

UNIVERSITÉ DU QUÉBEC À MONTRÉAL

ÉLÉMENTS MICROÉCONOMIQUES SOUS-JACENTS AUX
PERCEPTIONS ET À L'ACCEPTABILITÉ SOCIALE DE
POLITIQUES ENVIRONNEMENTALES PAR DES POPULATIONS
VULNÉRABLES DE LA RÉGION DU TAPAJOS EN AMAZONIE
BRÉSILIENNE

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PAR
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Aux communautés du Tapajós

TABLE DES MATIERES

REMERCIEMENTS.....	iii
LISTE DES TABLEAUX.....	xii
LISTE DES FIGURES.....	xiii
RÉSUMÉ	xiv
INTRODUCTION GÉNÉRALE	1
Causes de la déforestation	1
Le projet PLUPH, l'exposition au mercure et la maladie de Chagas.....	5
L'exposition au mercure.....	5
La maladie de Chagas	6
Région à l'étude	8
La dynamique des régions frontières.....	9
Communautés étudiées.....	10
Objectifs et hypothèses	13
Objectifs	13
Chapitre 1.....	14
Chapitre 2.....	15
Chapitre 3.....	15
Hypothèses.....	15
Chapitre 1.....	15
Chapitre 2.....	16
Chapitre 3.....	16
Cadre méthodologique général	17
Échantillonnage et questionnaires	17
Codage et analyse des données	20
Originalité de l'approche	22
Perception et santé environnementale	22
Définition des modalités de PSE dans une région précise.....	23
Faire le lien entre les programmes de transfert conditionnel et l'état de l'environnement	23
Collaborateurs	24
Cadre conceptuel.....	26
Analyse de perception.....	26
Services écosystémiques	28
Services écosystémiques et pauvreté.....	29

Paiements pour services écosystémiques (PSE)	31
PSE et réduction de la pauvreté	33
PSE et acceptabilité sociale.....	34
Autonomisation	35
PSE, développement socioéconomique et autonomisation.....	36
Acceptabilité sociale	37
Effet-revenu.....	39
Liens entre les concepts pertinents dans cette étude.....	39
Références	42
CHAPTER 1 – Ecosystem services perception as a determinant of health and wellbeing of subsistence-living populations of the Tapajos River region in the Brazilian Amazon	
Abstract.....	51
Introduction.....	53
Materials and methods	54
Study sites	57
Sampling.....	59
Data analysis.....	65
Limitations of the study.....	65
Results.....	67
ES responses distribution among individuals.....	67
Explanatory variables	71
Discussion	74
Provisioning services	74
Subsistence and traditional medicines	75
Regulating services.....	75
Supporting services	76
Cultural services	77
Land Tenure.....	78
Household income	79
Origin of the respondents	81
Other sociological variables	82
Conclusion	84
References.....	86
Chapter 2 - Social acceptance and opportunity costs required to implement a Payment for Ecosystem Services (PES) program in subsistence living communities in the Brazilian Amazon	
Abstract.....	93
Introduction.....	96
PES in Brazil	97
Social acceptance and PES programs	98
PES and opportunity costs.....	101

Methodology	103
Sampling.....	103
Opportunity cost	104
Data analysis.....	105
Results.....	106
Distribution of responses	106
Incentive program	108
Monetary transfer	109
Other Effects	109
Distribution of the transfer	109
Opportunity costs of land use	116
Discussion.....	117
Incentive program and monetary transfer.....	117
Distribution.....	117
Land tenure	118
Social performance and Transaction costs	119
Opportunity cost	122
Conclusion	124
References.....	126

CHAPTER 3 - Adverse environmental effects of cash transfer programs: the case of the Family Allowance Program (*Bolsa Familia*) and retirement pension in the

Brazilian Amazon	130
Abstract.....	132
Introduction.....	133
CCT and Bolsa Familia.....	133
Income effect.....	135
Material and Methods.....	137
Study site.....	137
Sampling.....	138
Data analysis.....	143
Limitations of the study.....	144
Results.....	145
Distribution of responses of the changes linked to CT	145
Results of the Correspondence analysis	149
Including explanatory variables	151
Discussion.....	154
Effects on agricultural and livestock production.....	155
Multiplier effect	156
Effects on migration	157
Additionality and opportunity costs.....	159
Conclusion	161
References.....	163

CONCLUSION GÉNÉRALE	168
Perceptions des services écosystémiques	169
Acceptabilité sociale de programmes de paiement pour services	
écosystémiques (PSE)	171
Impacts et effet-revenu de programmes de transfert conditionnel	173
Recommandations finales	175
Régularisation des titres de propriété foncière	175
Planification des services publics afin de réduire des coûts de transaction.....	177
Faciliter la transition agricole et abandonner les cultures sur coupe et brûlis .	178
Références	180
ANNEXES	183
ANNEXE 1 - Questionnaire de la collecte de données de 2011.....	184
ANNEXE 2 – Questionnaire de la collecte de données 2012 et Guide à l’intention des	
intervieweurs.....	229

LISTE DES TABLEAUX

Table 1.1 – Classification of the explanatory variables.....	60
Table 1.2: Categorization of the responses given in the interviews.....	63
Table 1.3 – Distribution of responses for each element in the analysis.....	67
Table 1.4 – Percentage of the inertia explained by each matrix of explanatory variables controlling covariables.....	72
Table 1.5 – Results of the stepwise canonical correspondence analysis.....	73
Table 2.1 – Distribution of the responses regarding perception of PES programs.....	106
Table 2.2 – Results of the Canonical Correspondence Analysis (CCA).....	111
Table 2.3 – Results of the Contingency Analysis.....	112
Table 2.4 – Annual production value of one hectare of Cassava, Beans, Rice and Corn (BRL).....	116
Table 3.1 – Categorization of the responses given in the interviews.....	141
Table 3.2 – Re-categorisation of agricultural and livestock production themes for Contingency analysis.....	143
Table 3.3 – Distribution of responses of the changes linked to conditional transfers.....	147
Table 3.4 – Results of the Canonical Correspondence analysis.....	152
Table 3.5 – Results of the Contingency analysis.....	153

LISTE DES FIGURES

Figure 0.1 – Dynamique de déforestation en Amazonie légale de 2003 à 2014 selon la taille de la zone déboisée et la contribution des petites zones de déforestation (<10ha) à la déforestation totale.....	2
Figure 0.2 – Le cycle de contamination au mercure.....	6
Figure 0.3 – Le cycle de transmission de la maladie de Chagas.....	7
Figure 0.4 – Localisation des communautés à l'étude.....	12
Figure 0.5 – Liens entre les principaux concepts.....	40
Figure 1.1 – General schema of the conceptual framework and variables.....	62
Figure 1.2 – Results of the correspondence analysis (CA) – Axis 1 and 2 – Four elements of the environment.....	70
Figure 2.1 – Conceptual framework and variables.....	105
Figure 3.1 – Conceptual framework and variables.....	140
Figure 3.2 – Results of the correspondence analysis (CA) – Agricultural production, livestock production and transportation	150
Figure 4.1 – Principales conclusions.....	168

RÉSUMÉ

L'État du Pará en Amazonie brésilienne est devenu une frontière active de développement et est soumis à des pressions environnementales provenant tant de l'agriculture et de l'élevage que de l'exploitation des ressources naturelles. Les populations d'agriculteurs familiaux, pratiquant principalement la culture sur coupe et brûlis présentent un indice de développement humain (IDH) parmi les plus faibles au Brésil. La dégradation de l'environnement qui s'accompagne de la perte de services écosystémiques a des conséquences néfastes autant pour l'équilibre écologique que pour la santé des populations vulnérables. Deux problèmes de santé publique intimement liés à la déforestation sont en émergence en Amazonie brésilienne et reflètent cette situation : l'exposition au mercure à travers la consommation traditionnelle de poissons et la prévalence de la maladie de Chagas.

Cette thèse se penche sur des éléments microéconomiques liés à la perception et à l'acceptabilité sociale de politiques environnementales par des populations d'agriculteurs familiaux de la région du Tapajós. Elle inclut spécifiquement trois analyses reposant sur autant de cadres conceptuels : l'analyse de la perception entre l'environnement, la santé et le bien-être, l'analyse de l'acceptabilité sociale d'un programme de paiement pour services écosystémiques (PSE) et l'analyse des impacts sur l'environnement de l'effet-revenu créé par des programmes de transfert conditionnel.

Le premier chapitre porte sur le lien perçu par les populations à l'étude entre les services écosystémiques générés par quatre éléments de l'environnement et la santé et le bien-être de ces populations, à savoir l'eau, la forêt, les systèmes agroécologiques et les champs en cultures traditionnelles. Le second chapitre s'intéresse à l'acceptabilité sociale d'un programme de Paiement pour services écosystémiques et aborde des critères de distribution, d'efficacité et d'indépendance. Il y fait également une estimation du paiement minimal acceptable à travers le coût d'opportunité. Le troisième chapitre détaille les impacts environnementaux non-prévus provoqués par la présence de programmes de transfert. L'hypothèse que l'effet-revenu entraîné par ces programmes a des effets sur des activités ayant des impacts sur l'environnement y est développée. Les activités considérées couvrent l'extractivisme, la production agricole, l'élevage, les transports et la volonté de migrer dans un contexte de région frontière.

Les données ont été recueillies dans quatre communautés de la région du Tapajós, dans l'État du Pará au Brésil. Ces communautés sont formées autant de familles établies depuis plusieurs générations que de migrants récents. Elles ont comme caractéristiques d'être soumises à des pressions intenses sur leur environnement, notamment à cause de l'agriculture sur coupe et brûlis mais aussi de l'élevage. Des entrevues semi-dirigées et des questionnaires de type sondage ont permis de recueillir des données auprès de 139 individus. Les principaux résultats montrent que la perception du lien entre les services écosystémiques et la santé et le bien-être des ménages passe surtout à travers les services d'approvisionnement et les services de régulation. La propriété de la terre et le niveau de revenu sont les principaux facteurs qui influencent la perception de ces services écosystémiques. Il existe une acceptabilité sociale pour un programme de PSE, même si un investissement direct dans la modernisation des activités agricoles est davantage souhaité. L'acceptabilité sociale d'un programme de PSE passe par une distribution équitable des paiements entre les ménages d'une même communauté de même que par un paiement minimal qui couvre le coût d'opportunité lié à l'agriculture sur coupe et brûlis. La propriété de la terre est un facteur explicatif favorisant l'acceptabilité sociale d'un PSE. Il existe un effet-revenu entraîné par les programmes de transfert conditionnels et non-conditionnels qui se manifeste surtout sur les activités agricoles et d'élevage de même que sur les habitudes de transport. La proportion que représentent ces transferts dans le revenu du ménage est un facteur important influençant cet effet-revenu.

Cette thèse a été réalisée dans un contexte interdisciplinaire et met l'accent sur des aspects microéconomiques permettant d'acquérir une connaissance pointue de quatre communautés de la région du Tapajós. L'utilisation des données de population permet d'appuyer les interprétations par des traitements statistiques forts. Elle s'inscrit dans un contexte de santé environnementale où les liens entre l'environnement et la santé sont au cœur de la problématique et des solutions développées. Ce contexte permet aisément d'aborder ces questions avec les communautés à l'étude et permet d'analyser les critères relatifs à l'acceptabilité sociale d'un point de vue du ménage et d'estimer la valeur minimale acceptable d'un PSE directement à partir des données du terrain.

Finalement, cette étude fait le lien au niveau micro entre l'effet-revenu créé par les programmes de transfert et différents comportements et décisions des ménages pouvant avoir un impact sur l'environnement. Ce lien qui fait état d'effets non prévus des politiques de protection environnementale ou de développement social est établi de façon empirique, cette étude ayant permis d'en faire l'observation. Les résultats et les conclusions de cette thèse

fournissent des recommandations pour l'élaboration de politiques publiques qui tiennent compte de ces éléments microéconomiques et qui promeuvent un développement durable dans la région du Tapajós. Ces éléments sont la régularisation des titres de propriété foncière pour les petits agriculteurs familiaux, une meilleure planification des services publics et des infrastructures et la mise en place d'outils permettant de favoriser la transition de l'agriculture sur coupe et brûlis vers une technique plus durable et adaptée aux agriculteurs familiaux.

Mots-clés : Services écosystémiques, paiements pour services écosystémiques, effet-revenu, agriculture sur coupe et brûlis, rivière Tapajos, Amazonie brésilienne.

INTRODUCTION GÉNÉRALE

La nature et les peuples de l'Amazonie sont fascinants mais gravement menacés par un développement tous azimuts. La forêt amazonienne est une des plus riches de la planète et fournit plusieurs services écosystémiques autant à la population locale qu'au niveau global. Depuis plusieurs décennies, l'Amazonie subit d'importants changements environnementaux qui vont de pair avec l'augmentation rapide de la population et de l'activité économique. La déforestation et la dégradation de l'écosystème forestier amazonien est un phénomène constant depuis au moins les années 1970 et se poursuit encore aujourd'hui.

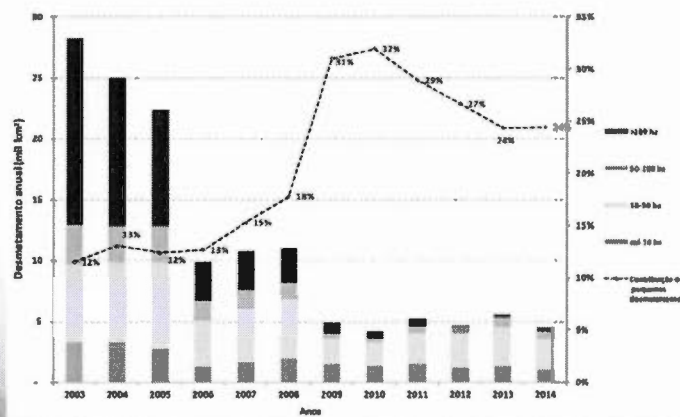
Causes de la déforestation

Parmi les multiples et complexes causes de la déforestation, on retrouve en premier lieu la migration humaine. L'Amazonie brésilienne légale (qui englobe les neuf états brésiliens qui abritent une partie de la forêt amazonienne) a connu une forte croissance de sa population au 20^e siècle. En effet, de 1970 à 2000 la population de cette région a cru de 5,3 à 20,1 millions de personnes (Laurance et al. 2001), se concentrant principalement dans les villes (Browder et Godfrey, 1997). On estime que l'Amazonie brésilienne rurale comptait un peu plus de 7 millions de personnes en 2015 (IBGE, 2015). Ces mouvements de population ne sont pas sans avoir d'effets. Les établissements humains nécessitent autant des ressources naturelles et des services publics que des infrastructures de transport (Caviglia-Harris et al., 2012).

La plupart vivant déjà en situation économique précaire, l'activité économique principale de ces nouveaux migrants demeure l'agriculture sur coupe et brûlis (Ramalho, 2006). Après quelques années vient parfois s'ajouter l'élevage bovin qui vient permettre une meilleure qualité de vie au ménage mais dégrade encore davantage l'environnement. Les petits producteurs pratiquant l'agriculture sur coupe et brûlis ont un grand impact sur le territoire qu'ils occupent étant donné la faible productivité et les rapides cycles de jachère et culture. On estime qu'entre 600 000 et 1 000 000 de familles dépendent de l'agriculture sur coupe et brûlis en Amazonie brésilienne (Fioravanti, 2008).

Figure 0.1

Dynamique de déforestation en Amazonie Légale de 2003 à 2014 selon la taille de la zone déboisée et la contribution des petites zones de déforestation (< 10 ha) à la déforestation totale (Alencar et al. 2016)



La figure 0.1, tirée de Alencar et al. (2016), montre que depuis 2009 les petites surfaces cultivées de moins de 50 hectares forment la plus grande proportion de la nouvelle déforestation en Amazonie légale. L'année 2009 concorde avec le moment où le gouvernement fédéral brésilien a décrété un moratoire sur la création de nouvelle surface de culture du soya à partir de terres nouvellement déboisées.

Ce cycle de pauvreté dans lequel vivent les agriculteurs de subsistance est la résultante d'une dépendance vis à vis de l'environnement local, notamment des ressources naturelles non-transformées utilisées pour la subsistance, l'énergie ou les matériaux (Baral et Heinen, 2007). Il existe également un cycle d'expansion et d'effondrement (*boom-and-bust*) se répétant de façon régulière à travers le temps et qui empêchent les ménages vulnérables de constituer un capital suffisant pour améliorer leurs conditions de vie (Rodrigues et al. 2009). Il semble que ces cycles de boom-and-bust économiques se retrouvent également représentés dans les indicateurs constituant l'Indice de capital humain (IDH) de l'Organisation des Nations Unies. En effet, Rodrigues et al. (2009) ont montré que le niveau économique et l'IDH des régions frontières de développement sont liés à l'étendue de la déforestation dans la région en question. Ils ont montré que les trois composantes de l'IDH (alphabétisation, espérance de vie et PIB per capita) augmentent au tout début du déboisement d'une nouvelle région frontière mais que, rapidement, ces indicateurs atteignent un plateau pour ensuite tendre à décroître avec le déboisement. Cette situation montre que la tendance actuelle de développement des régions frontières n'est pas un modèle qui permette le développement humain.

Cependant, certaines études ont démontré qu'il peut exister des modèles d'agriculture sur coupe et brûlis qui sont adaptables, productifs et qui permettent la conservation de la biodiversité et une bonne gestion des paysages agroforestiers complexes (Padoch et Pinedo-Vasquez, 2010 ; Heckenberger, 1999).

Parmi les autres causes de la déforestation, on retrouve aussi l'arrivée progressive de grands propriétaires terriens qui sont souvent des acteurs de premier plan dans la consolidation des terres laissées en friche par les agriculteurs de subsistance (Pacheco, 2012). Cette expansion des grands agriculteurs de soja est causée par de nombreux facteurs macroéconomiques parmi lesquels l'ouverture aux marchés internationaux, la pression pour la mise en disponibilité de nouvelles terres de même que la volonté assumée du gouvernement fédéral brésilien de devenir un exportateur de produits agricoles de premier plan (Hopewell, 2013).

