



# **Understanding the Private Demand for International Ecosystem Services – Public attitudes and preferences towards REDD**

## **FINAL REPORT**

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**Geneva School of Business Administration (HEG-GE);**

**The International Union for Conservation of Nature (IUCN);**

**United National Environment Programme Economics and Trade Branch  
(UNEP-ETB)**

in close collaboration with

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# Preface

This report is a product of an initiative which is exploring the challenges and opportunities of developing International Payments for Ecosystem Services (IPES), officially launched by IUCN and the United Nations Environment Programme (UNEP), in close collaboration with the Secretariat of the Convention on Biological Diversity (CBD).

This study focused specifically on one perceived opportunity for developing IPES, namely the concept of Reducing Emissions from Deforestation and forest Degradation (REDD). REDD refers to any conservation or sustainable land-use initiative that effectively mitigates a real deforestation/degradation threat in a given area. Considering that close to 25% of all anthropogenic greenhouse gas emissions come from deforestation and forest degradation, REDD is currently being considered as a potentially promising climate change mitigation strategy.

The main component of this research project is a socio-economic survey of public attitudes and preferences towards REDD (also referred to as avoided deforestation). The survey was carried out as part of a post-graduate course offered by the Geneva School of Business Administration (HEG Geneva), with oversight provided by all of the project partners. The results provided in this report reflect the preliminary findings of a statistical analysis of the information collected through the survey.

The report is composed of two main sections. The first one is a literature review by David Huberman, which served as the theoretical foundation for the survey. The second main section is a presentation of the preliminary results obtained through the survey by Anne-Kathrin Faust and Andrea Baranzini. The two questionnaires which were used as part of the survey are attached as an annex.

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# **Public Attitudes and Preferences towards REDD**

## **Abstract**

This paper provides an analytical background for a study of public attitudes and preferences towards the conservation of tropical forests, with a particular focus on the role of Reducing Emissions from Deforestation and Degradation (REDD) in climate change mitigation. The 'ecosystem services' concept is offered as a basis for integrating positive environmental externalities into the economy. The opportunity to build on the growing carbon market and combining conservation and climate concerns through payments for REDD is presented and discussed. Drawing on previous experiences, an analytical framework is offered for a consumer-based survey to assess public receptivity to and potential private demand for carbon credits based on the conservation of tropical forests.

Preliminary results from a survey that was conducted in the streets of Geneva, Switzerland, during November and December 2007, are presented. The main aims of the survey were to test the level of awareness on tropical deforestation and to determine the willingness to pay for forest conservation.

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## ***I) Introduction***

Environmental issues are at the forefront of global media and political debates. Around the world, people are increasingly aware that economic activity can generate significant environmental damages, with potentially serious repercussions for human welfare. Global climate change, especially, has been receiving increasing attention, but many other ecological problems are also getting worse (MA, 2005).

Recent advances in environmental economics suggest that the environment can be usefully considered as a capital asset: i.e. ‘natural capital’ (Heal, 2007). In this perspective, natural resources and processes are recognized as assets that play an integral role in sustaining our economies. While many natural resources (e.g. food, timber, medicine, etc.) are valued through markets, other natural processes and ecosystem services (e.g. erosion control, carbon sequestration, plant pollination, etc.) are typically neglected in economic decision-making.

With many of its associated values left external to the economy, natural capital is particularly vulnerable to market failures, whereby the socially optimal allocation of resources is not reached (Buchanan and Stubblebine, 1962). This dilemma is inherent to the conservation of biological diversity (“biodiversity”), which generates many values that fall outside market transactions. Biodiversity refers to the diversity of life that is found in our natural environment, and is defined by the United Nations Convention on Biological Diversity (CBD) as “*the variability among living organisms and the ecological complexes of which they are part, including the diversity within species, between species and of ecosystems*” (CBD, Article 2). An incomplete internalization of biodiversity values could reduce the financial incentive to conserve valuable ecosystems, such as tropical forests, as other land use options become more economically attractive.

Recent efforts have been made to internalize these environmental ‘externalities’ through the development of payments for ecosystem services (PES) and related initiatives. The PES approach, whereby the providers of valuable ecosystem services are compensated for doing so by those who benefit from such services, is believed to hold significant potential for providing additional funding for managing and conserving ecosystems (Wertz-Kanounnikoff, 2006). However, PES remains a relatively new mechanism and there is considerable uncertainty regarding its general applicability (Landell-Mills & Porras, 2002; Wunder, 2007). As such, it has been argued that PES is not a ‘one-size-fits-all’ solution to financing ecosystem conservation (Wunder, 2007).

With the growing concern about climate change, interest is likewise growing in one particular ecosystem service, namely the sequestration of carbon in biomass. Carbon sequestration through the conservation of tropical forests is increasingly seen as a cost-effective option for mitigating climate change and regulating the global climate. The potential benefits for biodiversity and rural development that could result from increased funding for tropical forests make this particular mitigation strategy appealing to a wide range of stakeholders.

As background for a survey of public attitudes towards tropical forest conservation as a climate mitigation option, this paper provides a review of relevant scientific literature and policy documents. The survey is intended to gain insights from the general public on how to combine the various benefits and beneficiaries of tropical

forest conservation. More specifically, the survey will gauge public awareness of the linkages between tropical forests, biodiversity and climate change, as well as their relative preferences for ‘the avoidance of deforestation’ as a climate mitigation option.

The paper is divided into two main sections. Section II outlines the main underlying concepts of the proposed attitudinal and preference survey: ecosystem services, PES, international PES (IPES), and avoided deforestation (AD). Exploring where biodiversity conservation fits into these relatively novel concepts will be a major focus of this section. The second part of the paper (section III) presents an analytical framework for a consumer-based survey to gauge attitudes and preferences regarding the opportunity of mitigating climate change and conserving biodiversity by avoiding tropical deforestation. Building on lessons learned from previous studies, some basic considerations for the design and implementation of the survey are also presented.

## ***II) Conceptual framework***

### **i) Ecosystem services and biodiversity**

Ecosystem services refer to the many natural processes by which ecosystems, and the species that make them up, sustain and fulfill human well-being (Daily, 1997). For example, the absorption of carbon by biomass through the natural process of photosynthesis is considered an ecosystem service, particularly in terms of regulating the global climate. Ecosystems deliver many other services, such as the pollination of crops, the conservation of habitat for wildlife species, and the regulation of water flow (MA, 2005).

The natural wealth which provides ecosystem goods and services is, to a large extent, defined by biodiversity (Kremen and Ostfeld, 2005). However, the relationship between biological diversity and the natural processes that result in ecosystem services is not straightforward. Considerable effort has recently gone into clarifying the linkages between ‘biodiversity’, ‘ecosystem processes’, and ‘ecosystem services’ (Heal, 1999a; Heal 1999b; Hooper et al., 2005; Ash and Jenkins, 2007; Perrings et al., 2007). Explaining these linkages to experts is difficult enough; conveying them to the general public is even more challenging.

The various levels at which biodiversity can be apprehended is apparent from its definition in the CBD; genetic, species, and ecosystem diversity are all touched upon. In addition to these three elements, functional diversity represents a significant component of biodiversity, referring to the resilience, or resistance to external shocks, of an ecological system (Nunes and Bergh, 2001).

Generally speaking, biodiversity is considered a defining and structuring component of ecosystem services, although it is not an ecosystem service in itself. Nevertheless, when we consider the typology of ecosystem services offered by the Millennium Ecosystem Assessment (MA, 2005), we notice that biodiversity is relevant in all cases:

- Provisioning (the supply of food, water, medicines and timber)

- Regulating (the regulation of natural processes, e.g. climatic stability, soil fertilization, and water flows)
- Cultural (the aesthetic and recreational benefits of ecosystems)
- Supporting (life-support systems, e.g. soil formation and nutrient cycling)

Other classifications, such as that used by the Costa Rican government in their nation-wide system of payments for ecosystem services (PSA), offer a more pragmatic breakdown. Most commonly, ecosystem services are divided into the following categories (e.g. Pagiola et al., 2005; Grieg-Gran et al., 2005; Wunder, 2005; Wertz-Kanounnikoff, 2006; Ravnborg et al., 2007):

- Carbon (the sequestration of carbon in biomass)
- Water (the provision and regulation of freshwater quantity and quality)
- Biodiversity (the conservation of habitat for wildlife)
- Scenic beauty (cultural, recreational and aesthetic value of the landscape)

In this typology, ‘biodiversity’ ecosystem services relate primarily to the conservation of habitat for wild species. With respect to tropical forests, it is the fact that these biomes house much of the world’s biodiversity that is considered an ecosystem service.

A further consideration is that biodiversity’s contribution to human well-being (i.e. its ecosystem service) is not entirely utilitarian. For the purposes of this paper we may consider ‘biodiversity conservation’ as an ecosystem service that contributes to human well-being through a variety of use and non-use values (Pagiola et al., 2004). Use values can be either direct (e.g. value derived through hunting and fishing), indirect (e.g. water filtration by upstream forest ecosystems), or optional (i.e. value derived from preserving the option of using an ecosystem service in the future). Non-use values refer to the worth that people associate with ecosystems simply by knowing of their existence, even though they might never use the resource directly themselves. Having said that, the particular focus of the proposed attitudinal and preference survey will be on the non-use values of biodiversity conservation in tropical forests, which are more relevant to the target population.

## **ii) Payments for ecosystem services**

The prospect of using payments for ecosystem services (PES) to provide incentives (and financing) for biodiversity conservation has been explored by many (Bayon et. al., 2000; Powell et. al., 2004; Jenkins et. al., 2004; Pagiola et. al., 2004; Wunder, 2005; Wertz-Kanounnikoff, 2006). Generally speaking, PES are a means of internalizing the positive externalities associated with a given ecosystem or a specific resource use (Pagiola et. al., 2004).

A commonly accepted definition of PES is offered by Sven Wunder (2005), who describes PES as being “*a voluntary transaction where a well-defined ecosystem service (or a land-use likely to secure that service) is being ‘bought’ by a (minimum one) ecosystem service buyer from a (minimum one) ecosystem service provider; if and only if, the ecosystem provider secures ecosystem service provision (conditionality)*”.

The novelty of PES arises from its focus on the ‘beneficiary-pays’ principle. PES differs from other economic incentives in that it aims to identify the stakeholder group that benefits from a specific service provided by an ecosystem and creates a mechanism through which a payment can be made to the provider of the service (or to the land steward(s) of the area providing the ecosystem service) (Wunder, 2005). For example, payments made by a carbon offset buyer towards either reforestation or the conservation of existing forests represent a form of PES in which the beneficiary is the person buying the carbon offset and the provider is the person (or persons) planting trees or taking actions to conserve a forest.

Another example of PES is when a hydro-electric utility pays farmers or communities for the sediment retention service provided by forests in the upper watershed. In Costa Rica, a private hydroelectric company pays \$18 per hectare per year for the conservation of forests in the upper watershed (Perrot-Maitre and Davis, 2001). While such localized schemes may be sufficient to secure particular ecosystem services (e.g. sediment control, water filtration, and flow regulation), they are unlikely to generate sufficient funds to reduce deforestation on a broad scale; hence the focus of efforts (and of this paper) on opportunities to scale up the PES model at the international level.

### **iii) International payments for ecosystem services (IPES) and REDD**

Carbon sequestration is a prime example of an international ecosystem service. By mitigating the threat of climate change, carbon sequestration serves the interests of people everywhere. The same can be said of biodiversity conservation, at least with respect to non-use values. Together, carbon sequestration and biodiversity conservation can be seen as globally significant ecosystem services provided by tropical forests.

The potential for conserving ecosystems as a climate change mitigation option is currently undergoing considerable scrutiny (UNFCCC, 2006). Tropical forests are particularly important for the regulation of the global climate system, as their conversion and degradation are estimated to account for close to 20% of total human-induced greenhouse gas (GHG) emissions (House et al, 2006). The reduction or avoidance of deforestation (AD) could thus help significantly to reduce overall GHG emissions.

Deforestation is mainly affecting developing countries of the tropics, where a projected 5% annual decline in forest cover is expected to continue for the next 30 to 50 years (Chomitz, 2007). This loss of biomass not only has significant consequences for the global climate but also reduces the stock of biological diversity and associated ecosystem services.

The avoidance of deforestation has yet to be fully integrated into regulatory frameworks for climate change mitigation. Until now, land-use, land-use change, and forestry (LULUCF) options for reducing GHG emissions have been largely excluded or highly restricted in climate change policy, at least as it concerns developing countries (Schlamadinger et al., 2006). However, there is growing interest in exploring the potential for reducing emissions from deforestation and degradation (REDD) in the next round of international climate change commitments (Schlamadinger et al., 2006).

While the idea of including REDD in a regulatory framework for climate represents an interesting opportunity, there are many conceptual, political, social, ethical,

and technical hurdles that need to be overcome before this opportunity can be translated into effective policy tools (Schlamadinger et al, 2006). Importantly, any ‘avoided deforestation’ scheme will need to make sure that the rural poor, who depend most on forests for their livelihoods are not made worse off by a greater international recognition of the climate- and conservation-related attributes of tropical forests.

On the technical side, the establishment of meaningful and equitable baselines for deforestation rates and the risk of non-permanence of sequestration due to forest fires or other events continue to provoke debate. The problem of leakage seems to be especially difficult to address, as one could expect market forces to shift a specific deforestation threat (e.g. conversion of forest to soy bean plantations) from one part of the world to another.

Despite these many challenges, the growing carbon market has seen the multiplication of voluntary offset programs, many of which offer forestry-based sequestration services (Taiyab, 2006; Bayon et al. 2007). Does the ‘avoided deforestation’ prospect represent an opportunity for biodiversity conservation? While the answer to this question is fairly straightforward: yes; more ambiguous is the question of how this opportunity should best be exploited.

### ***III) Surveying public attitudes and preferences towards IPES and Avoided Deforestation***

#### **i) Objectives of the study**

#### **Main research topic**

As we have observed, IPES in general is new and undeveloped. It will only be successful if the funds needed to cover the payments can be raised. In short, there needs to be a demand for IPES if it is ever to be an effective conservation finance tool. The existence of many voluntary PES schemes is one indicator that this demand exists and is growing (Jenkins et al., 2004). However, this demand is most easily turned into payments when the beneficiaries of the ecosystem services are already organized (Pagiola and Platais, 2002). This is a particularly problematic issue when dealing with the non-use values of biodiversity, which are enjoyed by many people scattered around the globe.

Due to the limited development of markets for biodiversity and related ES, indicators of demand for biodiversity conservation are few and far between. However, the prospect of growing demand for climate mitigation could represent an opportunity for mobilizing public demand for biodiversity conservation. Indeed, the idea of jointly investing in climate and conservation through the concept of ‘avoided deforestation’ could offer significant efficiency gains for environmental efforts by (i) integrating conservation and climate efforts into a coherent policy framework and (ii) using the carbon market to scale up funding for the preservation of biodiversity.

From an IPES perspective, tropical forests can be seen as offering a wide range of ecosystem services (e.g. carbon sequestration, biodiversity conservation, regulation of water flows, erosion control, plant pollination, aesthetics, etc.). The opportunity of using

PES as a means of ‘bundling’ payments for various ecosystem services stands out as a particularly promising feature of the approach (IUCN-UNEP, 2007).

While consideration of AD as a climate mitigation strategy is currently fueling international debates within the environmental community, less is known about the extent to which the general public is aware of such issues. With many institutional, technical, and political details still needing to be addressed, an indication of public knowledge, understanding, and potential approval of avoided deforestation as a climate mitigation strategy could be useful. In the wider context of environmental policy making, such a survey could also serve as an input into the search for new mechanisms for financing biodiversity conservation.

## **Research methodologies**

There are several techniques that can be used for surveying attitudes and preferences for global public goods such as biodiversity. However, stated preference non-market valuation techniques alone allow for the estimation of existence values in monetary terms. These survey mechanisms allow researchers to ask individuals about their willingness to pay (WTP) to continue receiving the services provided thus far, their WTP to enjoy an increase in these services or their willingness to accept (WTA) compensation to forego these services or to accept a decrease in their provision. Both WTP and WTA refer to the demand for a good or service expressed in monetary terms (Pagiola et al., 2004).

The main techniques used to survey stated preferences are contingent valuation, contingent ranking, and choice experiments (Bateman et al., 2002). Contingent valuation (CV) is perhaps the most well-known and often used method for surveying stated preferences (Giraud et al., 2002). The CV method is used to derive WTP from hypothetical situations concerning non-marketed goods and services (Bateman et al., 2002). However, it has been noted that the CV method is limited when it comes to addressing complex situations (Rolfe et al., 2000). Thus, choice models are increasingly being used for environmental valuations, and it has been argued that they are especially useful when considering environmental goods with multiple attributes (Rolfe et al., 2000). Thus, an attitudinal and preference survey of tropical forests, who are the providers of many ecosystem services, might be best implemented by using the choice model methodology.

