# Financial Support for Biodiversity Protection in Developing Countries - Does the CBD Mechanism Lead to an Appropriate Level of Biodiversity Protection?

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## 1 Introduction

An economic analysis asks, whether or not a production or regulation leads to an efficient production or provision of a good. The topic here concerns the Convention on Biodiversity (CBD) and the provision of biodiversity protection in developing countries in connection with the Convention. In the case of biodiversity protection and services we are confronted with provision problems, as the good in question is a (global) public good. To solve the problem of insufficient biodiversity protection in developing countries the CBD proposes a solution. The contracting developed country parties have committed themselves to provide „new and additional financial resources“ to developing countries in order to enable them to protect their own biodiversity (Article 20). With Article 21 and one of the Conferences of the Parties respectively, the Global Environmental Facility (GEF) was appointed to operate the financial mechanism under the CBD. The overall question now is, whether or not the regulations concerning financing biodiversity protection lead to an efficient provision of biodiversity protection in developing countries. As the perspective is global, the question of a global efficient level of biodiversity protection in developing countries is central in this article.

More precisely the questions are:

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- Do the new and additional financial resources provided through GEF lead to an appropriate level of biodiversity protection?
- Will the negotiations lead to an appropriate level of biodiversity protection?

The paper addresses these questions and is organised as follows: it is assumed that it is known that biodiversity and its components are suitable for the satisfaction of human needs. First, it describes what is understood as an economic analysis and an economic perspective. Then biodiversity services are described as public goods and global public goods, respectively. The problem of providing these goods is explained and articles 20 and 21 are presented as a solution to the market failure problem of providing public goods. Then the aforementioned questions are examined. To answer the first question estimated costs for biodiversity protection and actual spending of the GEF are compared. To respond to the second question, the replenishment regulations are analysed. Both of these considerations lead to the thesis that the actual regulations lead to an undersupply of global biodiversity protection. It is argued that the economic criterion for the amounts of money provided by the industrialised countries should be their benefits from protection of biodiversity. To verify the thesis a Contingent Valuation study and its results are presented. Before the results of the survey are compared to the actual spending of the GEF, their validity is discussed. The results of the Contingent Valuation study support the assumption, that the request for global biodiversity protection is definite higher than the actual spending of the GEF. This result can be used to argue for more attention from political decision makers on preferences of the public on biodiversity protection spending.

## 2 Economic analysis & economic perspective

In this paper economic analysis is understood as an analysis which questions, whether or not the use of resources leads to an efficient production of a private or public good (Zimmermann 1994), (Hanley 1997). The economic perspective includes the assumption of self-interested individuals maximising their personal benefits.

On a complete markets, when several conditions are achieved, the activities of self-interested individuals lead to a socially optimal production of goods. The individual marginal costs correspond to the social marginal benefit. But if not all conditions are met, markets are incomplete and externalities occur. Public goods are a case of externalities, no one can be

excluded from the consumption of these benefits additionally no rivalry in consumption occurs (Samuelson, 1951 cited after (Hanley 1997) and (Cansier 1993)). There are little incentives for companies to produce goods with positive external effects: as the users can not be excluded from the consumption of the goods, they tend not to reveal their demand. They can consume the good without paying for it ("free riding"), and consequently the producer gains no revenue from (a part of) the benefits he produces and therefore his production is lower than the actual demand for the good. The classic solution for this case of market failure is the provision of the public good by the government (Hanley et al 1997).

Biodiversity services can be regarded as public goods. So the market failure problem as described above occurs. That leads to the implication that biodiversity services are undersupplied and should be provided by the government. But to provide the good by the government is not as easy as in the case of "normal" public goods. Some of the positive external effects of biodiversity protection occur global. Thus, biodiversity services are referred to as global public goods (Kindleberger 1986; Kaul 1999; Perrings 2003).

The provision of **global** public goods causes special challenges. In the case of global public goods there is no government which could provide the public good (Kaul 1999). Also in the case of biodiversity there is no supranational institution or "world government", which would have the authority to internalise the external effects of biodiversity conservation (Hanley 1997, p. 163 ). From an idealised economic point of view this institution would have to organise the protection of biodiversity in developing countries at a level where the global marginal cost of biodiversity protection corresponds to global marginal benefit of protection.

As participating nations recognised the importance of biodiversity protection in developing countries and the problem of undersupply of the public good, they tried to find solutions to the problem. Some parts of the CBD can be regarded as regulations to ensure the provision of biodiversity services in developing countries.

# 3 Contribution of CBD to provision of biodiversity protection in developing countries

With articles 20 and 21 of CBD a multinational regulation was agreed upon to contribute to the solution of undersupply of biodiversity protection in developing countries. More developed countries compelled themselves to provide new and additional financial resources for biodiversity conservation. The incremental cost approach, which should lead to sharing pf expenses provided for biodiversity protection projects, was also agreed. More developed

countries only have to pay for ***global environmental benefit*** of measures or projects to protect biodiversity in developing countries[2]. The national or local benefit that occurs from these projects in developing countries has to be financed by national governments or co-financers. At the same time Article 20(2) states, that "implementation of these commitments shall take into account the need for adequacy".