L'élevage tant à grande qu'à petite échelle est également responsable d'une partie de la déforestation en Amazonie brésilienne. L'élevage à grande échelle a fait l'objet d'incitatifs fiscaux de la part du gouvernement brésilien et était même considérée comme l'activité à privilégier pour occuper et développer le territoire (Carvalho et al. 2002). L'élevage à petite échelle quant à lui fait souvent partie des stratégies de diversification des activités de la part de l'agriculteur de subsistance. La taille du cheptel devient un élément relatif au statut social dans une communauté et les bovins constituent une forme « d'épargne » qui s'accumule et qui devient utile lorsque le besoin s'en fait ressentir.

Le projet PLUPH, l'exposition au mercure et la maladie de Chagas

Ce projet de recherche a été réalisé dans le cadre du projet Poor Land Use, Poor Health (PLUPH) (<http://www.pluph.uqam.ca>). Ce projet ayant eu cours entre 2008 et 2013 avait comme orientation principale la compréhension du lien qui existe entre les changements dans le paysage et deux problématiques de santé environnementale dans la région de la rivière Tapajos en Amazonie brésilienne.

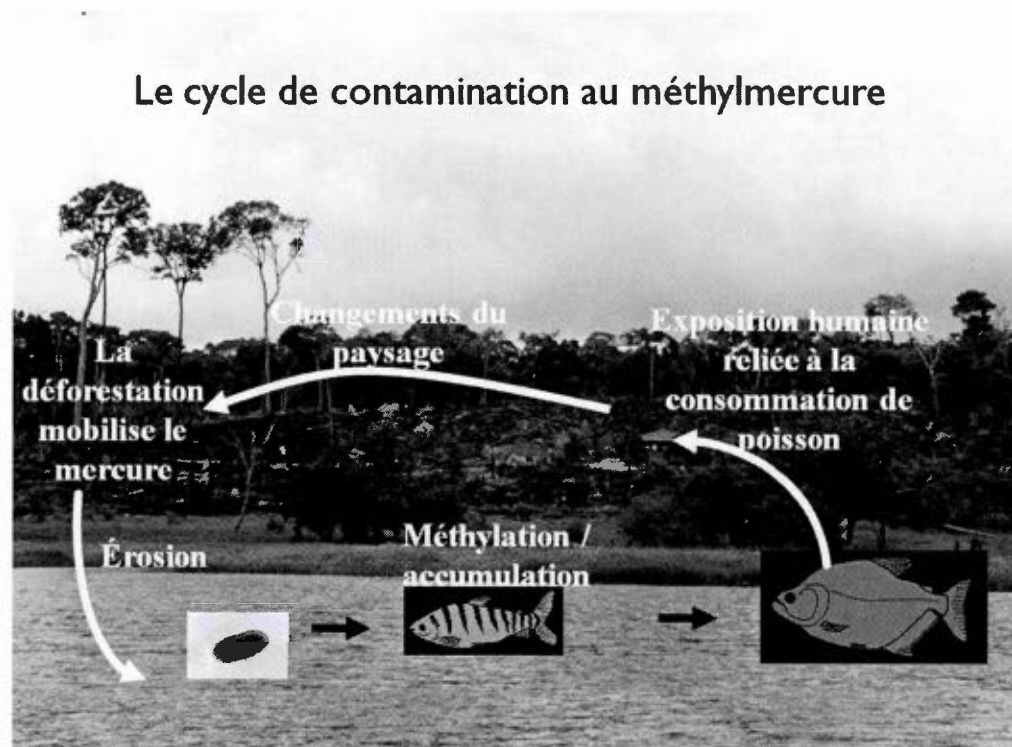
Le projet PLUPH incluait des travaux individuels de plusieurs étudiants de 2^e et 3^e cycle et touchait autant les sciences sociales, naturelles et de la santé. Le projet a été développé selon une approche participative avec les communautés à l'étude et incluait des partenariats avec de nombreuses universités et institutions gouvernementales et non-gouvernementales. Le projet PLUPH fait suite au projet CARUSO qui a établi les bases d'intervention dans la région et a assuré l'entrée et un bon niveau de confiance au préalable de la part des communautés à l'étude.

L'exposition au mercure

L'exposition humaine au mercure à travers la consommation de poisson dans la région de la rivière Tapajos est une des plus élevée documentée jusqu'ici à travers le monde (Mergler et al. 2007). Dans cette région, l'exposition au mercure est exacerbée par les conséquences de la déforestation qui mobilise le mercure naturellement présent dans les sols et qui devient ainsi disponible dans la chaîne alimentaire après le processus d'érosion (Figure 0.2) (Roulet et al. 1998). Les activités d'agriculture sur coupe et brûlis représentent une cause importante de déforestation, bien qu'il existe également d'autres activités pouvant provoquer cette déforestation. La consommation fréquente

de poissons avec des teneurs appréciables en mercure dans la région représente un risque de santé publique. Le mercure affecte le système nerveux central et peut entre autres causer d'importants problèmes de vision et de dextérité manuelle (Passos, 2007).

Figure 0.2 – Le cycle de contamination au mercure



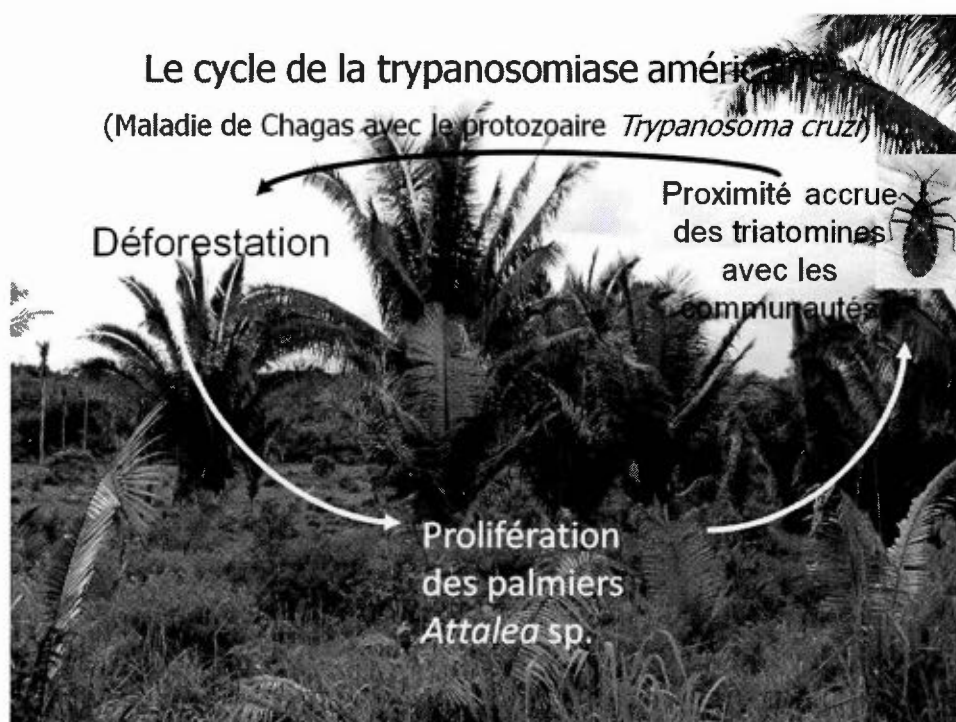
(Tiré de PLUPH)

La maladie de Chagas

De la même façon, la hausse du risque de transmission de la maladie de Chagas est liée à la déforestation. En effet, en Amazonie, la hausse de la prévalence de cette maladie est attribuable à la prolifération des palmiers de

type *Attalea*, qui sont le principal habitat des triatomines, insectes responsables de la transmission de la maladie (Abad-Franch et al. 2005; Valente et al. 1999). La végétation secondaire est dominée par ces palmiers et créent alors des « ponts » écologiques entre les réservoirs de la maladie et les habitats humains (Figure 0.3). On estime qu'il y a déjà 8 millions de personnes qui sont affectées par la maladie de Chagas en Amérique latine (OMS, 2015).

Figure 0.3 – Le cycle de transmission de la maladie de Chagas



(Tiré de PLUPH)

Région à l'étude

La région du fleuve Tapajós dans l'État du Pará en Amazonie brésilienne est un endroit particulièrement diversifié autant sur les plans physiques, humains que culturels. La région souffre toutefois d'une pauvreté endémique et cyclique créant des inégalités parmi les plus élevées au Brésil.

Les taux élevés de déforestation sont notamment à l'origine de la dégradation des services écosystémiques accentuée par les activités agricoles, d'élevage et l'urbanisation. Un peu plus de la moitié de la superficie de l'État du Pará a déjà été déboisé. Bien que le taux de déforestation ait montré une certaine baisse dans les dernières années dans certaines régions de l'Amazonie, les projections de perte nette de forêt dans la région du Tapajós sont à la hausse particulièrement à cause de l'avancée rapide de la production industrielle de soja et l'asphaltage de la route BR-163 (Barber et al. 2014 ; Fearnside, 2005).

L'historique de la région est marqué par de grandes vagues de colonisation organisées par le gouvernement fédéral brésilien qui souhaitait intégrer la région du Nord au reste du pays et y affirmer sa souveraineté territoriale. De plus, de grands groupes de la population souffraient de la sécheresse et du manque de terres agricoles dans la région du Nord-Est créant ainsi des pressions sociales en faveur de la migration interne (Fearnside, 2005). La construction des routes transamazoniennes BR-230 et BR-163 est un signe de la volonté de l'État de s'engager dans une telle entreprise.

Les familles déplacées apportent avec elles un bagage culturel et des pratiques ancestrales d'utilisation de la terre. Ces pratiques, dont la technique de culture sur brulis, ne sont pas adaptées à l'écosystème amazonien, tout

comme les variétés cultivées qui ne sont pas indigènes à la région (riz, maïs, fèves). L'utilisation de ces cultivars est cependant encouragée par l'État qui souhaite que les familles aillent vers une intensification de la production pour la vente sur les marchés nationaux. Ces stratégies n'ont par contre pas l'effet escompté car elles ne mènent pas à terme à une amélioration des conditions de vie dans la population en général (Rodrigues et al. 2009).

La dynamique des régions frontières

Les régions frontières sont des lieux physiques où la colonisation a lieu, où un paysage « primaire » est modifié substantiellement par des activités anthropiques de façon permanente. L'expansion de la frontière consiste au résultat du processus d'occupation progressive des zones forestières par différents acteurs qui sont souvent en compétition pour l'occupation du territoire (Schmink and Wood, 1992). Ce processus amène souvent à l'appropriation de zones forestières, suivi de la coupe de la forêt pour la conversion en terres agricoles. L'évolution de la frontière dans ses premières phases peut être interprétée comme un processus primitif d'accumulation. Ce processus est largement motivé par un intérêt dans l'extraction des ressources naturelles existantes (sol et forêt) (Kaimowitz, 2002).

Le concept contemporain de développement de la frontière implique des objectifs économiques et politiques d'intégration dans l'économie nationale dominante de nouveaux territoires jusqu'ici inoccupés ou isolés. En Amazonie brésilienne cela se traduit par l'arbitrage entre différents usages des terres avec l'objectif de générer des revenus de l'exploitation des ressources et de s'inscrire dans des marchés plus larges (capitaux, travail, échanges de biens etc.)

Certains incitatifs sont créés par l'ouverture de la frontière, physiquement parlant. L'ouverture de routes (Fearnside, 2007) et les politiques d'occupation de la frontière (incitatifs fiscaux, régularisation des terres) jouent un rôle important dans l'explication des causes de la déforestation créée par l'arrivée de nouveaux migrants. Plusieurs études ont pu faire ce lien en Amazonie brésilienne en étudiant spécifiquement les régions près des routes récemment ouvertes qui dévoilent le phénomène « arrêtes de poisson » lors de l'observation d'images satellites (Alves, 2002 ; Pfaff, 1999). Ce phénomène est également observable ailleurs en Amérique latine (Sierra, 2000 ; Sader et Joyce, 1988).

Communautés étudiées

L'étude a pris place dans les communautés de São Tomé (03°99'S – 55°57'O), Agrovila de Araipá (04°03'S – 55°54'O), Nova Estrela (04°03'S – 55°51'O) et Vicinal da Batata (04°40'S – 56°04'O) dans la partie Ouest de l'État du Pará (Figure 0.4). Les trois premières sont situées dans la municipalité d'Aveiro et la quatrième est située dans la municipalité de Trairão. Les deux premières sont accessibles par voix fluviale tandis que les deux autres sont accessibles par la route. Agrovila de Araipá et São Tomé sont situées à environ 50 km de Itaituba, ville régionale offrant des services tandis que Nova Estrela et Vicinal da Batata sont situées respectivement à 90km et 175km d'Itaituba.

São Tomé est une communauté riveraine au fleuve Tapajós et constitue la plus anciennes des communautés à l'étude. Toutefois elle est la moins dégradée des quatre en termes de déforestation (Rozon et al. 2015). Cela s'explique par le fait que les habitants de la communauté ont vécu un isolement durant de nombreuses décennies et qu'ils ont dû vivre

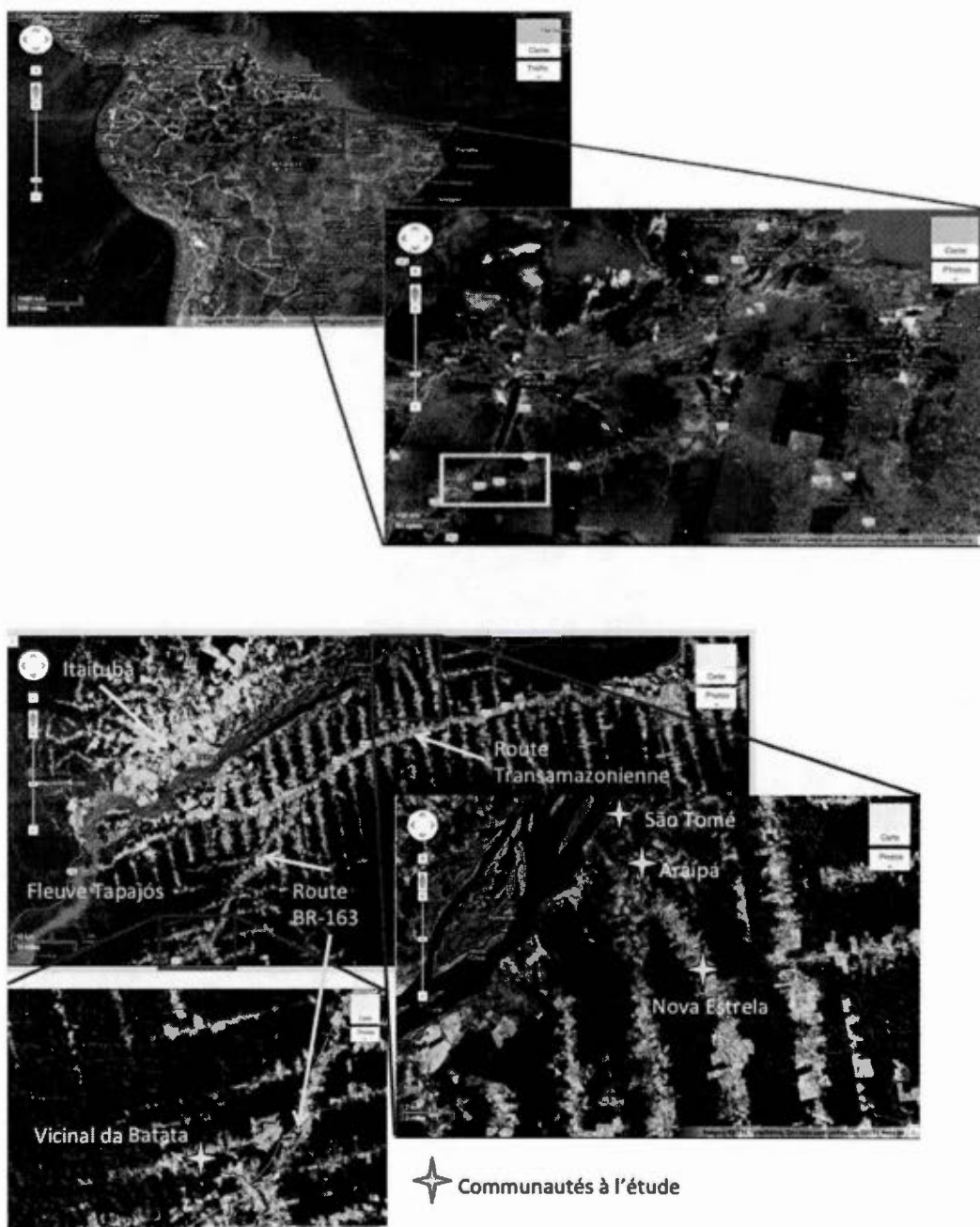
essentiellement des activités de subsistance que sont la chasse, l'extractivisme et l'agriculture de subsistance.

Agrovila de Araipá est aussi une communauté riveraine habitée par des personnes d'origines mixtes, soit habitant dans l'État du Pará depuis plusieurs générations, mais également ayant récemment émigré de la région du Nord-Est du Brésil. Cette communauté montre un état de dégradation plus avancé que la précédente étant donné la plus grande présence des activités d'élevage bovin (Rozon et al. 2015).

Nova Estrela est une communauté de l'intérieur, nettement plus isolée que les deux précédentes. Elle est située sur une route secondaire menant à la route transamazonienne (BR-230). Bien qu'elle soit alimentée en électricité, son intégration aux marchés est difficile. Les activités d'élevage y sont également très développées.

Finalement, Vicinal da Batata est une communauté récente formée essentiellement d'immigrants du Nord-Est et du Sud du pays. Elle est la plus intégrée et la moins isolée des communautés à l'étude. Son paysage est déjà relativement fragmenté par les activités d'élevage. Cette communauté a été ajoutée à l'étude afin d'être en mesure de faire des comparaisons avec les autres communautés étant donné ses caractéristiques différentes.

Figure 0.4 : Localisation des communautés à l'étude



Objectifs et hypothèses

Objectifs

Cette thèse vise à comprendre les liens qui existent entre les écosystèmes et les populations à l'étude de même que les liens entre les politiques sociales et environnementales et cette même population. Elle vise à faire ressortir les éléments à prendre en compte dans la définition des politiques de développement social et de protection de l'environnement dans le contexte particulier de la région à l'étude. Ces éléments serviront de base pour établir des recommandations destinées aux décideurs pour la mise en place de politiques de développement de la région.