### **ii) Valuing ‘avoided deforestation’**

## **Climate change – the hot topic**

As part of the discussion on including ‘avoided deforestation’ into climate regulatory frameworks, carbon sequestration is becoming an increasingly attractive ecosystem service provided by tropical forests. Indeed, recent surveys on public perceptions towards environmental issues show a strong prominence of climate change as the most important problem to be addressed (Curry et al. 2004; Reiner et al. 2006; Curry et al. 2007; Asahi Glass Foundation, 2007). Accompanying the rise of climate change in the public consciousness, environmental issues as a whole are gaining in importance relative to other issues such as health care, crime, and education (Curry et al., 2007).

The Curry et al. study (2007) compared attitudes in the United States towards climate change between 2003 and 2006, and found that the average WTP to address global warming increased by an impressive 50%. The payment vehicle presented in the questionnaire was an increase in the electricity bill, with respondents expressing an average monthly WTP of \$21 in 2006 (\$14 in 2003). Unsurprisingly, the study found a positive correlation between ‘impact of concern for global warming’ and willingness to pay, as well as between WTP and the variable measuring people’s preference of environment over the economy.

A less promising finding of the Curry et al study (2007) was the low level of understanding among respondents of the issues underlying actions to combat climate change. Carbon sequestration was particularly poorly understood, with only 5% of all 2006 respondents admitting to having heard of it (up only one percentage point from 2003) (Curry et al., 2007). Another study carried out a year early found similar low levels of awareness, recognition or understanding of carbon sequestration (Reiner et al., 2006).

The Reiner et al. study (2006) found interesting geographical discrepancies on the levels of awareness of and preference for carbon sequestration as a climate change mitigation strategy. Interestingly, the Japanese seemed to have a high appreciation for carbon sequestration, while it was found that respondents in the United States, Germany, and Sweden had a stronger preference for other mitigation technologies (solar, energy efficiency appliances, efficient cars, etc.).

## **Biodiversity valuation**

In carrying out a survey of public attitudes, a significant challenge will be to make sure that the ecosystem service of biodiversity conservation is well understood. As we have stated previously, the linkages between biodiversity and the ‘ecosystem services’ concept are not straightforward. Biodiversity especially can be associated with a variety of values, for example the variety in agricultural crops, the diversity in genes, or the multiplicity of colored patterns in butterfly wings. Any attempt to gauge how people value biodiversity will inevitably need to understand how these same people perceive it (Nunes & Bergh, 2001).

As a starting point, it is useful to distinguish between the more utilitarian and the non-use values of biodiversity.

- ***Use values***

Geoffrey Heal presents three levels at which biodiversity is relevant to human welfare (Heal, 1999a). Firstly, he describes experimental evidence that both species and functional diversity are important for maintaining the ***productivity*** of ecosystems. The second value associated with biodiversity is its capacity to act as natural ***insurance*** against risks associated with undesirable environmental changes as well as invasive species, pests, and pathogens (Heal, 1999a, Baumgartner, 2007). Finally, Heal discusses biodiversity’s contribution to human ***knowledge***. In this case, it is especially medical research which is concerned, as the natural diversity in the environment represents the largest laboratory from which valuable chemical compounds can be developed.

Of the three above-mentioned values, only the knowledge value and, to some extent, the insurance value, can really be applied at the global scale. The productivity attributes hold value mainly for those that live within the ecosystem being considered. According to Heal (1999a), the knowledge value of biodiversity applies mainly to the development of medical products and of new and better food crops.

- ***Non-use values***

Although the more direct and utilitarian contributions of biodiversity to human well-being seem to be either very localized or limited to a select group of stakeholders, indirect and non-use values should not be overlooked. Ever since Krutilla introduced the notion of vicarious utility arising from the simple knowledge that certain natural wonders exist (Krutilla, 1967), non-use environmental values have been coined in a variety of different ways: bequest value, existence value, intrinsic values, inherent value, passive use value, and stewardship value (Carson, 1999).

These various terms have their own particular nuances, but all have in common that they have a greater potential to attract an international demand for biodiversity conservation than the more utilitarian values detailed above. Indeed, it is mainly these non-use values that have a truly global reach, as they are often enjoyed by people who are far removed from the area where the value is being produced (Albers and Ferraro, 2003). Our projected study will therefore need to focus specifically on this non-utilitarian type of biodiversity value.

## **Ecosystem services valuation**

Recently, it has been argued that the ‘ecosystem services’ concept might actually help reduce the potential information bias in stated preference studies. Within a non-specialist population, the risk of bias due to a lack of consistent levels of knowledge and information among respondents on the issues at hand needs to be confronted (Glenk, 2006). Thus, translating ecosystem processes into ecosystem services by highlighting the links between ecosystems and human welfare can help researchers collect environmental valuation data more accurately. Such considerations, however, were mainly used to facilitate valuation studies being conducted at a local level, related mainly to watershed-based ecosystem services. Most theory (Farber et al., 2002; Perrings et al., 2007) and practice (Wilson and Carpenter, 1999; Pattanayak, 2004; Gürlük, 2005; Glenk, 2006;) with ecosystem services valuation relates to more localized cases. To date, there is limited experience with the valuation of biodiversity as an international ecosystem service.

Recently, Joachim Sell (2006) examined the private WTP for various ecosystem services. The breakdown of services offered was the commonly used one we presented earlier: carbon sequestration, biodiversity protection, scenic beauty, and watershed protection. The research was specifically designed for and implemented in the business community, as the main objective was to gauge the demand for ecosystem services coming from companies as opposed to consumers. Unsurprisingly, international companies associated most financial value to the ecosystem service of ‘carbon sequestration’. However, the study revealed that non-financial motivations were an

important consideration for international companies, and that they perceived biodiversity conservation to offer the most benefits on that front.

The PES approach was also used as part of study of public preference for biodiversity conservation and scenic beauty in Costa Rica (Biénabe and Hearne, 2005). Costa Rican residents and foreign tourists were surveyed and both groups expressed a strong interest towards increasing the provision of the two ecosystem services. The foreign tourists demonstrated a WTP of almost \$7 for improved biodiversity conservation and more than \$3 for scenic beauty, both as a one-time payment. An interesting finding from this Costa Rica study is that it provides evidence of how the existence value of biodiversity is a significant factor in shaping WTP. Indeed, with respondents showing preference for biodiversity conservation over scenic beauty, and for prioritizing conservation in remote over proximate lands, the non-use values of biodiversity are clearly demonstrated (Biénabe and Hearne, 2005).

### **Tropical forest valuation**

Considering the challenges inherent in adequately valuing biodiversity and ecosystem services, it might be more appropriate to focus on the ecosystem providing the services: tropical forests. A focus on tropical forests could be useful in terms of associating one or several ecosystem services with a specific geographic entity (Carson, 1997). It has been found that a ‘bundled’ approach to the valuation of ecosystem services is currently lacking and could be very useful to the consideration of trade-offs across scales and stakeholders (Turner et al., 2003). Considering tropical forests as providers of such ‘bundles’ of ecosystem services could help fill the perceived gap in ecosystem services valuation.

Over ten years ago, a survey of citizens’ opinions on tropical rainforest policy was implemented in the United States (Kramer and Mercer, 1997). This study was specifically designed to assess how people in the United States value the rainforests of the world, recognizing that they were ‘distant beneficiaries’ of their conservation. A survey was used to evaluate US residents’ willingness to pay for the conservation of rainforests. Two different question formats were used, both yielding similar estimates of household level WTP for the conservation of rainforests: \$24 and \$31 per household as a one-off contribution to a ‘Save the Rainforests’ Fund. Besides offering a solid methodology for assessing WTP for tropical forest protection, the study found that most people (about 2/3) felt that developed countries should be sharing the costs of costs of biodiversity conservation.

The results of the Kramer and Mercer (1997) study suggest that people are effectively able to respond to valuation questions about tropical forests and that their answers were consistent across varying survey techniques. The fact that the issue of tropical deforestation was known to almost all the respondents (91%) probably helped in the consistency of the results.

A similar study was implemented in Europe (Italy and the United Kingdom) by Horton et al. (2003). This time, a specific biome, the Amazon, was considered as opposed to a general focus on the tropical forests of the world. The results of the analysis found

that the average willingness to pay expressed by households in the UK and Italy for protecting 5% of the Amazon was \$45, and \$60 for 20% protection.

Similarly to the findings of Kramer and Mercer (1997), this study found that 93% of the respondents believed that developed countries should help preserve tropical forests, with a mean response for the level of this contribution amounting to about 52% of the total cost. Interestingly, the most commonly given reason for accepting the payment principle was: “*I think the future of Amazonia is a globally important issue*”, given in almost 60% of the cases. The reason: “*I am very concerned about climate change*” was mentioned in about 50% of all cases.

### **iii) Implementing a public survey – some basic considerations**

Given our focus on PES as a financing option, it seems important to ensure that respondents understand how tropical forests produce a variety of ecosystem services, and why some of them – biodiversity conservation and carbon sequestration specifically – have an international reach. Although the concept of ecosystem services and PES is relatively well understood within the conservation community, it is safe to assume that such a new topic has yet to make much of an impact with the general public.

Our projected study will have the advantage of assessing attitudes and preferences in relation to a specific mitigation option – REDD. While confusion on the linkage between the environmental problem (biodiversity loss) and the mitigation strategy (REDD) will be limited to the extent that the issue is explained clearly to the respondents, there will certainly be other sources of confusion. It should be reminded that previous levels of awareness and information on the issue at hand can have a significant influence on the responses (Cameron and Englin, 1996).

As the REDD debate is still in its infancy stage, the speculative discussions do not provide a solid foundation for communicating with a non-specialist audience. However, in order to assess public attitudes and preferences, the respondents will need to understand *how* REDD might actually work in practice. This will inevitably involve some speculations on the potential components of a REDD scheme, such as who will be implementing it, and how the money will be collected and distributed (i.e. the payment vehicle).

Related to the payment vehicle, the Kramer and Mercer (1996) study on tropical forest valuation, which was carried out in the United States, asked respondents to say how much they would be willing to contribute to a hypothetical United Nations ‘Save the Rainforests’ fund. The similar study carried out in Europe (Horton et al., 2003) used taxation as a means of collecting funding.

In the previously mentioned Bienabé and Hearne (2005) study on WTP for biodiversity conservation and scenic beauty in Costa Rica, foreign respondents expressed a stronger preference for voluntary payments (e.g. at hotels) for conservation as opposed to taxation (e.g. at the airport). Given the recent rise of carbon offsets in the past few years (Taiyab, 2006; Capoor & Ambrosi, 2007) it might be interesting to consider the voluntary market for carbon offsets as a payment vehicle for the purpose of our own study. Although the use of offsets to finance REDD remains an experimental endeavor, recent initiatives such as the Climate, Community, and Biodiversity Alliance standards

(<http://www.climate-standards.org/>) or Carbofor (<http://www.cifor.cgiar.org/carbofor/>) offers some insights into how voluntary carbon offsets could be used to finance forest conservation.

Previous surveys of willingness-to-pay conducted in Europe, the United States and Japan have confirmed that there is indeed a significant interest in the conservation of biodiversity from outside the tropics (Kramer and Mercer, 1997; Horton et al., 2003). Although these studies have showed promising figures for public interest in developed countries for financing the conservation of tropical forests, current trends in environmental policy seem to indicate that these values are poorly translated into the decision-making process (Pearce, 2007).

With a renewed interest in the possibility of integrating REDD as a climate mitigation strategy, there is hope that new institutional and financial arrangements can be used to support the conservation of tropical forests. While many issues related to the effective design and implementation of potential REDD schemes have yet to be solved, an enhanced understanding of the general public's appreciation of the different values of tropical forests could potentially be useful.

# Survey on Avoiding Tropical Deforestation

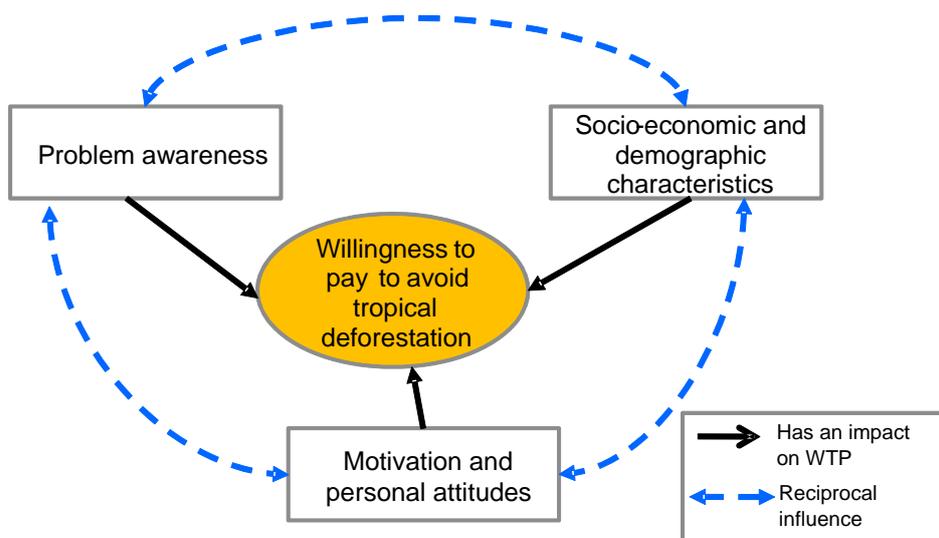
## *IV) Survey design*

After a review of the literature in July-August 2007 by IUCN, the project partners met in order to establish the major axes of the survey, which are:

1. assess public awareness of tropical deforestation
2. To investigate the willingness to pay to conserve tropical forests

Those main axes served as the basis for defining the survey questions, which were conceived in a series of brainstorming sessions in September 2007 in collaboration with the HEG-Geneva students. A preliminary version of the questionnaire was then tested from 15<sup>th</sup> to 25<sup>th</sup> October 2007 on focus groups by the students. This procedure allowed for the elimination and reformulation of various questions, in order to increase the overall coherence of the questionnaire for the respondents. After the new version of the questionnaire was validated by all the partners, the students conducted face-to-face interviews of individuals in the streets of Geneva. The survey started on November 1<sup>st</sup> and ended on December 10<sup>th</sup> 2007.

The questionnaire is divided into four main parts (see Appendix 1). The first part contains the questions testing the individuals' knowledge and awareness of tropical deforestation. In part two, personal attitudes and motivations concerning environmental issues are investigated. Part three is the core of the questionnaire, as it aims to highlight the willingness to pay (WTP) to avoid deforestation. In order to test for the influence of the payment vehicle on WTP, we created two questionnaires: one with a payment to a voluntary international fund, and another with a mandatory international tax. The final part of the questionnaire collects the individual's socio-demographic characteristics. Figure 1 below presents the structure of the questionnaire and shows the major linkages that are expected to influence the WTP for avoiding tropical deforestation. For instance, socio-demographic characteristics, like income level, could be related to the level of education and then to the awareness level on tropical deforestation, which finally could have an impact on WTP.



**Figure 1: Structure of the questionnaire**

## V) *Statistical Analysis*

As already mentioned, in order to test the impact of the payment vehicle on the WTP to avoid tropical deforestation, we created two questionnaires depending on whether the individual is asked to contribute to a voluntary international fund or she has to pay an international tax. As a result, we have obtained two sub-samples. The “fund” sub-sample contains 312 observations and the “tax” sub-sample 327, for a total of 639 observations. In the following short statistical analysis, depending on the subject, we will sometimes present the results for the whole sample, while in other occasions, also for comparative reasons, we discuss the results obtained with the sub-samples.

### i) **Sample Characteristics**

In this Section, we briefly present the general characteristics of the sample and the sub-samples. As we will see, there are no noticeable differences in the composition of the sub-samples. In addition, the whole sample and the two sub-samples are representative of the Geneva population with respect to main socio-demographic characteristics.

Table 1 summarises the age, gender, nationality and household composition of the whole sample and the sub-samples. We note that, except for a relatively lower proportion of Swiss individuals in the tax sub-sample, the composition of both sub-samples is very similar.

