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THE INFLUENCE OF ETHNICITY AND CULTURE ON THE VALUATION OF ENVIRONMENTAL IMPROVEMENTS

RESULTS FROM A CVM STUDY IN SOUTHWEST CHINA

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The influence of ethnicity and culture on the valuation of environmental improvements

– Results from a CVM study in Southwest China –

Michael Ahlheim[1], Tobias Börger[2] and Oliver Frör[3]

Summary: The provision of environmental goods by government creates social benefits which might vary between citizen groups with different cultural and ethnic backgrounds. These differences as well as the overall extent of benefits should be analysed before the implementation of public projects in order to consider not only the efficiency aspects of such a project but also its distributional effects.
In Southwest China we are facing a rapid deforestation for the development of rubber cultivation and at the same time find an ethnically highly diverse population. This Contingent Valuation study tries to assess the short-term and long-term benefits accruing from a public reforestation programme in Xishuangbanna and their distribution among different ethnic groups living in that region. The results show that different ethnic groups value short-term and future benefits of reforestation differently and that these differences can be explained by the different cultural and historical backgrounds of these ethnic groups.

Keywords: Rubber cultivation, contingent valuation method, environmental costs, ethnicities, equity, cultural ecosystem services, China

1. Introduction

The economic appraisal of environmental projects typically aims at an assessment of the effects such a project has on the overall efficiency in an economy: if the social benefits accruing from a project outweigh its costs, this is interpreted as proving that the project leads to a potential Pareto improvement in the sense of the Hicks-Kaldor criterion. But environmental projects influence also the utility distribution among the individuals and

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households affected by this project since they benefit in different ways from it. In this paper we focus on the distributional effects an environmental project conducted in Xishuangbanna, Southwest China, has on different ethnic groups living there.

Standard project appraisal techniques like the Contingent Valuation Method (CVM) aim at the assessment of people's willingness to pay (WTP) for a public project as a monetary expression of the benefits they expect from that project. Further, they assess people's socio-demographic data, lifestyles, attitudes, political affiliations etc. Regression models are used to find out which of these characteristics are related in which way to the WTP amounts stated by respondents in CVM interviews. This procedure allows a characterisation of the interviewed households by their socio-economic and other attributes. Since the benefits accruing from a public project are typically provided for free, the WTP statements by respondents in CVM surveys express the benefits they will obtain from the project in question in case it is realised. If the regression analysis of the collected data shows that there exists a positive correlation between stated WTP and a certain socio-economic characteristic, like e.g. belonging to a specific ethnic group, it can be concluded that people belonging to this group will benefit from a realisation of the project in question more than members of other ethnicities. In this study we are especially interested in this kind of ethnic redistributive effects of a reforestation project in Xishuangbanna in Southwest China.

Xishuangbanna is an exceptionally diverse region in terms of ethnicity and culture. Distinct ethnic groups differ in their cultural, spiritual and linguistic backgrounds. Over the past years the cultivation of rubber trees on former forest land has fostered unprecedented economic prosperity while at the same time causing deforestation at a large scale. This development has led to the impairment of rare and valuable ecosystems and a dramatic loss of biodiversity and ecosystem services (ES) in this region. The ES provided by the natural rainforest in Xishuangbanna comprise among other things the provision of food, fresh water, feed for livestock, wood for construction and cooking, the regulation of the microclimate in the region and the provision of habitat for rare animals and plants. Further, the natural rainforest is of great cultural importance for some of the ethnic groups living in Xishuangbanna. These different kinds of ES are endangered by the rapid expansion of rubber plantations leading to a dramatic reduction of the area covered with tropical rainforest.

In this study we want to find out which of the ethnic groups living in Xishuangbanna would benefit most from a reforestation programme aiming at the (partial) restoration of the original ecosystems and ES provided by rainforests in that region. Such reforestation efforts would enhance the provision of forest-related ES not only for the present generation, but also and especially for future generations. In order to identify the distribution of these long-run environmental effects among the different ethnicities in addition to the short-run effects we conducted a field experiment in our CVM study with two split samples drawn from the overall population of our survey. We confronted the respondents in one split sample with a project scenario according to which the benefits from the project would be available immediately after the project had been started (Short-term Scenario), while the members of the other split sample were told that the benefits would accrue only after about thirty years,

so that mainly future generations would benefit from the reforestation project in question (Long-term Scenario).

We focused our analysis on three different ethnic groups living in Xishuangbanna. One was the ethnicity of the Dai who have been living here for many centuries. The second group consisted of the Han population who have been immigrating to Xishuangbanna mainly since the early fifties of the last century. The third – artificial – group was formed as a composite of many different small ethnicities which also have been living in the mountainous forests of the region for a very long time. Among them are Hani, Yi, Jinuo, Lahu, Bai, Bulang, Yao, Zhuang, Tujia, Miao and Buyi.[4] We grouped them together under the artificial label "Others" in our study.

Regarding the distribution of the short-run benefits between the three different ethnic groups (Han, Dai, and "Others"), we find that the highest overall WTP for the reforestation programme is stated by the group of the Others, followed by the Dai, while Han people state the lowest WTP for reforestation, meaning that they will receive the lowest benefits if the project is realised. The same holds for the distribution of the long-run effects only where, again, the Others seem to be the main beneficiaries of the reforestation project. Interestingly, the Others even state a higher WTP for the scenario with the long-run benefits than for the short-run benefit scenario. This contradicts the neoclassical "rationality" propagated by economic theory, according to which consumers should show a positive time preference, as has already been pointed out by Irving Fisher in his seminal work on "The Theory of Interest" (1930). The WTP statements of the Dai and Hani conformed to the assumptions of economic theory, showing a preference for the short-run benefit scenario.

The paper is organised as follows: In the next section we describe the historical and cultural background of the various ethnic groups living in Xishuangbanna. In section 3 we explain the main features of the Contingent Valuation Method, which we use to assess the social benefits accruing from the reforestation project under consideration. In this section we also describe shortly our sampling technique and the econometric methods we employ. In section 4 we present and discuss our results, while section 5 contains some concluding remarks.