À partir de ces éléments microéconomiques analysés dans chaque section de la thèse, des recommandations seront formulées pour que les politiques tiennent compte de la réalité observée sur le terrain. Ces recommandations sont donc liées aux modes de vie et aux conditions dans lesquelles se trouvent les communautés vivant principalement de l'agriculture de subsistance dans la région du Tapajós.

Quatre questions de recherche sous-tendent la présente thèse :

- Comment les individus perçoivent-ils l'écosystème qui les entoure et les bien et services rendus par ces écosystèmes ? (Chapitre 1)
- De quelle façon ces services écosystémiques ont-ils un impact perçu sur la santé et le bien-être des populations ? (Chapitre 1)
- Quelle forme devrait prendre une politique visant à protéger l'environnement et qui aurait l'aval des communautés locales en termes d'acceptabilité sociale ? (Chapitre 2)

- Comment les programmes de transfert peuvent-ils également avoir un impact sur l'environnement à travers l'effet-revenu? (Chapitre 3)

Cette thèse est constituée de trois chapitres centraux présentés sous la forme d'article soumis ou à soumettre pour publication dans des revues scientifiques avec comité de lecture. Les premières parties permettent de mieux cerner le contexte et la région à l'étude, de décrire les objectifs généraux et les hypothèses, de décrire les cadres méthodologique et conceptuel et finalement, de cerner l'originalité de cette thèse. La conclusion générale permet de rassembler les acquis des trois chapitres et permet de formuler des recommandations. Les trois chapitres centraux de la thèse sont organisés de la façon suivante :

Chapitre 1

Dans ce chapitre, l'auteur se penche sur la perception des liens entre différents services écosystémiques et la santé et le bien-être économique des populations locales. Il contient une partie descriptive et analytique des réponses fournies par les participants à l'étude. Quatre éléments du paysage sont utilisés pour la provenance des services écosystémiques: l'eau, la forêt, l'agroécosystème et l'agriculture traditionnelle. L'eau correspond aux lacs, cours d'eau ou tout autre plan d'eau de surface, la forêt correspond à la forêt primaire et aux forêts secondaires, l'agroécosystème correspond à toute surface en culture pérenne et l'agriculture traditionnelle correspond aux surfaces destinées à l'agriculture sur coupe et brûlis. Pour chaque élément, on demandait de quelle façon et par quel processus cet élément du paysage affecte la santé et le bien-être économique des personnes. Des groupes de réponses ont été constitués et des variables socioéconomiques ont été utilisées pour déterminer l'influence de différents facteurs sur la réponse.

Chapitre 2

Ce chapitre est axé sur l'acceptabilité sociale d'un éventuel programme de Paiement pour services écosystémiques (PSE) à mettre en place. On y explore différents critères qui permettent cette acceptabilité. D'autres avenues pour réduire la déforestation dans la région sont aussi à l'étude dans ce chapitre. Le coût d'opportunité lié à l'agriculture traditionnelle sur coupe et brûlis y est également établi afin d'établir un montant minimum de compensation socialement acceptable dans le cadre d'un PSE.

Chapitre 3

L'effet-revenu créé par les programmes de transfert conditionnels et non-conditionnels constitue la thématique centrale du chapitre 3. Cet aspect crée un changement de comportement économique chez les personnes touchées et ces comportements peuvent avoir un impact négatif sur l'environnement alors que le programme en question ne visait nullement la sphère environnementale. Dans ce chapitre, on considère la production agricole et l'élevage bovin, les habitudes de transport, la migration, le recours aux ressources ligneuses et non-ligneuses, l'achat de biens de consommation et la perception de sécurité financière comme des comportements qui peuvent changer sous l'effet-revenu.

Hypothèses

Chapitre 1

Ce chapitre est basé sur l'hypothèse qu'il existe une dépendance *perçue* entre les services écosystémiques et la santé et le bien-être des populations à l'étude. Ce lien de perception n'est en général pas explicité dans un contexte de santé environnementale. Une sous-hypothèse formulée est que

les conditions socioéconomiques dans lesquelles vivent les populations à l'étude ont un impact sur cette perception. Ces éléments influencent directement la façon dont les populations voient le lien qui existe entre leur santé et leur bien-être et l'environnement qui les entoure. Cela est en partie explicable par l'horizon temporel dans lequel se trouvent les populations à l'étude.

Chapitre 2

Ce chapitre est basé sur l'hypothèse qu'il existe une acceptation sociale pour un programme de Paiement pour services écosystémiques sous certaines conditions, incluant une distribution équitable des transferts monétaires entre les ménages d'une communauté et des investissements dans les infrastructures de base (routes, énergie). De plus, ce travail de recherche explore l'hypothèse selon laquelle le coût d'opportunité de ne pas pratiquer l'agriculture sur coupe et brûlis doit minimalement être compensé pour assurer l'acceptation sociale d'un tel programme.

Chapitre 3

Ce chapitre est basé sur l'hypothèse à ce jour peu explorée que l'effet-revenu généré par les programmes de transfert conditionnel a des impacts inattendus sur l'environnement. En effet, les programmes étudiés se concentrent sur des objectifs de développement social et ne sont pas construits pour interférer sur des éléments environnementaux. Une sous-hypothèse formulée est que des éléments microéconomiques amplifient ce phénomène et viennent exacerber les impacts potentiels sur l'environnement.

Cadre méthodologique général

Échantillonnage et questionnaires

Bien que chaque chapitre comporte une description de la méthodologie utilisée, il apparaît important de contextualiser davantage ici la méthodologie de façon générale. La collecte des données a été réalisée en deux temps et les trois chapitres utilisent des données des deux campagnes d'échantillonnage.

La première collecte de données sur le terrain a été réalisée de janvier à mars 2011 dans les quatre communautés à l'étude. Tous les adultes de 15 ans et plus ont été sollicités pour répondre à un questionnaire qui comprenait des points touchant à une multitude d'aspects de leur vie. Ce questionnaire a été bâti en 2010 par le travail en collaboration de quatre doctorants du projet PLUPH : Annie Béliveau, Leandra Fatorelli, Jordan Sky Oestreicher et l'auteur de cette thèse. Il comprenait donc des questions qui ont été utilisées par tous (données socioéconomiques de base) et des questions utilisées par un seul doctorant. Le tout a été amalgamé en un seul questionnaire afin de faciliter l'administration du questionnaire à des répondants communs. Le questionnaire a été administré par des auxiliaires de terrain locaux afin de faciliter la communication et aider à comprendre certaines expressions régionales (voir Annexe 1).

L'échantillonnage de l'ensemble de la population âgée de 15 ans et plus impose donc une analyse de *population* et non pas d'*échantillon*, ce qui permet de tirer des conclusions sur les populations étudiées mais qui ne permet pas nécessairement de tirer des conclusions sur l'ensemble des populations de la région du Tapajós.

Ce premier questionnaire était essentiellement destiné à faire la collecte de variables socioéconomiques qui seront utilisées dans l'analyse comme variables explicatives. Les personnes interrogées ont été sélectionnées à partir d'un recensement réalisé par Valadão (2009) pour les communautés de São Tomé, Agrovila de Araipá et Nova Estrela. Le recensement pour Vicinal da Batata a été réalisé immédiatement dans les jours précédant l'administration de ce premier questionnaire. Toutes les variables qui concernaient la production agricole familiale ont été collectées dans ce premier questionnaire (taille du lot, quantité plantée, quantité produite, quantité vendue, quantité consommée, prix de vente etc...). Il s'agissait de la seule façon de connaître ces données puisque qu'elles ne sont pas collectées de façon formelle et peu d'agriculteurs gardent ces données par écrit.

La deuxième campagne d'échantillonnage a été réalisée de janvier à mars 2012 dans les quatre communautés à l'étude. Durant celle-ci, l'auteur de cette thèse a administré son propre questionnaire, plus spécifique à la recherche présentée ici à l'aide d'une équipe d'assistants locaux (voir Annexe 2). Tous les adultes de 15 ans et plus qui avaient déjà participé à la collecte de données en 2011 ont été interviewés à nouveau. L'objectif de cette deuxième campagne d'échantillonnage était de pouvoir accoler les données socioéconomiques collectées en 2011 avec les données de perception des services écosystémiques (chapitre 1), l'acceptabilité sociale des programmes de PSE (chapitre 2) et l'impact de l'effet-revenu des programmes de transfert conditionnel et non-conditionnel (chapitre 3).

Il est pertinent ici de mettre de l'avant le fait que la base de données ainsi constituée est puissante et très vaste. Elle est constituée d'une vingtaine de

tables liées qui contiennent des données par variables (colonnes) pour chacun des individus ou unité familiale (lignes). Les données ont été amassées au départ sous forme papier pour ensuite être saisies, nettoyées et organisées dans chacune des tables. Ce travail a été réalisé de façon itérative car la création de nouvelles tables s'est faite au moment où les utilisateurs en ressentaient le besoin.

Afin de limiter le plus possible les erreurs de saisie et de catégorisation, une vérification interne a été réalisée entre les quatre utilisateurs de cette base de données. À partir de ce moment, il a été possible de réaliser des requêtes établies en fonction des objectifs et des questions de recherche de chacun des utilisateurs.

Il faut cependant exposer une distinction très claire qui existe dans cette base de données. Les données qui sont partagées sont celles relatives aux caractéristiques socioéconomiques de base des répondants (âge, sexe, origine, revenu, occupation, niveau de scolarité etc.). Il aurait été contreproductif que chacun des étudiants fasse la collecte de ces mêmes données plusieurs fois pour les mêmes répondants. Par contre, chacun des étudiants avait des questions spécifiques qui lui étaient exclusivement dédiées et qui ont fait l'objet d'une analyse propre. Dans le cadre de cette thèse, les sections relatives aux perceptions sur l'environnement (chapitre 1), à l'acceptabilité sociale d'un programme de PSE (chapitre 2) et aux changements de comportement liés aux programmes de transfert (chapitre 3) ont été montées par l'auteur de cette thèse. Un système de code à sept chiffres permettait d'identifier spécifiquement un individu. Ce système est utilisé depuis de nombreuses années et a été instauré par le projet CARUSO (CARUSO), précurseur du projet PLUPH.

Codage et analyse des données

Les données recueillies ont été saisies et stockées dans une base de données de type *Structured Query Language* (SQL). Elles ont été vérifiées et triangulées avec d'autres données existantes provenant d'études préalables faites par d'autres étudiants ou chercheurs du projet PLUPH. Certaines analyses de base ont été réalisées sur tableur (mesures de tendances centrales, écart-type etc) afin d'avoir un portrait préliminaire des données. Le lecteur trouvera à l'intérieur des sections méthodologie de chaque chapitre la façon dont les réponses ont été catégorisées.

Par la suite, selon la nature des données, une analyse de correspondance a tout d'abord été réalisée avec les variables dépendantes afin d'en connaître la distribution et la présence de « groupes » de réponse. Une analyse canonique de correspondance était ensuite réalisée avec les variables explicatives afin de montrer les liens entre ces variables. Certaines variables ont plutôt subi une analyse de contingence car elles étaient soit des variables de catégories ou alors des variables dichotomiques.

L'analyse de correspondance est une méthode qui permet d'analyser des données en créant une représentation graphique des résultats qui permet l'interprétation et la communication des résultats. Elle permet de cerner des groupes de réponses et de répondants en les situant sur des axes qui représentent les tendances à certaines réponses. L'analyse de correspondance peut autant être utilisée pour des données quantitatives que qualitatives (comme les perceptions) et est ainsi un puissant outil permettant de faire des associations entre des éléments tangibles et intangibles (Yavas et Shemwell, 1996). Elle permet également de construire un lieu permettant l'interdisciplinarité. Cette méthode d'analyse est donc pertinente dans le

cadre de ce travail, car elle est adaptée à l'analyse d'un grand nombre de données et part du principe qu'il n'y a aucun *a priori* sur les données.

L'analyse de correspondance permet de gérer et d'analyser une grande quantité de données autant qualitatives que quantitatives tout en permettant une solide interprétation des résultats (Kudlats et al. 2014). Ce processus de représenter graphiquement des perceptions environnementales en utilisant l'analyse de correspondance est original à cette recherche. D'autres recherches ont cependant cartographié (SIG) des préférences et des perceptions (Zoderer et al. 2016)

Originalité de l'approche

L'originalité de l'approche adoptée dans cette thèse tient avant tout dans le choix du niveau de l'échelle d'analyse. En effet, contrairement à la plupart des autres études présentées dans la littérature qui abordent un sujet similaire au niveau régional ou au niveau national, le présent travail détaille le niveau micro, soit le niveau des individus et des ménages. Cela permet d'obtenir une connaissance très fine et très pointue de quatre communautés de la région. Celles-ci sont considérées par le projet PLUPH comme étant « représentatives » de la réalité qui prévaut dans la région du Tapajos, bien que cette représentativité ne relève pas des statistiques inductives.

La technique d'échantillonnage permet d'utiliser des outils statistiques puissants car elle se base sur la population et non pas sur un échantillon. Tous les adultes des quatre communautés ont été interviewés. Cela a permis de constituer une base de données particulièrement exhaustive et qui contient une grande diversité de variables à analyser.

Trois éléments généraux d'originalité de la présente étude sont abordés ici tandis que d'autres plus spécifiques sont abordés dans le texte des trois chapitres principaux. Les différents concepts présentés dans la section « cadre conceptuel » permettent également de mettre de l'avant plusieurs éléments originaux à cette thèse.

Perception et santé environnementale

Le fait que cette étude fasse partie d'un projet plus grand de santé environnementale lui confère une originalité de par son contexte. En effet, il existe dans cette étude la présence sous-jacente des deux problématiques

de santé publique qui préoccupent le projet PLUPH, soit l'exposition au mercure et la prévalence de la maladie de Chagas. Ces objets reliés à la santé environnementale ont évidemment teinté les discussions durant les entrevues pour la collecte des données. Le fait que le projet PLUPH avait été lancé plusieurs années avant la collecte des données pour cette étude a permis de situer rapidement les sujets qui ont été abordés, c'est-à-dire le lien entre la santé, le bien-être et l'environnement de même que le rôle de l'humain dans la transformation de son environnement et les mesures qu'il peut prendre pour diminuer ses impacts.

Définition des modalités de PSE dans une région précise

Une des forces importantes de cette étude réside dans le fait qu'elle se déploie dans un contexte micro. En effet, la plupart des études se penchant sur la question des programmes de PSE ou des programmes de transfert conditionnel le font de façon macro, sur l'Amazonie entière ou encore sur une région entière. La connaissance fine de quatre communautés permet une analyse très précise au niveau individuel et du ménage afin de comprendre les motivations, les perceptions et les intentions des répondants. Cela a permis d'aller en détail dans la définition des modalités acceptables d'un programme de PSE et d'établir le niveau du paiement minimal acceptable par les communautés à l'étude à partir du coût d'opportunité réel lié à l'agriculture de subsistance.

Faire le lien entre les programmes de transfert conditionnel et l'état de l'environnement

Finalement, cette étude fait le lien au niveau micro entre l'effet-revenu créé par les programmes de transfert et différents comportements et décisions des

ménages ayant un impact sur l'environnement. Ce lien qui fait état des effets non prévus des politiques de protection environnementale n'avait jamais été établi de façon empirique dans la littérature. Cette étude permet non seulement d'établir ce lien, mais avance un certain nombre d'explication du phénomène à travers des variables socioéconomiques. Les changements de comportement des acteurs sont isolés pour tenir compte de l'effet-revenu engendré par les différents programmes de transfert. L'utilisation du concept « d'effet-revenu » dans ce contexte particulier n'est également pas rencontré dans la littérature.

Collaborateurs

Pour l'ensemble des chapitres, le premier auteur a réalisé l'essentiel du travail, autant dans l'élaboration des objectifs, de la méthodologie, de la collecte et de l'analyse des données que dans la rédaction. Les noms de A. Béliveau, L. Fatorelli et J.S. Oestreicher apparaissent comme co-auteurs dans l'ensemble des chapitres alors que ces chercheuses ont travaillé en collaboration avec l'auteur de cette thèse à l'élaboration d'un questionnaire commun administré en 2011 et qui a permis de colliger les informations socioéconomiques de base sur les individus et les ménages dans les communautés à l'étude. Certaines variables de base ont été utilisées dans l'ensemble des thèses de ces étudiants, tandis que d'autres variables ont été utilisées par un seul des étudiants. Elles apparaissent également pour les différents conseils et les discussions qui ont surgi lors du processus et qui ont permis de bâtir un meilleur travail de recherche. Le professeur M. Lucotte apparaît dans l'ensemble des articles comme directeur de ce projet de recherche et comme chercheur principal du projet PLUPH. Les professeurs F. Mertens, R. Davidson, C.J. Passos et C. Romana apparaissent dans

l'ensemble des articles comme membres du comité exécutif du projet PLUPH. Ils ont contribué aux discussions menant à l'interprétation des résultats, à la relecture des chapitres en plus de faciliter la logistique et le financement inhérents au déroulement du projet. Le nom de la professeure J. Saint-Charles apparaît dans le premier article car elle a permis de mieux cerner la méthodologie utilisant l'étude des perceptions. Le nom de S. Paquet apparaît dans le premier chapitre car il a permis l'élaboration de la méthode d'analyse des données statistiques.

Il est important de remettre de l'avant que l'auteur de cette étude a imaginé, initié et réalisé les campagnes d'échantillonnage, récolté les données puis les a compilées, et finalement interprété toutes les données présentées dans cette étude. Seules les données socioéconomiques de base ont été utilisées dans plus d'une étude. Les co-auteurs mentionnés dans les trois chapitres principaux de la thèse ont essentiellement participé aux discussions menant aux interprétations de l'auteur principal et commenté les textes selon leurs connaissances personnelles.

Cadre conceptuel

Le cadre conceptuel présenté ci-après permet de cerner et de définir les principaux concepts qui seront utilisés dans la présente thèse. Ils seront également discutés en regard des différents courants de pensée actuels dans la littérature. À la toute fin de cette section se trouve un diagramme faisant la synthèse des concepts utilisés et des liens entre ces concepts.