With respect to the overall population of Geneva<sup>1</sup>, the samples are representative with respect to gender (in the Geneva Canton the proportion of males is 48.1 % and 51.9 % are female), while they slightly over-represent younger people (the average age of the overall Geneva population is 39, but the survey target population is for obvious reasons limited to residents aged 18 and older, who are on average 47 years old). The share of

<sup>1</sup> All the data referring to Geneva are taken from the Geneva Cantonal Statistical Office (Ocstat) and refer to the latest available data (in general 2006, most data from <http://www.geneve.ch/statistique/>).

Swiss residents (about 62% for the overall Geneva population) and the household size (in Geneva the average household is composed by 2.11 persons) are also a little larger in our samples, compared to the whole population in the Geneva Canton.

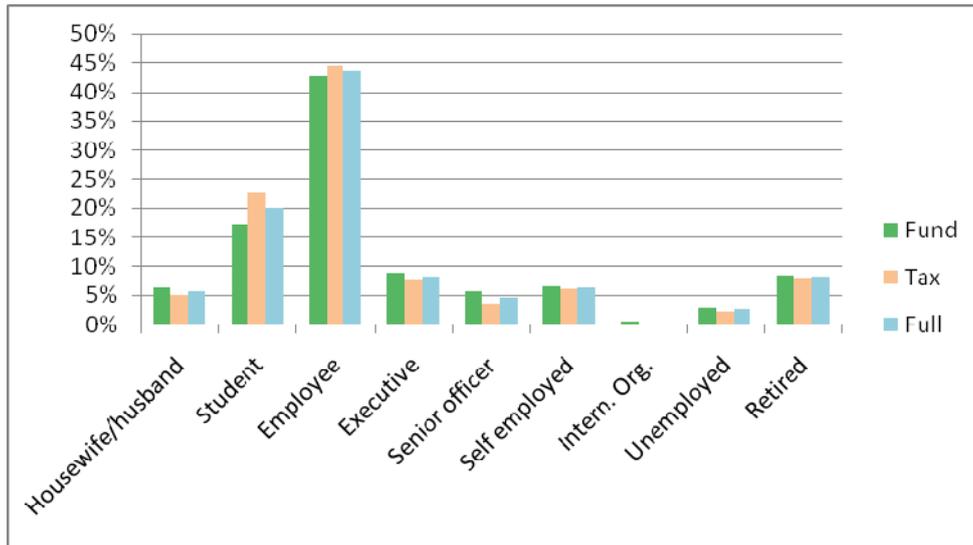
The final rows in Table 1 also report a useful information concerning people's attitudes and motivations towards the environment and/or more general social issues (question 21 and 20 of the questionnaire, respectively). Those factors are of course expected to influence WTP for avoiding tropical deforestation. From Table 1 we can observe that about 14% of the individuals in our samples are members of an environmental organisation and that a little less than 70% of them have already donated money to a non-profit organisation.

<b>Characteristic</b>	<b>Fund sample</b>	<b>Tax sample</b>	<b>Full sample</b>
<i>Age (in years)</i>	37.8 (15.8)	38.3 (16)	38 (15.9)
<i>Gender</i>			
Female	50.32%	51.07%	50.7%
Male	49.68%	48.93%	49.3%
<i>Nationality</i>			
Swiss	84.29%	71.6%	77.83%
European Union	13.14%	21.91%	17.61%
Others	2.56%	6.48%	4.56%
<i>Household composition</i>			
Adults	2.25 (1.18)	2.15 (1.04)	2.2 (1.11)
Children	0.54 (0.96)	0.52 (0.9)	0.53 (0.93)
<i>Member of an environmental organisation</i>	14.1%	14.98%	14.55%
<i>Donation to an organisation</i>	66.99%	70.34%	68.7%
<b>Number of observations</b>	312	327	639

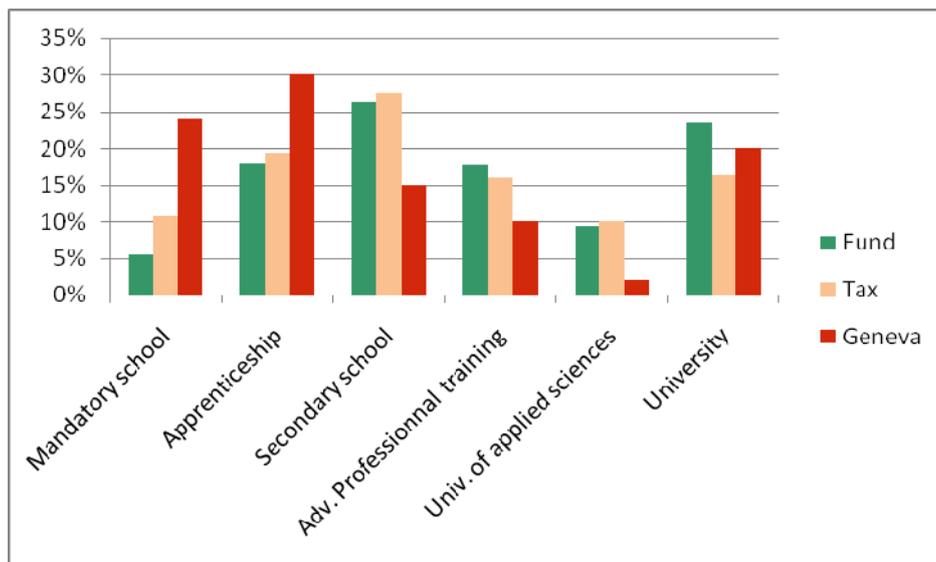
Note: standard deviation in brackets.

**Table 1 : Socio-demographic characteristics of the survey sample**

Figure 2 below reports the professional status for the whole sample and the sub-samples, while Figure 3 compares the educational level of the respondents in the two sub-samples of the Geneva population. Again, we can observe that the respective shares in the samples are almost identical, except for a slightly larger share of individuals with a University education level in the fund sub-sample. With respect to the population of the Canton of Geneva, we remark that our samples slightly under-represent lower education levels (mandatory school and apprenticeship) while they include a little too many people who have completed secondary school, followed advanced professional training or obtained a degree from a University of applied sciences.



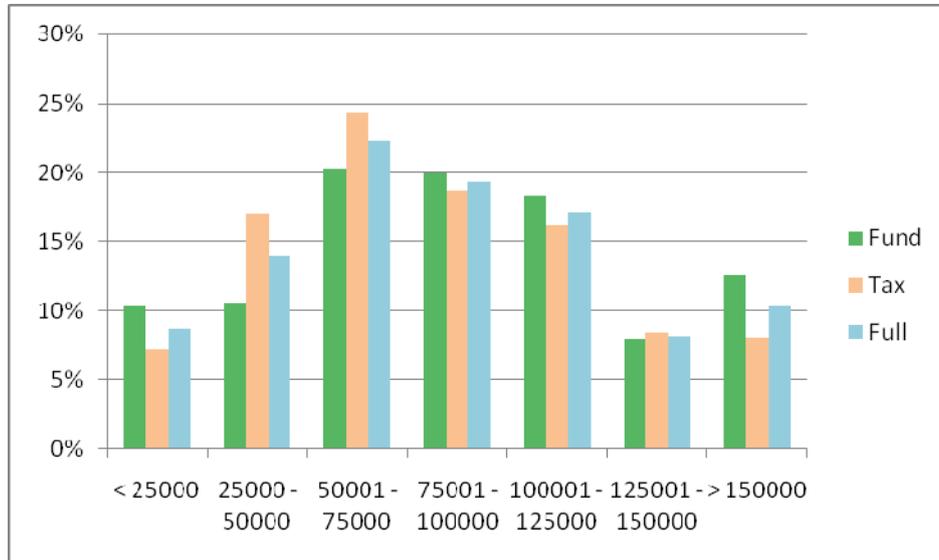
**Figure 2 : Professional status**



**Figure 3 : Education level**

Finally, Figure 4 reports household's total gross income in the three samples. We note that about 22% of the sample has an income comprised between CHF 50'001 and 75'000 per year, and about 20% between 75'001 and 100'000. Those data are relatively difficult to compare with the available income data for the whole Geneva population, since the only available data are at the individual level and refer to the private sector. Moreover, in their answer our respondents probably referred not to the total income, but to the salary only. As a comparison, we can mention that the median yearly salary for the private sector in Geneva is about CHF 76'000. Aggregated data from the Federal Statistical Office (see e.g. <http://www.bfs.admin.ch/>) report an average yearly gross

income for labour of about CHF 82'000 in the Lemman region. We can thus conclude that the income in our sample is relatively similar with the one for the whole Geneva population.



**Figure 4: Household's income**

To conclude this section on the general socio-demographic characteristics of our samples, we can firstly observe that the sub-samples composed of the individuals answering to the fund instrument and those responding to the tax payment vehicle are very similar. Secondly, we can also affirm that our samples are representative of the whole Geneva population, although our samples slightly over-represent people with a higher education level (tertiary level).

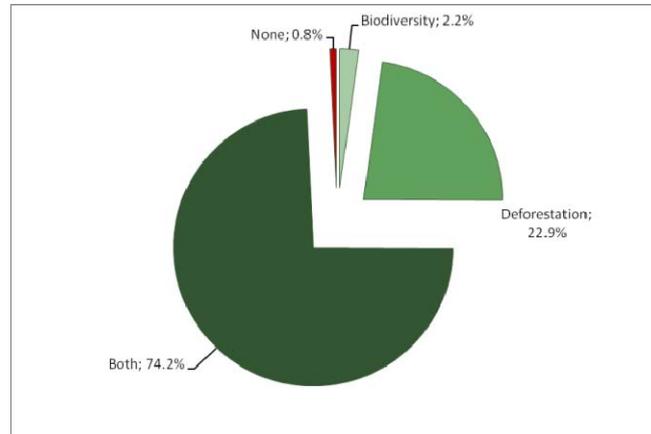
## ii) Awareness, perception and importance

Questions 1 to 7 are designed firstly to test the population's knowledge on the tropical deforestation problem, and then to understand the importance that people give to this issue, relative to other problems. In this section, we present the results for the whole sample, since they are the same as those in both sub-samples.

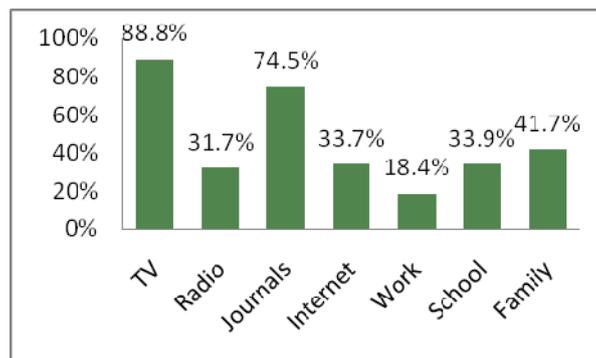
Figure 5 shows that the sample is well aware of tropical deforestation and biodiversity. Indeed, about  $\frac{3}{4}$  of the interviewed individuals affirm that they already have heard about both those issues. We could be quite surprised by this high level of awareness. However, we should note that the period of the survey was just before the international climate change convention meeting of the parties (UNFCCC COP13) in Bali, and some media talked about the link between deforestation and climate change<sup>2</sup>.

<sup>2</sup> We should highlight that the local newspapers reported on one of the initiatives presented in Bali, i.e. the international deforestation fund launched by the World Bank, with the financial participation of the Swiss Government. However, that news appeared in the newspapers only after the survey was closed. Therefore,

As expected, individuals obtained information on deforestation with the traditional media, TV and newspapers (see Figure 6).



**Figure 5: Have you ever heard about deforestation and biodiversity loss before?**

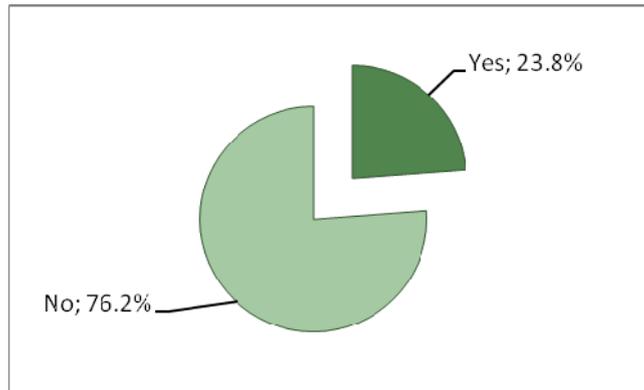


**Figure 6: By which means have you heard about deforestation and biodiversity loss?**

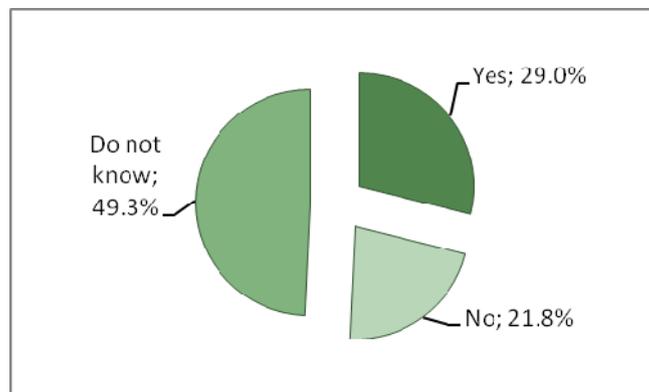
The following two Figures show that almost  $\frac{1}{4}$  of the sample already visited a tropical forest, while about  $\frac{1}{3}$  is planning to visit one in the near future. Those relatively high proportions, in combination with previous figures on awareness, demonstrate that our sample is composed of people who are relatively well-informed about tropical forests and thus we do not expect the answers on the WTP to be particularly biased by information problems. The data on people who have already visited a tropical forest, as well as those who are planning to visit one, are important in order to highlight what determines WTP and also to distinguish among different tropical forest values. Indeed, the WTP of those respondents who visited a tropical forest and those who are planning to visit one could possibly be related to use and option values respectively, while those stating that they will never visit it, to existence values only.

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this element is for sure not an explanation for the relatively high awareness level and will also not influence the responses concerning the WTP (especially those using the fund).



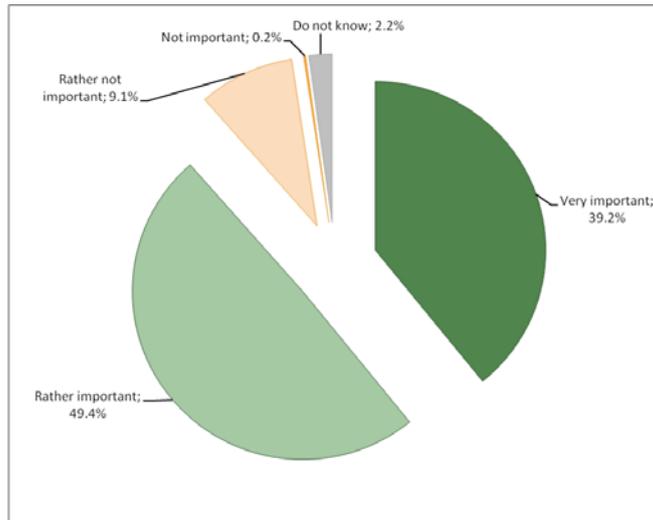
**Figure 7 : Have you already been to a tropical forest?**



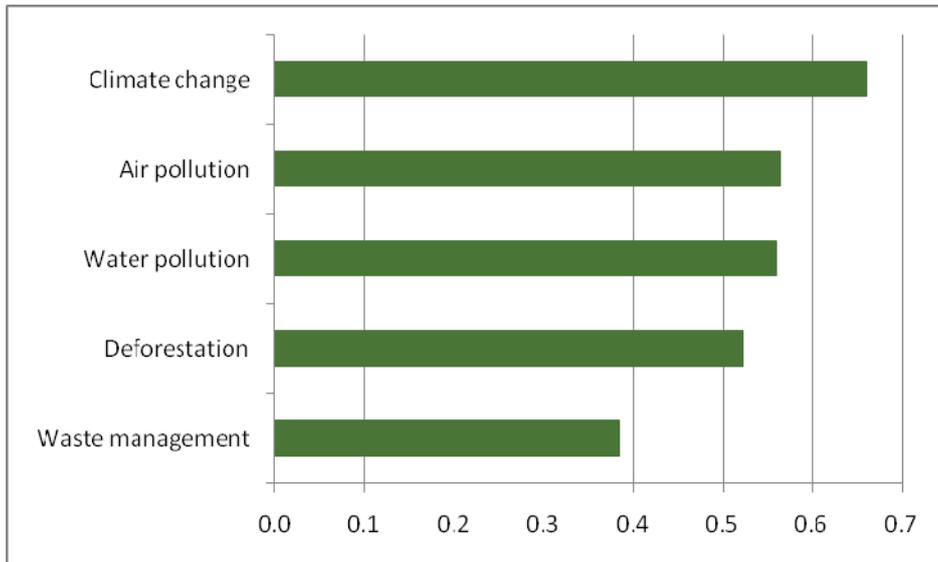
**Figure 8 : Do you plan to visit a tropical forest in the future?**

The next Figures present the perceived importance of environmental problems relative to other issues; the importance of tropical deforestation in relation to other environmental issues; and the main perceived contributions of tropical forests.