From an economic point of view this "need for adequacy" can be interpreted in several ways. In most of the cases the discussion about adequacy concerns sharing of burden between developing and developed countries. Developing countries interpret "adequacy" as following: They estimate that the contributions shall be as high as the individual costs which occur in developing countries when protection measures are implemented. The viewpoint of the developed countries is that the contributions shall be adequate to finance only social costs of these measures. Beyond the discussion of cost sharing between developed and developing country parties the need for adequacy can be alternatively interpreted: Need for adequacy, however can be interpreted as a level of contributions of donor countries that allows for a **global efficient level** of protection of biodiversity in developing countries.

An optimal global level of biodiversity conservation in developing countries can be achieved when the **global social marginal costs of protection are as high as the social marginal benefit of the protection.** The question is then: Are the commitments of donor countries adequacy in sense of global efficiency?

With Article 21 and the Conference of the Parties (COP I) respectively, the Global Environmental Facility (GEF) was appointed to operate the financial mechanism under the CBD. Thus, the GEF is the institution that organises the governmental provision of financial resources for biodiversity protection in developing countries. Does the regulation defined to the CBD and achieved by the GEF lead to a level of biodiversity protection in developing countries where global social costs and benefit are equal?

[2] "The developed country Parties shall provide new and additional financial resources to enable developing country Parties to meet the agreed full incremental costs to them of implementing measures which fulfil the obligations of this Convention and to benefit from its provisions and which costs are agreed between a developing country Party and the institutional structure referred to in Article 21, in accordance with policy, strategy, programme priorities and eligibility criteria and an indicative list of incremental costs established by the Conference of the Parties." Article 20 (2) CBD

# 4 Financial resources from GEF and costs of worldwide biodiversity protection

## 4.1 Financial resources provided by GEF

If we consider the payments of the GEF, it must be distinguished between payments to and from the GEF. Besides biodiversity protection projects, the GEF-fund also finances climate change, international waters, ozone, land degradation, and persistent organic pollutants projects.

Every four years the donor countries decide on the payments for the following four years. After the pilot phase of the GEF (1991-1993) the GEF-fund was replenished three times in 1993 (GEF-1), 1997 (GEF-2) and 2002 (GEF-3) (Streck 2001; Horta 2002; GEF 2002e; GEF 2002f). The intended ratio for the focal area biodiversity was 32 to 41 percent of the whole GEF-fund (Bundesregierung 1999), (GEF 2002f). For the GEF-1 approximately $834 million

**Table 1: Payments in the GEF ( in million US$ with exception of 1)**

| | GEF-1 (1994-1997) | GEF-2 (1998-2002) | *GEF-3 (2003-2007)*[3] |
|---|---|---|---|
| (1) commitments in billion US-$ ([4] and [5]) | approx. 2 | approx. 2 | *2,92 (2,21)*[6] |
| (2) percentages of contributions for biodiversity ([7] and [8]) | 41,7% | 39% | *32%* |
| (3) absolute payments for biodiversity[9] | 834 | 676 | *960* |
| **(4) calculated annual payments for biodiversity** [10] | **208** | **169** | ***240*** |
| (5) Germany´s contributions (absolute and as percentages of whole GEF)[11] | 238 (11,9%) | 228 (11,4%) | *264 (11%)* |
| (6) average annual contributions of Germans for biodiversity to GEF[12] | approx. 25 | approx. 22 | approx. 21 |

**Source: see footnote (own assembly)**

[3] planned
[4] (GEF 2002e)
[5] (GEF 2002f)
[6] 2,21 million US-$ are new commitments (Horta 2002). The difference results from carryover of GEF-2 resources and investment income.
[7] (Bundesregierung 1999)
[8] (GEF 2002f)
[9] calculated from (1) and (2)
[10] calculated (3) /(4)
[11] (GEF 2002e; GEF 2002f)

were planned to finance the biodiversity conservation(GEF 2002e). For the years 2003 to 2007 there are $960 million planned for biodiversity protection in developing countries (GEF 2002f). We can deduce computed value of $240 million annually. These are planned payments into the GEF-fund.

Germany contributes 11% to 12% of the total amount of the donor countries (GEF 2002e; GEF 2002f). As 32 to 14 percent of the GEF money were spent or are planed to spent for biodiversity protection, Germany spent and spends a calculated annually amount of approximately 25 million US-$ for biodiversity protection in developing countries through the GEF (see **Error! Reference source not found.**).

