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NATURE CONSERVANCY VERSUS TRADITIONAL PEOPLE'S RIGTHS: APPLYING ENVIRONMENTAL VALUATION AS AN ENVIRONMENTAL JUSTICE STRATEGY FOR MEDIATING CONFLICTS STABLISHED BY THE CREATION OF AN INTEGRAL PROTECTION CONSERVATION UNIT AND RIVERSIDE TRADITIONAL POPULATION PERMANENCE IN ECOLOGICAL STATION OF TERRA DO MEIO, PARÁ, AMAZONIA, BRAZIL.

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1 INTRODUCTION

Brazilian Federal Law that normatizes Brazilian Nature Conservation Units System (SNUC, in Portuguese) establishes two groups of Conservation Units (CU) in Brazil: the Integral Protection CU and the Sustainable Use CU. Among Integral protection CU, the Ecological Stations are ones of the most restrictive cathegories in terms of allowed used for natural resources inside the CU area. In order to better protect Amazon Forest from deforestation and other negative impacts associated with hydroplants and other highly impactful economic enterprises, pressed by public opinion, Brazilian Government created a CU set in the heart of Amazon, surrounding Xingu River watershed, and "in the heart of the heart" of Terra do Meio (Middle Land), Pará, implanted the Ecological Station of Terra do Meio (EETM).

Inside the new born CU, created in 2005, about a dozen of riverside traditional families have already settled down there since early Amazonian rubber extraction cycle, and merged with Brazilian First Nations in cultural and parental levels. Since CU creation, these people's staying at EETM is against Brazilian Federal Laws, once that legislation prohibits anyone to live inside Ecological

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Station and establishes that even traditional population already settled in such territories will have to live after a certain period, which shall be establish by legal specific instruments. Prevented by Law from education and health services for almost nine years since EETM's creation, riverside families have today illiterate children and elders, no sanitation and mean family income of less than ten per cent of the minimum Brazilian salary. In the middle of Middle Land, these riverside people are however extremely integrated with Nature, and need very little from modern society to survive, but they do not want to leave! Amazon Forest is their lives and if Government takes them out, their whole existence will be profoundly negatively affected. Furthermore, as they do not have legal possession on their occupations and their way of living do not require expensive buildings nor other sophisticated infrastructure, tradition valuation aiming compensation for possession loss and for improvements would not be enough for them settling down in other places. In the other hand, in the wilds of the Amazon forest, these inhabitants have Local Traditional Knowledge -LTK (INGOLD; KURTTILA, 2000 *apud* PRADO, 2012) about biodiversity.

Thus, the objective of this work, supported by a partnership among Federal Fluminense Institute (IFF), Chico Mendes Institute for Biodiversity Conservation (ICMBio), Brazilian National Fund for Biodiversity Conservation (FUNBIO) and Wildlife World Foundation (WWF) is to develop a valuation study able to grasp existence value of EETM for its traditional riverside people inhabitants, applying Contingent Valuation techniques, in order to propose a scheme of payment for the environmental services (PES) they provide not only to Brazilian, but also to global society, once that their land use is likely to secure ecosystem services of Amazon forest in EETM's region, which is a necessary condition to design a PES program (WUNDER, 2005; WUNDER, 2008). In parallel, the project team is working to produce juridical, technical and scientific evidence to support the permanence of EETM's riverside families in their original territories.

2. CHARACTERIZATION OF CASE STUDY AREA

The Iriri River is one of the most important tributaries of the Xingu River, and the lands lying between the two rivers became known locally as the "Middle Land" (Terra do Meio). Located in the State of Pará (Figure 1), the region has gone through several economic cycles, such as the extraction of latex from rubber trees and the trade of animal skins, especially from felines such as wild cats (*Leopardus tigrinus*) and jaguars (*Panthera onca*). Situated in the Brazilian Amazon's arc of deforestation, and being, because of this, an area of intense land conflicts, in the beggining of the 21th the region experienced strong anthropic pressure due to logging, mining and farming, while universities, research institutes, professional bodies, trade unions, and other non-governmental organizations were claiming for the creation of protected areas in this region.