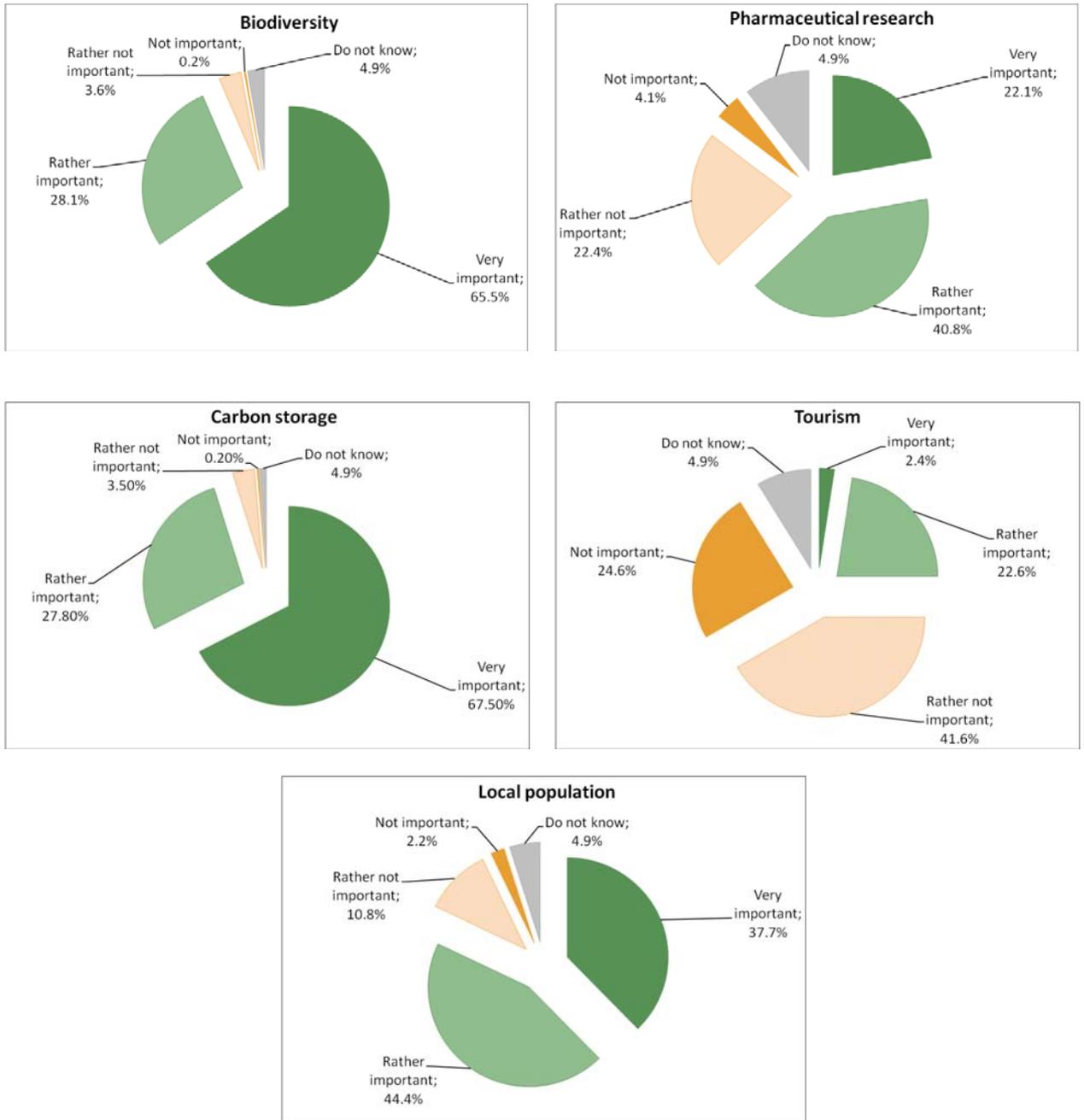
Concerning the importance of environmental issues relative to other problems, question 5 of the questionnaire explicitly asked the respondents to judge them relative to issues like poverty, health, social security, international migrations, education and unemployment. We observe that about 40% of the sample judge that environmental problems are “very important” and about 50% state that they are “rather important”. Overall, a large majority of the individuals perceive the environment as an important issue. Looking then at the relative importance attributed to various environmental issues, we observe from Figure 10 that climate change is most often perceived as the most important issue, followed at about the same level by air pollution, water pollution and deforestation.



**Figure 9 : Importance of environmental problems relative to other issues.**



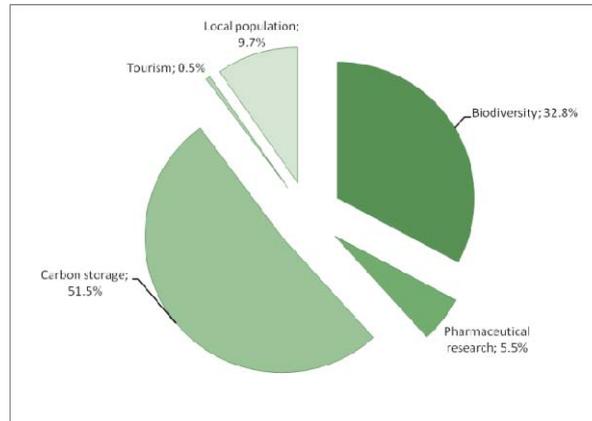
**Figure 10: Ranking of environmental problems**



**Figure 11 : Ranking of the contribution of tropical forests to various domains**

Question 7 in the questionnaire asked respondents to rank the relative importance of the different main functions offered by tropical forests. Given the prominence of climate change as shown above, it is not surprising that people rank carbon storage as the most important contribution of tropical forests. The other main perceived contribution is the preservation of biodiversity, while support to local communities is ranked third. It is

interesting to note that tourism – which represents the most direct and individual use value of tropical forests for developed countries’ individuals – is ranked last.

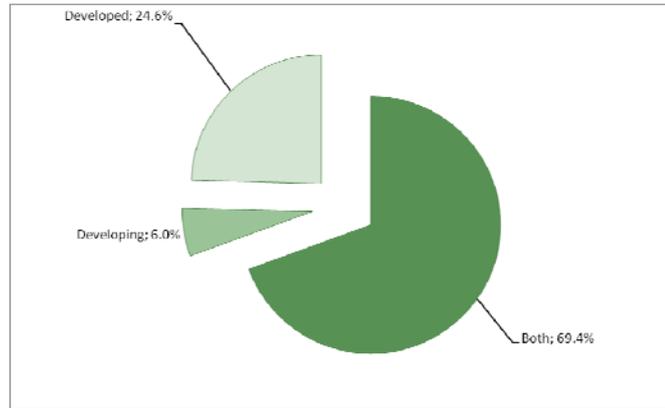


**Figure 12 : Ranking of tropical forests contributions: summary**

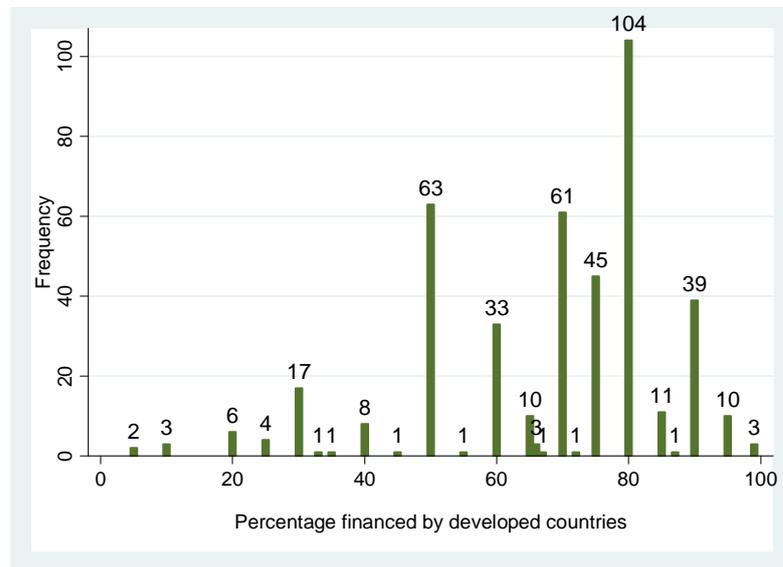
To conclude this section, we can observe that respondents perceive environmental issues as being important ones, and particularly climate change. Tropical deforestation is also perceived as being an important issue. As many respondents named carbon storage as the most important contribution of tropical forests to human well-being, it can be argued that the importance of deforestation was raised at least partly due to its contribution to greenhouse gases emissions.

### **iii) Financing of and willingness to pay for avoiding deforestation**

This section describes the heart of the survey, which is the study of the WTP to avoid deforestation. The first question (question 8 in the questionnaire) asked respondents who should finance the preservation of tropical forests. As shown in Figure 13, about 25% of the sample indicated that developed countries should be the sole financiers of the preservation of tropical forests. On the other hand, only 6% of the sample stated that developing countries alone should finance the preservation of tropical forests. The great majority (70% of the answers) indicated that both developed and developing countries should contribute to its financing. When an individual indicated that both countries should contribute to the total cost of preservation, they were explicitly asked to indicate what should be the countries’ respective share. Figure 14 shows the frequency distribution of the percentage to be paid by developed countries. It can be observed that 80% of the financing to be paid by developed countries is the percentage that was indicated by most of the people. The second-most observed percentage is a 50-50 split between developed and developing countries. The mean of the stated relative contributions is about 68% of the total preservation costs to be covered by developed countries, with however a relatively large standard deviation of about 18%.



**Figure 13 : Who should finance the preservation of the tropical forests?**



**Figure 14 : Frequency distribution of the share of the total preservation cost that should be financed by developed countries**

Question 9 in both the fund and tax questionnaires explicitly asks individuals their WTP to preserve tropical forests. It should be noted that the payment card goes from CHF 0.- to CHF 1'000.- and over, and that in both the tax and the fund questionnaires, the amount to be indicated is a yearly contribution. Therefore the amounts indicated under the tax or the fund are perfectly comparable. Of course, one of the main problems with this kind of question is that people do not think too seriously about the amount that they indicate, since it does not correspond to a real money payment, i.e. there is an hypothetical bias. In order to minimise such a bias, we asked people to indicate the maximum amount they are sure to pay; the maximum amount they could eventually pay; and the amount that for sure they are not willing to pay. In this way, we are giving an incentive to think about the answer they are giving. In addition, and in order to check for

the rationale in the answer, we explicitly asked to indicate the main reason justifying the stated amount (see below).

Table 2 summarises the WTP for the fund and tax sub-samples, and for the whole sample. We can observe that the mean amount of CHF 95 in the fund sub-sample is quite close to the CHF 90 mean obtained in the tax sub-sample, with however a relatively high standard deviation of CHF 172 and CHF 131, respectively. As expected from the literature, we have a relatively high proportion of 0 answers in both sub-samples. Indeed, about 20% of the total answers in the fund sub-sample and about 14% in the tax sub-sample refuse to pay anything at all. An answer indicating a CHF 0.- WTP could possess different motivations and interpretations. It might effectively indicate a zero value for tropical forests, or it might indicate a refusal to indicate a monetary value for it, although the tropical forest might have a very high value for the respondent. Therefore, we explicitly asked respondents to indicate their motivations for refusing to pay to preserve tropical forests (see below). Since there is a difference in the zero responses in the fund compared to the tax sub-sample, we performed a t-test in order to check whether there is a statistically different proportion of people refusing to pay, depending on the payment vehicle. We test two alternative hypotheses, namely whether the proportion of nonzero WTP answers with the fund is different ( $H_{a1}$ ) or smaller ( $H_{a2}$ ) than the proportion with the tax. The null hypothesis is that the zero WTP proportions are the same with both instruments ( $H_0$ ). The reported p-value for  $H_{a1}$  against  $H_0$  of 0.03 implies that  $H_{a1}$  can be accepted with a confidence level of 95%. This means that the proportion of nonzero WTP is statistically different in the tax and fund subsamples. A p-value of 0.015 for  $H_{a2}$  against  $H_0$  shows more specifically that the proportion of nonzero WTP is statistically higher (confidence level = 95%) with the tax vehicle compared to the fund.

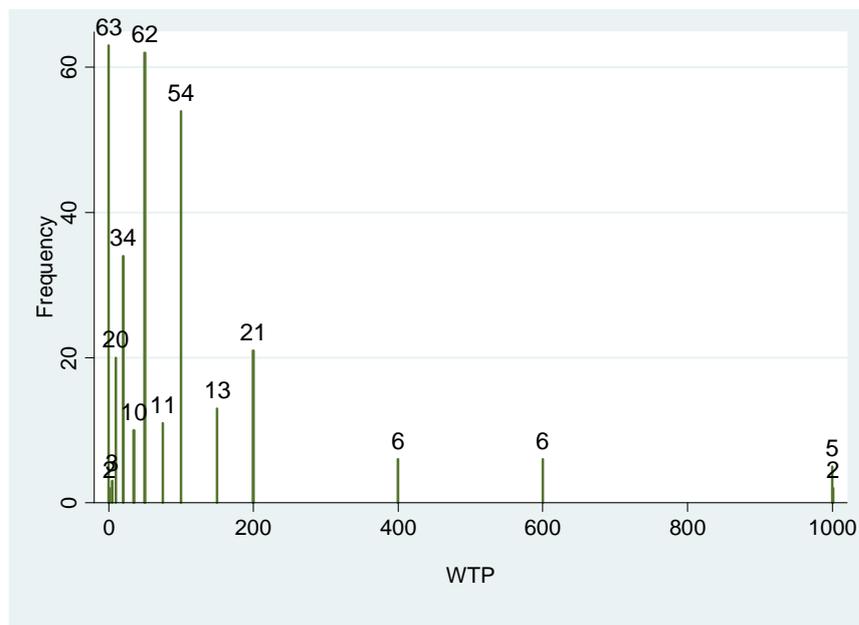
	Fund sample	Tax sample	Full sample
<i>WTP (in CHF/year)</i>	95.3 (172.1)	90.6 (131.2)	92.9 (152.5)
<i>Non zero WTP(in CHF/year)</i>	119.4 (185.1)	105.2 (135.8)	111.8 (160.8)
<i>Proportion of non zero WTP</i>	79.8	86.2	83.1
$H_0$ : proportion (fund) – proportion (tax) = 0			
$H_{a1}$ : proportion (fund) – proportion (tax) $\neq$ 0			
p-value			0.03
$H_{a2}$ : proportion (fund) – proportion (tax) < 0			
p-value			0.015

Note: standard deviation in brackets.

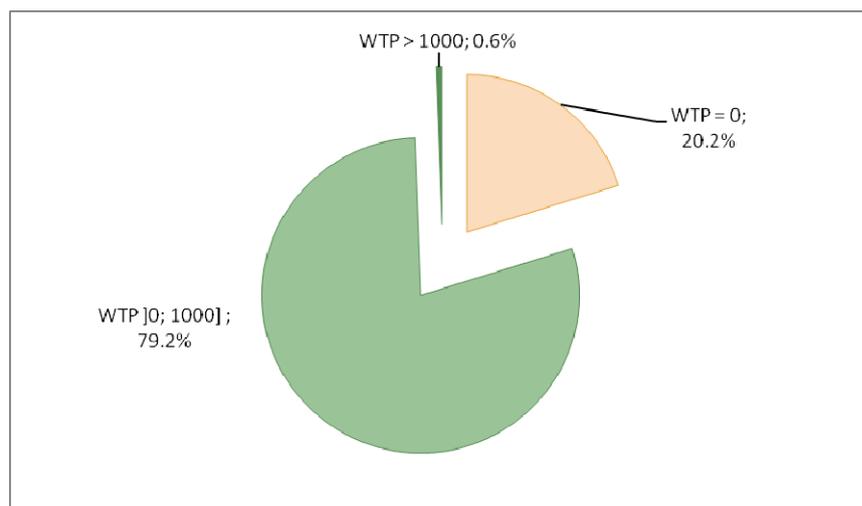
**Table 2 : Willingness to pay to preserve tropical forests.**

## International tropical forests preservation fund and WTP

We will now focus our discussion on the preservation fund sub-sample only. Figure 15 shows more precisely the distribution of the WTP to preserve tropical forests. We observe that the response that possesses the highest rate is 0, which corresponds to about 20% of the total (see Figure 16). Of the 80% that indicated a positive WTP, most are for an amount which is lower than CHF 100, although 21 individuals indicated an amount of CHF 200. Finally we note a few outliers (7 individuals) indicating CHF 1'000 or more.