**Table 1: Payments from the GEF for biodiversity protecting projects**

| **Source** | **Period** | **Spending** | **Annual spending** |
|---|---|---|---|
| (GEF 2002b) | 1992-2002 | 1.4 billion US-$ | 140 million US-$ |
| GEF (gefweb.org) | 1991-1999 | 991 million US-$ (grants) plus 1.5 million US-$ (co financing) | 310 million US-$ |

**Source: own assembly**

Figures concerning payments **from** the GEF projects are as follows: "from 1992 to 2002, GEF had allocated nearly $1.4 billion for 470 biodiversity projects in 160 countries" (GEF 2002b). 1.4 billion in ten years means that on average $140 million was spend annually for biodiversity projects between 1992 and 2002. According to another source the GEF payments from 1991 to 1999 were $991 million in grants. An additional $1.5 billion in co-financing for biological diversity projects was mobilized (GEF, internet, focal areas). There is a total payment of $310 million annual contribution from industrialised countries for biodiversity protection in developing countries (see Table 1)..

## 4.2 Costs of global biodiversity protection and biodiversity protection in developing countries

There are only a few estimations on the costs of global biodiversity protection and biodiversity protection in developing countries. The estimations of annual costs range from

[12] calculated from (2) and (5)

US-$ 170 million for traditional protection of tropical rain forest (Reid 1989) over 500 million US dollars for the protection 25 biodiversity hot spots mostly in developing countries (this is equal to the protection of 1.4% of the Earth's land surface, or 44% of the vascular plant species and 35% of the species in four vertebrate groups) (Myers 2000) to 27.5 billion US dollars for a representative global network of protected areas (James 1999) (see Table 2).

The estimations refer to different items of protection and have been done with different methods, so a "definite" assessment of costs does not exist. The appraisals must be considered as very rough.

**Table 2: Annual cost of biodiversity protection**

| **Author** | **Reid & Miller (1989)** | **Reid & Miller (1989)** | **Agenda 21 (1992)** | **James et al. (1999** | **James et al. (1999)** | **Myers et al. (2000)** |
|---|---|---|---|---|---|---|
| **Subject of protection** | Traditional protection of tropical rain forests | 2000 species (a 500 individuals) | Activities outlined in agenda 21 for biodiversity protection | Compre-hensive global con-servation programme | Represen-tative global network of protected areas | 1.4% of the land surface of the Earth. (44% spec. vascular plants, 35% species vertebrates) |
| **Annual costs (US-$ million)** | 170 | 1250 | 440 | 300,000 | 27,500 | 500 |

**Source: different objects of protection, authors, years and estimations. (own assembly)**

## 4.3 Comparison of GEF-spending and costs

It is evident that all cost estimations are higher than the actual the GEF spending. The rough estimations vary substantially. If we assume the estimations of 500 – 27.5 million US dollars as realistic and compare them to the estimated payments: 140-310 million US dollars, the factors between spending of the GEF and estimated costs are 1.5 to 200.

From an economic perspective, however, the estimated costs are not an absolute benchmark for the GEF spending. If we want to use them as benchmarks, we have to bear in mind, that biologists consider this problem form a point of view of natural scientist: they do not deal

with the needs of people. And from their perspective they can not define the dimension of a necessary biodiversity protection, as they do not consider the "objective" necessity of biodiversity protection. They can estimate the possible costs of protecting 25 of the "hottest hot spots", which cover 1.4 percent of the Earth's land surface, or the possible costs of strictly protecting 10 percent of the land surface to get a representative global network of protected areas. In the past natural scientists often defined levels of protection ignoring population's need. But in the last decade natural scientists have been considering more social requirements, so the aim protecting 1,4 to 10 percent of the Earth's surface is to some degree concerted with needs of people and can be seen as a benchmark in biodiversity protection. Their cost estimations are, however, based on the actual individual costs of protection projects. If governments of the developing countries changed their politics, arising costs would be lower than the ones calculated in the aforementioned enquiries. Thus, the estimated costs should not be perceived as economically necessary or reasonable, but rather as a frank indication that the present payments are too low in the sense of an optimal economic level of protection.

# 5 Negotiations for the replenishment of GEF-fund

## 5.1 Procedure of replenishment

Every four years the GEF-fund has to be replenished. The procedure is as follows:

The council of the CBD asks the world bank for replenishment of the GEF-fund. The world bank convenes the donor countries to negotiations for replenishment of the GEF-fund. There is little publicly available information on the regulations of how the replenishment negotiations take place. Representatives of donor countries negotiate on their contributions and division of total amount based on the scheme, which was developed by the International Development Association of the world bank for the shares of development assistance (Horta 2002), (Hanley 1997). It is based on the national economic strength of nations. "In practice, however, contributions reflect political will more than agreed formulas." (Horta 2002, chap. 2). Furthermore national representatives act under strong restrictions of (national) ministers of finance (Kaiser, 2003)

## 5.2 Results of negotiations

The replenishment negotiations of the GEF are written down in the 'Summary of Negotiations' (see Appendix I). The following is an excerpt from the 'Summary of Negotiations' concerning the levels of overall commitment of the donor countries:

The biggest amount is provided by the USA (21% [of the whole GEF-fund spending]) followed by Japan (18%), Germany (11%), and the UK (GEF 2002f). The order in which contributions are made to fund corresponds to the order in which more developed countries would appear on a national GDPs list. However, the donor countries contribute different percentages of their GDP to the fund. Nation which we could call „leaders" committed a total of 0.01% of their GDP to the GEF over four years (Japan, France, Germany, UK, Canada). Some smaller countries, we could call them „front-runners", spent more than 0.02% of their GDP e. g. Sweden and Denmark. The "taillights" of the more developed donor countries committed 0.005% or less of their GDPs: e. g. USA or Spain (see **Error! Reference source not found.**) (GEF 2002f).