Local inhabitants as well as governmental documents point out the murder of the American missionary "Sister Dorothy" as a driving force that led the Brazilian Government to speed up the requests of pro-conservation social actors to create a set of protected areas that became known as CU Block of the Middle Land, composed by three Sustainable Use CU (Iriri, Riozinho do Anfrísio e Rio Xingu Extractivist Reserves - RESEX) and two Integral Protection CU (National Park of Serra do Pardo and EETM), surrounding and protecting Xingu River Watershed, which represent 6,41% of the total area of Brazilian Federal CU, with EETM alone responding for 4,49% (Table 1).

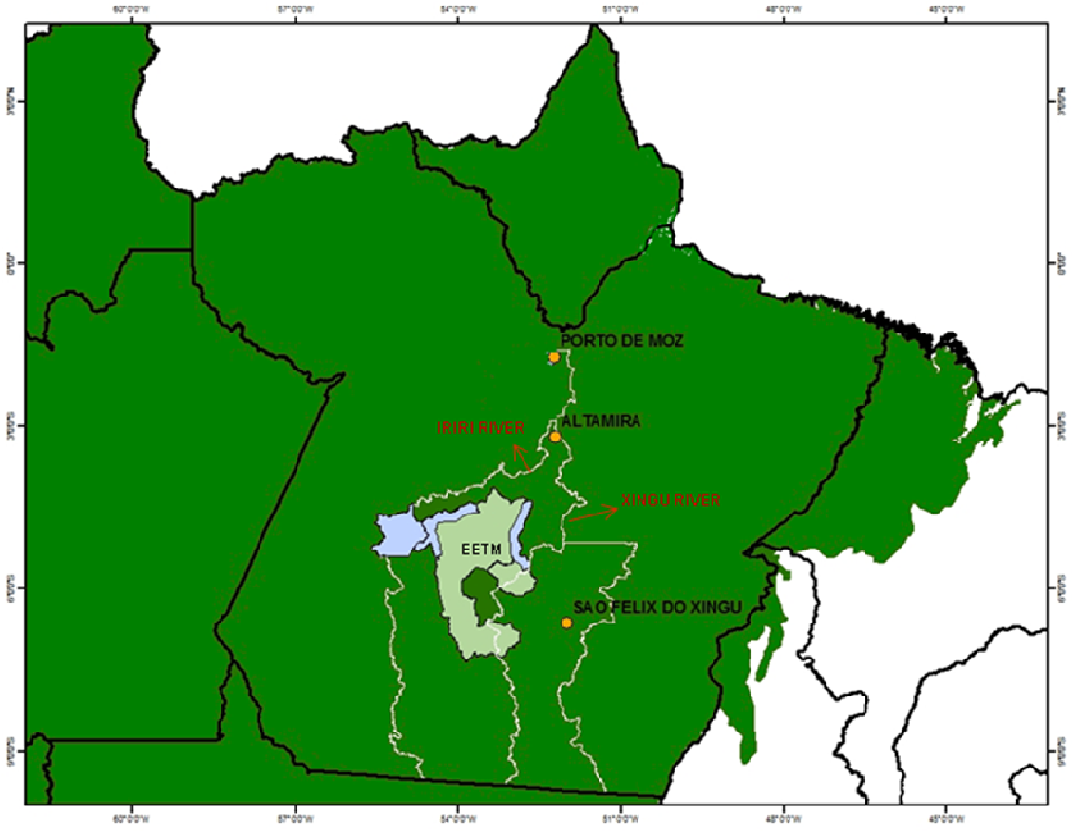

Figure 1. Schematic representation of Brazilian Federal CU located at the CU Block of the Middle Land, showing Sustainable Use CU in light blue and Integral Protection CU in light green, highlighting EETM, Iriri and Xingu Rivers.