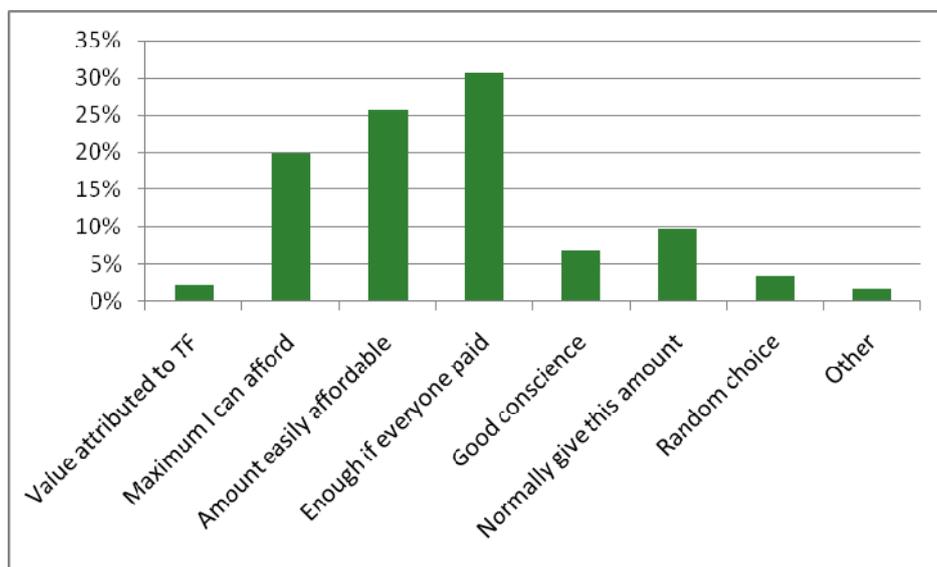


**Figure 15 : Frequency distribution of the WTP with the fund.**



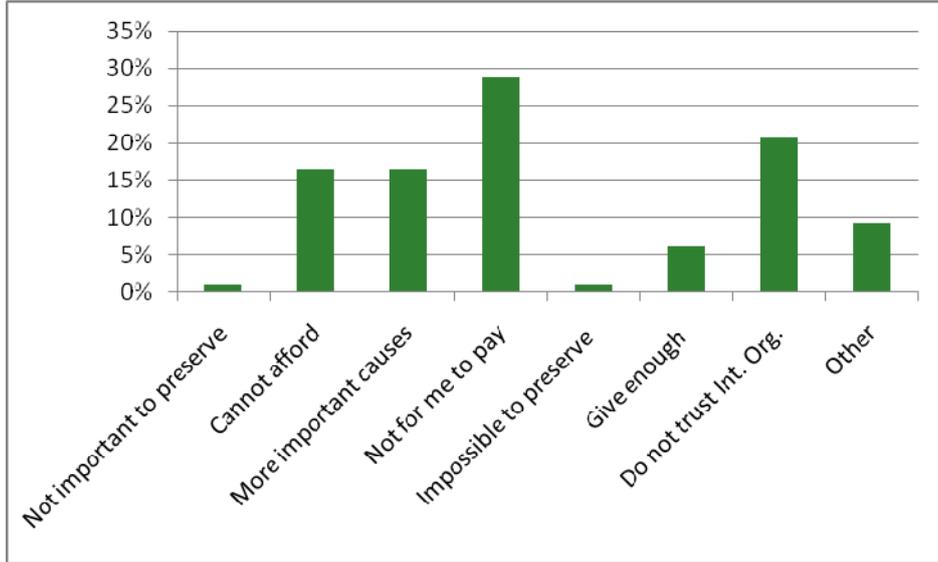
**Figure 16 : Proportion of zero and positive WTP with the fund.**

Figure 17 reports the main reasons indicated to justify the positive WTP. We observe firstly that the answer “random choice” is fortunately very low, which seems to indicate that people did not just mention an amount without any rationale just because of the hypothetical scenario. In the same vein, only about 10% of the respondents indicate that the amount they chose is simply the amount that they would normally give to similar issues. We can therefore be relatively confident that the indicated WTP is related to the value of tropical forests. It is also interesting to note that about 1/3 of the sample indicated an amount that “would be enough if everyone will pay the same”. This illustrates quite nicely the respondents’ sensitivity to the free-rider issue, which is commonly associated with voluntary funds.



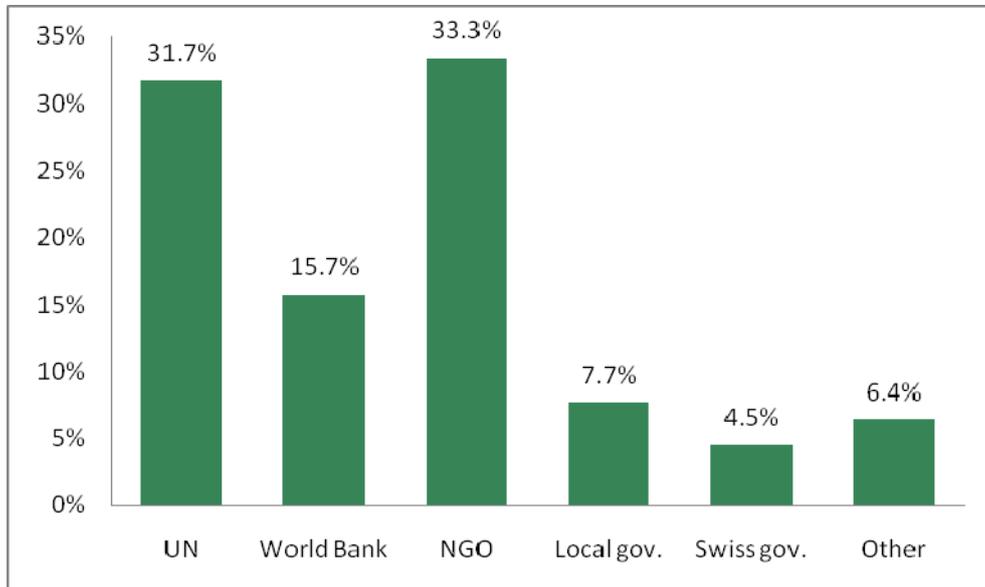
**Figure 17 : Reasons justifying a positive WTP with the fund.**

Figure 18 reports the stated reasons for not contributing to an international tropical preservation fund. The answer with the highest score (“not for me to pay”) could again reinforce the free-rider issue related to the particular voluntary payment vehicle. Interestingly enough, we note that about 20% of the respondents stated that they would refuse to pay because they do not trust international organisations. The cumulated 30% of answers stating that “there are more important causes”, that “they can not afford to pay”, and not “important to preserve” is an indication of the “true” zero value of tropical forests for those individuals.



**Figure 18 : Reasons justifying a zero WTP with the fund.**

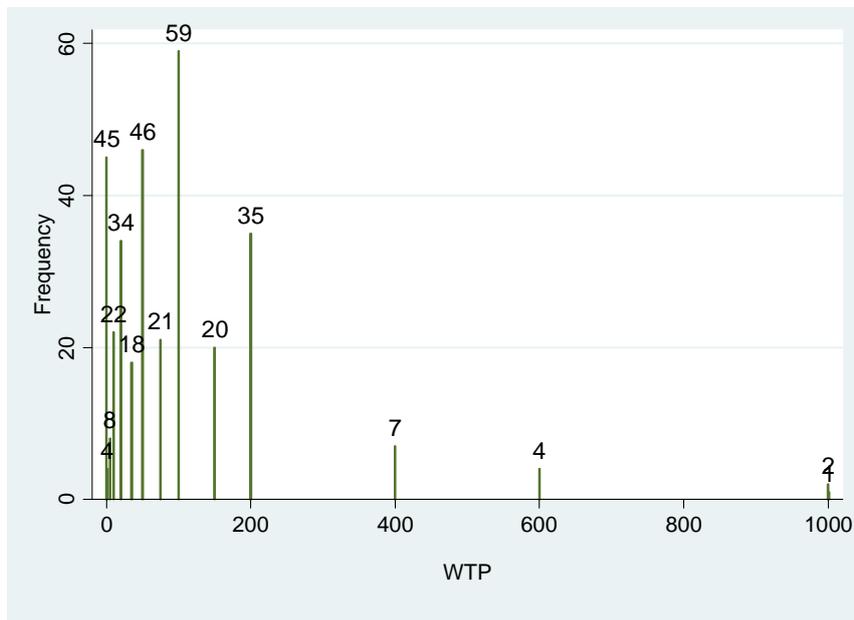
The final question specifically related to the fund relates to who should manage it. It is interesting to note that non-governmental organisations received the highest score, closely followed by the United Nations. Surprisingly, the World Bank received only about 16% of the respondents' support, even though this organisation is also known to be managing different funds in the environment and development domain.



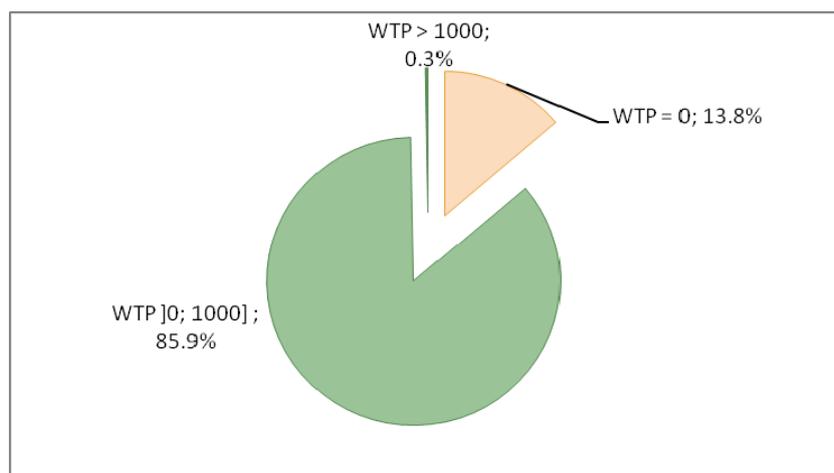
**Figure 19 : Who should manage the fund?**

## International tropical forests preservation tax and WTP

Figure 20 describes the distribution of the WTP for the respondents of the tax sub-sample. Contrary to the fund sub-sample, we can observe that the number of individuals refusing to pay is not the highest category. Relative to the whole sub-sample, we can see in Figure 21 that the zero answer corresponds to about 14% of the total answers. We note again that the majority of the respondents indicated a WTP lower than CHF 100. Note however, that there is a relatively high number of persons (35) willing to pay CHF 200. As with the fund, there is a very small number of outliers (2 individuals) indicating an amount of CHF 1'000 and above.

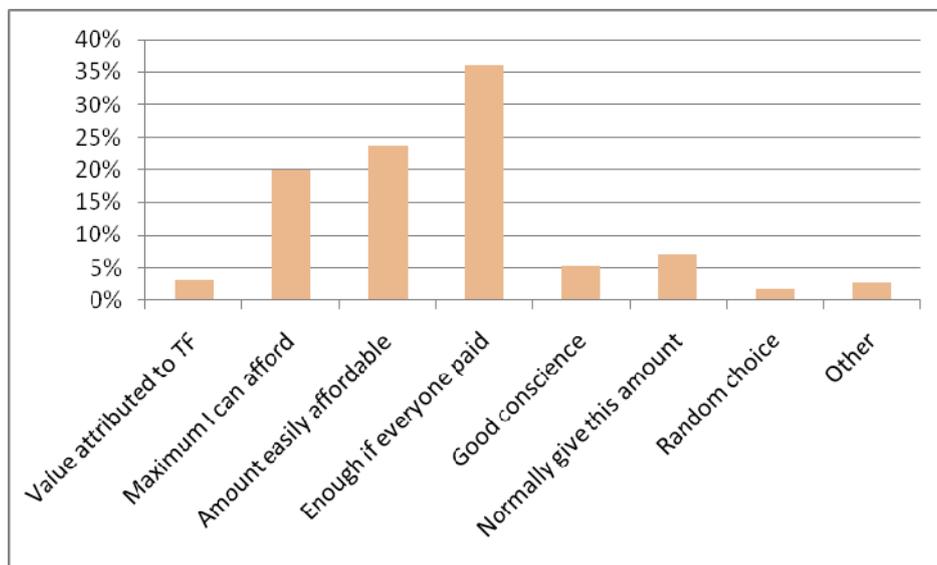


**Figure 20 : Frequency distribution of the WTP with the tax.**



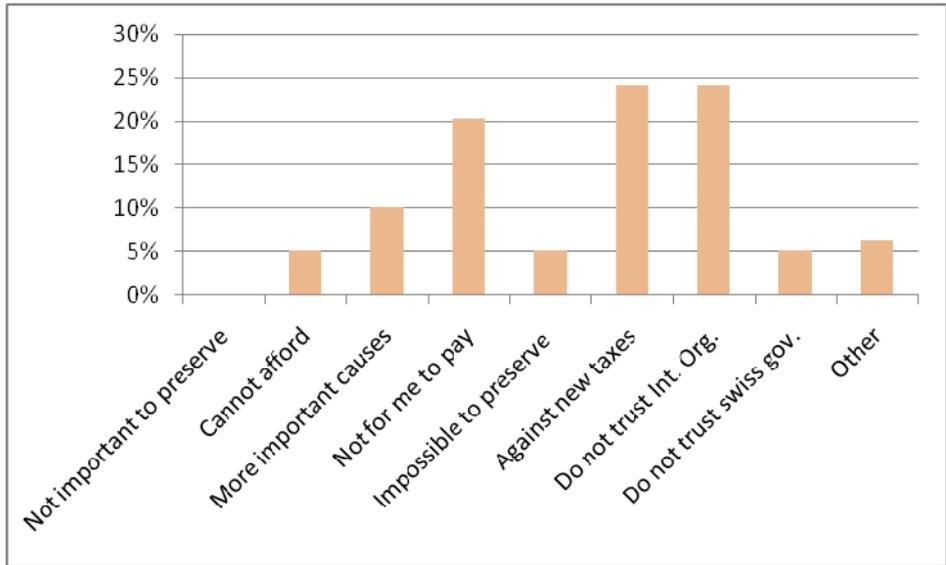
**Figure 21 : Proportion of zero and positive WTP with the tax.**

Figure 22 explains the reasons stated for justifying a positive WTP. As with the fund, we notice that random answers and amounts that just correspond to what people normally give to similar issues is very low (less than 10% of the answers). About 40% of the reasons stated for justifying a positive WTP can be explicitly attributed to the value of tropical forests (i.e. the sum of “value attributed to tropical forests” + “maximum affordable amount” + “affordable amount”). We are quite surprised by the high score received by the justification stating that the indicated amount “would be enough if every one paid the same” since, as already mentioned, this answer could be related to the free-rider issue. Indeed, since the tax is mandatory, the individual should not worry about the amount that others will pay. However, since the instrument is an international tax, individuals are maybe considering the possibility that other countries will not implement such an instrument.



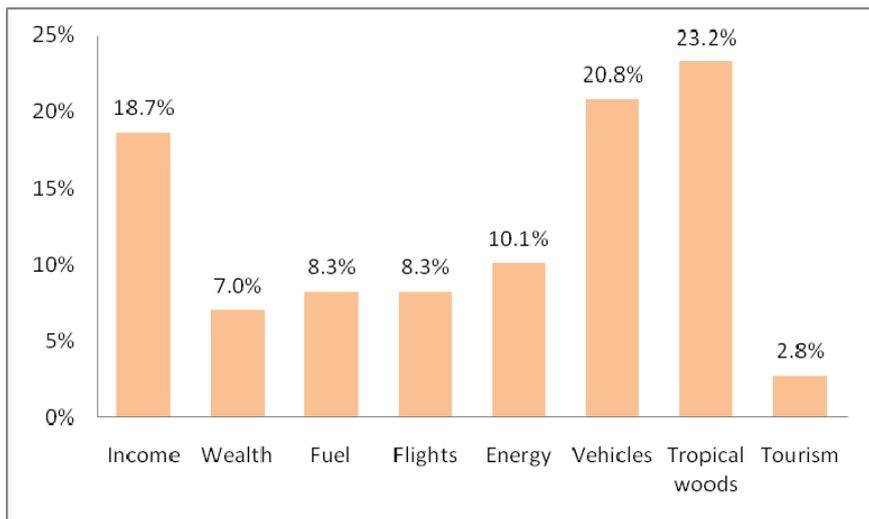
**Figure 22 : Reasons justifying a positive WTP with the tax.**

In Figure 23 we report the arguments offered for refusing to pay a tax to preserve tropical forests. It is quite interesting to note that the two major reasons which are indicated are that the individual is against new taxes or she does not trust international organisations. An important reason is also related to the fact that the individual feels that it is not herself who has to pay to preserve deforestation. We note that the reasons that could be related to a zero value attributed to tropical forests (i.e. “not important to preserve” + “more important causes” + “cannot afford”) represent only about 15% of the total.