2. Cultural and ethnic background

2.1. History

The study area, Xishuangbanna Prefecture, is located at the southernmost rim of Southwest China's Yunnan Province bordering Myanmar in the South and West and Laos in the East (cf. figure 1). Due to its favourable climatic conditions Xishuangbanna abounds in plant and animal species and has long been recognised as a biodiversity hotspot. While it only

[4] The Hui and Man ethnic groups are subsumed under the Han, since they are originally from Northern China, i.e. not native to Xishuangbanna.

accounts for 0.2% of the land area of the People's Republic of China (PRC), the region is home to 16% of higher plant species, 21.7% of mammal species and 36.2% of bird species in the country (Li et al. 2007). The major part of the area is covered by different subtypes of tropical forest. This flora and fauna make Xishuangbanna an ecologically and geographically special region in China.

Figure 1: Map of Xishuangbanna Prefecture and its location in China (LILAC 2006)

The population of the region is highly ethnically diverse. Historically, the area was a Dai kingdom with the ruling Dai settling in the fertile valley bottoms and cultivating paddy rice. The other local ethnic groups, such as Hani, Lahu, Jinuo, Bulang and Yi, dwelled in the highlands and lived predominantly from shifting cultivation (Kui 1997). Interactions between the different groups mostly took place in the form of trade. All groups, including the Dai, had to pay taxes to the government of the Dai ruler. There were practically no Han Chinese, the major ethnic group in the PRC today, in Xishuangbanna at that time.

It was only after the foundation of the PRC in 1949 that a certain influx of Han Chinese migrants began. Administratively the area was designated the rank of a prefecture within Yunnan Province and became Autonomous Prefecture of the Dai in 1955, which – rather on paper – granted certain privileges to the local ethnic groups. They were now acknowledged as ethnic minorities in relation to the dominant group of the Han in the whole of China. The region was integrated into the socialist state planned economic system of the PRC, which triggered the cultivation of rubber trees (*hevea brasiliensis*) to produce natural rubber,

because of an economic embargo imposed on China in the early 1950s (Sturgeon and Menzies 2006). Already in 1956 the first 14 state farms planting rubber had been established in Yunnan (Lu et al. 2010). As workers in the newly set up state farms, which had the exclusive task to produce natural rubber (Sturgeon 2010), Han Chinese farmers from other provinces were sent to Xishuangbanna because the local population was considered too backward to be employed on rubber farms (Sturgeon and Menzies 2006). During the Cultural Revolution of the late 1960s and early 1970s the so-called Educated Urban Youth from the big cities, also Han Chinese, were sent to Xishuangbanna to work on rubber state farms as part of their "re-education" (Sturgeon 2010, Shapiro 2001). So, the first waves of Han settlers came due to state coercion and lived both geographically and administratively separated from the original population.

After the dismantling of the socialist commune system in the early 1980s and with the subsequent expansion of private rubber cultivation those early Han settlers were stuck in the state farms and thus could not profit from the new entrepreneurial opportunities as much as the minority farmers (Sturgeon 2010). Since the late 1990s many state farms have been privatised, subdivided into smaller private farms and are now managed by former farm workers who belong to the Han ethnicity. In recent years, the booming tourism sector and the moderate prosperity resulting from ever increasing rubber cultivation have made more Han Chinese migrate voluntarily from other parts of the country to Xishuangbanna. Today, the approximately 1.1 million inhabitants roughly consist of 30% Han Chinese, 30% Dai, and 40% of the other 12 ethnic groups (Xishuangbanna 2010).

Traditional land-use patterns served to preserve the natural forest and the resulting richness in species. The valley bottoms were mostly used for paddy rice and other food crops, whereas only a limited number of plots in the uplands were used for shifting cultivation. Especially steep-sloped hillsides could not be used as agricultural land in the past. This pattern changed with the introduction of rubber on a larger scale. Originally cultivated only within the boundaries of state-farms during the socialist planned economy phase before 1978, the cultivation of rubber became the major driver of land use change after the dismantling of the commune system. After far-reaching reforms in agricultural policy and the introduction of the Household Contract Responsibility System in the early 1980s, Chinese farmers were allocated plots of agricultural land (Guo et al. 2002) and became evermore autonomous in deciding on their crops. Accompanied by increasing prices for natural rubber throughout the 1990s, this development led to a rapid expansion of the area used for rubber cultivation from only 8,474 ha in 1965 up to 136,181 ha in 1998 and 287,373 in 2011 (XBS 2012, Fu et al. 2004, Guo et al. 2002). Since it is possible to cultivate rubber trees even on steep mountain slopes, more and more natural forest land or plots that had formerly been used for shifting cultivation were transformed into rubber plantations. This trend, which has continued into the new century, entails many ecological and environmental consequences. First and foremost, the replacement of natural forests and traditional shifting agricultural land by both large-scale and small-scale rubber plantations has led to a huge loss of biodiversity (Ziegler et al. 2009). Moreover, the existence of these monocultures threatens

the whole hydrological system of the area. This includes the problem of increased precipitation run-off in the plantations, which reduces rainwater infiltration (Ziegler et al. 2009), and the increased use of pesticides and chemical fertilisers in the plantations, which endangers water quality in local rivers and streams. The clearing of forest on sloped land further leads to soil erosion increasing also the risk of landslides (Ziegler et al. 2009). Overall, it appears that the economic benefits of rubber cultivation, which are obvious in the region, are bought at an ever increasing ecological and environmental price (Ahlheim et al. 2012).