Analyse de perception

Le premier chapitre de cette étude aborde l'analyse de perceptions. Le concept de perception est large et fréquemment utilisé dans la recherche en sciences sociales. Différents courants de pensée ont fourni une définition et une application au concept. À la base, la perception est un mécanisme « analysable en terme d'apprentissage » et résulte d'un schéma stimulus-réponse (Abric, 1987). De plus, « la perception n'exprime pas une quelconque réalité objective et analysable à partir d'un concret, elle exprime [...] le sujet lui-même et son engagement personnel et subjectif dans le monde, c'est un "compte- rendu du monde vécu" » (Abric, 1987). La subjectivité est donc au cœur de la perception et est liée aux besoins, aux motivations, à l'attitude et aux sentiments du sujet. La perception de l'environnement dépend d'un réseau complexe de réponses mentales apprises et entretenues par des facteurs culturels et individuels. Le concept de perception réfère au résultat de l'application de connaissances à une situation particulière (Leeuwis, 2004). De plus, les attitudes sont formées en partie par les perceptions et les expériences de la communauté et des individus (Infield et Namara, 2001). La perception et l'attitude face à la l'environnement dépendent de facteurs socioéconomiques (Weladji et al., 2003; Case et al. 2005). Ceux-ci peuvent être multiples et complexes. C'est

pourquoi cette étude s'est également penchée sur une multitude d'éléments d'ordre socioéconomique permettant de comprendre ces liens.

Le recours à l'analyse des perceptions permet d'aborder les liens intrinsèques qui existent entre l'environnement local et le bien-être des populations étudiées dans le cadre de ce travail de recherche. Au-delà de la simple observation de l'utilisation des ressources, l'analyse des perceptions permet de comprendre la profondeur des relations entre l'environnement et le bien-être. La connaissance de la perception est essentielle pour fournir de l'information importante pour les décideurs et pour la résolution de conflits (Trakolis, 2001; Manfredo et al. 2004).

Plusieurs études ont fait l'utilisation du concept de perceptions en les analysant de façon quantitative. L'analyse quantitative permet l'utilisation d'outils statistiques puissants permettant d'y accoler plusieurs variables explicatives. Cela était pertinent dans le cadre de ce travail étant donné le grand nombre de variables explicatives collectées de même que son caractère interdisciplinaire. La plupart des études utilisant une analyse de perception quantitative contiennent également un grand nombre de variables (Vodouhê, 2010; Sattler et al. 2013; Radics et al. 2016). La présente étude veut faire la démonstration qu'il est possible de faire ressortir des résultats pertinents et significatifs à travers l'analyse quantitative et semi-quantitative de perceptions exprimées.

Services écosystémiques

Le concept de services écosystémiques trouve racine dans une littérature datant de plusieurs décennies. Au départ ayant un aspect purement utilitaire et anthropocentrique (DeGroot et al., 2002), le concept devient rapidement très utilisé autant dans la littérature en sciences sociales qu'en sciences naturelles. L'utilisation du concept repose beaucoup sur l'estimation d'une valeur économique à attribuer à un élément ou un autre de la nature, ou encore à un écosystème en entier (Costanza et al, 1997). L'Évaluation des écosystèmes pour le millénaire (*Millenium Ecosystem Assessment*, MA, 2005) a contribué grandement à faire connaître le concept et à promouvoir son utilisation dans les politiques publiques et dans la littérature scientifique en général (Fisher et al., 2009).

L'utilisation de plus en plus fréquente du concept de services écosystémiques autant par les chercheurs que par les décideurs en a quelque peu dilué le sens premier. À travers le temps, un nombre grandissant de fonctions écologiques ont été définies comme services écosystémiques tout en ayant fait l'objet d'évaluations monétaires (Gomez-Baggethun et al. 2010). Le concept fait également l'objet d'applications diverses que ce soit à des fins pédagogiques ou alors à des fins de compensations monétaires de différents groupes (Peterson et al. 2010).

L'Évaluation des écosystèmes pour le millénaire (MA, 2005) a été un document fondateur pour faire le lien entre les écosystèmes et leurs fonctions et la santé et le bien-être des populations humaines. À travers une classification basée sur le type de services produits, il catégorise les différents services écosystémiques et fait un lien avec les effets potentiels sur le bien-être humain. Ces catégories sont : les services d'approvisionnement,

soit les services directement fournis par les écosystèmes (bois, hydrocarbures, eau etc.) ; les services de régulation, dont les fonctions écologiques permettent la fourniture d'autres services (régulation du climat, purification de l'eau etc.) ; les services culturels, qui peuvent être liés à des aspects spirituels, esthétique ou encore de récréation et finalement les services de support, qui permettent l'existence des trois autres catégories de services (production primaire, recyclage des nutriments etc...). Cette classification permet entre autres d'accoler à ces services différents usages ou différents paysages et permet de suivre le changement, l'évolution du flux de services écosystémiques (Raudsepp-Hearne et al., 2010). L'Évaluation des écosystèmes pour le millénaire fait un lien fort entre les services écosystémiques et leur qualité et le développement économique et social. Cette étude est développée sur cette base. À travers ce lien accepté dans la littérature, cette étude vise à observer cette réalité et cette compréhension du lien existant entre l'environnement et le bien-être humain sur un terrain particulier et s'inscrivant dans un contexte de santé environnementale.

Services écosystémiques et pauvreté

Plusieurs études établissent un lien entre la pauvreté et les conditions environnementales prévalant dans un endroit donné. La dégradation des services écosystémiques locaux peut entraîner des effets néfastes sur la santé et le bien-être des populations. (Iftekar et Takama, 2008 ; Reed, 2008 ; Ronnback et al. 2007 ; Borner et al, 2007).

La présente étude met l'accent sur le lien existant entre les services écosystémiques et la santé et le bien-être des populations rurales. Plusieurs études ont mis au jour l'importance de ce lien, notamment chez les

populations vulnérables des pays en développement. Le revenu tiré directement de l'usage, de la vente ou des bénéfices indirects tirés des écosystèmes peut être considérable. Angelsen et al. (2014) ont déterminé que le revenu lié aux biens et services tirés des écosystèmes chez des ménages ruraux dans 24 pays en développement s'établissent en moyenne à 28% du revenu total. Les ménages les plus pauvres ont une part de revenu provenant des biens et services écosystémiques plus élevés que les ménages plus riches. L'accès à des activités économiques dépendantes des écosystèmes peut réduire significativement les inégalités entre les ménages ruraux (Shackleton et al. 2011). En prenant en compte cette donnée, la présente étude veut notamment observer la différence de perception entre des ménages plus riches et plus pauvres en utilisant des variables socioéconomiques liées au mode de vie et au contexte dans lequel elle s'est inséré.

De plus, certains éléments du paysage sont plus importants que d'autres en ce qui a trait à l'impact qu'ils peuvent avoir sur le bien être des ménages ruraux dans les pays en développement. Wunder et al. (2014) ciblent spécifiquement les forêts et les prairies (ou steppes) comme des paysages de première importance pour les populations rurales vulnérables. Par les services écosystémiques qu'elles fournissent, celles-ci peuvent jouer le rôle de filet de sécurité pour de nombreuses familles et même entraîner la sortie de l'état de pauvreté (Angelsen et Wunder, 2003; McSweeney, 2004).

Cependant, l'effet inverse peut également se produire lorsqu'il y a dégradation du paysage et donc des services écosystémiques qui y sont liés. Il se produit alors un échange intertemporel entre le revenu futur et le revenu actuel diminuant ainsi les capacités futures des ménages à accumuler du

capital à long terme (Nielsen et al. 2012). Cette dégradation peut également créer des externalités négatives pour la société en général.

Les services écosystémiques jouent trois rôles principaux en ce qui a trait au bien-être des populations rurales : assurer la consommation actuelle, fournir un filet de sécurité contre les chocs et les variations saisonnières, et fournir une façon d'accumuler du capital (Angelsen et Wunder, 2003).

Malgré la très vaste littérature faisant le lien entre l'état de l'environnement et le niveau de pauvreté, il existe beaucoup de disparité entre les méthodes utilisées pour évaluer ce lien. Plusieurs utilisent les Systèmes d'information géographique (SIG) (Raudsepp-Hearne et al. 2010 ; Börner et al, 2007 ; 2010) ou alors des méthodes qualitatives (Chimello de Oliveira et Berkes, 2014 ; Lamarque et al. 2011). La diversité des sites d'études empiriques sur le sujet fait en sorte qu'il est difficile de faire des généralisations. Une approche au niveau microéconomique permet d'approfondir la connaissance particulière d'une région spécifique et qui s'inscrit dans un contexte de vulnérabilité environnementale.

Paielements pour services écosystémiques (PSE)

Les mécanismes de paiements pour services écosystémiques sont des 1) des transactions volontaires où 2) un service écosystémique bien défini (ou un usage qui garantit ce service de façon plausible) 3) est acquis par un acheteur de services écosystémiques 4) d'un fournisseur de services écosystémiques 5) si et seulement si ce dernier garantit la fourniture du service (Wunder, 2005). Bien que cette définition soit généralement acceptée dans la littérature, certaines précisions doivent être faites, notamment en ce qui a trait aux acheteurs et vendeurs, à la dimension volontaire de la

transaction et à l'aspect « bien défini » des services écosystémiques. En effet, les programmes de PSE sont souvent pris en charge par les gouvernements où ils prennent alors davantage la forme de programme de transfert conditionnel de fonds (voir définition plus loin) (Vatn, 2010).

Les programmes de PSE ont été créés afin d'internaliser les externalités positives des services écosystémiques au sein des marchés pour influencer la prise de décision des agents économiques. Une externalité se produit quand un agent est affecté par un coût ou un bénéfice qu'il n'a pas choisi. Du point de vue des PSE, les externalités positives apportées par les écosystèmes sont « compensées » par un paiement à l'agent qui contribue à la maintenir (Schomers et Matzdorf, 2013). Plusieurs considèrent qu'il est plus pratique de voir les PSE comme un transfert de ressources entre des acteurs afin de créer des incitatifs pour favoriser une décision d'un agent économique dans l'intérêt social (Muradian et al. 2010).

La majorité des programmes de PSE suivent un modèle pigouvien où le gouvernement joue un rôle central dans le fonctionnement en donnant des subventions qui jouent le rôle d'incitatifs. Ils permettent de changer les comportements des agents impliqués en fournissant un incitatif économique (Corbera et al. 2009). En ce sens, les PES permettent d'envoyer un signal sur les actions qui sont dans le sens de l'intérêt social en ce qui a trait à la gestion des ressources (Muradian et al. 2010).

Bien que la conceptualisation d'un PSE puisse sembler assez simple, sa création et son fonctionnement sont des processus complexes et posent de nombreux défis. L'établissement d'un PSE doit être adapté aux réalités prévalant sur son lieu d'implantation et doit être socialement acceptable. Dans le cadre de cette étude, ce dernier élément est analysé du point de vue

des ménages vivant essentiellement de l'agriculture de subsistance. Les éléments favorisant cette acceptabilité seront soulevés et mis en perspective avec d'autres études.

PSE et réduction de la pauvreté

En regard de leurs impacts, les PSE doivent être analysés comme toutes autres politiques. Ils peuvent avoir de multiples impacts autant en termes d'efficacité environnementale ou en termes de coûts que d'un point de vue de réduction de la pauvreté. Ils ont d'ailleurs été pensés et implantés en premier lieu dans des pays en développement avec pour objectif avoué d'être en faveur des moins nantis (Jack et al. 2008; Pagiola, 2007). Il est généralement admis que les programmes de PSE sont uniques en eux-mêmes. En effet, ceux-ci doivent s'adapter au contexte dans lequel ils sont implantés et aux institutions desquelles ils relèvent. Fisher et al. (2010) affirment alors que les programmes locaux deviennent difficiles à implanter à une plus large échelle à cause des contextes socioéconomiques différents. Cela soulève donc la question à savoir jusqu'à quel point il est possible de généraliser des observations sur le terrain étant donné des contextes aussi spécifiques qu'uniques.

Plusieurs variables socioéconomiques peuvent avoir un impact important sur l'efficacité des PSE en termes d'additionnalité, mais aussi d'effet sur la réduction de la pauvreté. Ces variables sont : les droits de propriété et d'occupation, les coûts de transactions, les caractéristiques sociodémographiques des ménages et des communautés et l'accès à l'information et aux marchés (Adhikari et Agrawal, 2013). Cette étude inclut plusieurs de ces variables dans son analyse et souhaite vérifier directement

chez les ménages concernés si ces éléments ont réellement un impact sur l'acceptabilité sociale et sur les effets de ces programmes.

PSE et acceptabilité sociale

La question de l'acceptabilité sociale par rapport aux programmes de PSE est fondamentale. L'acceptabilité sociale de tels programmes est tout d'abord liée à son design, ses caractéristiques, la participation à l'élaboration du programme, de même que des aspects d'équité (Zammit, 2013 ; Wustenhagen et al. 2007). L'implication des parties prenantes dans l'élaboration d'un programme de PSE permet l'appropriation et l'adaptation rapide du programme par les populations locales.

Plusieurs auteurs ont abordé la question de l'équité et de l'efficacité des PSE. Même si le programme est considéré efficace d'un point de vue agrégé, un modèle qui mène à une distribution injuste des bénéfices ou des coûts a moins de chances d'être acceptable ou considéré légitime par les parties prenantes. L'aspect interdépendant des questions d'efficacité et d'équité est une notion bien développée par Pascual et al. (2010). De plus, Börner et al. (2010) vont plus loin en faisant l'analyse de différents modèles de compensations financières et qui sont différents en termes de compromis entre efficacité et équité. Ils affirment que même les PSE qui sont conçus pour être les plus universels en termes de distribution vont profiter plus largement aux grands propriétaires terriens car ils sont responsables d'un niveau de déforestation plus élevé.

Ceci dit, les écarts locaux sont exacerbés par les différents conflits qui peuvent exister de même que par la question des droits de propriété qui mènent à davantage d'iniquité dans la distribution des bénéfices et des coûts

des PSE (Corbera et al., 2007; Zbinden et Lee, 2005). La présente étude se penche sur ces caractéristiques très locales qui favorisent ou défavorisent une acceptabilité sociale dans le contexte des communautés à l'étude.

Autonomisation

Le concept d'autonomisation (*empowerment*) est utilisé par bon nombre de chercheurs et par des institutions internationales, notamment pour les questions relatives au développement. Ce concept n'a pas encore pour l'instant une définition claire et acceptée de façon générale (Trommlerova et al. 2015). On le présente souvent comme un processus dans lequel les groupes marginalisés ou ayant peu de pouvoir améliorent leurs conditions (Ibrahim et Alkire, 2007). Dans cette définition, l'autonomisation est considérée comme une façon d'accroître les possibilités d'agence. Les mesures les plus étudiées et qui favorisent l'autonomisation des ménages sont celles qui mettent l'accent sur le pouvoir de prise de décision des ménages (Malhotra et Mather, 1997).

Le concept d'autonomisation est lié à des termes tels que agence, autonomie, auto-direction, auto-détermination, libération, participation, mobilisation et confiance en soi (Ibrahim et Alkire, 2007). Il est constitué de deux éléments : 1) l'habileté à agir en fonction de ce que l'on valorise et ce pourquoi on le valorise et 2) l'environnement institutionnel qui donne la possibilité d'agir. Selon Bennett (2002), le concept d'autonomisation peut s'appliquer aux personnes, au capital humain de ces personnes et aux institutions. Dans le cadre de cette étude, l'autonomisation est vue en partie comme une résultante de l'effet des programmes de transfert conditionnel (voir Figure 0.4).

PSE, développement socioéconomique et autonomisation

Les programmes de paiements pour services écosystémiques sont liés à l'autonomisation. En effet, sous certaines conditions, ils peuvent favoriser l'autonomisation d'une population à travers un effet-revenu mais aussi à travers une forme de justice sociale (Kolinjivadi et al. 2015). La protection du flux de services écosystémiques à travers la protection des écosystèmes peut être liée au bien être général d'une population. Pour y parvenir, il est crucial de distinguer les moyens (processus participatif, arrangements institutionnels, gestion des ressources naturelles) et les fins (satisfaire le bien être humain) (Daly, 2007). Ces fins sont fondamentales pour atteindre un certain niveau d'autonomisation (Sen, 2010). Cependant, les paiements ne peuvent être suffisants pour atteindre un état d'autonomisation. Il importe de tenir compte de plusieurs éléments tels que les diversités de perception, le vécu, la culture et les conditions sociales. La probabilité que les paiements améliorent l'autonomisation doit être évaluée à partir de plusieurs de ces éléments.

L'inefficacité ou le manque d'additionalité de certains PSE font qu'ils pourraient être jugés négativement alors qu'ils peuvent avoir des effets bénéfiques en termes de conservation des écosystèmes ou alors d'autonomisation des communautés (Corbera et al. 2007). Des auteurs ont également montré que certaines communautés peuvent joindre un programme de PSE pour des raisons autres qu'économiques, comme le prestige ou encore la perception d'avoir plus de pouvoir (Corbera et al. 2007).

Le capital social, les institutions locales et l'autonomisation jouent un rôle crucial dans l'implantation d'un PSE (Adhikari et Agrawal, 2013). Le capital social est vu comme important pour augmenter la participation des ménages dans les programmes de PSE. Celui-ci est souvent défini en termes de

réseau social, d'organisation communautaire, de confiance et d'accès à l'information (Bremer et al. 2014). Dans le même sens, les PSE pourraient être considérés comme des « incitatifs à l'action collective ». Cependant les incitatifs monétaires n'ont pas toujours donné l'effet escompté et dépendent du contexte et de la culture locales. Ils peuvent également être davantage assimilés à des « récompenses » plutôt qu'à des incitatifs ou des signaux de marché. Ces récompenses sont liées aux performances passées et sont une façon de donner une forme de reconnaissance sociale, d'encourager la performance future, d'inciter d'autres personnes à changer leurs pratiques et à agir comme un transfert social favorisant le développement (Muradian, 2013).

Acceptabilité sociale

Le concept d'acceptabilité sociale est utilisé de plus en plus dans l'évaluation de projets de grande envergure, surtout dans les projets de nature énergétique. Cependant, celui-ci revêt de plus en plus un aspect universel dans son processus et dans sa finalité et peut s'inscrire de plein droit dans l'évaluation d'impacts sociaux ou environnementaux des projets ou des politiques. Il existe une distinction de plus en plus claire entre acceptation et acceptabilité. Le terme acceptation réfère davantage à une attitude individuelle et passive tandis que l'acceptabilité est plutôt de nature collective et peut évoluer dans le temps (Fortin et Fournis, 2015). Le caractère collectif de l'acceptabilité revêt des formes et des échelles multiples : parties prenantes, groupes d'intérêts, communautés (Fortin et Fournis, 2015).