The model used to design these protected areas corresponds to what researchers describe as source-sink model (PULLIAM, 1988) in which the protected areas of the most restrictive management categories according Brazilian Law (belonging to the Integral Protection group) are located at the center of protected area's block whereas the protected areas in which human occupation is permitted (Sustainable Use Group and Indigenous Lands) are in its surroundings. Thus, as shown in Figure 1, "at the heart" of the CU Block of Middle Land, EETM was created in 2005 by Federal Decrete.

Table 1. Brazilian Federal CU located at the CU Block of the Middle Land

CU Group	CU Name	Area (ha)
Sustainable Use	RESEX of Iriri	398938.00
	RESEX of Riozinho do Anfrízio	736340.99
	RESEX of Rio Xingu	303841.40
Integral Protection	Serra do Pardo National Park	445.392.00
	EETM	3373111.00
CU Block of Middle Land		4812231.39
Federal Brazilian CU		75050370.00

Source: ICMBIO, 2014.

3 METHODOLOGY

Environmental valuation techniques and methods have been widely described in literature (PIERCE, 1994; MORAN *et. al.*, 1995; OECD, 2002; DE GROOT *et al.*, 2002; FARBER *et al.*, 2002; MAIA, 2004) and despite of all controversy involving the theme (GATTO; DE LEO, 2000; BOYD, 2011), biodiversity valuation might be considered as an strategy for decision makers worried about Nature conservation. In order to calculate total economic value for ecosystem goods and services, which would be the first step not only to determine a fair indemnity for them to leave but also to establish a minimum payment value for designing a PES Program, we applied the concept of Total Economic Value (TEV) of EETM's biodiversity related to environmental goods and services, which can be estimated by summing parcels associated to use and non-use values, as follows (PIERCE, 1994; MORAN *et. al.*, 1995):

$$TEV = DUV + IUV + OV + EV,$$ where:

TEV = total economic value; *DUV* = direct use value; *IUV* = indirect uses value; *OV* = option value (consumptive uses); and *EV* = existence value.

According to de Groot *et al*. (2004), each of these parcels can be related to one or more valuation techniques, but only the Contingent Valuation Method can grasp existence values (OEDC, 2002). In order to calculate the restitution necessary for riverside EETM inhabitants' resettlement or a monthly minimum value that could be payed to them while they stay inside CU waiting to be resettled, we tried to get data to combine and apply the following methods: opportunity cost, replacement cost and dose-response methods (useful to estimate direct and indirect use values); hedonic pricing (useful to estimate use and option values); and contingent valuation method (useful to estimate direct and option uses values and also existence values). Data related to the first three

methods were researched at ICMBio (Chico Mendes Institute for Biodiversity Conservation, Federal Brazilian Governmental Agency which manages all Federal CU) data sources. To apply hedonic pricing the authors researched rural land market prices in Altamira and São Felix do Xingu (the two municipalities in which EETM is inserted, as shown in Figure 2). For Contingent Valuation method we applied a survey questionnaire to eleven members from each of the nine riverside families, asking them about their willingness to receive compensation (WRC) to leave EETM if the resettlement process occurs, as well as their willingness to receive a monthly payment for environmental service (WPES) and to stay there maintaining their traditional way of using the landscape. The survey was made during workshops conducted in two field trips, between July, 2012 and August, 2013, employing participant observation of EETM's residents conducted during participatory diagnosis (parallel activity made to produce subsides to CU Management Plan, which began previously to valuation survey).