2.2. Ethnic groups and their relationship to the natural forest

As a consequence of the dissimilar histories of the three main groups in the area (Dai, Han and Others) their relationship to the natural forest varies. In this section these groups will be introduced one by one, and the importance of different categories of ES for these groups will be highlighted. The Dai people, whose presence in Xishuangbanna was mentioned as early as in the first century BC (Kui 1997), traditionally used the valley bottoms for irrigated cultivation of paddy rice and vegetables. They are Theravada Buddhists but also worship nature, which is a relic of their polytheistic beliefs of the time before the arrival of Buddhism in the area. This polytheistic influence manifests itself in the existence of holy hill forests in virtually every Dai village in the region (Liu et al. 2002). Dai people believe that gods live in these hills and therefore have been leaving them undisturbed, since traditional beliefs prohibit hunting, gathering and any type of active use of these forests. The holy hills are typically the only undisturbed spots of natural forest in a traditional Dai village (Xu 2006). As a consequence of Buddhist influence on the perception of environmental conservation among Dai people, Buddhist temples are required to have a garden, which can be regarded as a small conservation corridor (Liu et al. 2002). While the religious beliefs and their manifestations in the form of holy hill forests and temple gardens are still influential among Dai people, many spiritual forests and gardens were destroyed during the Cultural Revolution of the 1960s and 1970s when atheism in Han-China reached its peak. It was only after the end of the Cultural Revolution that many of these places could be re-established (Liu et al. 2002).

In comparison to the Dai, the smaller indigenous minority groups have traditionally settled in higher altitudes, engaged in rotational shifting cultivation and thus realised a lower agricultural output. Due to their dwelling in the mountainous uplands, their life has been closely connected to the existence of natural forests, both economically and spiritually. This becomes obvious in the varying natural religions of the respective groups. The Jinuo, an ethnic group that only lives in Xishuangbanna, believe that all living creatures, including plants, have a spirit and a soul (Kui 1997). Similarly, the Hani[5] worship their ancestors on highly protected cemetery forests. They have a complex traditional system of rules of forest

[5] Hani is the Chinese name of this ethnic group, who call themselves Akha. Akha is also their name in Thailand and the English translation in many scientific publications.

protection, which prevents them from cutting trees within village boundaries, in watersheds and on cemeteries (Sturgeon 1997). Apart from shifting cultivation, the Hani also use the forest for collecting food and cultivating 'jungle tea gardens' (Xu 2006). Compared to the Dai, who are traditionally rice farmers in the lowlands, all upland minorities live off the forest to a much greater extent and their existence is tied much closer to the availability of an intact natural forest. So, it becomes clear that spiritually, economically and geographically these highland ethnicities have the closest relationship with the natural forest in Xishuangbanna. Both, provisioning and cultural ES are therefore expected to play an important role for these groups.

This is different in the case of the Han migrants. As outlined above, the Han have the shortest history in Xishuangbanna and, therefore, a quite loose relationship to the natural forest. The early waves of migrants who worked on the state farms were sent to this southernmost tip of Yunnan Province explicitly in order to 'conquer nature' (Shapiro 2001) and make it ready for economic production. The rainforest was regarded neither as a natural asset nor as the environmental basis for human livelihood in this region, but as the raw state of nature which awaited human conversion. The more recent Han migrants who mostly relocate to Xishuangbanna to work in the booming tourism sector predominantly settle in the prefectural capital or other rural towns. It appears quite plausible that these economic migrants do not have any spiritual or emotional bond to the natural forest as a special feature of the region. Therefore, the relationship of Han migrants to the natural forest can be expected to be rather distanced and instrumental.

3. Methodological approach

This section sketches shortly the methodological framework employed to study the hypotheses derived in the previous section empirically. As mentioned above, the Contingent Valuation Method (CVM) is used to estimate the welfare effects of a regional reforestation programme. Within this framework, a split sample design is administered to investigate potential treatment effects of different scenario specifications.

3.1. The Contingent Valuation Method

The environmental consequences of large-scale rubber cultivation in Xishuangbanna discussed in section 2.1 are indicators of a decrease in social welfare of the local population. In order to assess this decrease in monetary terms the present study employs the Contingent Valuation Method to determine the social benefits accruing from an environmental policy measure that would lead to a mitigation of these consequences.

The CVM is a widely used method for the valuation of nonmarket benefits resulting from public projects in the environmental sector (Carson and Hanemann 2005, Carson 2012). It is based on interviews with a representative sample of all households affected by the public

project to be valued. During such a household interview respondents are asked – among other things – the willingness to pay of their households for the practical implementation of the public project in question. These WTP statements are interpreted as the monetary equivalent of the change in utility that an interviewed household expects from the proposed public project. If the selected survey sample is representative of all people affected by the public project, the average WTP of the respondents in that sample can be extrapolated to calculate the aggregate WTP of all households affected. This aggregate WTP is then typically interpreted as the "social value" of the environmental improvement caused by the public project in question.

The survey questionnaire of our study consists of five parts. The interview starts with questions regarding respondents' awareness of the environmental problems caused by rubber plantation in Xishuangbanna. After that a scenario of a possible public programme to convert rubber plantations back into forest is presented to respondents. This reforestation measure would be carried out in the Nabanhe National Nature Reserve (NNNR) about 25 kilometres northwest of the prefectural capital Jinghong (cf. figure 1). The 'Return Rubber into Forest' programme as it is called in the survey was designed to resemble the sloping land conversion programme (Bennett 2008), a policy measure implemented nationwide by the Chinese government and well known to the survey population. During the survey interview respondents were informed that existing rubber plantations in the nature reserve area would be transformed back into forest and that the following consequences could be expected from this restoration effort. The original forest area would be partially restored, which would provide habitat for a number of rare plant and animal species. Reforestation would lead to better water quality in local rivers because less pesticide would have to be brought out. This would result in less pesticide contamination in agricultural food products and in the whole local ecosystem.

Subsequently the so-called payment vehicle is introduced. Respondents are informed that a fund would be set up by the local government, which all citizens would have to contribute to. The payments would have to be made every three months over a time-span of five years. Then respondents are asked to mark the range of their household's WTP for the realisation of this reforestation programme in a so-called payment card (PC), where a series of suggested payment intervals are stated in an increasing order (cf. fig. 2).[6] The last part of the interview consists of socio-demographic (e.g. regarding the ethnicity of the respondent) and attitudinal questions that aim at an assessment of potential determinants of WTP and at the assessment of the distributional effects of the suggested reforestation project.

[6] More information on the implementation of the scenario can be found in Ahlheim et al. (2012). The complete PC used in this study is displayed in Ahlheim et al. (2013).