L'approche centralisée ou « top-down » a longtemps été la façon de faire pour la mise en place de projets ou de politiques. Cependant, on assiste de plus en plus à une prise de conscience de l'importance d'inclure les

communautés locales. Selon Wustenhagen et al. (2007), il existe trois dimensions à l'acceptabilité sociale: l'acceptabilité sociopolitique, celle de la communauté et celle du marché. L'acceptabilité sociopolitique est celle qui est la plus visible et la plus évidente. Elle comprend l'acceptabilité dans « l'opinion publique » générale tout comme celle des décideurs et des parties prenantes. L'acceptabilité de la communauté est l'acceptation par les parties prenantes locales, les autorités locales comme les résidents. Cette acceptabilité est liée aux notions de justice et d'asymétrie d'information. C'est sur cette partie de l'acceptabilité que se penche ce travail de recherche. L'acceptabilité du marché quant à elle réfère davantage à des agents économiques comme les consommateurs ou les investisseurs et est moins pertinente dans le cadre de cette recherche. Il existe un rapprochement intéressant à faire entre l'acceptabilité sociale et les perceptions. En effet, Carcamo et al. (2014) affirment que c'est en prenant en compte les perceptions et les attentes des parties prenantes que les communautés locales sont le plus susceptible « d'accepter » un projet ou une politique. La définition d'une vision commune à partir de la perception qui inclut des aspects sociaux et environnementaux peut faire partie des facteurs qui aident à l'acceptabilité sociale.

De la même façon, on souligne le rôle des institutions intermédiaires (locales et régionales) dans le cadre de l'acceptabilité sociale au niveau communautaire. Celles-ci peuvent prendre la forme d'institutions officielles (comme le gouvernement municipal ou local) ou encore d'organismes non-gouvernementaux (ONG). Elles permettent de faire le lien entre les individus et les groupes et créent des synergies positives entre les différentes perceptions de ces derniers (Adhikari et Agrawal, 2013).

Effet-revenu

En termes économiques, l'effet revenu est l'arbitrage effectué par un agent de modifier sa consommation, ses épargnes, son investissement ou son temps de travail dû à un changement dans son revenu. Cet effet peut autant être positif que négatif. On fait alors l'hypothèse de base qu'étant donné une augmentation du revenu d'un ménage rural, celui-ci pourrait être tenté de réduire sa production agricole et son temps de travail. Plusieurs études ont montré qu'il existe une relation positive entre le revenu et la préoccupation par rapport aux problèmes environnementaux (Ekins, 1997 ; Dunlap et York, 2008). Cependant, dans certaines situations, il existe une relation inverse entre le revenu et la perception du risque environnemental (Lo, 2014 ; Knight et Messer, 2012). Les personnes ayant un revenu faible perçoivent davantage le danger de la dégradation de l'environnement. L'insécurité matérielle renforce la perception du danger et de la vulnérabilité face aux changements environnementaux (Lo, 2014). Des revenus stables sont synonymes de protection contre les changements environnementaux. Dans cette étude nous analysons l'importance de cet effet-revenu sur le changement de comportement des ménages ruraux, autant sur le plan du travail que sur le plan de la consommation. L'effet-revenu est vu ici comme ayant un effet multiplicateur sur les possibilités de choix qui s'offrent aux ménages. Dans la région à l'étude une petite augmentation dans le revenu des ménages peut mener à des changements importants dans leur mode de vie et dans leurs décisions économiques.

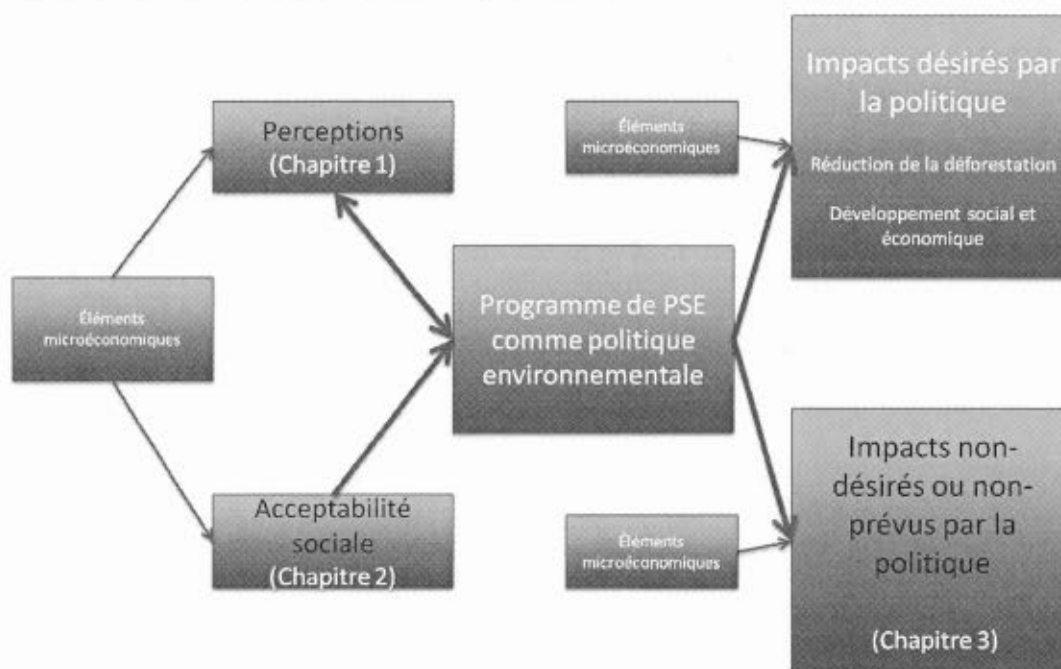
Liens entre les concepts pertinents dans cette étude

Le concept de PSE est central dans cette thèse. Il réunit à la fois la perception provenant des communautés à l'étude par rapport à leur

environnement, l'acceptabilité sociale d'un tel programme de même que les effets adverses ou non-prévus de tels programmes.

La figure suivante permet de voir le lien entre ces concepts et la présente recherche.

Figure 0.5 : Liens entre les principaux concepts



La Figure 0.5 montre que les perceptions liées à l'environnement et aux services écosystémiques de même que l'acceptabilité sociale sont influencées par des éléments microéconomiques liés aux ménages. Ces perceptions et cette acceptabilité ont des impacts sur l'implantation des politiques environnementales, dont les programmes de PSE. Ces mêmes politiques ont des impacts désirés et non-désirés qui peuvent être amplifiés par des éléments microéconomiques. Dans le cadre de cette thèse, nous

nous concentrons sur deux éléments faisant partie de la définition des programmes de PSE (chapitres 1 et 2) et un élément pouvant être une résultante de ce programme (chapitre 3). Les éléments microéconomiques influençant ces relations sont en trame de fond et servent ensuite à formuler des recommandations. Chacun des trois chapitres de cette thèse se penche sur une partie de ce diagramme que le lecteur retrouvera dans l'introduction de chaque chapitre.

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**CHAPTER 1 – Ecosystem services perception as a determinant of
health and wellbeing of subsistence-living populations of the
Tapajos River region in the Brazilian Amazon**

Ecosystem services perception as a determinant of health and wellbeing of subsistence-living populations of the Tapajos River region in the Brazilian Amazon

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Abstract

The valuation of ecosystem services has been subject to many studies in the past decade. The research field of ecosystem services perception is relatively new, and the traditional valuation techniques remain highly uncertain. This article presents the results of a perception study conducted among subsistence-living populations of the Tapajos River region of the Brazilian Amazon. Four elements of the environment were used in order to circumscribe the possible responses for ecosystem services: water, forest, traditional agriculture and agroecosystem. Results confirm the assumption that provisioning services are central in the perception of the health and wellbeing of those populations. Regulating services are important for the water and forest elements. Land-tenure conditions, employment income and origin of the respondents are particularly important to explain the variability of responses regarding ecosystem services perceptions. The main economic activities in the region (slash-and-burn farming and cattle breeding) are also important to understand the perceptions. Land tenure and household income are the two main explanatory factors to influence the perception of the link between the environment and health and well-being. The consideration of these perceptions is important for policy-makers to understand the relationship between these populations, their immediate environment, and their choices regarding agricultural practices.

Keywords

Ecosystem services

Perceptions

Brazilian Amazon

Introduction

There has been an increasing interest from policy-makers and researchers concerning the economic valuation of ecosystem services (ES) as it furnishes rich information about the interdependencies between human wellbeing, health and ecosystems (Millennium Ecosystem Assessment, 2005). The field of ecosystem services perception research is relatively new, and valuation techniques remain highly uncertain (Johnson et al. 2012). There are different frameworks to analyse ecosystem services (Millennium Ecosystem Assessment, 2005; deGroot et al., 2002; Costanza et al., 1997). However, few studies address the perceptions of ecosystem services by local populations or link these services with prevailing socioeconomic conditions.

The links between ES and human wellbeing are complex, diverse, context-dependent and complicated by the need to consider different spatial and temporal scales to assess them properly (Pereira et al. 2005). Many ES studies are focused on monetary and biophysical perspectives (Martin-Lopez et al. 2012). Valuation methods are not neutral. They are culturally constructed and, as such, can have a greater or smaller impact on the decision-making process (Martin-Lopez et al. 2013). So, "socio-cultural valuation approaches appear to be appreciated in understanding the diversity of value emerging from ES" (Oteros-Rozas et al. 2013).

According to Norgaard (2010), ES were first used as a metaphor and later as a tool to analyse links between the environment and human wellbeing. The dominant paradigm conceptualizes ES in terms of exchange values. It puts the emphasis on monetary valuation and payment schemes (Gomez-Baggethun et al. 2010). The adequacy of market-based valuation techniques has long been seriously questioned. These techniques, albeit robust in some

respects, does not capture the subtleties and nuances of many ES, since there is a psychological bias in stated reference methods (Kumar and Kumar, 2008). Social factors also have a big influence on the willingness to pay inherent to contingent valuation methods (Garcia-Llorente et al. 2012). Understanding non-economic motives behind valuation is important in order to obtain further information that can trigger decision-making (Martin-Lopez et al. 2007).

The analysis of ES perceptions is particularly important as human pressures on ecosystems continue to increase and has an impact on the health and wellbeing of the local population, especially in developing regions (Iftekhar et Takama, 2008; Reed, 2008; Ronnback et al. 2007; Wunder, 2001; Sagoff, 1998). Few studies have incorporated the social-cultural dimension of ES, despite it being a research priority (Martin-Lopez et al. 2012).

Traditional economic valuation fails to accommodate embedded values of regulating, cultural and supporting ES because those values do not fit in the traditional economic model. In fact, it is hard to apply traditional valuation methods based on contingent valuation or shadow pricing as they suppose the existence of an organized market. However, some studies have succeeded in examining these embedded values in non-traditional ways (Iniesta-Arandia et al. 2014; Rodriguez et al. 2006; Lamarque et al. 2011). Oteros-Rozas et al (2013) state that "Non-economic valuations are particularly appealing, as they offer insights into the motivations for conserving ecosystem services, which are frequently invisible in monetary valuations".

Many studies suggest a link between poverty and environmental degradation (Swinton and Quiroz, 2003; Swinton et al. 2003). However, the causality is hard to establish and there is no evidence of a direct correlation between the

level of wellbeing and environmental degradation (Ravnborg, 2003). Many variables connect poverty and environment: land-tenure, principal occupation, natural resources management, access to agricultural knowledge etc...

Thus, it is important to inform policy-makers about the perception of local populations in order to develop a practical point of view of the environmental situation.

This paper aims to describe and analyse the perceptions of ES of four communities of the mid-Tapajos region. Four elements of the environment were used in order to lead the discussion about ecosystem services: water, forest, traditional agriculture and agroecosystem. The study also analyses these perceptions in regard to socioeconomic variables in order to see if there is a pattern of responses among individuals in the study region. An emphasis is put on the ES that have a perceived effect on the health and wellbeing of the local population. It is a population-wide empirical study that aims at establishing a portrait of the interdependencies between ES and the health and wellbeing conditions of local population using perceptions. The main hypothesis of this study are that the predominance of slash-and-burn farming in the area could be partially explained by the fact that there's a relative imbalance in the perception of provisioning and regulating ES benefits by local populations (Börner et al, 2007). Benefits that come from the direct exploitation of ecosystems are overrated compared to indirect benefits that are not reflected in the decision-making process of economic agents. These indirect benefits have such importance that they have an impact on the health and wellbeing of the local populations (Metzger et al. 2006).

Materials and methods

Study sites

This study was conducted in four communities of the mid-Tapajos region in the Brazilian Amazon. Data was gathered in the communities of São Tomé, Agrovila de Araipá, Nova Estrela and Vicinal da Batata. The first three are located in the municipality of Aveiro and the fourth is located in the municipality of Trairão. The first two are accessible by waterways while the last two are accessible by road. Agrovila de Araipá and São Tomé are about 50 km away (by waterways) from the main regional city of Itaituba. Nova Estrela and Vicinal da Batata are respectively 90km and 175km away (by road) from Itaituba.

The choice of the Tapajos region is relevant due to strong evidence of public health problems linked to deforestation and the increasing environmental pressure (Confalonieri, 2000; Romana et al. 1999). This region has been an important development frontier since the 1970s (Fearnside, 2005). Also, it is a region characterized by endemic rural poverty. The high deforestation rates in the region are at the origin of the ecosystem services degradation and are principally due to the opening and asphaltting of the BR-163 road (Fearnside, 2005).

This study is part of a broader research project (the Poor Land Use, Poor Health (PLUPH) project) that aims at studying two emergent health issues in small-scale farming populations of the Tapajos region: mercury exposure through contaminated fish consumption and transmission of Chagas disease. It has been demonstrated that these two health issues are related to environmental degradation. In the study region, this environmental

degradation is primarily due to slash-and-burn practices (Roulet et al. 1998; 2000, Romana, 1999).

To date, Pará is the Brazilian state where the rate of deforestation is one of the highest. The principal cause of deforestation in the state is the increase in the size and number of pasture plots by large and small land owners (Nepstad et al. 2014).

Between 1980 and 2013 alone, the population of the municipality of Aveiro, within which three study communities are located, doubled from 7,700 to 16,000 (IBGE, 2013). The large majority of this population relies on subsistence agriculture (Farella 2005). In the municipality of Trairão, the population doubled from 1990 to 2013 to reach a little more than 17,500 persons. In terms of wealth, the municipalities of Aveiro and Trairão had in 2011 a GDP per capita of R\$3,388 and R\$5,349 respectively while it was of R\$11,493 for the Pará state and R\$21,535 for Brazil. Even if GDP per capita doesn't take into account the distribution of wealth, it does give an idea of the general wealth in the region. The GDP per capita is less than half of the GDP per capita of the Pará state (IBGE, 2011).

Research shows that the perceptions of ES by individuals are influenced by their principal occupation (Chimello de Oliveira and Berkes, 2014), land-tenure (Warren-Rhodes et al. 2011), education and wealth (Sodhi et al. 2010) and other sociological variables (Ronnback et al., 2007; Warren-Rhodes et al. 2011). Chimello de Oliveira and Berkes (2014) identified the cross-dependency between ES, principal occupation and economic activities of individuals. They showed that occupations tend to adapt to the extent of changes in provisioning ES and that the perception of those ES tends to change with time too. Oteros-Rozas et al. (2013) showed that the geographic

origin could also be an important variable, as past experiences and education are affected by origin.

For more than 15 years, the Tapajós region has been the host of collaborative research-to-action projects involving researchers and students from Canadian and Brazilian universities. These projects have allowed researchers to get well acquainted with communities in the region. The participation of these communities in various research projects allows for this confidence to be maintained and has made a major contribution to the validity of this and other projects.

Sampling

Fieldwork was conducted in January-February 2011 and in January to March 2012. During those periods, every adult head-of-household (men and women) of the four communities was interviewed. The list of respondents was made using a census of the communities realized by Valadão (2009) and validated during the fieldwork. Techniques used entailed semi-structured interviews and direct face-to-face surveys.

The process of data collection proceeded as follows: 1- Respondents were questioned on a series of sociological, economic and agricultural data, that were classified in three matrices of variables (Table 1.1), and 2- Respondents were asked about their perception of ES that come from four different elements of the environment using a semi-structured interview approach. They were asked to talk about the link they see between a certain element of the environment (e.g. the forest) and their health and economic wellbeing. Spontaneous responses were preferred to responses given after a discussion with the interviewer, even if those were also considered in the analysis. Using

a thematic approach, the responses were then categorized using the Millennium Ecosystem Assessment framework.