**Table 3: Country contributions to de GEF-3 (extract)**

| Nation | Percentage of GDP for GEF (for four years) | Contribution in million US $ |
|---|---|---|
| Sweden | 0.03 | 72 |
| Denmark | 0.023 | 36 |
| UK | 0.012 | 190 |
| Germany | 0.012 | 264 |
| Japan | 0.011 | 423 |
| France | 0.011 | 163 |
| Canada | 0.011 | 103 |
| USA | 0.0023 | 500 |
| Spain | 0.0023 | 19 |

**Source: commitments to the GEF 3 according to summary of negotiations (GEF 2002f), GDPs according to the CIA world fact book http://www.cia.gov/cia/publications/factbook/fields/2001.html [own calculations]**

### 5.3 Short Analysis of negotiations

We can assume (according to public choice theory (e.g. Buchanan cited after (Frey 1994)) that administration officials try to maximise their personal benefits. We can also assume, that they want to maximise the numbers of votes for their governance, as their personal benefit depends on a re-election. The governments are voted for by *national* voters. We assume that the national representatives act in self-interest and thus in national interests.

It can also be presumed that the national agents

- assume that they (or the nations they represent) have little influence on overall protection activity and the level of biodiversity protection.
- The officials can guess that the good (biodiversity services) will be provided even if their own activity is low.
- In addition the outcome of funds invested in biodiversity protection is difficult to market in the 'home' country.
- The perceived importance by officials of global biodiversity protection is relatively low for voters.

As a overall result of the assumptions the national governments would have high incentives to act as "free rider" and low incentives to spend money on global biodiversity protection. The officials presume that the money which could be spend for biodiversity protection could better be spend for projects that have direct impact on national problems.

## 6 Undersupply thesis

The two considerations of GEF spending and negotiation leads to the thesis, that the actual amount and procedure, which results in the commitments of donor countries to finance biodiversity protection in developing countries, does not lead to a global adequate level of this protection.

It seems worthwhile to try to estimate the benefit of biodiversity protection in developing countries for developed countries or one developed country to verify the thesis.

# 7 Case study – willingness to pay for the conservation of biodiversity

There are several economic methods to estimate the benefits of items or issues. Some are based on revealed preferences (or market data) and are called indirect methods (like the travel cost method or the replacement cost method). Others are based on stated preferences collected through direct questioning on willingness to pay for described goods or through observed choices of goods with slightly different attributes or parameter values, respectively.

In this study the Contingent Valuation Method was chosen to estimate the benefit which arises in more developed countries from the protection of biodiversity.

The Contingent Valuation Method (CVM) is very popular in environmental economics to estimate values of non-market goods (Hanley 1997). In Contingent Valuation (CV) studies respondents are asked to answer how much they are willing to pay (wtp) for a non-market good or whether or not they are willing to pay a specific amount for a good[13]. From these answers the median and mean of payments can be estimated. And the economic benefit of providing the valued good can be evaluated with respect to the basic population. Many studies evaluate the benefit of the conservation of single species or specific conservation projects like national parks (Loomis 1996) (Hanley 1998). The aim of this study was to survey the benefit of biodiversity protection in developing countries. Germany was chosen as an example because the willingness to pay of all people living in more developed countries can not be collected in one survey.

## 7.1 Study design

The basic population of the survey consists of German residents (native and foreign) aged 18 and older[14] [15]. Because of the huge basic population of 66,4 Million people a minimum sample of 1.000 people had to be interviewed to ensure a representative result. Because of the figure of 1.000 interviewed persons and restricted financial resources to conduct the study a telephone survey was chosen as interview technique. To get a sample from the basic population telephone numbers were generated with the "random digit dialling method"[16]. Within the household the "last-birthday-method"[17] was adopted. The object of valuation was the protection of half of the endangered species which will become extinct in the next ten

[13] first question format is called "open-ended" the second "dichotomous choice"
[14] One part of the basic population is it's eligible voters. In Germany people are eligible to vote when they turn 18. 1998: 60.8 million (1998). (Federal Statistical Office, Bundeswahlleiter)
[15] 5.775 million (2001), 5.561million (1998) (Federal Statistical Office)
[16] With this method random telephone numbers are generated.
[17] When the contact is established, the person with the latest birth date is asked to participate.