Figure 2: The Payment Card

○	**0 RMB**
○	**1 - 5 RMB**
○	**6 - 15 RMB**
○	**16 – 25 RMB**
○	**26 – 35 RMB**
○	**. . .**

3.2. Applying a split-sample design to detect intertemporal distributional effects

As explained above, in this study we want to find out how much three different ethnic groups (one of them a conglomerate of several small minorities) would benefit from a reforestation project, where rubber plantations in Xishuangbanna would be reconverted into forest (the "Return-Rubber-into-Forest" programme - RRFP). The basic assumption here is that the WTP for the realisation of the RRFP stated by respondents from these three groups indicate how much utility they expect from the programme.

We test these effects for two different versions of our scenario, where the first version (which we term the "Short-term Scenario") suggests that the benefits from the RRFP will accrue soon after the implementation of the programme, while the second version (the "Long-term Scenario") holds that these benefits will be available only after thirty years. The exact wording of these scenarios can be found in box 1.

The different treatments help us to identify the distribution of the short-run benefits (from the Short-term Scenario) as well as of the long-run benefits (from the Long-term Scenario) among the three ethnic groups. Comparing the WTP for the Short-term Scenario to the WTP for the Long-term Scenario of members of the same ethnic group indicates the time preference of this group with respect to environmental benefits. Consumer theory suggests that people have a positive time preference, therefore, our hypothesis is that for all ethnic groups the WTP stated for the Short-term Scenario is higher than the WTP stated for the Long-term Scenario, i.e. $WTP_{lt} < WTP_{st}$.

Box 1: The two versions of the scenario text for the two treatments

Both treatments *("Short-term Scenario" and "Long-term Scenario")***:**

"The NNNR has always been a so-called biodiversity hotspot where many endangered plants and animals exist which are already completely extinct in many other places. This variety of plants and animals is jeopardized by the fast spreading plantation of rubber trees. As a consequence of the ecological damages that might result from rubber cultivation in the NNNR, government authorities as well as scientists are thinking about a programme to convert rubber plantations in the NNNR back into forest. This programme will be called "Return Rubber Into Forest". This programme will partly restore the original forest area in the NNNR in the future and thereby create habitats for rare plants and animals so that the NNNR can resume its original function as an important biodiversity preservation area for whole China.

Preserving biodiversity in NNNR means an important contribution to the survival of these rare species which might be useful for medicine and as inputs in many production processes in the future. If these plants and animals will be extinct, our children and grandchildren will never have the chance to see them and to benefit from their existence, i.e. as important ingredients for medicine.

The "Return Rubber Into Forest" programme would further lead to an increase in the overall forest area as compared to today and to a better water quality in the Naban, Mandian and Mekong rivers. For example, there would be less pesticide contamination in the water, since less pesticides would be brought out to the fields. As a consequence less pesticide residues would be in the whole ecosystem and, therefore, fruits and vegetables would be less contaminated. The danger ensuing from agricultural products to human health would be reduced.

Only "Long-term Scenario" (Treatment 2): ***Experts calculate that when the Return Rubber into Forest programme is implemented today, the positive effects will be realized in about 30 years' time. This is the time that the forest and the whole ecosystem need to regain its original functions. Thus, mainly our children and grand-children will benefit from the RRF programme.***

Both treatments: *All in all, the "Return Rubber Into Forest" programme would be an important contribution to the conservation of the environmental heritage of Xishuangbanna."*

3.3. The estimation model

The first objective of the econometric analysis of survey responses is the calculation of the mean WTP of the sample of households. The estimates of the mean WTP for the overall sample and for the different splits are computed according to the maximum likelihood

approach of Cameron and Huppert (1989). However, we use a linear probit specification for these estimations following the recommendations by Crooker and Herriges (2004).

The second objective of the statistical analysis is to identify the determinants of WTP statements in order to test whether different ethnic groups hold different values of a reforestation programme. Since we use the payment card elicitation format according to fig. 2 in our study we cannot estimate a WTP function but, instead, we calculate the probability that respondent h selects the payment interval $\left[t^{low}, t^{high}\right]$ according to Haab and McConnell (2002):

$$Pr_h\left(select\ \ t^{low}, t^{high}\right) = Pr_h\left(t^{low} \leq WTP_h < t^{high}\right). \tag{1}$$

We assume that WTP can be explained by the characteristics of the respondent, the reforestation scenario and the interview setting contained in the vector x_h and an unobservable component e_h. It is assumed that the latter component is normally distributed with mean zero, i.e. $e_h \sim N(0, \sigma)$. So, WTP as stated by respondent h can be expressed as $WTP_h = \beta x_h + e_h$. The likelihood of respondent h selecting interval $\left[t^{low}, t^{high}\right]$ can now be written in the form

$$Pr_h\left(select\ \ t^{low}, t^{high}\right) = \Phi\left(\frac{t_h^{high} - \beta x_h}{\sigma}\right) - \Phi\left(\frac{t_h^{low} - \beta x_h}{\sigma}\right). \tag{2}$$

In this expression $\Phi(\cdot)$ is the standard normal cumulative density function. From this expression the log-likelihood function of WTP responses can be derived.

$$\ln L\left(\beta \middle| t_h^{low}, t_h^{high}\right) = \sum_{h=1}^{H} \ln\left[\Phi\left(\frac{t_h^{high} - \beta x_h}{\sigma}\right) - \Phi\left(\frac{t_h^{low} - \beta x_h}{\sigma}\right)\right] \tag{3}$$

The command intreg in Stata 12 serves to maximise eq. (3) and yield estimates of the coefficient vector β. If we want to study the influence of different treatment dummies as well as respondent characteristics on WTP, these variables can be included in the vector x_h. Several models with different sets of explanatory variables and interaction effects between ethnic group and scenario design are run for analysis. The results obtained from these models are reported in the next section.

4. Results

The survey was conducted in early summer 2009. All interviews were carried out face-to-face by a group of local interviewers who were recruited and trained especially for the purpose of this survey. The group of interviewers was multi-ethnic, and the interviewers were assigned to the interviews in a random manner. In order to ensure the representativeness of the results with respect to the overall population of the study area a random sample of households was drawn. The local government provided a complete list of all housing units in the urban area of Jinghong, indicating how many households reside in each unit. Based on these data a random list of addresses was generated and the interviewers were sent specifically to those designated addresses. Interviews were conducted seven days per week in the late afternoon and early evening when most people are at home.