**Figure 23 : Reasons justifying a zero WTP with the tax.**

The final tax-specific question is about the tax base. From Figure 24 we observe that the preferred tax base would be a tax on tropical woods. The individuals probably associate tropical deforestation with one of the possible activities leading to it, i.e. to produce tropical woods to be sold in international markets. An increase of its price would thus be paid only by consumers of tropical woods, who would also probably reduce their consumption. However, it is interesting to observe that the majority of the respondents selected a large tax base, where the financial burden is carried by almost everyone, e.g. an income tax or a tax on vehicles. This could indicate that, in addition to equity reasons, individuals seem to consider tropical deforestation as a global problem which requires the financial contribution of everyone.



**Figure 24 : What should be the tax base?**

#### **iv) What determines WTP? Some preliminary evidence**

This section investigates some preliminary explanations on the elements that determine the respondents' stated willingness to pay. It looks at the influence of different variables on WTP using univariate analysis, namely considering only the impact of a single variable at once. The results should therefore be interpreted with caution and a complete model including all the different variables simultaneously would have to be estimated to get a more robust idea of the determinants of the willingness to pay.

The results of some t-tests are presented in Table 3. They highlight the differences that may exist in respondent's WTP with respect to a specific variable. The first test explores whether the mean WTP is statistically different in the fund compared with the tax sub-sample. Indeed, the payment vehicle can have a substantial impact on the stated WTP. For instance, the United States' National Oceanic and Atmospheric Administration (NOAA) expert panel on contingent valuation recommends the use of a coercive tax rather than a voluntary payment to a fund<sup>3</sup>. It is expected that the tax is more realistic and reduces the free-rider problem, thus resulting in less frequent zero WTP, while minimizing the variability among responses. However, the tax has a non neutral effect and people's generally negative attitude towards the introduction of any new tax can lead to an overestimation of the rejection rate of payments to avoid tropical deforestation. As already mentioned, to control for the payment vehicle bias, the survey has been conducted on two subsamples. In order to test whether the mean WTP is statistically different depending on the payment vehicle, we again performed a t-test on the  $H_0$  hypothesis that the mean WTP in the fund and the tax samples are the same, against the alternative hypothesis  $H_a$  that the mean WTPs differ. The reported p-value in Table 3 shows that the mean WTP does not seem to be statistically different across the two samples, which could be interpreted as an indication of the absence of the vehicle bias often encountered in the literature.

Gender is a determinant of WTP that has been mentioned in previous studies. For this reason, the second row of Table 3 compares the mean WTP by gender. We observe that the mean WTP in the whole sample is CHF 91.1 for female and CHF 94.7 for male respondents. However, the p-value for the t-test shows that this observed difference in the WTP by gender is not statistically significant.

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<sup>3</sup> For more information, see Arrow, K., Solow, R., Portney, P., E. Leamer, E., Radner, R., Schuman, H. 1993. *Report of the NOAA Panel on Contingent Valuation*. Washington, National Oceanic and Atmospheric Administration. Cited in literature review.

<b>Student test</b>	<b>Fund sample</b>	<b>Tax sample</b>	<b>Full sample</b>
<i>Payment vehicle</i>			
Mean fund			95.3 (172.1)
Mean tax			90.6 (131.2)
H <sub>0</sub> : mean (fund) – mean (tax) = 0			
H <sub>a</sub> : mean (fund) – mean (tax) ≠ 0			
p-value			0.704
<i>Gender</i>			
Mean female	94.8 (156.1)	87.7 (118)	91.1 (137.7)
Mean male	95.8 (187.4)	93.7 (143.9)	94.7 (166.5)
H <sub>0</sub> : mean (female) – mean (male) = 0			
H <sub>a</sub> : mean (female) – mean (male) ≠ 0			
p-value	0.961	0.678	0.766
<i>Has visited a tropical forest</i>			
Mean visited	135.4 (236.3)	115.1 (153.4)	124.5 (195.5)
Mean not visited	83.6 (147.1)	82.4 (122.1)	83 (135)
H <sub>0</sub> : mean (visited) – mean (not visited) = 0			
H <sub>a</sub> : mean (visited) – mean (not visited) > 0			
p-value	0.043	0.041	0.008
<i>Has made a donation</i>			
Mean yes	109.9 (176)	99.6 (146.2)	104.5 (161)
Mean no	65.7 (160.6)	69.4 (82.7)	67.5 (128.5)
H <sub>0</sub> : mean (yes) – mean (no) = 0			
H <sub>a</sub> : mean (yes) – mean (no) > 0			
p-value	0.014	0.009	0.001
<i>Member of an environmental organisation</i>			
Mean yes	131.9 (192.7)	154.8 (205.2)	144 (198.7)
Mean no	89.3 (168.1)	79.3 (109.9)	84.2 (141.5)
H <sub>0</sub> : mean (yes) – mean (no) = 0			
H <sub>a</sub> : mean (yes) – mean (no) > 0			
p-value	0.086	0.008	0.003

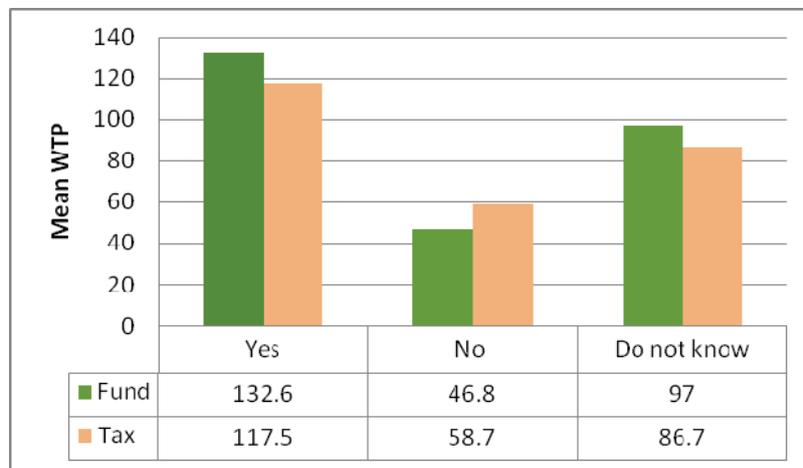
Note: standard deviation in brackets.

**Table 3 : Determinants of WTP**

An interesting result is generated when comparing the WTP of respondents who have visited a tropical forest and the WTP of those who never visited one. It shows that people who have been to a tropical forest are ready to pay a statistically significantly

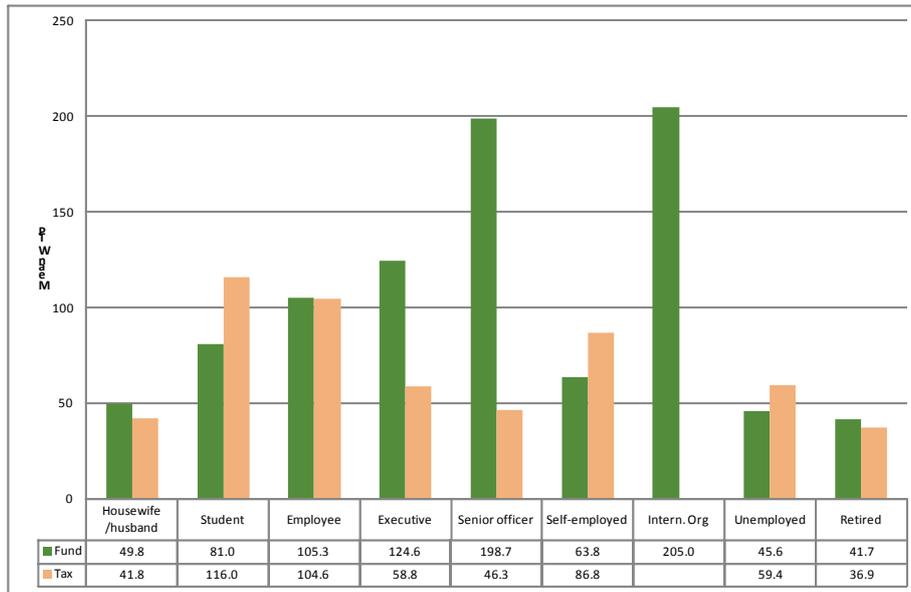
higher amount for their protection than those who have not. Figure 25 also confirms that the mean WTP is higher for the respondents who plan to go to a tropical forest or who are not sure about going than for the ones who do not want to go. This suggests that at least part of the contribution reflects direct use values, although part of the differences among the amounts may result from superior knowledge about issues related to deforestation of those who plan to visit or have already visited tropical forests.

The other potential WTP determinants that are tested in Table 3 relate to the respondents' affiliation to an environmental organisation and to the habit of donating. Results show that the mean WTP is statistically significantly higher for those who have made previous donations to non-profit organisations compared to those who have not. The same applies to members of environmental organisations compared to non members.

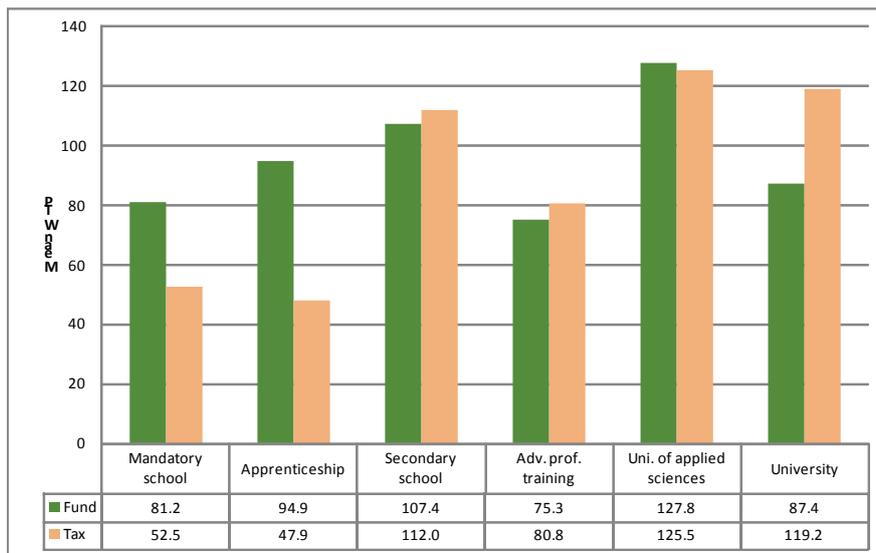


**Figure 25 : Plans to visit a tropical forest and mean WTP**

Figure 26 and Figure 27 relate the mean WTP to the professional status and the educational level of the respondents, respectively. No obvious pattern emerges from them. In addition, the relationships between the mean WTP and the professional and educational levels differ across the two sub-samples. Therefore, we can draw no conclusions from these figures. To get a better picture of the impact of professional and educational levels on WTP, further analysis will be needed. Two major issues need to be addressed. Firstly, some of the sub-categories include only very few respondents, making it impossible to get robust results. This problem is especially blatant regarding the professional status, some sub-categories of which include less than five respondents. This fact highlights the necessity to merge a few of the subcategories to get more accurate measures. Secondly, there are certainly other variables that interact with the professional and educational levels (for example the income and age of the respondents). Therefore, as already mentioned, the precise impact of education and professional level on WTP would need to simultaneously consider and control for other variables through multivariate analysis.



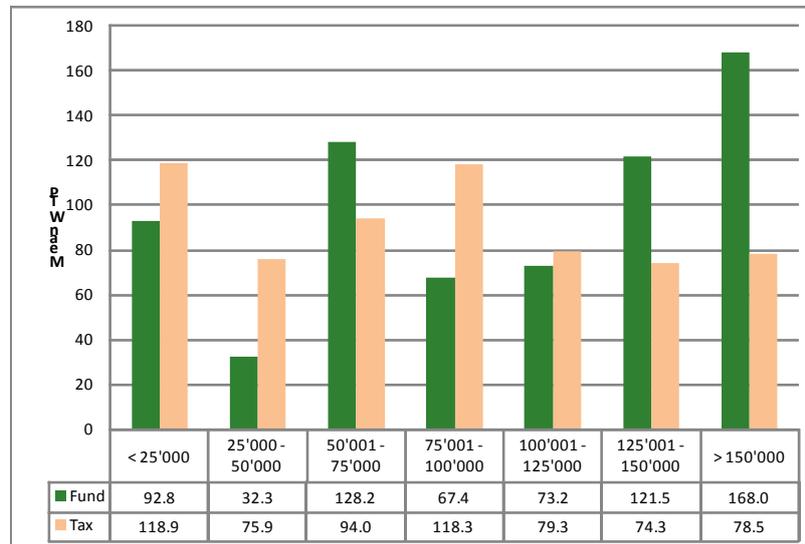
**Figure 26 : Professional status and mean WTP**



**Figure 27 : Educational level and mean WTP**

Environmental services are generally found to be normal goods, which mean that their demand increases when income rises. We would thus expect people with higher income to be willing to contribute more to avoid deforestation. Figure 28 shows the mean WTP in relation to the income of the respondents. It suggests that the impact of income on the WTP differs depending on the payment vehicle. While respondents generally seem to be willing to make higher voluntary contributions as income increases, no such relationship can be found when dealing with a tax-based funding. However, data contained in the figure is purely descriptive and more profound empirical work would be required to assess the impact of income on the WTP. Variables like the age of the

respondents or their education are likely to influence WTP. Younger people, who have generally lower incomes, may for example care more about tropical forest preservation, as the negative effects of deforestation will show in the long term. Such variables would definitely have to be included in a multivariate analysis to be able to draw conclusions about the influence of income on WTP.



**Figure 28 : Income and mean WTP**

## ***VI) Summary and conclusions***

In this Report, we presented a survey that was conducted in the streets of Geneva during November and December 2007. The main aims of the survey were to test the level of awareness on tropical deforestation and to determine the willingness to pay for forest conservation.

The final sample contains about 640 observations. In order to test for the impact of payment vehicle on the WTP to avoid tropical deforestation, we created two questionnaires depending on whether respondents were asked to contribute to a voluntary international fund or to pay an international tax. The “fund” sub-sample contains about 310 observations and the “tax” sub-sample 330. The composition of the sub-samples is very similar and they are both representative of the whole Geneva population, although with a slightly over-representation of people with a higher education level (tertiary level).

From the survey, it results that environmental issues are perceived as important, especially climate change. Tropical deforestation is also perceived as an important issue, possibly because of its contribution to greenhouse gases emissions.

Concerning the costs of preserving tropical forests, about 70% of the respondents indicate that both developed and developing countries should contribute to its financing. When the individual indicated that both countries have to contribute to the

total cost of preservation, people indicated that developed countries should finance about 68% of the costs.

The mean WTP for avoiding tropical deforestation is about CHF 95 per year. However, we should note that a non negligible proportion of the respondents refused to pay. Some stated justifications for a zero response are free-riding, or that people do not trust international organisations or do not like new taxes. Non-governmental organisations, closely followed by the United Nations, were indicated as the preferred managers of the fund. If an international tax were to be implemented, people seem to prefer a tax on tropical woods or taxes with a large funding base, like an income tax or a tax on vehicles.

The final part of the report investigates some preliminary explanations on the elements that determine the respondents' stated willingness to pay. However, we stress that we need to implement a more complete model get a more robust idea of the determinants of the willingness to pay for avoiding tropical deforestation.