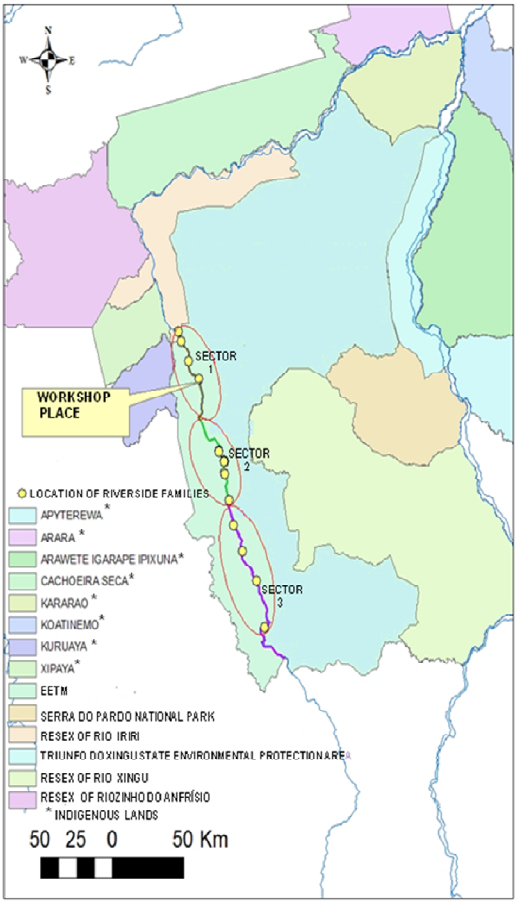

Figure 2. Schematic representation of EETM's sectors and workshop place used for developing the present case study, showing surrounding indigenous lands and other CU.

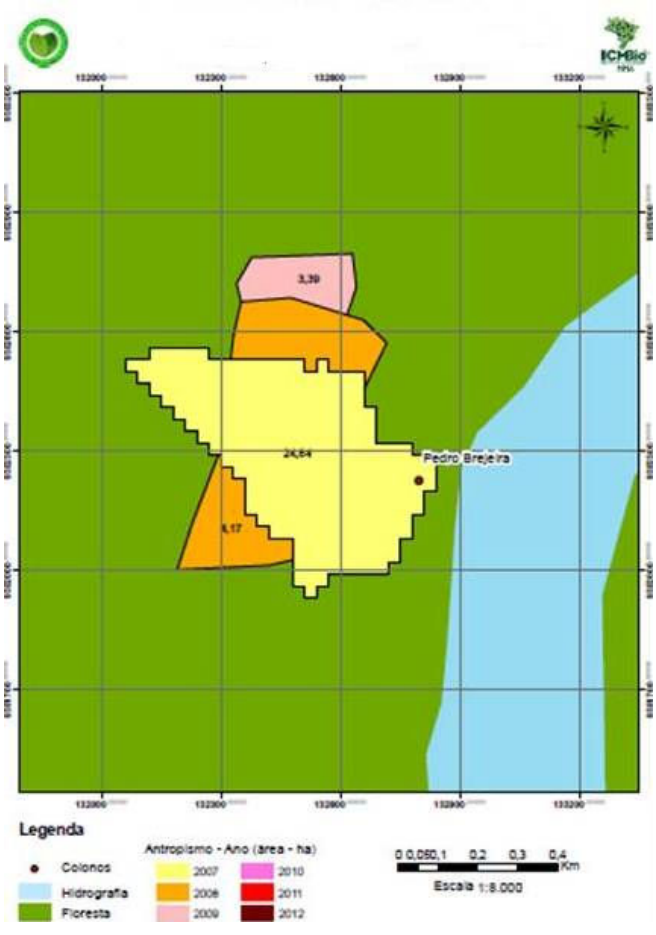

Figure 3. Example of muititemporal anthropism assesment (from 2007 to 2012) made by one of the authors for a resident of Sector 1 in EETM, produced with the collaboration of INPE. No deforestation could be detected after 2011.

orkshop

sectors (as shown in Figure 2) and riverfront inhabitants were brought together by speedboat

transportation. The valuation issues contained questions about their livestock, agricultural and extractive production (previous to EETM's creation) to compliment ICMBio's data and to enable the authors calculate the opportunity costs. Anthropism assessment (Figure 3) was made by one of the authors, who as EETM's manager from 2011 to 2014, with the cooperation of technical staf from National Institute of Spacial Research (INPE), applying GIS technology.