4.1. Demographics of the two split samples

The survey yielded 410 completed questionnaires for the two treatments analysed in this study.[7] After discarding questionnaires with respondent age under 18 or missing age statement, 399 valid cases remain in the sample, 202 in the short-term scenario treatment and 197 in the long-term scenario treatment. Table 1 displays means and standard deviations of several demographic variables in the sample.

Table 1: Means, standard deviation and range of several socio-demographic variables

	N	Mean	Std. dev.	Minimum	Maximum
Age	399	36.60	12.50	18	78
Male	398	0.47	0.50	0	1
Children	398	0.68	0.47	0	1
Education	397	3.86	1.23	1	7
Income	356	2922.75	2320.99	250	17500

Since we will compare WTP statements between the two treatments later, table 2 displays the comparison of these socio-demographic variables and the proportions of each ethnic group. Applying Mann-Whitney- and t-tests to compare the mean estimates we do not find significant differences except for respondent age and household income. Respondents in the long-term effects treatment are significantly younger and these households have a lower overall income. However, most importantly the distribution of the different ethnic groups (Han – Dai – Other) is the same across treatments, as their shares in the subsamples do not

[7] This sample is a subset of overall sample of N=2,606 interviews, which included further split sample experiments. The general analysis of this sample is reported in Ahlheim et al. (2012).

differ significantly. Overall these comparisons show that the data can be used to study the treatment effects as laid out in the previous section.

Table 2: Household demographics across the treatments (Mann-Whitney-tests)

		Short-term scenario	Long-term scenario	
	Unit	**Mean**	**Mean**	**p-value**
Age*	years	38.05	35.12	0.019
Male	share	0.48	0.46	0.675
Children	number	0.95	0.99	0.522
Education	scale 1-7	3.98	3.74	0.044
Income*	RMB Yuan	3001.44	2847.53	0.532
Han	share	0.65	0.61	0.483
Dai	share	0.15	0.20	0.133
Other	share	0.21	0.18	0.559

* for these variables a t-test is performed.

4.2. Regression analysis: Who benefits most from reforestation in Xishuangbanna?

The analysis of survey results consists of two steps. Firstly, mean WTP estimates are calculated and compared across different ethnic groups for the two treatments. From this analysis we can see which of the different ethnic groups benefits most from the short-term effects of the RRFP and who benefits most from the long-run effects. In a second step, regression models of stated WTP are run including interaction terms of a number of variables and a dummy indicating the long-term effects treatment. This step shows us among other things the time preference of the different ethnicities, i.e. their WTP for short-run benefits as compared to their WTP for the long-run benefits of the RRF programme. The exact wording of the elicitation question used in this study can be found in box 2.

In table 3 mean WTP estimates for different treatments and different subgroups of respondents are stated. Comparing WTP of the different ethnic groups for the Short-term Scenario we find that the Han population's mean WTP (40.19 RMB) is lower than the mean WTP of all ethnicities taken together (41.17 RMB). The mean WTP of the Dai population (43.16 RMB) is higher than the overall WTP for that scenario, while the composite ethnic group of the Others states the highest mean WTP with 45.60 RMB. Though these differences are not significant in a statistical sense they reflect at least by trend the different cultural and historic backgrounds of the different ethnic groups as described in section 2. These cultural effects are more pronounced for the Long-term Scenario where now the mean WTP of the Others is significantly higher than that of the Han and the combined group of Han and

Dai.[8] Here the Han mean WTP is with only 29.35 RMB much lower than the WTP of all ethnicities taken together (38.20 RMB), while the Dai People's mean WTP (38.87 RMB) is just above "average" and the Others are willing to pay 66.78 RMB every three months over five years. Assuming that such a programme would be implemented without perceivable extra cost for all ethnic groups these results show that the group of the Others would benefit most from the Short-term Scenario as well as from the Long-term Scenario, while the Han would benefit least. These results are, of course, also reflected by the valuation of the Overall Scenario by the different ethnic groups where the WTP for the Short-term Scenario and the Long-term Scenario are taken together (first column in table 3).

Box 2: The elicitation question

> *"The "Return Rubber into Forest" program will be organized by the NNNR under the guidance of higher levels of government. In order to finance this environmental protection program a fund will be founded to which all citizens of Jinghong will have to contribute. This fund will be organized by the relevant government departments. The money in this fund will be used exclusively for the "Return Rubber into Forest" program.*
>
> *Considering the benefits of this program for all people in this region and for you personally, we would like to ask you to mark in the following list how much at most your household would be willing to contribute every three months to this fund for the next five years in order to get the "Return Rubber into Forest" program realized. The program can be implemented only if the sum of all contributions will cover the cost of the program."*

It is interesting that the differences between the three ethnic groups are more pronounced for the Long-term Scenario than for the Short-term Scenario. The reason for this result seems to be the difference between the time preference rates of the three ethnic groups. Of course, the results for Han and Dai shown in table 3 are not significant, but still they provide an indication that these ethnic groups seem to behave in accordance with neoclassical consumer theory by stating a higher mean WTP for the Short-term Scenario than for the Long-term Scenario. However, the opposite is the case for the group of the Others. While Dai people show a positive time preference, just as household theory postulates, the Others state with 66.78 RMB a significantly higher WTP for the Long-term Scenario than for the Short-term Scenario (45.60 RMB). This negative time preference of the Others might follow from their culture, especially from the high spiritual significance they attach to forests, in combination with their history. The fact that these groups have been living for many centuries in remote places in mountainous Xishuangbanna, where they preserved their

[8] The differences in WTP between the ethnic groups were tested with dummy variables for the different groups and performing t-tests.

traditions might make them believe that these traditions will also prevail in the future. Therefore, it might appear important to them to preserve the natural basis of these traditions, i.e. the rain forests, also and especially for future generations.