## VII) *References*

- Alber, H.J., Ferraro, P. 2004. The economics of terrestrial biodiversity conservation in developing countries. Initiative for Policy Dialogue Environmental Economics Working Papers Series. Available at:  
<http://www0.gsb.columbia.edu/ipd/programs/item.cfm?prid=17&iyid=13&itid=453>
- Arrow, K., Solow, R., Portney, P., E. Leamer, E., Radner, R., Schuman, H. 1993. Report of the NOAA Panel on Contingent Valuation. Washington, National Oceanic and Atmospheric Administration.
- Asahi Glass Foundation. 2007. Questionnaire on environmental problems and the survival of humankind – 15 year summary. Asahi Glass Foundation, Tokyo, Japan.
- Ash, N., Jenkins, M. 2007. Biodiversity and poverty reduction; the importance of biodiversity for ecosystem services. UNEP-WCMC.
- Bateman, I.J., Carson, R.T., Brett, D., Hanenmann, M., Hanley, N., Hett, T., Jones-Lee, M., Loomes, G., Mourato, S., Özdemiroğlu, Pearce, D.W., Sugden, R., Swanson, J. 2002. Economic Valuation with Stated Preferences Techniques: A Manual. Edward Elgar: Cheltenham, UK.
- Baumgärtner, S. 2007. The insurance value of biodiversity in the provision of ecosystem services. *Natural Resource Modeling* 20(1) 87-127.
- Bayon, R. Lovink, J.S. and Veening, W.J. 2000. Financing biodiversity conservation. Sustainable Development Department Technical Paper Series. Inter-American Development Bank. Washington D.C.
- Bayon, R., Hawn, A., Hamilton, K. 2007. Voluntary carbon markets. London: earthscan.
- Biénabe, E. & Hearne, R.R. 2005. Public preferences for biodiversity conservation and scenic beauty within a framework of environmental services payments. *Forest Policy and Economics*, 9: 335-348.
- Buchanan, J.M, Stubblebine, W.C. 1962. Externality. *Economica*, 29: 371-384.
- Cameron, T.A., Englin, J. 1996. Respondent experience and contingent valuation of environmental goods. Working paper 752, UCLA Department of Economics.
- Capoor, K., Ambrosi, P. 2007. State and trends of the carbon market 2007. The World Bank, Washington DC.
- Carson, R.T. 1998. Valuation of tropical rainforests: philosophical and practical issues in the use of contingent valuation. *Ecological Economics* 24: 15-29.
- Carson, R.T. 1999. Contingent valuation: a user's guide. Draft discussion paper 99 26. University of California, San Diego.
- Chomitz, K.M. 2006. At loggerheads? Agricultural expansion, poverty reduction and environment in the tropical forests. A World Bank Policy Research Report, Washington D.C.
- Convention on Biological Diversity (CBD). Article 2, available online at:  
<http://www.cbd.int/convention/articles.shtml?a=cbd-02>
- Curry, T.E. 2004. Public awareness of carbon capture and storage: a survey of attitudes toward climate change mitigation. M.I.T. Masters Thesis available at:  
<http://sequestration.mit.edu/bibliography/policy.html>
- Curry, T.E., Ansolabehere, S., Herzog, H.J. 2007. A survey of public attitudes towards climate change and climate change mitigation technologies in the United States:

- Analyses of 2006 results. MIT Laboratory for energy and the environment, Boston, MA.
- Daily, G. 1997. Nature's services: Societal dependence on natural ecosystems. Island Press, Washington D.C.
- Emerton, L., Bishop, J., Thomas, L. 2006. Sustainable financing of protected areas – a global review of challenges and options. Best Practice Protected Area Guidelines Series No. 13. IUCN, Gland, Switzerland.
- Farber, S., Costanza, R., Wilson, M.A. 2002. Economic and ecological concepts for valuing ecosystem services. *Ecological Economics* 41: 375-392.
- Giraud, K.L., Turcin, B., Loomis, J.B., Cooper, J. 2002. Economic benefits of the protection program for the Stellar sea lion. *Marine Policy* 26(6): 451-458.
- Glenk, K. 2006. Economic valuation of biological diversity – exploring non-market perspectives in the vicinity of the Lore-Lindu National Park in Indonesia's Central Sulawesi region. Dissertation, Georg-August-Universität Göttingen, Germany.
- Goulder, L.H., I.W.H. Parry, I.W.H, Burtraw, D. 1997. Revenue-raising versus other approaches to environmental protection: The critical significance of preexisting tax distortions. *RAND Journal of Economics* 28 (4): 708-731.
- Grieg-Gran, M., Porras, I., Wunder, S. 2005. How can market mechanisms for forest environmental services help the poor? Preliminary lessons from Latin America. *World Development*, Vol 33 (9): 1511-1527.
- Gürlük, S. 2005. The estimation of ecosystem services' value in the region of Misi Rural Development Project: Results from a contingent valuation study. *Forest Policy and Economics* 9: 209-218.
- Heal, G. 1999a. Biodiversity as a commodity. Columbia University. New York, USA.
- Heal, G. 1999b. Valuing ecosystem services. Columbia University. New York, USA.
- Heal, G. 2007. A celebration of environmental and resource economics. *Review of Environmental Economics and Policy*. Volume 1(1): 7-25.
- Hooper, D., Chapin III, F.S., Ewel, J.J., Hector, A., Inchausti, P., Lavorel, S., Lawton, J.H., Lodge, D.M., Loreau, M., Naeem, S., Schmid, B., Setälä, H., Symstad, A.J., Vandermeer, J., Wardle, D.A. 2005. Effects of biodiversity on ecosystem functioning: A Consensus of Current Knowledge. *Ecological Monographs*, 75(1).
- Horton, B., Colarullo, G., Bateman, I.J., Peres, C.A. 2003. Evaluating non-user willingness to pay for a large scale conservation programme in Amazonia: a UK/Italian contingent valuation study. *Environmental Conservation* 30 (2): 139-146.
- House, J., Brovkin, V., Betts, R., Costanza, R., Assunção Silva Dias, M., Holland, E., Le Quéré, C., Kim Phat, N., Riebesell, U., Scholes, M., Arneth, A., Barratt, D., Cassman, K., Christensen, T., Cornell, S., Foley, J., Ganzeveld, L., Hickler, T., Houweling, S., Scholze, M., Joos, F., Kohfeld, K., Manizza, M., Ojima, D., Prentice, I.C., Schaaf, C., Smith, B., Tegen, I., Thonicke, K., Warwick, N. 2006. Climate and Air Quality. In *Millennium Ecosystem Assessment 2005—Current State and Trends: Findings of the Condition and Trends Working Group. Ecosystems and Human Well-being*. Washington, D.C.: Island Press.
- IUCN-UNEP. 2007. Developing international payments for ecosystem services – towards a greener world economy. IUCN-UNEP IPES brochure, available at: [http://www.iucn.org/themes/economics/Files/IPES\\_brochure\\_0607.pdf](http://www.iucn.org/themes/economics/Files/IPES_brochure_0607.pdf)

- Jenkins, M. Sherr, S., Inbar, M. 2004. Markets for biodiversity services – Potential roles and challenges, *Environment*, 46(6). 2004.
- Kramer, R.A., Mercer, E. 1997. Valuing a global environmental good: U.S. residents' willingness to pay to protect tropical rain forests. *Land Economics*, Vol. 73 (2): 196-210.
- Kremen, C., Ostfeld, R.S. 2005. A call to ecologists: measuring, analyzing, and managing ecosystem services. *Front Ecol Environ*; 3(10): 540-548.
- Krutilla, J.V. 1967. Conservation Reconsidered. *American Economic Review*, 57, 4: 777-786.
- Millennium Ecosystem Assessment (MA). 2005. Ecosystems and human well-being: Synthesis Report. Island Press. Washington D.C.
- Mulder, I., ten Kate, K., Scherr, S. 2005. Private sector demand in markets for ecosystem services: preliminary findings. Adapted from the full report submitted to the UNDP-GEF project: *Institutionalizing payments for ecosystem services, Supplement IV. Mobilizing private sector buyers of ecosystem services*. Forest Trends. Washington D.C., USA.
- Nunes, P., van den Bergh, J. 2001. Economic Valuation of Biodiversity: Sense or Nonsense? *Ecological Economics*, Elsevier, 39(2): 203-222.
- Pagiola, S. & Platais, G. 2002. Payments for environmental services. Environmental Strategy Note No.3, The World Bank, Washington D.C.
- Pagiola, S. von Ritter, K., Bishop, J. 2004. Assessing the economic value of ecosystem conservation. Environment department Paper 101. World Bank. Washington D.C.
- Pattanayak, S. 2004. Valuing watershed services: concepts and empirics from Southeast Asia. *Agriculture, Ecosystems, and Environment*. 104 (1): 171-184.
- Pearce, D. 2007. Do we really care about biodiversity? *Environmental and Resource Economics* 37:313-333.
- Perrings, C., Barbier, E.B., Baumgartner, S., Chopra, K., Costello, C., Kinzig, A., Pascual, U., Polasky, S., Hassan, R. 2007. DRAFT. The economics of biodiversity and ecosystem services. DIVERSITAS international.
- Peterson, A., Gallagher, L., Huberman, D., Mulder, I. 2007. Seeing REDD: Reducing emissions and conserving biodiversity by avoiding deforestation. DRAFT. UNEP-IUCN.
- Powell, I. White, A., Landell-Mills, N. 2002. Developing markets for ecosystem services of forests. Forest Trends. Washington D.C.
- Ravnborg, H.M., Damsgaard, M.G., Raben, K. 2007. Payments for ecosystem services – issues and pro-poor opportunities for development assistance. Danish Institute for International Studies (DIIS) Report 2007:6, Copenhagen, Denmark.
- Reiner, D.M., Curry, T.E., de Figueiredo, M.A., Herzog, H.J., Ansolabehere, S.D., Itaoka, K., Johnsson, F., Odenberger, M. 2006. American exceptionalism? Similarities and differences in national attitudes towards energy policy and global warming. *Environ. Sci. Technol.* Web release date: 22 Feb. 2006.
- Scherr, S., White, A., Khare, A. 2004. For services rendered: the current status and future potential of markets for ecosystem services provided by tropical forests. ITTO Technical Series No. 21, Tokyo, Japan.
- Schlamadinger, B., Bird, N., Brown, S., Canadell, J., Ciccacese, L., Dutschke, M., Fiedler, J., Fischlin, A., Fearnside, P., Forner, C., Freibauer, A., Frumhoff, P.,

- Hoehne, N., Johns, T., Kirschbaum, M., Labat, A., Marland, G., Michaelowa, A., Montanarella, L., Moutinho, P., Murdiyarso, D., Pena, N., Pingoud, K., Rakonczay, Z., Rametsteiner, E., Rock, J., Sanz, M.J., Schneider, U., Shvidenko, A., Skutsch, M., Smith, P., Somogyi, Z., Trines, E., Ward, M., Yamagata, Y. 2006. A synopsis of land use, land-use change and forestry (LULUCF) under the Kyoto Protocol and Marrakech Accords. *Environ. Sci. Policy*, 10, doi:10.1016/j.envsci.2006.11.002, in press.
- Sell, J. 2006. Decision making of market actors in the context of ecosystem services from tropical forestry – criteria, preferences, and expected benefits. Dissertation presented to the Swiss Federal Institute of Technology Zurich, Switzerland.
- Taiyab, N. 2006. Exploring the market for voluntary carbon offsets. International Institute for Environment and Development (IIED), London, UK.
- Turner, R.K., Paavola, J., Cooper, P., Farber, S., V. Jessamy, Georgiou, S. 2003. Valuing nature: lessons learned and future research directions. *Ecological Economics* 46: 493-510.
- UNEP-IUCN. 2006. Developing international payments for ecosystem services: a technical discussion. Summary report of expert workshop. Geneva, Switzerland, September 12-13, 2006.
- UNFCCC. 2006. Background Paper for the Workshop on Reducing Emissions from Deforestation in Developing Countries. Part II: Policy Approaches and Positive Incentives. Working Paper No. 1(b).
- Wertz-Kanounnikoff, S. 2006. Payments for environmental services – A solution for biodiversity conservation? IDDRI. Paris, France.
- Wilson, M.A., Carpenter S.R. 1999. Economic valuation of freshwater ecosystem services in the United States. *Ecological Applications*, Vol 9, No. 3: 772-783.
- Wunder, S. 2005. Payments for ecosystem services: some nuts and bolts. Occasional Paper No. 42. CIFOR. Jakarta, Indonesia.
- Wunder, S. 2007. The efficiency of payments for environmental services in tropical conservation. *Conservation Biology*. Vol 21 (1): 48-58.

## **ANNEX: Questionnaires**

À remplir par l'étudiant

Initiales étudiant :

Questionnaire n° :

**Questionnaire portant sur la préservation des forêts tropicales**  
Cette enquête est réalisée par la Haute École de Gestion de Genève

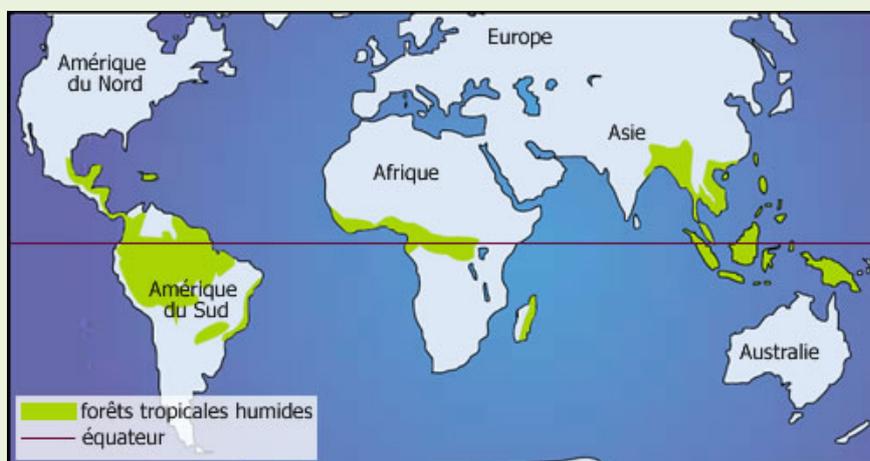
**La confidentialité et l'anonymat des données sont garantis**

**La Haute École de Gestion de Genève réalise une enquête sur les problèmes de déforestation et le financement de la préservation des forêts tropicales. Dans ce cadre nous vous serions très reconnaissants de compléter ce questionnaire.**

**Ce questionnaire s'intéresse aux problèmes de déforestation des forêts tropicales :**

- Le bassin Amazonien (Amérique du sud)
- Le bassin du Congo (Afrique centrale)
- Les forêts d'Asie du Sud-Est

**Surface totale des forêts tropicales : 970 millions d'hectares. (Environ 235 fois la Suisse)**



**Les faits**

Les forêts disparaissent à une vitesse de 20 hectares par minute ce qui correspond à environ 20 terrains de foot à la minute ou à 3 fois la surface de la Suisse par année.

1. Avant aujourd'hui, aviez-vous déjà entendu parler des problèmes de la déforestation ou de la disparition de la biodiversité ? **[1 réponse possible]**
  - Oui, de la biodiversité
  - Oui, de la déforestation
  - Oui, des deux
  - Non, d'aucun des deux
2. Si vous avez répondu oui à la question précédente, par quels biais avez-vous déjà entendu parler des forêts tropicales, de la biodiversité ou de la déforestation ? **[plusieurs réponses possibles]**
  - Par la télévision
  - Par la radio
  - Par les médias papiers
  - Par internet
  - Au travail
  - A l'école, à l'université
  - Par les amis, la famille, les connaissances

3. Vous êtes-vous déjà rendu dans une forêt tropicale ?

- Oui  
 Non

4. Pensez-vous vous rendre dans une forêt tropicale dans le futur ?

- Oui  
 Non  
 Je ne sais pas

5. Quelle est **selon vous** l'importance relative des problèmes environnementaux par rapport à d'autres thèmes tels que le chômage, les assurances retraite et santé, la pauvreté, l'éducation ou encore l'immigration ?

Très importants	Plutôt importants	Peu importants	Pas importants	Je ne sais pas
<input type="checkbox"/>				

6. Classez de 1 à 5 les enjeux environnementaux suivants selon leur importance (1 étant l'enjeu le plus important et 5 le moins important) :

- ... Le réchauffement climatique
- ... La déforestation
- ... La pollution de l'eau
- ... La pollution de l'air
- ... Le traitement des déchets

#### Le rôle des forêts tropicales et les conséquences de la déforestation :

- **Biodiversité** : par biodiversité on entend la variété des organismes vivants. L'ensemble des forêts tropicales recèle au moins 75% des espèces vivantes animales et végétales de notre planète.
- **Recherche pharmaceutique** : la biodiversité de ces forêts pourrait permettre de découvrir des médicaments afin de soigner des maladies encore incurables à ce jour.
- **Absorption de CO<sub>2</sub>** : La végétation rend possible le stockage d'une quantité de carbone plus importante qu'elle n'en rejette, participant ainsi à la réduction des gaz à effets de serre, principaux responsables du réchauffement climatique. La déforestation est responsable de 20% des émissions de CO<sub>2</sub> au niveau mondial.
- **Tourisme** : des touristes visitent les forêts chaque année et la population locale profite de ses retombées.
- **Érosion du sol** : la déforestation entraîne la perte de fertilité des sols.
- **Population locale** : la déforestation détruit l'environnement de vie de nombreuses populations locales.