3 RESULTS AND DISCUSSION

The first research result was the verification of a situation of environmental injustice generated by the Brazilian Government when creates an Integral Protection CU like EETM and thereafter bringing to itself the legal obligation of financially compensating land owners and other occupants for their lost property's rights and also to resettle families from traditional populations which were living there by the time of CU's creation. Historically and systematically, throughout the national territory, Brazilian Government has disrespected its own legislation. Therefore, in EETM's case, the Federal Government is the very creator of environmental injustice (ISA, 2015; OLIVEIRA, 2010). The occurrence of environmental injustice has been historically unveiled by the light of environmental racism and has usually been linked to large enterprises and private capital that de-structure the livelihoods of socially and environmentally vulnerable populations (ACSELRAD, 1999; HERCULANO, 2002; ACSELRAD, 2009; DUARTE, 2009). However, environmental injustice associated with the State apparatus, particularly with the creation of Integral Protection CU in Brazil, deserves more extensive research. Participant observation during field trip allowed the authors to distinguish three occupation categories inside the CU: big farms, outback ranchs and riverside sites. Large farms are not being analyzed by the present study. The occupation of the settlers by the Transiriri road, in which families also live in social and environmental vulnerability, will be discussed further. The present paper focuses on the situation of local riverfront inhabitants, the "beiradeiros" ("beiradão" is the local denomination for the river edge and riparian areas where they have settled decades ago). Among the "beiradeiros" of Iriri River, two types of livelihoods were identified: some families self recognized themselves as ranchers ("colonos"), and others as riverside people('ribeirinhos").

In general, most of the ranchers are "beiradeiros" who got Federal Government funding to buy their land during mid twenty century promoted Amazon occupation and came to live near Iriri River in recent decades, with the perspective to remove the forest and to plant pasture for cattle, reproducing the type of soil use characteristic of family farmers. Differently, the "beiradeiros' who are living for longer time in the Iriri River region, usually descendants of the "rubber soldiers" that came to Amazon in the first half of the twentieth century, make their living predominantly from

chestnuts, acai berry and vegetal oils extraction, that since EETM's creation cannot be marketed. They have hunting and fishing as their main source of protein for food and do not wish to raise cattle, having a way of life similar to other traditional people and groups who are currently living in extractive reserves, along the rivers of the Xingu Watershed. Some are married with indigenous people. Self recognized as riverside people, they want to stay inside the CU definitely. When facing the EETM's creation decree, riverfront people's desire to leave or to stay in CU can be considered the dividing line between the ranchers and the riverside people.

Table 2 presents a brief socioeconomic characterization of the seventeen riverfront families living on Iriri's edge within the EETM. Data were produced after consolidation of participatory preliminary diagnosis conducted between November, 2011 and August, 2013 and show the high degree of environmental vulnerability in which the "beiradeiros" of Iriri River were thrown after seven years of economic strangulation caused by EETM creation.

Table 2. Socioeconomic characterization of the riverfront families living on Iriri's edge within the EETM

Riverfront Inhabitants ("beiradeiros")	**Riverside People**	**Ranchers**
Number of families	9	8
Mean family income (Can $ per month)	0 – 56.84	18.95 – 94,73
Education pattern – adults	97.5% illiterate	85.0% illiterate
Education pattern – children and young adults	52.2% illiterate 47.8% studying in Altamira (they left EETM)	100% studying in Altamira (they left EETM)
Citizenship-related basic documents	54.2% without at least one basic document; 4.2% with no documents at all	13.0% without at least one basic document; 4.3% with no documents at all
Elderly's retirement income	67 % without income	
Citizen participation in community associations	None	
Basic sanitation facilities	None	

Note: 1 Can $ = R$ 2,639

This depicted situation unveils the need to formulate strategies for inclusion of these families, who are actually with no real prospect of improving their life quality. Research also showed that riverside peolple could be inequivocally characterized as traditional population (DIEGES, 1996), and that Brazil has ratified the 169 ILO Convention, that guarantees traditional people's rights (despite the federal law has forbidden them to continue living there).

Once that riverside people do not have legal possession on their occupations and their way of living do not require expensive buildings nor other sophisticated infrastructure, conventional

valuation techniques aiming compensation for possession loss and for site betterments would not be enough for them settling down in other places. Furthermore, at the same time, their local traditional knowledge (which can be considered a key to research and conservation in Amazon) is being lost. Once that riverside people do not have legal possession on their occupations and their way of living do not require expensive buildings nor other sophisticated infrastructure, conventional valuation techniques aiming compensation for possession loss and for site betterments would not be enough for them settling down in other places. This is why the authors propose the payment for environmental services as a plausible strategy for improving their life quality and for maintaining their cultural practices while they are not resettled.