*Table 3: Mean WTP estimates for different treatments and subgroups of respondents (***= 1 % significance level)*

	Overall in RMB	**Short-term scenario (WTP_{st})** in RMB	**Long-term scenario V2 (WTP_{lt})** in RMB
All	39.70	41.17	38.2
	N = 389	N = 196	N = 193
Han	34.92	40.19	29.35
	N = 241	N = 124	N = 117
Dai	40.67	43.16	38.87
	N = 69	N = 29	N = 40
Other	55.47	45.60	66.78***
	N = 76	N = 40	N = 36

These findings can be confirmed when interval regression models with WTP as dependent variable according to equations (1) to (3) are run to detect possible determinants of WTP. The results are displayed in table 4. For our analysis we estimate three different econometric models with increasing degrees of complexity.

Model 1 on the left column shows several significant coefficients. The levels of respondents' education level (EDU) and household income[9] (INCOME) both affect WTP in a positive way, whereas the fact that a respondent is married (MARRIED) has a negative impact on stated WTP, maybe because of the household budget constraint being tighter in this case. There is no significant influence of any other single demographic variable in this basic model. In the lower part of table 4 we show the interaction terms[10] between the Long-term Scenario (V2) and several other variables. For model 1 we see that while there is a no interaction effect for the variable DAI, there is a significantly positive interaction term for OTHER. That means that the dummy OTHER (i.e. belonging to the ethnic group of the Others) has a significantly positive impact on WTP in the Long-term Scenario treatment. This confirms our earlier result

[9] The coefficient for income is positive only after the second decimal place (not shown in table 4). Since we are dealing with interval regression models here the absolute value of the coefficients is of no importance for their interpretation.

[10] We are well aware of the problems pointed out by Ai and Norton (2003) and Norton et al. (2004), that the significance of an interaction term in a nonlinear model does not necessarily mean that the respective interaction effects are also significant, but as shown in table A.1 in the appendix in our case most of the marginal effects of the interaction terms related to V2 are significant. We are grateful to Andreas Ziegler and Claudia Schwirplies for drawing our attention to this problem.

from table 3 that members of ethnic groups other than Han or Dai have a higher WTP for the Long-term Scenario than for the Short-term Scenario. Among Dai respondents, however, this tendency cannot be found.

In models 2 and 3 additional interaction terms are included into the regression model. In model 2 the interaction of the Long-term Scenario treatment and the dummy for having a child (V2*CHILD) and the interaction of this treatment with emotional care for the environment (V2*EMOCARE)[11] are significantly positive. An interpretation of these effects might run as follows. Respondents having a child state a systematically higher WTP amount for the Long-term Scenario than for the Short-term Scenario, i.e. their time preference is negative which might be interpreted here as an indication of intergenerational altruism. Further, this result indicates that with respect to the Long-term Scenario respondents with a child state a significantly higher WTP than respondents without children. Analogously, those who score high on the environmental attitude EMOCARE in model 2, i.e. respondents with a strong emotional attachment to the natural environment, state a higher WTP for the Long-term Scenario than for the Short-term Scenario. Scoring high on emotional care leads to a higher WTP only in the Long-term Scenario. This makes sense since those people can be expected to be interested in a long-term sustainable development of their environment, which implies that they care for long-run benefits more than for short-run benefits.

These results show that, on average, positive time preference which is in line with economic theory can be identified in our data according to model 2 for respondents without children and with little emotional attachment to the environment (the coefficient of V2 alone is significantly negative). On average, time preference is reversed for people who have children (because of intergenerational altruism), for people from the ethnic group of the Others (for cultural and spiritual reasons) and for people who have a special emotional attachment to nature (because of their long-term thinking and their interest in a sustainable development of their region).

The significance of the latter effect (V2*EMOCARE) vanishes in model 3 where additional interaction terms are included in the analysis. Instead, the interaction term with respect to a special emphasis of the importance of preserving Xishuangbanna's natural heritage for future generations (V2*HERITAGE) counteracts the positive time preference shown for the Long-term Scenario V2 alone. Respondents attributing a high level of importance to the fact that the RRFP leads to the “conservation of the environmental heritage of Xishuangbanna for future generations” (i.e. scoring high on the variable HERITAGE) state a significantly higher WTP for the Long-term Scenario than for the Short-term Scenario (the coefficient of V2 alone is negative while the coefficient of V2 in interaction with HERITAGE is positive). This can be interpreted as an indication of the long-term thinking and forward-looking dedication to nature of these respondents.

[11] Respondents scoring high on EMOCARE agreed with statements like "I like to be in nature because I love the natural environment", " Humans need an intact nature to survive", " Nature has a value all its own", " It makes me sad to see natural environments destroyed" etc.

*Table 4: Interval regression models of WTP including interaction terms (***= 1 %, **= 5 %, * = 10 % significance level)*

	Model 1		**Model 2**		**Model 3**	
	Coefficient	**Std. Err.**	**Coefficient**	**Std. Err.**	**Coefficient**	**Std. Err.**
CONSTANT	19.81	(18.72)	21.18	(20.23)	229.90*	(69.65)
AGE	-0.40	(0.33)	-0.40	(0.33)	-0.36	(0.33)
MALE	3.38	(6.87)	2.77	(7.05)	2.33	(7.06)
MARRIED	-15.48*	(8.26)	-14.30*	(8.33)	-16.41*	(8.47)
EDU	9.60***	(3.08)	11.29***	(3.23)	10.81***	(3.23)
INCOME	+0.00***	(0.00)	+0.00**	(0.00)	+0.00***	(0.00)
CHILD	-8.44	(8.01)	-20.79*	(10.86)	-21.38*	(11.21)
DAI	-2.05	(13.75)	0.06	(13.56)	-3.97	(13.60)
OTHER	-4.38	(12.06)	-0.99	(12.54)	-3.33	(12.36)
EMOCARE			-7.06	(5.33)	-2.51	(5.42)
HERITAGE					-42.82**	(16.78)
SATHEALT					-11.73*	(6.35)
V2	-8.47	(8.48)	-22.89*	(13.02)	-308.98***	(94.76)
V2*DAI	11.51	(18.37)	5.49	(18.53)	10.98	(18.52)
V2*OTHER	35.73**	(17.11)	34.06*	(17.43)	38.02**	(17.46)
V2*CHILD			27.46*	(14.34)	26.24*	(14.51)
V2*EMOCARE			13.76*	(7.09)	8.09	(7.15)
V2*HERITAGE					54.80**	(23.16)
V2*SATHEALT					21.96***	(8.38)
Observations	343		310		303	
Log likelihood	-1,880.95		-1,653.27		-1,578.71	
Chi-square	0.000		0.000		0.000	

