2]

3) In your opinion, to what extent do you think that air pollution negatively affects public health and the quality of life (1 = very little, 5 = strongly):

1	**2**	**3**	**4**	**5**

[2] https://www.euro.who.int/en/health-topics/environment-and-health/air-quality/news/news/2018/5/over-half-a-million-premature-deaths-annually-in-the-european-region-attributable-to-household-and-ambient-air-pollution

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Damages associated with extreme weather events amount to 11.9 billion EUR per year in European Union throughout the period 1980-2020. [3]Such type of economic losses is even higher in developing countries, and these losses are expected to increase dramatically in the coming years due to the climate change.

4) In your opinion, to what extent do you think that climate change negatively affects public health, income of households, and the daily lives of citizens (1 = strongly disagree, 5 = strongly agree):

1	**2**	**3**	**4**	**5**

The eruption of the Iceland's Eyjafjallajökull volcano in 2010 and the ash released resulted in the cancellation of approximately 100,000 commercial flights and economic losses amounted to over $5 billion in global GDP.

5) In your opinion, how important is it to have infrastructures allowing the systematic monitoring of the atmosphere thus providing data and real time information (available to all citizens) about emergencies that may be due to either natural phenomena (e.g., Sahara dust transport, volcanic eruptions) or anthropogenic activities (e.g. technological accidents) (1 = not important, 5 = very important):

1	**2**	**3**	**4**	**5**

6) In your opinion, which of the following is the most appropriate body for managing and operating air monitoring infrastructure:

[3] https://www.eea.europa.eu/ims/economic-losses-from-climate-related

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Governments through civil protection agencies

Local government through their civil protection services

Universities / Research centers

Private sector

7) In your opinion, should air monitoring infrastructure be developed at national level or at European level with a view to cover all Member States?

☐
☐
☐

National development

Development at European level

Both

SCENARIO AND FINANCIAL QUESTION

In recent years, climate change and the impact of air pollution on public health have emerged as the most important environmental problems worldwide, motivating governments, citizens, the media, etc.

Despite the indisputable progress of science in understanding these phenomena, important questions about their mechanisms still remain unresolved hindering their effective treatment.

The ACTRIS (Aerosol, Clouds and Trace Gases Research Infrastructure, www.actris.eu), developed in recent years at pan-European level, plays a crucial role in this effort. Aiming at the development of infrastructure and techniques for analyzing the chemical composition of the atmosphere, particularly for short-lived compounds (aerosols, trace elements, smoke), it enables us to:

- Improve the existing climate models by producing more reliable simulations of future climate conditions.

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- Monitor the development of air pollution incidents in real time and to understand directly the sources that contribute to the atmospheric pollution events such as industrial activities, traffic, fires, technological accidents, etc., providing direct information to decision makers and the society.
- Monitor in real time the evolution of natural phenomena in the atmosphere, such as dust transport or volcanic ash in cases of volcanic eruptions, and to inform the bodies responsible for taking measures.
- Identify key pollutants that are not systematically measured so far, by developing protocols for their systematic monitoring in the future.

8) As the ACTRIS research infrastructure is still under development, would you agree to pay an additional amount to your annual tax in order to complete its development and make its capabilities fully operational?

A. YES

B. NO

9) In case you answered YES to the question 8, please indicate the additional amount in your tax that you are willing to pay annually for the next 5 years:

1€	5€	10€	20€	30€	40€	50€
75€	100€	125€	150€	175€	200€	250€
300€	350€	400€	450€	500€	600€	700€
800€	900€	1000€	Other	Specify		

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10) In case you answered NO to the question 8 it is particularly helpful to know the reasons for your choice. Please specify:

- I already pay enough.
- Governments and local authorities should finance such initiatives from their existing budgets.
- I do not think that environmental problems are so important that additional funding is required.
- I do not believe in the effectiveness of public structures and I would not want them to manage additional resources.
- I need more information to fund these activities.

DEMOGRAPHIC

In this part of the survey, we'd like you to give us some information about yourself and your household. Please be advised that the questionnaires are anonymous!

1. Gender : Male Female Other/prefer not to say

2. Age :_____

3. Place of residence (city/country) :

_____

4. Please specify the number of your family members (including yourself) with their corresponding age:
   -Under 18 years of age.....
   -Between 18-65 years of age.....
   -Over 65 years of age.....

5. Please specify your educational level:
   -I have not been to school at all
   -Primary school graduate
   -High school graduate
   -Bachelor's Degree
   -Master's Degree
   -Doctorate holder

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6. Please specify your current occupation status:
-Employee
-Unemployed
-Retired
-Student
-Other (Please Specify):

7. Please specify which of the following categories represents the annual gross income of your family:

	Under 9.000 €
	9.000 - 13.000 €
	13.000 - 17.000 €
	17.000 - 22.000 €
	22.000 - 27.000 €
	27.000 - 34.000 €
	34.000 - 42.000 €
	42.000 – 60.000 €
	60.000 – 80.000 €
	Over 80.000 €

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