Table 1.1 – Classification of the explanatory variables

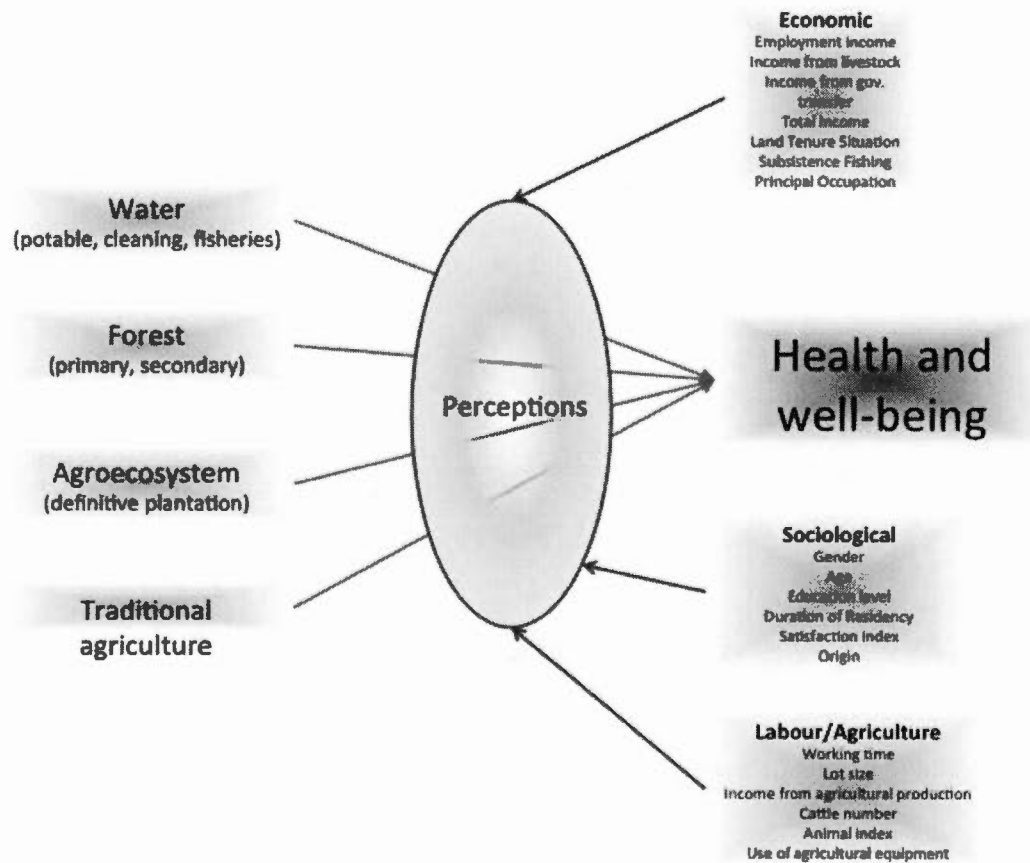
Matrices	Variables
Sociological	Gender
	Age
	Education level
	Duration of Residency
	Satisfaction Index
	Origin
Economic	Employment income
	Income from livestock
	Income from gov. transfer
	Total income
	Land Tenure Situation
	Subsistence Fishing
	Principal Occupation
Agricultural	Working time in agriculture
	Lot size
	Income from agricultural production
	Cattle number
	Animal index
	Use of agricultural equipment

The four elements chosen were Water, Forest, Traditional agriculture and Agroecosystem. They are used as proxies to illustrate the ecosystem services they are linked to. A choice was made to keep these elements pretty general in order not to restrain the potential responses. The elements can be described as follows: 1- Water: every waterway and water body of the immediate environment, including creeks, rivers and lakes as well as springs

and wells. 2- Forest: every primary and secondary forest of the immediate environment, being on private or public land. 3- Agroecosystem: every permanent plantation of vegetables and fruits. Orchards are also considered in this category. 4- Traditional agriculture: every extensive agricultural crop field for subsistence or income generation as well as pastures for livestock, based on the use of fire and fallow rotation. The differentiation between Agroecosystem and Traditional agriculture was based on the permanent aspect of the plantation. We consider that these four elements include the majority of the land-use/land-cover in the study area according to on-field observation and discussion with locals.

The general schema of the variables used is shown in the Figure 1.1:

Figure 1.1: General schema of the conceptual framework and variables



This schema shows how the selected independent variables can influence the perception of the link between the ecosystem services provided by four elements of the environment and the health and well-being of local population.

Responses given in the interviews were categorized as shown in the Table 1.2

Table 1.2: Categorization of the responses given in the interviews

	Response	Category
Water	Water to drink Water food preparation	Water provisioning (Subsistence)
	Water for irrigation Water for animals	Water provisioning (Irrigation)
	Lake or river level affects presence of animals and insects	Ecological regulation
	Lake or river level affects local climate	Climate regulation
	General appreciation Tranquility	General appreciation
	Life is everything Without water, there is no life	Support: General
	Water is important in general for my health	Support: Health
	Lake or river level affects our transportation	Support: Transport
Forest	Response	Category
	Extractivism and sale (fruits, nuts, hunting)	Food provisioning for sale
	Material to build house Material to build canoe Material to build (other)	Material provisioning
	Extractivism for own use	Subsistence
	Collecting medicinal plants	Traditional medicines
	Forest is important because it filters the water	Water filtration
	Forest is important because it protects from erosion (from land to go)	Erosion protection
	Forest is important for air filtration	Air purification

	Forest protects against bug bloom Forest maintains dangerous animals in it	Ecological regulation
	Forest helps maintaining a cool local climate There is more rain with forest	Climate regulation
	General appreciation (I like walking in the forest, it's relaxing)	General appreciation
	Forest is the base of life for us and for animals and plants	Support: Biodiversity
	Forest is everything we need	Support: General
	The presence of forest helps my health in general	Support: Health
Agroecosystem	Response	Category
	Provides food for sale	Food provisioning for sale
	Provides food	Subsistence
	Material to build	Material provisioning
	Collecting medicinal plants	Traditional medicines
	Agroecosystem protects against bug bloom Agroecosystem maintains dangerous animals in it	Ecological regulation
	Agroecosystem helps maintaining a cool local climate	Climate regulation
	It is beautiful, it creates diversity on my property	General appreciation
Traditional agriculture	Response	Category
	Provides food	Subsistence
	Provides food for sale	Food provisioning for sale
	Material to build	Material provisioning
	It destroys regulation functions from forest	Regulation functions
	It supports my health in general	Support: Health
	It is the base of our life	Support: General

Data analysis

Data were stored and organized using a MySQL database. After consolidation and pre-screening of data, 139 individuals were kept in the analysis, out of a possible 149 individuals (in ES data as well as explanatory matrices). Using CANOCO for Windows, a correspondence analysis (CA) was performed on ES data for each element of the environment, creating four different analyses. This was made in order to see patterns of response across individuals together with the variance among them. Then, four canonical correspondence analyses (CCA), one for each element, were performed using explanatory variables from the sociological, economic and agricultural matrices. A stepwise permutation test enables retention in the analysis of the most significant variables. An analysis of covariance within the three matrices then permits isolation of the effect of each individual matrix in the variance.

Limitations of the study

This study is limited in its interpretation principally because of the local scope it has. The study was designed to thoroughly understand the microeconomic conditions in which households make their decisions. However, the four communities studied presented similar characteristics in terms of livelihoods, public services and infrastructures. In the region, and in other regions of the Amazon, there are similar communities with the same environmental, health and social issues. Even if the comparison may not be direct, the results and recommendations of this study are applicable to communities with similar context.

Regarding the quantitative approach for data analysis, a choice in that sense was made in order to consider the whole population of the communities and to consider the variety of the responses. This quantitative approach permits to

consider all 139 adults that accepted to participate to the study. This analysis offers powerful tools to aggregate and link these responses to socioeconomic factors represented in the explanatory variables.

Results

ES responses distribution among individuals

Table 1.3 shows the distribution of responses for each element of the environment. In total, the forest element has the highest mean of response with an average of 2.7 responses per respondent, for a total of 359 ES cited by the respondents. Subsistence, climate regulation and traditional medicines material are the most cited ES from forest. Altogether, regulation ES from forest count for 34% of the responses. With an average of 2.1 responses per respondent, ES from Agricultural Fields are the second most cited by respondents. Provisioning services are the most cited with 76.5% of the responses. Supporting ES are cited in 21.64% of the responses. For ES coming from Water, it is interesting to note that Supporting ES counts for 22.93% of the responses. Provisioning and Regulating ES count for 46.79% and 27.52% respectively.

Finally, for Agroecosystem, 86.37% of the responses are Provisioning ES and 11.62% are Regulating ES.

Table 1.3 – Distribution of responses for each element in the analysis

Element	Ecosystem service	Number	Percentage
Water	Water provisioning (Subsistence)	69	30,94
	Water provisioning (Irrigation)	33	14,80
	Ecological regulation	8	3,59
	Climate regulation	53	23,77
	Conservation	4	1,79
	General appreciation	6	2,69
	Support: General	31	13,90
	Support: Health	15	6,73
	Support: Transport	4	1,79

Total number of response	223	100
# of respondents "no relation"	24	17,3
Total number of respondent	139	100
Response/Respondent Mean	1,9	

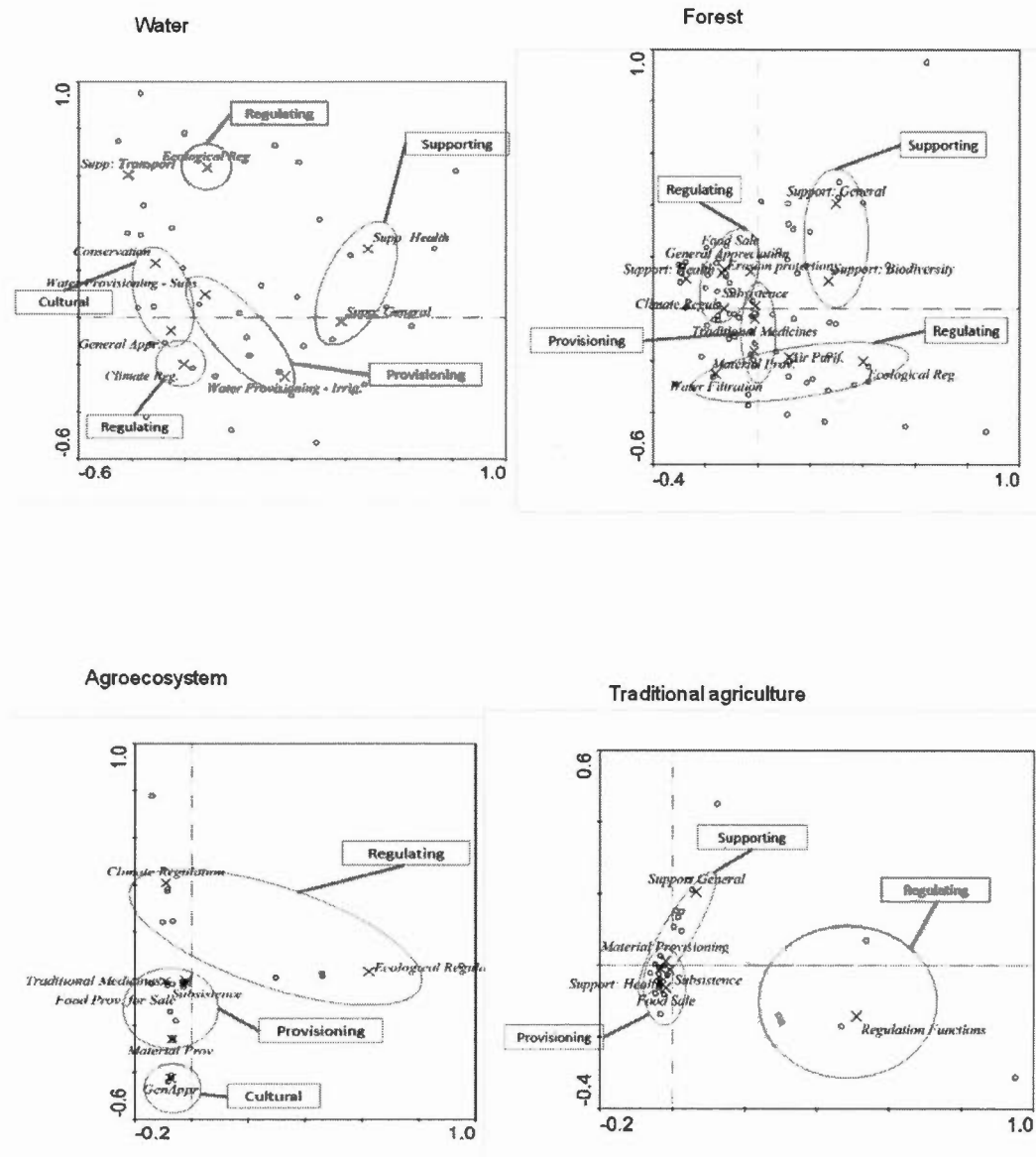
Element	Ecosystem service	Number	Percentage
Forest	Food provisioning for sale	19	5,29
	Material provisioning	18	5,01
	Subsistence	98	27,30
	Traditional medicines	61	16,99
	Water filtration	6	1,67
	Erosion protection	5	1,39
	Air purification	29	8,08
	Ecological regulation	17	4,74
	Climate regulation	67	18,66
	General appreciation	10	2,80
	Support: Biodiversity	3	0,84
	Support: General	20	5,57
	Support: Health	6	1,67
	Total number of response	359	100
	# of respondents "no relation"	4	2,9
	Total number of respondent	139	100
	Response/Respondent Mean	2,7	

Element	Ecosystem service	Number	Percentage
Agroecosystem	Food provisioning for sale	75	37,88
	Subsistence	75	37,88
	Material provisioning	7	3,54
	Traditional medicines	14	7,07
	Ecological regulation	10	5,05
	Climate regulation	13	6,57
	General appreciation	4	2,02
	Total number of response	198	100

	# of respondents "no relation"	17	12,2
	Total number of respondent	139	100
	Response/Respondent Mean	1,6	
Element	Ecosystem service	Number	Percentage
Traditional agriculture	Subsistence	79	29,48
	Food provisioning for sale	53	19,78
	Material provisioning	73	27,24
	Regulation functions	5	1,87
	Support: Health	36	13,43
	Support: General	22	8,21
	Total number of response	268	100
	# of respondents "no relation"	12	8,6
	Total number of respondent	139	100
	Response/Respondent Mean	2,1	

Figures 1.2 show the results of the correspondance analysis (CA) for axis 1 and 2 for each element of the environment. For Water, it is possible to see a similarity in responses for Water Provisioning – Subsistence and Cultural services. Supporting services show another pattern of response while Support: Transport is completely appart. The two Regulating services cited do not show the same pattern of response.

Figure 1.2 – Results of the correspondence analysis (CA) – Axis 1 and 2 –
Four elements of the environment



The Forest CA presents the strongest inertia (Chi-square/Total N). There is a similarity in the responses for Supporting ES as well as within Erosion Protection, Support: Biodiversity and Support: General on the 2nd axis. Traditional Medicines and Material Provisioning are similar on the first axis. Provisioning services have their own pattern. There are two different groups for Regulating services, the first with Erosion Protection, Climate Regulation and the second one with Water Filtration, Air Purification and Ecological Regulation.

For Traditional agriculture, clearly, there is a specific pattern of responses for Regulation Functions ES. Provisioning and Supporting ES responses are centered and similar. For Agroecosystem, Provisioning services are centered and similar one to the other. Regulating ES responses are excentered and different one to the other. Cultural services are similar to Provisioning on the first axis but slightly different on the second.

Explanatory variables

Table 1.4 shows the results of 12 Partial Canonical Correspondance Analyses (Partial CCA) for the four elements of the environment and the three matrices of explanatory variables. For each element, the ES responses were analysed with the three matrices of explanatory variables, at every turn controlling the effect of the covariables.

It is possible to see that for each element, the agricultural matrix explains the highest part of the inertia (variance). For the water and forest, the sociological matrix comes second and for the Agroecosystem and Agricultural Field, the economic matrix comes second.

32,48% of the inertia of the water ES responses is explained by the three explanatory variables matrices. This means that all variables together explain

32% of the variance. Of this proportion, 9,8% is explained by the sociological variables, 9,45% by the economics variables and 12,89% by the agricultural variables. For the three other elements, agricultural variables are also the ones that explain the most the variance.

Table 1.4 – Percentage of the inertia explained by each matrix of explanatory variables controlling covariables

Element	Matrix	Percentage of inertia explained by the matrix
Water	Sociological	9,8
	Economic	9,45
	Agricultural	12,89
	Total	32,48
Forest	Sociological	8
	Economic	5,99
	Agricultural	9,87
	Total	25,96
Agroecosystem	Sociological	6,16
	Economic	8,43
	Agricultural	13,75
	Total	26,74
Traditional agriculture	Sociological	9,24
	Economic	10,1
	Agricultural	11,35
	Total	28,2

Table 1.5 shows the stepwise CCA analysis for all explanatory variables. Only the variables with $P \leq 0,05$ are included in the table. As can be seen, land tenure is the most important variable for three out of four elements. Employment Income and Origin are also present in three of the four analyses. Variables related to cattle breeding (Animal Index and Cattle Number) are important for the Water ES response matrix. Sociological variables are present in three out of four elements. Origin is significant for Water, Forest and Agricultural Fields. Education level is important in the perception of ES that come from the forest. Employment income is also an important variable in the analysis.

Table 1.5 – Results of the stepwise canonical correspondence analysis

Element	Matrix	Variable	Coefficient	P
Water	Economic	Land Tenure (No Title)	0,07	0,004
	Agricultural	Animal Index	0,05	0,02
	Economic	Employment Income	0,042	0,044
	Sociological	Origin	0,048	0,018
	Sociological	Duration of Residency	0,041	0,044
	Agricultural	Cattle Number	0,037	0,05
Forest	Economic	Land Tenure (Definitive Title)	0,068	0,004
	Sociological	Education Level	0,056	0,02
	Economic	Employment Income	0,051	0,04
	Sociological	Origin	0,045	0,05
	Sociological	Age	0,043	0,044
Agroecosystem	Economic	Land Tenure (Definitive Title)	0,04	0,03
Traditional agriculture	Economic	Employment Income	0,044	0,016
	Sociological	Origin	0,034	0,03
	Agricultural	Lot Size	0,034	0,03
	Economic	Principal Occupation	0,034	0,04

Discussion

Provisioning services

Provisioning ES constitute a central part of the responses in this study as well as in several other studies. Local provisioning services are the center of attention of many subsistence-living populations in developing countries. Provisioning services are the most cited by respondents for the four elements in our study.

This phenomenon indicates a strong attachment of those populations to their local environment. In fact, many studies show this reliance for provision of raw material, food, traditional medicines and energy (Iftekhar and Takama, 2008; Vilardy et al. 2011; Warren-Rhodes et al. 2011; Swinton et al. 2007; Zhen et al. 2010). Pereira et al. (2005) found that provisioning services are cited to be the most important ES for local populations.

The results of the correspondence analysis show that most of the time there is a pattern of response for provisioning ES. Respondents that cited at least one provisioning service are more likely to cite another provisioning ES. This is true for Traditional agriculture, Agroecosystem and Forest elements. Such a clear pattern of response is harder to see for the other types of ES. When respondents cited a Regulating, Cultural or Supporting ES, they were not as likely to cite another service from these categories.