An analogous effect can be found for respondents who are satisfied with their current health status (V2*SATHEALT). Interestingly, health satisfaction alone has a negative impact on WTP for the Short-term Scenario, maybe because these people do not see any necessity to change things in the short run. This attitude changes as soon as the benefits accruing from the RRF programme are promised for the future only. Maybe these respondents are not so sure that their good health will also prevail in the future, so that they want to ensure a healthier environment for the future. This motivation is plausible only for young respondents, of course. For others, who will not benefit personally from the future improvements of environmental quality, intergenerational altruism might offer an explanation of the positive coefficient of the interaction term V2*SATHEALT. Note that the

inclusion of additional interaction effects in models 2 and 3 leaves the results for the ethnic groups largely unchanged. Obviously, it is indeed the ethnic and cultural identity of these groups that makes this difference.

Finally, it is interesting to observe that the level of significance of the negative impact of the Long-term Scenario treatment dummy (V2) increases from the 10 % level to the 1 % level as more interaction terms are included in the model. This means that the more factors are identified which cause reversed time preference, such as having children or belonging to ethnic groups other than Han or Dai, the stronger is the effect of positive time preference for respondents not displaying these factors.

5. Concluding remarks

In this study our empirical interest was focused on the preferences of three different ethnic groups for a reforestation programme in Xishuangbanna in southwest China. The differing preferences of these groups for that programme can be taken as an indication of how much these groups would benefit from this programme if it were implemented. Therefore, our study highlights, among other things, the potential distributional effects of the reforestation programme in question.

In Xishuangbanna rubber plantations have been encroaching the natural rainforest from various sides over several decades. Increasing world market prices of rubber have triggered this development bringing higher incomes and general economic prosperity and growth to this region. The downside of this development is the destruction of the natural environment in Xishuangbanna, especially the rainforest, which used to be a unique biodiversity hotspot in the past. In our CVM study we proposed a programme for the reforestation of rubber plantations in the Nabanhe National Nature Reserve and asked a representative sample of members of three different ethnic groups (Han, Dai and a composite of several small mountain tribes which we called "Others") their WTP for the realisation of this programme.

We found that there seems to be a close relation between the cultural and historical background of these different groups and their different degrees of appreciation of the RRF programme, as expressed by their WTP for its realisation. In the survey we confronted two different splits of our sample with two different project scenarios. In the first treatment the scenario promised that the environmental benefits of the RRF programme would accrue soon after the implementation of the programme (the "Short-term Scenario"), while in the second treatment (the "Long-term Scenario") respondents were told that the benefits of the project would be available only after thirty years. It showed that for the Long-term Scenario the WTP of the ethnic group of the Others was significantly higher than the WTP of the Dai and of the Han. We tried to explain this outcome by the differences in culture and spiritual attachment to forests of the three ethnic groups and by their different historical roots in Xishuangbanna.

Comparing respondents' WTP for the Short-term Scenario on the one hand and the Long-term Scenario on the other we found that Han as well as Dai people stated a higher WTP for the Short-term Scenario than for the Long-term Scenario which is in line with economic theory postulating a positive time preference in consumption. However, this is astonishingly not the case for the ethnic group of the Others who stated a significantly higher WTP for the Long-term Scenario, i.e. showing a negative time preference. Again we tried to find explanations for this result in their cultural and spiritual background.

In a regression analysis we tried to identify determinants of WTP for the two treatments using an interval regression model. This analysis confirmed our result that the WTP for the Long-term Scenario is higher for the group of the Others than for Dai and Han respondents. We further found that the fact of having children or being emotionally especially attached to nature led to a reversal of the originally positive time preference of the Han respondents. While having children or nursing the wish to pass the natural heritage of Xishuangbanna on to future generations has a negative effect on WTP for the Short-term Scenario, things change as soon as respondents are confronted with the Long-term Scenario. Now these items have a significantly positive impact on WTP for the RRF programme in its long-term-benefit version as compared to the short-term-benefit version. Explanations for this time preference reversal might be the intergenerational altruism of people with children and the long-term thinking of people who feel responsible for passing on the natural heritage of Xishuangbanna to future generations.

Taken together, our results show that differences in the ethnic and cultural background of people have significant effects on the extent to which different groups of the population benefit from public projects in the environmental sector. Further, our study results illustrate the influence of having children and of emotional attachment to nature on the time preference of people with respect to environmental improvements.

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References:

Ahlheim, M., Börger, T. and Frör, O. (2012) The ecological price of getting rich in a green desert: A contingent valuation study in rural Southwest China. FZID Discussion Papers 55/2012. Stuttgart, University of Hohenheim.

Ahlheim, M., Börger, T. and Frör, O. (2013) The effects of respondent incentives in contingent valuation studies, *Journal of Environmental Economics and Policy*, 2(1), pp. 45-70.

Ai, C. and Norton, E.C. (2003), Interaction terms in logit and probit models, *Economics Letters*, 80, pp. 123-129.

Bennett, M. T. (2008) China's sloping land conversion programme: Institutional innovation or business as usual?, *Ecological Economics*, 65(4) pp. 699-711.

Cameron, T.A. and Huppert, D.D. (1989) OLS versus ML estimation of non-market resource values with payment card interval data, *Journal of Environmental Economics and Management*, 17, pp. 230-246.

Carson, R.T. (2012) Contingent Valuation: A Practical Alternative When Prices Aren't Available, *Journal of Economic Perspectives*, 26(4), pp. 27-42.