years if nothing further is done[18]. It was decided to use a tax increase as payment vehicle[19]. It was considered that this form of payment lead the respondents to take the payment serious (in comparison with a donor to a nature conservation organisation). A nature tax (comparable to a visitors tax) was considered as implausible for the respondents, particularly because of the non-excludability from the benefits of biodiversity conservation (Bateman 2002). The dichotomous choice format[20] was chosen as question format. This question format is favoured because it is most similar to purchase decisions (Spash 1999). This format is also particularly suitable when the respondents are unfamiliar with the good they shall value. The wtp question for the protection of half of the endangered species in developing countries was evaluated as an unfamiliar question that demands a lot of attention and thought from the respondents. Thus, the dichotomous format should facilitate an answer to the wtp question. Results of CV studies are difficult to validate and the object in question here is very abstract. Furthermore, the results of this wtp-question are hard to compare with data of other studies. To test the validity of the wtp-result, additional variables were collected. These variables were derived from a socio-psychological theory, the protection motivation theory developed by ROGERS (1977, 1983). It is assumed, that if the answers to the wtp question can be forecasted with the answers to the questions deduced form the psychological theory, the responses to the wtp-question are valid.

## 7.2 Study results

In April and May 2001 a total of 12.000 numbers were dialled, 3675 persons were contacted and read the screening text. 58% refused to participate in an interview, but only 1,5 % dropped out and a total of 1017 people were interviewed (see **Table 4**).

[18] At first glance protecting of surface area seems to be the appropriate measure. But as focus group interviews determined, people can not imagine areas in acres or hectares. Also the goal of protection of e.g. tropical rain forest is not only to protect biodiversity, but also for reasons concerning climate. And as we wanted to assess the value of biodiversity protection, the protection of „natural areas“ or tropical rain forest cannot be counted as the same.

[19] To answer the question of the appropriate payment vehicle the common pro and con arguments were considered (Mitchell 1988; Bateman 2002).

[20] A question requiring a „yes“ or „no“ answer.

**Table 4: Sample report**

| | Cases | Percentages |
|---|---|---|
| **Telephon-Number Total** | **12000** | **100,0%** |
| neutral outfalls: | 5177 | 43,1% |
| no connection | 4537 | 37,8% |
| wrong connection / number has changed | 83 | 0,7% |
| business telephone number | 557 | 4,6% |
| **Revised Brutto I** | **6823** | **100,0%** |
| other outfalls | 3148 | 46,1% |
| no connection tone, no contact | 1701 | 24,9% |
| busy | 86 | 1,3% |
| answering machine / mailbox | 601 | 8,8% |
| fax machine/ modem (whistle) | 541 | 7,9% |
| strong communication problems | 219 | 3,2% |
| **Revised Brutto II** | **3675** | **100,0%** |
| not neutral outfalls: | 2658 | 72,3% |
| cancelled appointments | 41 | 1,1% |
| person not available in given time period (10 contacts attempt) | 427 | 11,6% |
| refusals | 2135 | 58,1% |
| drop outs | 55 | 1,5% |
| **Realised Interviews** | **1017** | **27,7%** |

**Source: own research and own calculations**

54.7 percent of the respondents were female, 45.3 percent are male. The age group ranging from 25 to 45 years is over represented in the sample and the group of people older than 65 are under represented (see **Table 5**).

**Table 5: Percentages of people in age groups in the sample and in the basic population**

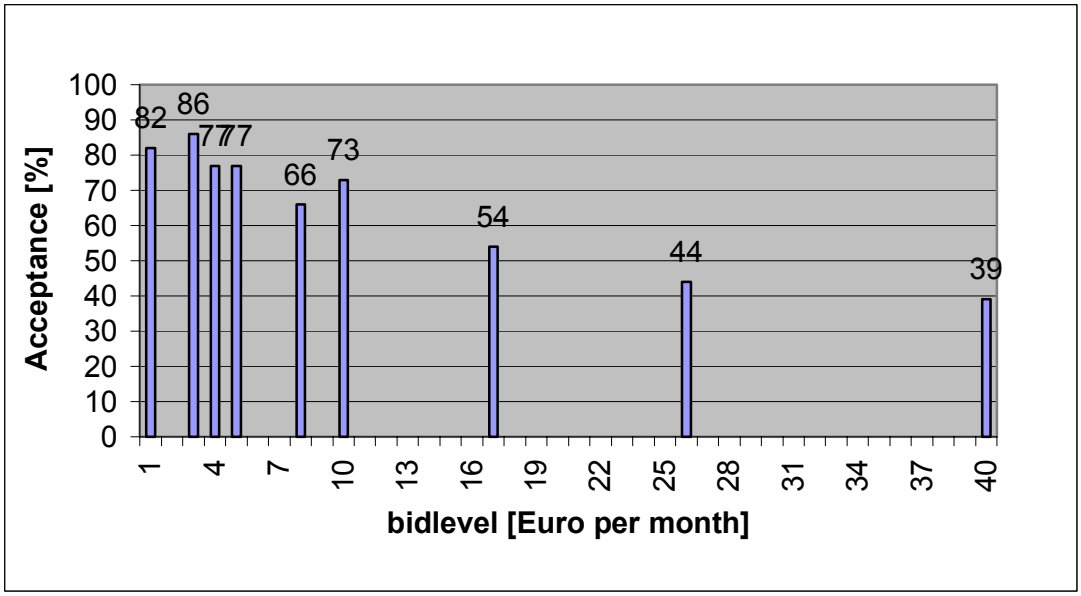
| | Percentage of sample | Percentage of basic population |
|---|---|---|
| 15(18)-25 | 15 | 13 |
| 25-45 | 45 | 36 |
| 45-65 | 29 | 31 |
| older 65 | 12 | 20 |

**Source: own research and own calculations**

The sample is more or less evenly distributed over the income categories. The representativeness can not be easily evaluated. But the distribution of the respondents over the categories seemed comparable to the basic population (see Appendix II).