Subsistence and traditional medicines

For many authors, material for subsistence is not only a provisioning service but also a cultural service. In fact, it is hard to fit it cleanly in a single category (Chan et al. 2012). The concept of subsistence is hard to define in itself. For Kostov and Lingard (2004), subsistence agriculture is the situation where there is a non-separability of production and consumption of agricultural products. Schumann and Macinko (2007) give a definition using the example of subsistence fisheries. that brings: “local, non-commercial fisheries, oriented not primarily for recreation but for the procurement of fish for consumption of the fishers, their families, and community”. Thereafter they give four more explanatory definitions, which are: 1- a level of existence that does not exceed a survival level; 2- an economy that does not include monetary exchange; 3- institutions that accord special social meanings to sharing and exchanges, and; 4- activities that do not have a strictly material motivation. Thus, there is also a cultural aspect in subsistence. This is why some authors categorize material for subsistence as a cultural ES as well as a provisioning one (Winthrop, 2014). Data in this study show the importance of subsistence as a Provisioning ES, but a part of it should also be categorized as a Cultural ES. In the same way, traditional medicines are not only provisioning ES. They also represent a cultural service, as they are important for social cohesion and knowledge related to them is often transmitted orally. For Winthrop (2014), the ES general framework is seldom appropriate for cultural services.

Regulating services

Regulating ES derived from the forest are important in this study. Perceptions of those services are mainly oriented to indirect use (water filtration, erosion protection, air purification...). Those indirect values are important in

developing countries (Aylward et Barbier, 1992), as they furnish essential services for the subsistence of local populations. While studying a transhumance community, Oteros-Rozas et al. (2013) found that regulating services are those considered the most important for wellbeing. This is true for forest but also for agroecosystems landscapes (Calvet-Mir et al. 2012). Among ES from agroecosystems, climate and ecological regulation were noted by many studies (Harrison et al. 2010; Zehnder et al, 2007; Nabuurs et al. 2008).

Swinton et al (2007) showed that even agricultural fields can provide regulating ES. They are important as they represent over 25% of the Earth's land area. The perceptions of regulating ES services from agriculture may either be positive or negative (also called disservices). Positive services are carbon sequestration, biodiversity conservation, in contrast to negative ones: water pollution, health risks and biodiversity loss.

In the study region, the slash-and-burn subsistence agriculture is predominant and this could be explained by the many provisioning services furnished by this practice. The main problem of this practice lies in the large number of disservices it creates. These disservices are most of the time Regulating ES and create health issues and loss of wellbeing for the local population (Roulet et al. 1998; 2000, Romana, 1999; Confalonieri, 2000; Swinton and Quiroz, 2003; Swinton et al. 2003).

Supporting services

The high presence of supporting ES in this perception study is surprising. In fact, while interviewing the local population, respondents were often able to describe the process behind each Provisioning or Regulating ES. A few

studies already exposed the importance of supporting ES for agroecosystem and traditional agriculture in order to protect the Provisioning and Regulating ES they furnish (Swinton et al., 2007; Zhang et al. 2007). In the same way, Ronnback et al. (2007) also saw a good understanding of how supporting ES are important to protect other type of services.

This finding shows that respondents have the intrinsic knowledge of the processes behind the generation of ecosystem services. This knowledge is important and valuable in the sense that local population understands to what extent it is important to protect the provision of ES.

Cultural services

Although cultural services are not often cited in this study (can be seen as “General appreciation”), they are still important and are often the most compelling reasons for conserving ecosystems. However, many barriers exist to their explicit characterization (Chan et al. 2012). This is explained by the fact that cultural services are hard to assess and intangible. For Chan et al. (2012), cultural services are principles-based, non-market-mediated, other-oriented, metaphysical and anthropocentric.

Intensively managed ecosystems are important for provisioning services, while semi-natural ecosystems (grasslands and mountains) are key for cultural services (Harrison et al. 2010). Wätzold et al. (2008) go further, showing that cultural ES (“Knowledge system” and “Sense of place”) are more important for local inhabitants than an endangered element of the environment, for example.

Land Tenure

Land tenure is a predominant variable in this study as it influences the responses of ES perceptions. The land tenure situation is complex and has constituted a hot topic in the region for many years. The study region is principally under the legalization of ("*assentamento*") land-tenure regime from the INCRA (National Institute for Colonization and Agrarian Reform). The legalization process asks for the occupant of the land to "regularise" his land tenure situation when occupying a public land. This process is often time and resources consuming and some respondents have not pursued it. This creates a situation where, in the same village, some families are registered landowners and others are not.

This situation is at the core of several economic and social behaviours in the region as well as in several developing countries (Iftekhar et Takama, 2008). It is a determining factor of livelihood and socio-economic status and it can also change the perception of the immediate environment (Iftekhar et Takama, 2008; Agbenyaga et al. 2009). The difference in perception among individuals could be explained by the uncertainty created by the problematic land-tenure situation in the region (Johnson et al. 2012).

Lack of status as a registered owner in the region can create an uncertainty feeling about the future for subsistence-living households. That feeling could impede future economic or social programs for being implemented in the region. A Payment for Ecosystem Services (PES) program is a good example of the extent of the uncertainty that could be created by a problematic land-tenure situation. Normally, ownership of the land is mandatory in many PES programs (Muradian et al. 2010). In order for the buyer and the service provider to agree on a payment, there should be no uncertainty linked to land tenure from one side or another (Wunder, 2001; Muradian et al. 2010).

Addressing this uncertainty feeling is critical to accurately assess trade-offs in land use (Johnson et al. 2012).

The results shown in this research are intrinsically linked to the land tenure situation. That means respondents who are also owners of their land tend to see a greater link between the environment and their health and well-being. This phenomenon is verified in many other studies, but at a more macroeconomic level as these studies assume that ownership of the land is given (Nelson et al. 2009; Muradian et al 2010). The land tenure appears as a determinant variable in all element of the environment analysed, except traditional agriculture.

Household income

Economic wealth is one of the underlying forces that Sagie et al (2013) point out as having a major influence on ES perception. Income deriving from a paid job is an important variable in the analysis. For three out of four elements of the environment, employment income is a significant variable. Like for land tenure, income stability has an impact on the perception of ES, economic uncertainty playing a critical role (Johnson et al. 2012).

Employment income (and other sources of income) is important to define the total wealth of an individual or a household. Sherr (2000) stresses the importance of total wealth in shaping resource use that may also modify the perceptions of ES. This could be explained by the fact that richer households can easily switch from one resource to another in order to ensure their subsistence and maintain their wealth. Furthermore, richer households are more able to absorb and mitigate environmental and economic risks and

shocks (Smith et al. 2000; Kolinjavadi et al. 2015). So, the dependency on natural resources and ES is lower as wealth increases.

Sodhi et al. (2010) have showed that in general, poorer people valued Forest ES more than richer. The results of this study tend to show otherwise for Regulating ES but similarly for Provisioning and Supporting ES. Poorer individuals place more value on Provisioning, Supporting and Cultural services than richer individuals. However, the latter tend to value Regulating ES more. This could be explained by the dependency on direct use of natural resources of the poorer households (Sagie et al., 2013). In the same way, Billard et al (2014) stressed out that in the Amazon, general income level is positively linked to deforestation on a regional level.

In this study, employment income stands out as prominent among all analyzed elements of the environment, to the exception of the agroecosystem. This means that richer households see a greater link between the environment and their health and well-being. It is important to note that only the sub-variable *Employment income* was statistically significant. That means that respondents who have a employment and income stability are able to better describe the link between the environment and their health and well-being. This can be explained by the fact that they normally are the people with greater education levels and that they have jobs that are linked to health (health agent) or education (teacher).

Baral and Heinen (2007) summed up the links between the dependency on natural resources in developing countries and the perceptions of ES. The

dependency is the result of reliance on untransformed natural resources for subsistence, energy and material. Meeting this dependency can take the form of hunting, extraction activities and reliance on natural water sources. This also can take the form of dependency on fertilisation that comes from burning the forest in order to pursue agricultural activities.

The poverty cycle that results from this dependency can be shown by the high migration rate in the region and by the economic boom-and-bust cycles. Rodrigues et al. (2009) showed that both the economic activity and the Human Development Index (HDI) of these regions follow a boom-and-bust cycle with the extent of deforestation. They indicated that the three components of the HDI (adult literacy, life expectancy and GDP per capita) follow the pattern, i.e. with deforestation, the HDI increases at the very beginning of the deforestation process, rapidly reaches a plateau, and then tends to decrease as deforestation becomes greater.

Origin of the respondents

In this study of ES perceptions, the origin of the respondent is the most important variable among sociological variables. Oestreicher et al. (2014) has also noticed this relation in our study region with respect to the link between origin and households' land-use decisions. She noticed a difference in the agricultural practices between settlers from the Northeast region of Brazil and those from the Pará state. In the present study, there is a difference between the perception of individuals from the state of Pará and from the Northeast region for the Forest and Agricultural Fields elements. Other origins do not have an influence on perceptions. This variation in the perception of the environment can be explained by the many differences between the North (mostly the Amazon region) and the Northeast regions of Brazil. The

Northeast is experiencing cyclical drought problems, problematic access to land for the poorest and an advanced degradation of primary and secondary forest lands (Oestreicher et al., 2014). The North region is characterised by large amounts of available land and the presence of a subsistence-living population as well as industrial farmers.

On the other hand, Oteros-Rozas et al. (2013) showed a difference in the ES perception between individuals with different origins at a more local level. They showed that perception could differ from one village to another in the same region, which is not the case in the present study. Sagie et al. (2013) noticed that even if people share the same environment, they could value services differently depending on their background culture. In their study, they consider ideology, tradition and origin as are determinant for culture.

Other sociological variables

The duration of residency could also be a determining variable in the perception of the environment. In this study, duration of residency only had an influence in the perception of the Water element. Sodhi et al. (2010) showed that people with longer length of residency valued the environment more in general, particularly Provisioning and Regulating services. For Mehta and Heinen (2001), this could be explained by the fact that longer length of residency is related to a better knowledge of the surrounding environment. In the case of this study, the duration of residency is linked to origin, as the majority of respondents from the Para state are born in the study region and respondents from other states are more recent immigrants.

Beyond these variables, socio-demographic variables can also have an impact on ES perception. Age and gender are cited by many studies as being

important factors for the perception of environment. In the present study, age was the only socio-demographic significant variable and this only for the Forest element. Ronnback et al. (2007) have noticed different perceptions of the environment for men and women and for different groups of age. They also pointed out that the principal occupation could act as a covariable in this relation. In the same way, Oteros-Rozas et al (2013) noticed a gender difference in the perception of ES. In their study, men tended to consider more ES related to cattle breeding while women typically perceived Regulating services as more valuable. Gender division of work and differentiated environmental awareness can explain such a difference in gender perception (Dietz et al. 2002; Reyes-Garcia et al. 2010). In the same study, Oteros-Rozas et al. (2013) showed that age also has an influence on the perception of the importance of ES for social wellbeing. For them, a confluence of three factors can explain this difference: 1- a change in preferences consonant with life experience, 2- an intergenerational change in values, and 3- a change in the ES delivered over time in one given environment.

Conclusion

Data arising from ES perceptions indicate that Provisioning services are values more cited in the region than Regulating, Cultural or Supporting services. This finding is consistent with the majority of ES perceptions studies in developing countries. As Pereira et al. (2005) noticed, people feel that provisioning services are the most important for their wellbeing. In the same way, Oteros-Rozas et al. (2013) pointed out that a subjective perception of general needs and preferences is apparent: respondents to their study gave higher values to provisioning services.

This study has shown the great importance of provisioning services in the local populations' perceptions of ES. Provisioning services account for 47 to 86% of the ES cited by respondents. Traditional agriculture and Agroecosystem are the elements where provisioning ES are most cited. Regulating services come second for Forest and Agroecosystem, while Supporting services come second for Water and Traditional agriculture elements. The Forest element presents the greatest inertia for the dispersion of responses. For the Agroecosystem and Traditional agriculture elements, there are two distinct groups between individuals who cited provisioning in one side, or regulating services on the other side.

The inclusion of explanatory variables showed the importance of agricultural and economic related variables. Land tenure situation is particularly important in the perception of the Water, Forest and Agroecosystem elements. Uncertainty created by an unregulated land tenure situation could explain the perception differences between individuals. Employment income is also important to explain the perceptions for three out of four elements studied here. The stability of income is an important factor, as it is also linked to

economic uncertainty. Previous studies showed an important dependency on ES in the study region. Some sociological variables are also important, such as the respondent's origin, duration of residency, age and gender. Those variables could also have an impact on the perception, to different extents.

Provisioning ES perception expresses the way that local population have to rely on the immediate environment (agriculture, extraction, water provision). The analysis of the results confirms the main hypothesis of this study that in the study region, there is a gap in the perception between Provisioning and Regulating ES.

Public policies in the region should focus on improving access to knowledge about sustainable agricultural in order to encourage more sustainable practices that could help protect Regulating, Cultural and Supporting ES in the region. These practices, such as agroecosystems that are not based on an open landscape, could help protect several Regulating ES. such as soil erosion protection, water filtration, biodiversity protection and climate regulation. Tremblay et al. (2015) indeed demonstrated that several alternatives agro-practices such as agroforestry systems and densified crops are economically viable in the study region. Policy-makers should consider this solution.

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**Chapter 2 - Social acceptance and opportunity costs required to
implement a Payment for Ecosystem Services (PES) program in
subsistence living communities in the Brazilian Amazon**

Social acceptance and opportunity costs required to implement a Payment for Ecosystem Services (PES) program in subsistence living communities in the Brazilian Amazon

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Abstract

Payments for Ecosystem services (PES) programs were imagined as a way to internalize the beneficial externalities of ecosystem services in the economic agents' decision. There is currently no national PES program in place in the Brazilian Amazon, even if the Brazilian territory covers over 60% of the Amazon rainforest. This paper aims at exploring the characteristics that would best allow the social acceptance of a hypothetical PES program designed to reduce deforestation in vulnerable communities of the mid-Tapajos region in the Brazilian Amazon. The opportunity costs of deforestation is use to determine the lower range of a hypothetical PES payment. Results show that there is social acceptance even if many respondents would prefer direct investment for the modernization of agricultural practices. An equal distribution of the payment transfer among households is preferred. Proportion of transfer in total income has a positive influence on social acceptance. Receiving a monetary compensation equivalent to the production of one hectare of crops in order not to deforest seems fair to the respondents. The opportunity cost for not deforesting to grow an annual crop varies from 216 to 962R\$ per hectare per year depending of the crop. To ensure the social acceptance of a PES program, policy-makers should focus on the opportunity cost linked to the avoided deforestation as well as the characteristics of such a program.

Keywords

Payments for Ecosystem Services (PES)

Social acceptance

Opportunity costs

Brazilian Amazon

Introduction

Payments for Ecosystem services (PES) programs are subject to increasing attention as they are recognized for bringing a variety of environmental and social benefits (Pagiola et al. 2005; Wunder 2005). Degradation of ecosystem services is increasing rapidly and public goods, such as ES, are difficult to valorize in the marketplace (Jenkins et al. 2010).

PES programs are defined as “a voluntary transactions where a well-defined ecosystem service is bought by a buyer (i.e. someone who is willing to pay for it), if and only if the provider secures the provision of such service” (Wunder, 2005). PES programs were imagined as a way to internalize the beneficial externalities of ES in the economic agents' decisions. An externality occurs when an agent is affected by a cost or a benefit it did not choose. As a consequence, beneficial externalities of many ES are not compensated and the service provider does not have an incentive to secure the provision (Schomers and Matzdorf, 2013). While difficult to implement this model in practice, “it may be convenient to define PES as a transfer of resources between social actors, which aims to create incentives to align individual and/or collective land use decisions with the social interest in the management of natural resources” (Muradian, et al. 2010, p.1205).

The majority of the PES follows the Pigouvian model within which the government is central in the payment scheme giving subsidy-like payments for the conservation of an ecosystem service (Schomers and Matzdorf, 2013). The Coasean model is utilized less frequently as it presumes the existence of well-defined property rights and no transaction costs. From that point, private owners can secure the supply of an ES if a buyer is interested. Pure Coasean PESs are hard to find, and they generally refer to cases where benefits are provided at a local scale (Schomers and Matzdorf, 2013).

PES in Brazil

Currently in Brazil there is no national level active PES program that aim to help maintain and develop traditional communities. However, there are currently some existing programs at the state or regional levels. the Forest Grant program (*Bolsa Floresta*, BF) in the state of Amazonas is claimed to be one of the biggest PES in the world, including more than 35 000 persons and 10 million hectares of land (Fundação Amazonas Sustentável). The program has four components: 1- BF Income: Support to sustainable production, 2- BF Social: Investment in health, education, transportation and communication, 3- BF Association: Strengthening local associations, 4 – BF Family: Involving families in reducing deforestation. Like any other PES or PES-like programs, BF is state-driven and aims to protect the environment, improve quality of life, and reduce poverty.

The Pro-Environment program (*Proambiente*) in Brazil was developed by civil society organizations in the Amazon region and was then transferred to the federal government (Schomers and Martzdorf, 2013). There were seven axes to this program: 1- reduction and avoidance of deforestation, 2 – carbon sequestration, 3- recuperation of ecosystem hydrological functions, 4- soil conservation, 5- preservation of biodiversity, 6- reduction of forest fires and 7- reduction of the loss of ES induced by agriculture. The program is still in search of financing sources and implementation procedures.

There are others compensation programs in Brazil that are active in the Amazon basin. They are destined to maintain conservation units, to large-scale farmer or to companies that do natural resources exploitation and want to compensate the damage to the environment (ICMS Ecológico,

Compensação Ambiental, Código Florestal, Imposto de Renda Ecológico) or are destined to regulate forestry activities. There are also programs destined to create or maintain conservation units where sustainable activities are permitted (Lei da Política Nacional de Recursos Hídricos, The Amazon protected areas programs). However, these last programs are not designed to maintain and help traditional communities in their environment, in contrast to Bolsa Floresta and Proambiente.

Likewise, there are other PES or PES-like programs in other Latin America countries, whether in the Amazon area or not. Most of these programs are specific to a region and an ES to protect (Grima et al. 2016). However, in the specific study region, there is no PES program in place.

Social acceptance and PES programs

Social acceptance is a concept where the collective acceptance is taken into account in opposition to the individual acceptance. The collective aspect of this concept can include many actors at different levels: stakeholders, interest group, communities etc. (Fortin and Fournis, 2015).

Social acceptance of PES programs is linked to its design, institutional arrangements, social participation in the development of the program and equity issues (Zammit 2013; Wustenhagen et al. 2007). Stakeholders participation and consultation are important but often not sufficient to ensure social acceptance.

Equity and efficiency concepts are at the heart of many debates between authors in the literature. A PES program can be efficient but a unfair distribution of the benefits and the costs can lead to a lack of social

acceptance by the stakeholders. There is interdependency between the concepts of efficiency and equity (Pascual et al. 2010).