7. **Selon vous**, quelle est la contribution des forêts tropicales aux domaines suivants?

	Très importante	Plutôt importante	Peu importante	Pas importante	Je ne sais pas
a. La biodiversité animale et végétale	<input type="checkbox"/>				
b. La recherche pharmaceutique	<input type="checkbox"/>				
c. L'absorption de carbone (CO2)/la réduction du réchauffement climatique	<input type="checkbox"/>				
d. Le tourisme	<input type="checkbox"/>				
e. Répondre aux besoins des populations locales	<input type="checkbox"/>				

Parmi cette liste, entourez la lettre qui correspond à **la contribution la plus importante** :

a

b

c

d

e

Supposez que l'on mette en œuvre **un programme international de préservation des forêts tropicales** visant à réduire de 50% la déforestation au cours des 20 prochaines années. Ce programme consisterait à protéger 100 millions d'hectares de forêts menacés de déforestation, soit environ 25 fois la taille de la Suisse.

Le coût total d'un tel programme de préservation des forêts se monterait à 38 milliards de francs suisse par an (soit 380 francs par hectare), ce qui correspond environ au double des investissements actuels dans la foresterie au niveau mondial.

Les fonds seront récoltés **dans tous les pays développés et gérés par un organisme international** tel que l'ONU qui les investira dans des projets concrets de préservation des forêts tropicales.

L'argent récolté sera utilisé pour :

- Aider les gouvernements des pays tropicaux à appliquer des mesures nationales visant à réduire la déforestation. La création de **zones protégées (Parcs Nationaux)** est un exemple des diverses mesures possibles qui pourraient réduire la déforestation.
- **Récompenser directement les acteurs locaux** dans les pays tropicaux qui choisissent de protéger leurs forêts au lieu de les convertir en champs ou en pâturages.

Un organisme indépendant de surveillance sera chargé de vérifier sur le terrain que les paiements servent bel et bien à réduire la déforestation.

Supposez qu'un **fonds international** soit mis en place pour récolter l'argent nécessaire pour pouvoir mettre en place le programme de préservation des forêts tropicales décrit plus haut.

8. Selon vous, qui devrait financer la préservation des forêts tropicales ? **[1 réponse possible]**

- Uniquement les pays développés
- Uniquement les pays en voie de développement dans lesquels se trouvent les forêts
- Les deux : les pays développés devraient assumer .....% des coûts totaux

9. Si on vous demandait de faire une donation au fonds de préservation des forêts tropicales décrit plus haut, quel montant seriez-vous prêt à verser **par an** ?

Remplissez l'espace à côté de chaque montant de la manière suivante :

Montant (CHF par an)	Je suis certain(e) de vouloir payer ce montant : <b>V</b>	Je ne pas sûr(e) de vouloir payer ce montant: --	Je suis certain(e) de ne pas vouloir payer ce montant : <b>X</b>
0	.....		
1	.....		
5	.....		
10	.....		
20	.....		
35	.....		
50	.....		
75	.....		
100	.....		
150	.....		
200	.....		
400	.....		
600	.....		
1000	.....		
Plus de 1000	.....		

10. Si vous ne voulez pas contribuer, quelles en est/sont la/les raison(s) ? **[2 réponses possibles]**

- Je ne pense pas qu'il soit important de préserver la forêt tropicale
- Je ne peux pas me permettre de donner de l'argent pour préserver la forêt tropicale
- Je pense qu'il y a des causes plus importantes à financer en priorité
- Préserver les forêts tropicales a une valeur pour moi, mais ce n'est pas à moi de financer leur préservation
- Je ne pense pas qu'il soit possible de préserver les forêts tropicales
- Je fais déjà assez de dons pour d'autres bonnes causes
- Je ne fais pas confiance aux organisations internationales
- Autre (à préciser) : \_\_\_\_\_

11. Si vous voulez contribuer, pourquoi avez-vous décidé de verser un montant maximal de \_\_\_\_\_ CHF par année ? **[2 réponses possibles]**

- C'est la valeur que j'attribue à la forêt tropicale
- C'est le montant maximal que je peux me permettre de donner
- C'est un montant que je pourrais facilement payer
- Ce montant serait suffisant si tout le monde payait la même chose
- Ce montant me donne bonne conscience
- C'est le montant que je verse normalement pour des bonnes causes
- J'ai choisi ce montant au hasard
- Autre (à préciser) : \_\_\_\_\_

12. **Selon vous**, qui devrait gérer ce fonds ? **[1 réponse possible]**

- L'ONU
- La Banque Mondiale
- Une ONG (WWF, Greenpeace...)
- Les gouvernements locaux des pays où se trouvent les forêts tropicales
- Le gouvernement suisse
- Autre (à préciser) : \_\_\_\_\_

### Informations générales :

13. Vous êtes :

- Une femme
- Un homme

14. Quel est votre âge ? \_\_\_\_\_ (nombre d'années)

15. Quelle est votre nationalité ?

- Suisse
- Pays de l'Union Européenne
- Autre (à préciser) : \_\_\_\_\_

16. De combien de personnes se compose votre ménage (vous compris)?

Nombre d'adultes (plus de 18 ans) : \_\_\_\_\_

Nombre d'enfants (moins de 18 ans) : \_\_\_\_\_

17. Quel est votre profil professionnel actuel ?

- Femme – Homme au foyer
- Étudiant(e)
- Employé(e)
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- Cadre supérieur(e)
- Indépendant(e)
- Fonctionnaire international
- Sans emploi
- Retraité(e)

18. Quel niveau d'étude avez-vous atteint ? Si vous êtes en train d'étudier, cochez le niveau qui correspond aux études que vous avez achevées.

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19. Quel est le revenu brut annuel de votre ménage ?

- Moins de CHF 25'000.-
- Entre CHF 25'000.- et CHF 50'000.-
- Entre CHF 50'001.- et CHF 75'000.-
- Entre CHF 75'001.- et CHF 100'000.-
- Entre CHF 100'001.- et CHF 125'000.-
- Entre CHF 125'001.- et CHF 150'000.-
- Plus de CHF 150'000.-

20. Avez-vous déjà fait un don à une organisation (par exemple WWF, Caritas, UNICEF)?

- Oui
- Non

21. Est-ce que vous êtes membre d'une association environnementale ? (par exemple WWF)?

- Oui
- Non

**La Haute École de Gestion de Genève vous remercie pour votre participation !**

**La confidentialité et l'anonymat des données sont garantis**

Remarque: il y a actuellement des discussions au niveau international sur le financement de la préservation des forêts tropicales. Ces discussions n'ont pas encore abouti à la mise en place d'un fonds. Ce questionnaire va aider à comprendre la valeur que les individus accordent à la préservation des forêts tropicales.

À remplir par l'étudiant

Initiales étudiant :

Questionnaire n° :

**Questionnaire portant sur la préservation des forêts tropicales**  
**Cette enquête est réalisée par la Haute École de Gestion de Genève**

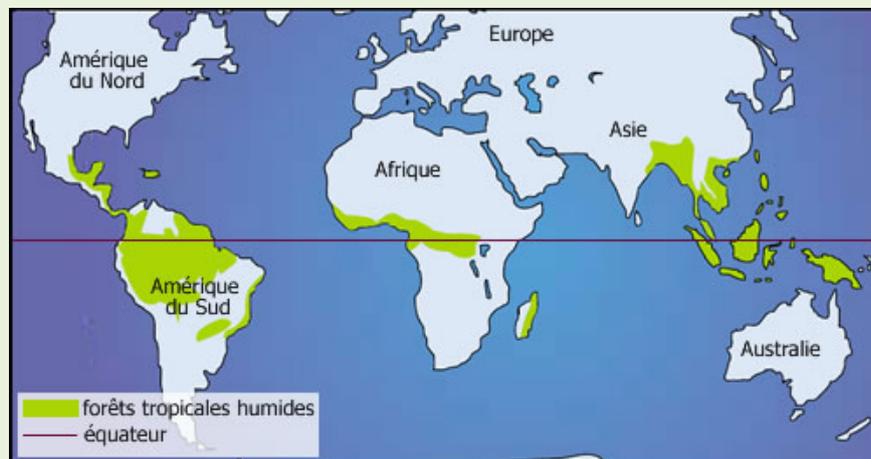
**La confidentialité et l'anonymat des données sont garantis**

**La Haute École de Gestion de Genève réalise une enquête sur les problèmes de déforestation et le financement de la préservation des forêts tropicales. Dans ce cadre nous vous serions très reconnaissants de compléter ce questionnaire.**

**Ce questionnaire s'intéresse aux problèmes de déforestation des forêts tropicales :**

- Le bassin Amazonien (Amérique du sud)
- Le bassin du Congo (Afrique centrale)
- Les forêts d'Asie du Sud-Est

**Surface totale des forêts tropicales : 970 millions d'hectares. (Environ 235 fois la Suisse)**



**Les faits**

Les forêts disparaissent à une vitesse de 20 hectares par minute ce qui correspond à environ 20 terrains de foot à la minute ou à 3 fois la surface de la Suisse par année.

1. Avant aujourd'hui, aviez-vous déjà entendu parler des problèmes de la déforestation ou de la disparition de la biodiversité ? **[1 réponse possible]**
  - Oui, de la biodiversité
  - Oui, de la déforestation
  - Oui, des deux
  - Non, d'aucun des deux
2. Si vous avez répondu oui à la question précédente, par quels biais avez-vous déjà entendu parler des forêts tropicales, de la biodiversité ou de la déforestation ? **[plusieurs réponses possibles]**
  - Par la télévision
  - Par la radio
  - Par les médias papiers
  - Par internet
  - Au travail
  - A l'école, à l'université
  - Par les amis, la famille, les connaissances

3. Vous êtes-vous déjà rendu dans une forêt tropicale ?

- Oui  
 Non

4. Pensez-vous vous rendre dans une forêt tropicale dans le futur ?

- Oui  
 Non  
 Je ne sais pas

5. Quelle est **selon vous** l'importance relative des problèmes environnementaux par rapport à d'autres thèmes tels que le chômage, les assurances retraite et santé, la pauvreté, l'éducation ou encore l'immigration ?

Très importants	Plutôt importants	Peu importants	Pas importants	Je ne sais pas
<input type="checkbox"/>				

6. Classez de 1 à 5 les enjeux environnementaux suivants selon leur importance (1 étant l'enjeu le plus important et 5 le moins important) :

- ... Le réchauffement climatique
- ... La déforestation
- ... La pollution de l'eau
- ... La pollution de l'air
- ... Le traitement des déchets

#### Le rôle des forêts tropicales et les conséquences de la déforestation :

- **Biodiversité** : par biodiversité on entend la variété des organismes vivants. L'ensemble des forêts tropicales recèle au moins 75% des espèces vivantes animales et végétales de notre planète.
- **Recherche pharmaceutique** : la biodiversité de ces forêts pourrait permettre de découvrir des médicaments afin de soigner des maladies encore incurables à ce jour.
- **Absorption de CO<sub>2</sub>** : La végétation rend possible le stockage d'une quantité de carbone plus importante qu'elle n'en rejette, participant ainsi à la réduction des gaz à effets de serre, principaux responsables du réchauffement climatique. La déforestation est responsable de 20% des émissions de CO<sub>2</sub> au niveau mondial.
- **Tourisme** : des touristes visitent les forêts chaque année et la population locale profite de ses retombées.
- **Érosion du sol** : la déforestation entraîne la perte de fertilité des sols.
- **Population locale** : la déforestation détruit l'environnement de vie de nombreuses populations locales.

7. **Selon vous**, quelle est la contribution des forêts tropicales aux domaines suivants?

	Très importante	Plutôt importante	Peu importante	Pas importante	Je ne sais pas
a. La biodiversité animale et végétale	<input type="checkbox"/>				
b. La recherche pharmaceutique	<input type="checkbox"/>				
c. L'absorption de carbone (CO2)/la réduction du réchauffement climatique	<input type="checkbox"/>				
d. Le tourisme	<input type="checkbox"/>				
e. Répondre aux besoins des populations locales	<input type="checkbox"/>				

Parmi cette liste, entourez la lettre qui correspond à **la contribution la plus importante** :

a

b

c

d

e

Supposez que l'on mette en œuvre **un programme international de préservation des forêts tropicales** visant à réduire de 50% la déforestation au cours des 20 prochaines années. Ce programme consisterait à protéger 100 millions d'hectares de forêts menacés de déforestation, soit environ 25 fois la taille de la Suisse.

Le coût total d'un tel programme de préservation des forêts se monterait à 38 milliards de francs suisse par an (soit 380 francs par hectare), ce qui correspond environ au double des investissements actuels dans la foresterie au niveau mondial.

Les fonds seront récoltés **dans tous les pays développés et gérés par un organisme international** tel que l'ONU qui les investira dans des projets concrets de préservation des forêts tropicales.

L'argent récolté sera utilisé pour :

- Aider les gouvernements des pays tropicaux à appliquer des mesures nationales visant à réduire la déforestation. La création de **zones protégées (Parcs Nationaux)** est un exemple des diverses mesures possibles qui pourraient réduire la déforestation.
- **Récompenser directement les acteurs locaux** dans les pays tropicaux qui choisissent de protéger leurs forêts au lieu de les convertir en champs ou en pâturages.

Un organisme indépendant de surveillance sera chargé de vérifier sur le terrain que les paiements servent bel et bien à réduire la déforestation.

Supposez que le programme de préservation des forêts tropicales décrit plus haut soit effectivement mis en place et que tous les pays développés participent à son financement. En Suisse, l'argent nécessaire serait récolté grâce à la mise en place **d'une taxe obligatoire**.

8. Selon vous, qui devrait financer la préservation des forêts tropicales ? **[1 réponse possible]**

- Uniquement les pays développés
- Uniquement les pays en voie de développement dans lesquels se trouvent les forêts
- Les deux : les pays développés devraient assumer .....% des coûts totaux

9. Quel montant seriez-vous prêt à payer **par an** sous forme de **taxe annuelle obligatoire à payer par toutes les personnes de plus de 18 ans qui résident ou travaillent en Suisse** ?

Remplissez l'espace à côté de chaque montant de la manière suivante :

Montant (CHF par an)	Je suis certain(e) de vouloir payer ce montant : <b>V</b>	Je ne pas sûr(e) de vouloir payer ce montant: --	Je suis certain(e) de ne pas vouloir payer ce montant : <b>X</b>
0	.....		
1	.....		
5	.....		
10	.....		
20	.....		
35	.....		
50	.....		
75	.....		
100	.....		
150	.....		
200	.....		
400	.....		
600	.....		
1000	.....		
Plus de 1000	.....		

10. Si vous ne voulez pas contribuer, quelles en est/sont la/les raison(s) ? **[2 réponses possibles]**

- Je ne pense pas qu'il soit important de préserver la forêt tropicale
- Je ne peux pas me permettre de donner de l'argent pour préserver la forêt tropicale
- Je pense qu'il y a des causes plus importantes à financer en priorité
- Préserver les forêts tropicales a une valeur pour moi, mais ce n'est pas à moi de financer leur préservation
- Je ne pense pas qu'il soit possible de préserver les forêts tropicales
- Je voudrais contribuer à la préservation des forêts tropicales, mais je suis contre l'introduction de nouvelles taxes
- Je ne fais pas confiance aux organisations internationales
- Je ne fais pas confiance au gouvernement suisse
- Autre (à préciser) : \_\_\_\_\_

11. Si vous voulez contribuer, pourquoi avez-vous décidé de verser un montant maximal de \_\_\_\_\_ CHF par année ? **[2 réponses possibles]**

- C'est la valeur que j'attribue à la forêt tropicale
- C'est le montant maximal que je peux me permettre de donner
- C'est un montant que je pourrais facilement payer
- Ce montant serait suffisant si tout le monde payait la même chose
- Ce montant me donne bonne conscience
- C'est le montant que je verse normalement pour des bonnes causes
- J'ai choisi ce montant au hasard
- Autre (à préciser) : \_\_\_\_\_

12. **Selon vous**, quelle devrait-être la nature de cette taxe ? **[1 réponse possible]**

- Impôt sur le revenu
- Impôt sur la fortune
- Taxe sur le carburant
- Taxe sur les billets d'avion
- Taxe sur l'énergie
- Taxe sur les véhicules polluants
- Taxe sur le bois tropical
- Taxe de séjour

**Informations générales :**

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