The respondents were randomly asked, whether or not they were willing to pay a specific amount ranging from 1 to 40 Euros. The bidlevels were 1, 3, 4, 5, 8, 10, 17, 26, and 40 Euros. The acceptance and rejection rate respectively range from 39% to 82% depending on the bidlevel. If a respondent had to decide about the 1 Euro amount, the probability of a "yes"-answer was 82%. If the bidlevel was 40 Euro the probability of a "yes"-answer was 39%.).

**Graph 1: Acceptance rate at different bidlevels (own calculations)**



A logistic regression with variables from the protection motivation theory and socio-demographic variables was performed to test the validity of the wtp-answers and to calculate the mean and median of wtp that result from the model.

Explanatory variables for the acceptance or rejection of the payment are:

- self-efficacy (= the belief in the effect of the own payment for the protection of biodiversity in developing countries);
- bidlevel (financial costs of contribution to protection);
- responsibility (of the respondent for the protection of species in developing countries);
- age;
- threat appraisal (perceived threat as consequence of loss of biodiversity),
- the opinion about the question, whether the industrialised countries have the right to interfere in biodiversity protection affairs of developing countries and,
- whether or not the person already had visited a developing country[21].

The pseudo-$r^2$ (Nagelkerkes) of the model is 0.339. From the median values of the explanatory variables and their regression coefficients the mean and median of wtp can be calculated as follows:

$$x_1 = \frac{\beta_0 + \beta_2 * \bar{x}_2 + \ldots + \beta_j * \bar{x}_j + \ldots + \beta_k * \bar{x}_k}{-\beta_1} \qquad (1)$$

$\beta_1$ = regression coefficient of the bidlevel

$x_1$ = median of the wtp= bidlevel where a average respondent is indifferent

$\beta_0$= constant

$\bar{x}_j$ = average parameter value of the explanatory variable $x_j$

$\beta_j$ = regression coefficient of the variable $x_j$

(Backhaus 2000)

[21] The income is also a significant explanatory variable. 16.9% of the respondents, however, who agreed to pay, did not provide information about their income and 28.6% of the respondents, who did not agree to pay, did not provide information about their income. If income is included as an explanatory variable, the percentage of explainable model cases increases, while the number of analysed cases decreases. Furthermore, biases in the mean and median wtp result are generated. Thus, the model was calculated without consideration of income.

The median of wtp ($x_1$) is 22 Euros. This can be deduced from the model as an average monthly wtp of the respondents. In the sense of a conservative average wtp-estimation, we assume, that persons who refused to participate in the survey or dropped out (59,6%), have a wtp of zero Euros. We also assume that people who cancelled their appointments and who were not available at the time the survey was taken, have the same wtp as people who took part in the interviews (total = 40,4%). The multiplication of the calculated wtp of 22 Euros with the sample population (40,4%) results in an average wtp of approximately 9 Euros.

This can be interpreted as an expression of benefits for an "average" German resident resulting from protection of 25.000 species in developing countries in the next ten years. We assume a basic population of 66.4 million people. A multiplication of the average wtp and the basic population results in figure of approximately 600 million Euros monthly, and 7 billion annual wtp, respectively. That can be taken as a potential benefit for Germany, if 25.000 species in developing countries are prevented from extinction.

With the acquired value of 9 Euros we can attempt to roughly estimate the benefits that occur in the "main" donor countries[22]: Taking a comparable percentage of beneficiaries in these countries (~80% of the population of a country), a similar average benefit per capita, and the population of the main donor countries, we can calculate (through multiplication) a benefit resulting from protection of 25.000 species in developing countries to be 4.4 billion Euros.

## 7.3 Discussion of results

A big effort was made to get a representative sample. But it must be mentioned, that achievement of objectives is questionable. "Denier" could have refused participation because the expression "*nature conservation*" was used in the screening text or because they unwilling to take part in a telephone interview or any other form of surveys. If the first happened, the results may be biased. We can state that the sample is not gender representative. Since it is not an explanatory variable, no problems occur because of that. The interviewed persons, however, are not representative concerning the age. That elderly people (older 65) are under represented and people ranging from 25 to 45 ages are over represented, may biased the result. Older people have lower and younger higher wtps.