Designing a PES Program needs an environmental valuation method that validates an economic value which could be associated to a minimum PES award. Although the Travel Cost Method is usually applied to estimate recreational values associated to biodiversity and ecosystems services in CU (GATTO; DE LEO, 2000; OECD, 2002) it was not used because tourist visitation is forbidden in Brazilian Ecological Stations, and other kinds of visitors cannot not access EETM easily because of its remoteness, and the few who do can only enter with ICMBio's special permission. Although research projects expenditures can also be linked to ecosystem values (FERREIRA *et al.*, 2012), avoided cost method was not tested either because of the lack of data about all research projects that ran out at the area since EETM's creation. Replacement cost method would imply a huge fauna and flora inventary of the area (which is not feasable in short-medium terms). Dose-response method is similarly not applicable, because environmental impacts caused by riverside people in EETM actually are very low to be measured, as shown by IMBio's anthropism assessment, coordinated by INPE - Instituto Nacional de Pesquisas Espaciais (National Institute for Space Research) together with the manager and only server from the Ministry of Environment that Brazilian Government's accelerated growth project designed for the country since 2002, have put Brazilian environmental agencies in a collective denial situation (REES, 2010) that is pushing hydroplants and other impactful enterprises to be carried out in Amazon, in general, and in Xingu River Watershed specifically, with a misbelief that sophisticated technology and GIS alone will cope with Amazon forest conservation successfully . Lack of priorities and human resources to deal with Amazon reflects the distorted vision of the region as a "demographic void", that leads to disregarding or at least underestimating the importance of local traditional knowledge in helping researchers and governmental technicians in their work for the maintenance of Amazon's ecosystem goods and services, thus reinforcing PES schemes as a strategy to be investigated.

Among the methods that were tested, in the case of EETM's residents, opportunity costs was impossible to calculate, due to lack of or inconsistent data from riverside people production

(previous to CU creation); it is worthwhile noticing that they practice subsistence cultures with very little trading. Hedonic Pricing was also tried but it led to very low values due to the high extension and consequent low costs of land in Amazon. Consequently, Contingent Valuation was the main choice done by the authors that could allow the calculation of a minimum award value in the case studied. When asked about their willingness to receive compensation to be resettled away from EETM (WRC), **72.7 %** of riverside family chiefs said that "**no money would be enough"** for them, reflecting the **immeasurable existence value they give for Amazon Forest**! On the other hand, when asked about their willingness to receive for remaining in the area, and sharing their local knowledge with government servers, technicians and researchers, they could figure out a value. Preliminary calculations led to "perpetual" monthly values of about R$ 1,608.82 per family (Can $ 609.63 per family per month) as an "award" for the environmental services they are maintaining for Amazon. The resulting value was **2.5 times the Brazilian minimum salary** in the time the questionnaires were applied and substantially higher than the payment received by Amazon families from **the "Forest Award"** that the Government of Amazon pays by its PES Program (which calculates the payment based on the opportunity costs method).

4. CONCLUSION

When compared to other Brazilian social programs' values, the award here presented also seems to be rather high. However, despite of this apparent high values regarding Brazilian social and PES programs, it is important to mention that if calculation considers the total area of EETM, which corresponds to more than 77 % of the territorial extension of Rio de Janeiro State, **each family award would be less than Can $ 1cent per ha per year** to help Brazilian Government to take care of EETM. Considering that during the period when this study was developed, Brazilian Government assigned only one ICMBio server to take care and manage the whole CU, and that monthly costs involved in supporting these nine families would not exceed Can $ 4,500.00, the authors hope that either national or international non-governmental partners find reasonable to contribute to a PES Program specially designed to help EETM's riverside people to be the "guardians of the heart of the heart of Amazon!".

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