Carson, R.T. and Hanemann, M.W. (2005) Contingent Valuation, in: Mäler, K.-G. and Vincent, J.R. (eds) Handbook of Environmental Economics, Elsevier, Amterdam, pp. 821-936.

Crooker, J.R. and Herriges, J.A. (2004) Parametric and semi-nonparametric estimation of willingness-to-pay in the dichotomous choice contingent valuation framework, *Environmental and Resource Economics*, 27, pp. 451-80.

Fisher, I. (1930) The theory of interest, MacMillan, New York.

Fu, Y., Guo, H., Chen, A. and Jingyun, C. (2004) Rubber development by smallholder farmers in Xishuangbanna, Yunnan, China - A case study from Daka and Baka.

Guo, H., Padoch, C., Coffey, K., Chen, A. and Fu, Y. (2002) Economic development, land use and biodiversity change in the tropical mountains of Xishuangbanna, Yunnan, Southwest China, *Environmental Science and Policy*, 5, pp. 471-79.

Haab, T.C. and McConnell, K.E. (2002) Valuing environmental resources, Edward Elgar, Cheltenham.

Kui, C. (1997) Relationship changes between lowlander and hill tribes in Xishuangbanna, P.R. China, *Asia Pacific Viewpoint*, 38, pp. 161-67.

Li, H., Mitchell Aide, T., Youxin, M., Wenjun, L. and Min, C. (2007) Demand for rubber is causing the loss of high diversity rain forest in SW China, *Biodiversity Conservation*, 16, pp. 1731-45.

LILAC (2006): Conservation of cultural landscapes through diversification of resource-use strategies and technologies for agro-ecosystems in mountainous Southwest China, Project Proposal, Hohenheim.

Liu, H., Xu, Z., Xu, Y. and Wang, J. (2002) Practice of conserving plant diversity through traditional beliefs: a case study in Xishuangbanna, southwest China, *Biodiversity and Conservation*, 11, pp. 705-13.

Lu, X. and Lin, S. (2010), Rubber expansion in Xishuangbanna, Manuscript of a talk held in RCSD/ChATSEA International Conference: Revisiting Agrarian Transformation in Southeast Asia: Empirical, Theoretical, and Applied Perspectives, Chiang Mai, Thailand.

Norton, E.C., Wang, C. and Ai, C. (2004), Computing interaction effects and standard errors in logit and probit models, *The Stata Journal*, 4(2), pp. 154-167.

Shapiro, J. (2001) Mao's war against nature: Politics and the environment in revolutionary China, Cambridge University Press, Cambridge.

Sturgeon, J. C. (1997) Claiming and naming resources on the border of the state: Akha strategies in China and Thailand, *Asia Pacific Viewpoint*, 38, pp. 131-44.

Sturgeon, J. C. (2010) Governing minorities and development in Xishuangbanna, China: Akha and Dai rubber farmers as entrepreneurs, *Geoforum*, 41, pp. 318-28.

Sturgeon, J. C. and Menzies, N. (2006) Ideological landscapes: Rubber in Xishuangbanna, Yunnan, 1950 to 2007, *Asian Geographer*, 25, pp. 21-37.

XBS (2012) Xishuangbanna Bureau of Statistics, Annual Statistical Yearbooks 2008 – 2011, http://xxgk.yn.gov.cn/canton_model2/newslist.aspx?classid=174690, last accessed September 2013.

Xishuangbanna (2010) The Government of Xishuangbanna Dai Autonomous Prefecture, Report of the Sixth National Census 2010, http://www.xsbn.gov.cn/zwgk/ShowArticle.asp?ArticleID=17745, last accessed September 2013.

Xu, J. (2006) The Political, Social, and Ecological Transformation of a Landscape, *Mountain Research and Development*, 26, pp. 254-62.

Ziegler, A. D., Fox, J. M. and Xu, J. (2009) The rubber juggernaut, *Science*, 324, pp. 1024-25.

Appendix

*Table A.1: Marginal effects of variables interacted with V2 treatment dummy calculated at V2=0 and V2=1, respectively (***= 1 %, **= 5 %, * = 10 % significance level)*

	Variable	V2	Treatment	Marg. effect	Std. Err.	Corresponding coefficient in table 4
Model 1	DAI	0	Short-term	-2.05	(13.75)	DAI
		1	Long-term	9.46	(12.31)	DAI*V2
	OTHER	0	Short-term	-4.38	(12.06)	OTHER
		1	Long-term	31.35***	(12.21)	OTHER*V2

	Variable	V2	Treatment	Marg. effect	Std. Err.	Corresponding coefficient in table 4
Model 2	DAI	0	Short-term	0.06	(13.56)	DAI
		1	Long-term	5.56	(12.72)	DAI*V2
	OTHER	0	Short-term	-0.99	(12.54)	OTHER
		1	Long-term	33.07***	(12.20)	OTHER*V2
	CHILD	0	Short-term	-20.79*	(10.86)	CHILD
		1	Long-term	6.67	(10.74)	CHLID*V2
	EMOCARE	0	Short-term	-7.06	(5.33)	EMOCARE
		1	Long-term	6.70	(4.69)	EMOCARE*V2

	Variable	V2	Treatment	Marg. effect	Std. Err.	Corresponding coefficient in table 4
Model 3	DAI	0	Short-term	-3.97	(13.60)	DAI
		1	Long-term	7.01	(12.67)	DAI*V2
	OTHER	0	Short-term	-3.33	(12.36)	OTHER
		1	Long-term	34.68***	(12.42)	OTHER*V2
	CHILD	0	Short-term	-21.38*	(11.21)	CHILD
		1	Long-term	4.85	(10.67)	CHLID*V2
	EMOCARE	0	Short-term	-2.51	(5.42)	EMOCARE
		1	Long-term	5.59	(4.68)	EMOCARE*V2
	HERITAGE	0	Short-term	-42.82**	(16.78)	HERITAGE
		1	Long-term	11.97	(16.15)	HERITAGE*V2
	SATHEALT	0	Short-term	-11.73*	(6.35)	SATHEALT
		1	Long-term	10.23*	(5.57)	SATHEALT*V2

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