[22] USA, UK, Japan, France, Germany, Australia, Belgium, Canada, Finland, Italy, Netherlands, Norway, Sweden and Switzerland (CIA 2002)

The wtp answers can be seen as valid, because the pseudo $r^2$ (Nagelkerke) of the regression model is 0.339. This figure indicates a moderate to good model (Backhaus 2000). In terms of a conservative calculation of the average wtp estimation (Arrow 1993), a wtp of zero is assumed for people who refused to participate.

The size of the basic population has a strong influence on the result, and we can not be sure that no one replied as head of the household. As a result this wtp expression would represent more than one adult person. If that occurred frequently, the previous calculation would have led to an overestimation of *Germany's* wtp. If we calculate with the number of households (=34 777[23]) German annual benefit would be approx. 3.8 million Euros.

# 8 Conclusion

The consideration of the spending of the GEF for biodiversity protection and the estimated costs of global biodiversity protection, as well as the analysis of the regulations concerning the replenishment of the GEF-fund, led to the hypothesis, that the payments from more developed countries to the GEF-fund are lower than economically adequate

The result of a contingent valuation study can be interpreted as a verification of the thesis. At the moment Germany contributes 25 million Euros annually for the protection of biodiversity into the GEF-fund, but the wtp of people living in Germany can be estimated to be as high as 3.8 billion Euros. I think we could dare to assert, that not only in Germany the benefit and wtp of people are higher than the actual national spending to the GEF-fund. If we assume similar wtp in other main donor countries as well, the benefit of the protection of 25.000 species in the next ten years can be appraised to 4.4 billion Euros annually.

This value can be condemned as unrealistic, but it is in the dimension of the estimated costs for a representative global network of protected areas and a comprehensive global conservation programme, respectively.

The results of the study show that commitments of donor countries should be higher than they currently are. Furthermore, the results show that politicians do not consider the preferences of the population for biodiversity protection in developing countries enough. The findings can be used to argue for more attention to preferences of the public in decision making on biodiversity protection activity and spending.

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[23] Indication for the year 2001 according to Federal Statistical Office, Germany http://www.destatis.de/basis/d/evs/budtab2.htm

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ANNEX

# Summary of negotiations on the third replenishment of the GEF Trust Fund, (GEF 2002f)

**GLOBAL ENVIRONMENT FACILITY TRUST FUND** **Attachment 1**

**THIRD REPLENISHMENT OF RESOURCES**

**CONTRIBUTIONS**
**(in millions)**

| | Calculated Basic Contributions | | Supplemental Contributions | | GEF-3 Total Contributions | | | |
|---|---|---|---|---|---|---|---|---|
| **Contributing Participants** | (%) | SDR | SDR | | % | SDR | National Currency | g/ |
| Australia | 1.46% | 27.60 | | | 1.46% | 27.60 | 68.16 | |
| Austria | 0.90% | 17.01 | 0.69 | a/ | 0.94% | 17.70 | 24.38 | |
| Belgium | 1.55% | 29.30 | 3.67 | a/ | 1.74% | 32.97 | 41.98 | |
| Canada | 4.28% | 80.91 | | | 4.28% | 80.91 | 158.94 | |
| China | - | 4.00 b/ | 4.44 | a/ d/ | 0.45% | 8.44 | 78.71 | |
| Cote d'Ivoire | - | 4.00 b/ | | | 0.21% | 4.00 | 3,758.86 | |
| Czech Republic | - | 4.00 b/ | 0.50 | a/ | 0.24% | 4.50 | 194.36 | |
| Denmark | 1.30% | 24.58 | 3.37 | | 1.48% | 27.95 | 298.18 | a/ |
| Finland | 1.00% | 18.91 | 2.03 | | 1.11% | 20.94 | 30.00 | a/ |
| France | 6.81% | 128.84 a/ | | | 6.81% | 128.84 | 164.00 | |
| Germany | 11.00% | 207.96 | | | 11.00% | 207.96 | 297.92 | |
| Greece | 0.05% | 0.95 | 3.55 | a/ c/ | 0.24% | 4.50 | 5.73 | |
| India | - | 4.00 b/ | 3.99 | a/ d/ | 0.42% | 7.99 | 426.39 | |
| Ireland | 0.11% | 2.08 | 2.42 | a/ c/ | 0.24% | 4.50 | 5.73 | |
| Italy | 4.39% | 82.99 | | h/ | 4.39% | 82.99 | 118.90 | |
| Japan | 17.63% | 333.41 a/ | | | 17.63% | 333.41 | 48,754.33 | |
| Korea | 0.23% | 4.35 | | | 0.23% | 4.35 | 7,142.95 | a/ |
| Luxembourg | 0.05% | 0.95 | 3.05 | c/ | 0.21% | 4.00 | 5.73 | |
| Mexico | - | 4.00 b/ | | | 0.21% | 4.00 | 4.00 | a/ |
| Netherlands | 3.30% | 62.39 | | | 3.30% | 62.39 | 89.38 | k/ |
| New Zealand | 0.12% | 2.27 | 1.73 | c/ | 0.21% | 4.00 | 12.13 | |
| Nigeria | - | 4.00 b/ | 0.50 | a/ | 0.24% | 4.50 | 4.00 | |
| Norway | 1.06% | 19.96 | | | 1.06% | 19.96 | 228.32 | |
| Pakistan | - | 4.00 b/ | | | 0.21% | 4.00 | 320.63 | |
| Portugal | 0.12% | 2.27 | 1.73 | c/ | 0.21% | 4.00 | 5.73 | |
| Slovenia | - | 1.00 | 0.13 | a/ | 0.06% | 1.13 | 313.94 | |
| Spain | 0.80% | 15.12 | | | 0.80% | 15.12 | 21.67 | |
| Sweden | 2.62% | 49.53 | 7.45 | | 3.01% | 56.98 | 764.67 | |
| Switzerland | 2.43% | 45.94 | | | 2.43% | 45.94 | 99.07 | |
| Turkey | - | 4.00 b/ | | | 0.21% | 4.00 | 4.00 | |
| United Kingdom | 6.92% | 130.82 a/ | 19.09 | a/ | 7.93% | 149.91 | 117.83 | |
| United States | 20.86% | 394.36 | | | 20.86% | 394.36 | 500.00 | f/ |
| 1. New Funding from Donors | 88.99% ** | 1,715.50 | 58.34 | | 93.82% | 1,773.84 | | |
| 2. Supplemental Contributions including Credits | | | 12.50 | a/ k/ | 0.66% | 12.50 | | |
| 3. Investment Income e/ | | | | | | 105.00 | | |
| 4. Carryover of GEF Resources j/ | | | | | | 450.00 | | |
| **5. Total Projected Resources to Cover GEF-3 Work Program ( 1 + 2 + 3 + 4 )** | | | | | | **2,341.34** | | |

** GEF basic shares, which are originally derived from the GEF-1 and were largely maintained in the GEF-2, do not add up to 100%.

*a/ Contributing Participants have the option of taking a discount or credit for acceleration of encashment and; (i) including such credit as part of their basic share; (ii) counting such credit as a supplemental contribution; or (iii) taking such discount against the national currency contribution. France and Japan have opted to include the credit for accelerated encashment in their basic share. The United Kingdom has chosen to accelerate encashment of its basic and supplemental contributions. A credit for accelerated encashment is thus included in its basic share and its supplemental contribution. Austria, Belgium, China, Czech Republic, Greece, India, Ireland, Nigeria, and Slovenia have opted to include the credit for accelerated encashment as a supplemental contribution. Denmark, Finland, Korea, and Mexico have opted to take a discount against their national currency contribution. Canada chose to acclerate encashment of its contribution but not to take either a discount or a credit.*

*b/ Represents the agreed minimum contribution level to the GEF-3.*

*c/ These Contributing Participants have agreed to adjust their contributions upward to the agreed minimum contribution level of SDR 4 million.*

*d/ China and India have indicated that they would contribute more than the agreed minimum contribution level of SDR 4 million.*

*e/ Represents projected investment income expected to be earned on resources projected to be held in the GEF Trust Fund over the GEF-3 commitment period (FY03 through FY06).*

*f/ In addition to four annual installments of USD 107.5 million, the United States will provide USD 70 million in the final year of the replenishment upon achievement of the performance measures outlined in Schedule 1 to this Table. The achievement of such measures will be determined by the Council on the basis of verification by the Independent Monitoring and Evaluation Unit, and taking into account any unforeseen events or circumstances that may prevent their achievement.*

*g/ Calculated by converting the SDR amount to the national currency using an average daily exchange rate over the period from May 15, 2001 to Nov 15, 2001, as agreed by the Contributing Participants at the May 7, 2001, GEF-3 replenishment meeting.*

*h/ For this Contributing Participant, acceleration of encashment is under consideration.*

*j/ Represents the amount carried over to the GEF-3 pursuant to paragraph 9 of Resolution No. ____, valued on the basis of June 30, 2002 exchange rates.*

*k/ Represents a credit from acceleration from Canada in the amount of SDR 10.13 million and a supplemental contribution from The Netherlands in the amount of SDR 2.37 million, bringing The Netherlands' total national currency contribution to EUR 92.76 million.*

Own research data

| | **Study sample** | | | **Basis population** | |
|---|---|---|---|---|---|
| | frequency | percentages | Valid percentages | Income-categories[24] | Percentages basis population[3] |
| Less than 900 Euros | 127 | 12 | **16** | < 920 | **16,7** |
| 900 - 1.250 Euros | 107 | 11 | **13** | 920-1534 | **27,7** |
| 1.251- 1.600 Euros | 138 | 14 | **17** | 1534-2556 | **32,5** |
| 1.601 - 2.000 Euros | 124 | 12 | **16** | | |
| 2.001 - 2.500 Euros | 107 | 11 | **14** | | |
| More than 2.500 Euros | 197 | 19 | **25** | >2556 | **22,9** |
| **total** | **800** | **77** | **100** | | |
| Do not know/ not specified | 217 | 21 | | | |

[24] Federal Statistical Office, Datenreport 2002, p. 212