According to Wustenhagen et al. (2007), there are three dimensions to social acceptance: socio-political, community and market acceptance. "Socio-political acceptance is social acceptance on the broadest, most general level." It is generally showed by the public acceptance or public opinion illustrated by polls. Community acceptance "refers to the specific acceptance (...) by local stakeholders, particularly residents and local authorities." (Wustenhagen et al. 2007). Market acceptance is linked to actors like consumers and investors and is less relevant to this study.

Institutions have a role to play in order to ensure social acceptance. By taking into account stakeholders expectations and perceptions, communities are more willing to accept a specific project or a policy change (Carcamo et al. 2014).

Corbera et al. (2009) define institutions as formal and informal rules that regulate what to do and not to do in a given situation. The governance structure and the institutional arrangements of PES programs are important in order to ensure equity and efficiency. There are three main aspects of governance: hierarchies, markets, and community management. The structures of the governance related to PES are: 1- the distribution of rights and the rules of coordination and interaction between agents, 2- the level of transaction costs, 3- the motivational aspects of PES and their implications (Vatn, 2010). Introducing a PES payments programs may be perceived differently depending on the institutions and the format used, as well as the perceived distinction people make between payment as an incentive or as compensation.

The complexity of establishing an institutional arrangement for a PES program comes from the fact that ES are often public goods or commons goods; i.e. they are non-excludable. Consequently, it is sometimes difficult to define who is the buyer and who is the service provider.

PES and opportunity costs

Getting the information about individual and collective opportunity costs is important in order to increase the efficiency of a PES scheme (Delacote et al. 2014). This information allows the calculation of what would be the lower range of a payment for a household. In order to change their economic behaviours to protect ES, households need at least to cover their opportunity cost of not doing the harmful activity.

Depending on the objectives that underlie the payment program (strictly environmental or environmental and development objectives), the opportunity cost for a household of abandoning or changing a productive activity is important to assess (Bulte et al. 2008). The access to information is crucial in calculating an agent's opportunity costs. A subsistence-farming household doesn't have the same opportunity cost of deforesting as an agri-business. There is an asymmetry of information between the policy maker and the agent regarding the real opportunity cost. Landowners use their private information as a source of market power, and policy makers want to maximize the provision of ES with the budget they have (Ferraro, 2008).

This paper aims to explore the social acceptance of a hypothetical PES program designed to reduce deforestation in vulnerable communities in the Brazilian Amazon. This paper also examines the opportunity costs of

deforestation in order to determine the lower range of a PES payment. Data were collected in four communities of the mid-Tapajós region in the state of Pará.

The choice of that region is relevant due to the increasing environmental pressure and problems linked to deforestation. The region has been an important development frontier since the 1970s, and it is characterized by endemic rural poverty (Fearnside 2005). The region does not have any PES in place, but a majority of the households are familiar with the Family Allowance program (*Bolsa Família*) which is a conditional cash transfer program like a PES.

For more than 15 years, the Tapajós region has been the host of collaborative research-to-action projects involving researchers and students from Canadian and Brazilian universities. These projects have allowed researchers to become well acquainted with communities in the region. The participation of these communities in various research projects developed and maintained confidence between the researchers and the community. This collaboration has made a major contribution to the validity of this and other projects.

This study is part of a broader research project (the Poor Land Use, Poor Health (PLUPH) project) that aims at studying two emergent health issues in small-scale farming populations of the Tapajos region: 1- mercury exposure through contaminated fish consumption and 2- transmission of Chagas disease. It has been demonstrated that these two health issues are related to environmental degradation. In the study region, this degradation is primarily due to slash-and-burn practices (Roulet et al. 1998; 2000, Romana, 1999).

Methodology

Sampling

Fieldwork was conducted in January to March, 2011, and January to March, 2012 in the four communities of São Tomé, Agrovila de Araipá, Nova Estrela and Vicinal da Batata. The first three communities are located in the municipality of Aveiro and the fourth is located in the municipality of Trairão. The first two communities are accessible by waterways while the last two are accessible by road. Agrovila de Araipá and São Tomé are about 50 km away (by waterways) from the main regional city of Itaituba. Nova Estrela and Vicinal da Batata are respectively 90km and 175km away (by road) from Itaituba.

During both sampling periods, every adult head-of-household (men and women) of the four communities were interviewed. The Valadão census (2009) was used to select the households except in Vicinal da Batata where a census was completed directly during fieldworks. The fieldwork technique used was primarily direct face-to-face surveys.

The process of data collection proceeded as follows: 1- Respondents were questioned about a series of socioeconomic variables, 2- Respondents were asked about their agricultural production and the size of their annual crop, and 3- Respondents were asked about their perception of PES programs.

Seven questions were asked to assess the perception of a hypothetical PES program, and then the responses were categorized using a thematic approach. The seven questions were: 1- What would be a way to reduce deforestation in the region? 2- Is a monetary transfer to families or

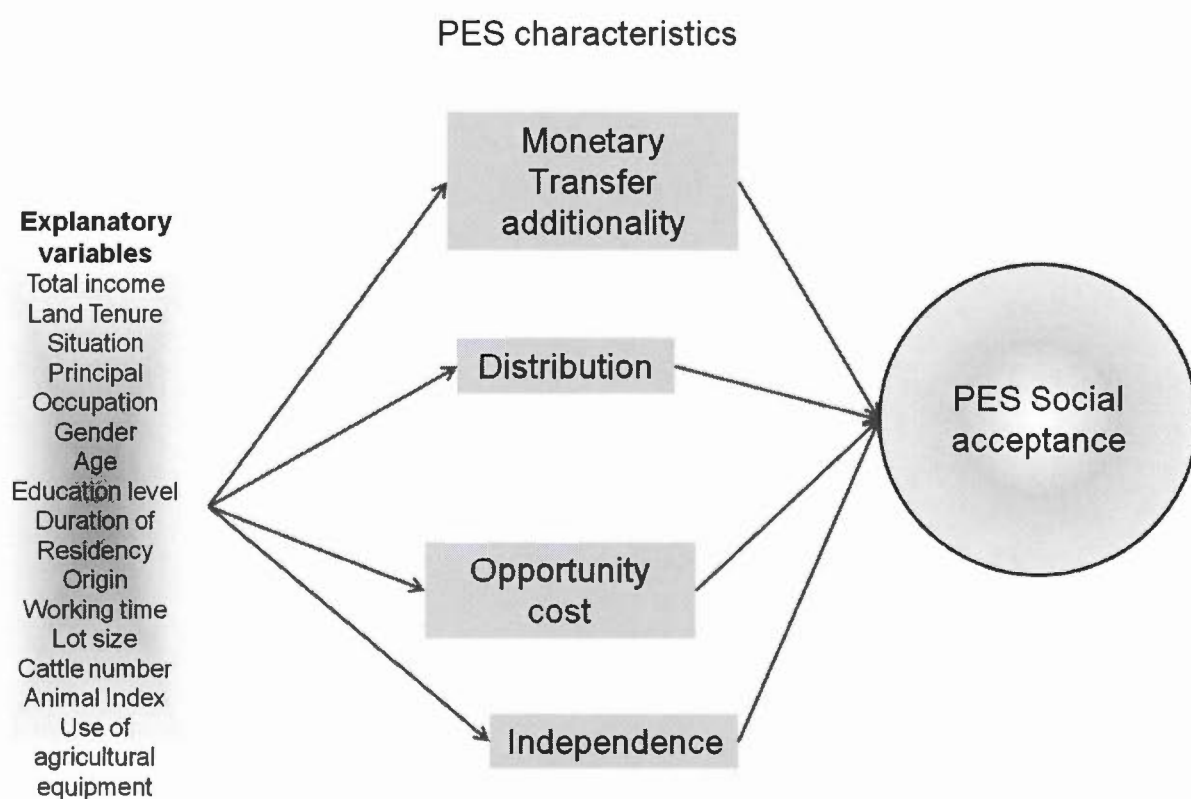
communities a good way to reduce deforestation in the region? 3- Why Yes? Why No?, 4- Are there other possible effects of a monetary transfer to families or communities? 5- What is the best way to allocate a monetary transfer destined to the community (A- Equally between households, B- Proportional to the efforts of conservation, C- Benefiting the poorest households first). 6- In order not to deforest an extra area, is it just to receive the equivalent of the revenue that would be earned from a crop on that area? 7- Is it better to be independent? This conditional aspects in the questions used is due to the fact that there is no PES program in the study region.

Opportunity cost

The calculation of opportunity cost to not deforest is based on the market and subsistence values of the crop that was not produced. This value includes labour and inputs (seeds, tools). However, it does not include land value as it is difficult to evaluate in the study region as there are not many land transactions. Normally, a parcel of land is given away by the state or is regularized once the person asks for it after a certain period of occupation. Labour is calculated using the daily wage in effect at that time (25BRL). To get access to these information, respondents were asked about a variety of agronomic variables (see Annex 1).

Figure 2.1 shows how the PES characteristics variables influence the social acceptance of that PES. These characteristics were selected according to the literature. Moreover, it also shows the explanatory variables that can have an impact on the social acceptance by modifying the perception of the PES characteristics.

Figure 2.1 – Conceptual framework and variables



Data analysis

After consolidation and screening of data, 139 individuals were kept in the analysis, out of a possible 149 individuals, for data regarding perception of PES programs. For the annual production, selling price and the size of annual crops, data is available for 31 households for cassava, 23 for beans, 34 for rice and 31 for corn. Using CANOCO for Windows, a correspondence

analysis (CA) was performed on the data of the questions 1, 3 and 4. This was undertaken to detect the similarities of responses inside each question and between questions. Then a Canonical Correspondence Analysis (CCA) was performed on these questions as well using the socioeconomic variables. A stepwise permutation test enabled retention in the analysis of the most significant variables. A contingency analysis using JMP for Windows was performed on questions 2, 5 and 6 with every single variable.

Results

Distribution of responses

Table 2.1 shows the distribution of responses given for the perception of a hypothetical PES program to be implemented in the study region.

Table 2.1 – Distribution of the responses regarding perception of PES programs

	Number	Percentage
Responses		
Incentive Program		
Monetary Transfer	39	19.40
Jobs	43	21.39
Limit Big Landowners	9	4.48
Mechanization	22	10.95
Regulation	14	6.97
Gov. Services	10	4.98
Infrastructures	13	6.47
Family Agric. Incentives	28	13.93
Nothing	23	11.44
Total number of responses	201	100.00
Total number of respondents	139	100

Response/Respondent		
Mean	1.4	
Monetary transfer?		
Yes	119	85.61
No	20	14.39
Total	139	100
Why?		
Yes		
Less Agric	58	39.19
Limit Large Landowners	10	6.76
Less Agric. Dependency	47	31.76
No		
Need Land Resources	19	12.84
Independence	6	4.05
More Agric	4	2.70
Laziness	4	2.70
Total number of responses	148	100
Total number of respondents	139	100
Response/Respondent		
Mean	1.06	
Other Effects		
More Food	36	17.22
Revenue Effect	10	4.78
Study	20	9.57
Less Agric	10	4.78
Migration	3	1.44
Health	17	8.13
Financial Security	31	14.83
Rest	27	12.92
Infrastructures	10	4.78
Investment in Agric	25	11.96
Nothing	20	9.57

Total number of responses	209	100
Total number of respondents	139	100
Response/Respondent Mean	1.5	

Distribution of the transfer		
Equally	65	46.76
Proportional to Effort	22	15.83
Pro Poor	52	37.41

Total number of responses	139	100.00
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Just to receive equivalent of 1ha?

Yes	96	69.06
No	43	30.94

Total number of responses	139	100
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Better to be Independent?

Yes	30	21.58
No	72	51.80
Don't know	37	26.62

Total number of responses	139	100
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Incentive program

Regarding an incentive program that would be a good way to reduce deforestation in the region, 21% of the respondents said that job creation could reduce it. The second most cited response is a monetary transfer program (19%), then incentive programs for sustainable family agriculture (technical support) at 14%. Mechanization of agriculture comes after at 11%, while another 11% consider that there is nothing to do to reduce the

deforestation in the region. Regarding mechanization, it is important to mention that this was a spontaneous response from respondents and was not suggested in any form by the interviewers, like all categories of responses.

Monetary transfer

86% of the respondents think that a program of monetary transfer would be a good way to reduce the deforestation in the region. 39% of the respondents think that it would reduce agriculture activities in the region while 32% think that it would help reduce the dependency of people on subsistence agriculture. Limiting large landowners was also cited. On the other side, 13% of the respondents think that a monetary transfer is not a good way to reduce deforestation in the region because families need the access to land resources, and 4% value their independence from the government.

Other Effects

Asking respondents about other effects of a monetary transfer, 209 responses were collected, for a mean of response per respondent of 1.5. An additional quantity of food was the most cited response by 17% of the responses. Increased financial security was the second most cited response (15%). Having a rest from the hard work comes next with 13%. Then an increased investment in agricultural activities and more time to study at 12% and 9.5% respectively. A non-negligible proportion of 10% of the respondents think there is no other effect of a monetary transfer.

Distribution of the transfer

Regarding the form that a PES program could have in the region, respondents were asked about their preferred form of distribution for the money transfer. 47% of the respondents said that an equal distribution among the households would be the best. 37% of them preferred to have the money first destined to the poorest households. Only 16% of the respondents mentioned that it would be better to distribute the money in terms of the efforts made for environmental conservation.

With regard to receiving the equivalent in cash of the value of their crops, 69% of the respondents think that would be just. While 52% of the respondents think that it is not better to be independent from the government in this regard, 21% of the respondents said that they would prefer to stay independent, and 27% do not have a position on this question.

Including explanatory variables

Integrating explanatory variables in the analysis, Table 2.2 shows the results of the Canonical Correspondence analysis (CCA). Table 2.3 shows the results of the Contingency analysis. Only the variables with $P < 0.05$ are shown in the tables.

Table 2.2 – Results of the Canonical Correspondence Analysis (CCA)

Question	Variable	Coefficient	<i>P</i>
Incentive Program			
	Land Tenure (Definitive Title)	0.13	0.002
	Gender	0.0639	0.06
Why Monetary Transfer			
	Time of Residency	0.12	0.006
	Land Tenure (Definitive Title)	0.03	0.04
	Land Tenure (Procuration)	0.08	0.05
	Land Tenure (Declaration)	0.06	0.06
Other Effects			
	Time of Residency	0.11	0.02
	Land Tenure (Declaration)	0.09	0.03

Table 2.3 – Results of the Contingency Analysis

Question	Variable	Coefficient	P
Incentive program			
Nothing	Gender (F)	+6.719	0.0095
	Gender (M)	-6.719	0.0095
Monetary transfer	-		
Jobs	-		
Limit Large Landowners	Animal Index	-5.9	0.02
	Land Tenure (Definitive)	+10.2	0.0014
Mechanization	Gender (F)	-7.945	0.0048
	Gender (M)	+7.945	0.0048
	Land Tenure (Definitive)	-8.325	0.0039
	Origin (South-Centre West)	-4.343	0.0372
Regulation	Total Income	-3.9	0.0481
	Number of Cattle	-4.94	0.0262
	Animal Index	-4.55	0.0329
	Land Tenure (Definitive)	+6.494	0.0108
Gvt. Services	Land Tenure (Declaration)	+4.7	0.0302
Infrastructures	Land Tenure (Declaration)	-4.028	0.0447
Family Agric. Incentives	Gender (F)	-4.375	0.0365
	Gender (M)	+4.375	0.0365
Why monetary transfer?			
Yes			
Less Agric.	Land Tenure (Declaration)	+16.91	0.0001
	Land Tenure (Procuration)	-10.164	0.0014
Limit Large Landowners	Land Tenure (Definitive)	+7.376	0.0066
Less Agric. Dependency	Time of Residency	+4.33	0.0374
	Land Tenure (No Title)	-5.402	0.0201
	Land Tenure (Procuration)	+4.335	0.0373
	Origin (Para)	-5.057	0.0245
	Origin (Northeast)	+4.712	0.0299
No			
Need Land	-		

Resources			
Independence	Age	+4.17	0.0411
	Animal Index	-5.37	0.0205
	Land Tenure (Procuration)	+4.189	0.0407
More Agric.	Age	+9.62	0.0019
Laziness	Income from Transfer	+5.95	0.0147
	Time of Residency	-13.23	0.0003
Other effects			
More Food	Land Tenure (No Title)	+4.749	0.0293
Revenue Effect	Land Tenure (Definitive)	+7.376	0.0066
Study	Land Tenure (Declaration)	+4.369	0.0366
Less Agric.	-		
Migration	Time of Residency	-8.65	0.0033
Health	-		
Financial Security	-		
Rest	Land Property	+6.904	0.0086
Infrastructures	Land Tenure (No Title)	+3.706	0.05
Investment in			
Agric.	Age	-3.97	0.0464
Nothing	-		
Distribution			
Equally			
	Age	+11.49	0.0007
	Time of Residency	+6.03	0.01
	Land Tenure (No Title)	-4.14	0.04
	Land Tenure (Declaration)	+4.2	0.04
Proportional to Effort			
	Land Property	+5.5	0.02
	Time of Residency	-6.9	0.008
Pro Poor	Age	-6.85	0.0088
	Land Tenure (No Title)	+10.25	0.0014
	Land Tenure (Occupation Title)	-3.89	0.0486
	Land Tenure (Declaration)	-12.3	0.0005

**Just equivalent of
1ha?**

	-	-	-
Better to be Independent?			
Yes	Animal Index	-6.55	0.0105
	Number of Cattle	-4.14	0.0419
No	Origin (Para)	-5.99	0.0143
	Origin (NorthEast)	+5.942	0.0148
Don't know	Animal Index	+13.47	0.0002
	Number of Cattle	+12.1	0.0005
	Land Size	8.93	0.0028
	Origin (Para)	6.97	0.0083
	Gender (F)	4.73	0.0297
	Gender (M)	4.73	0.0297
	Origin (NorthEast)	4.493	0.034

With respect to incentive programs, two variables were significant in the CCA: land tenure (definitive title) and gender. The same results appear in the contingency analysis as land tenure and gender explain several variables. Regarding gender, it is possible to see that men think that mechanization and incentive to family agriculture are a good way to limit deforestation in the region. Women are more likely to say that there is nothing to do to limit deforestation in the region. The land tenure situation had a significant influence on the answers of the respondents. Respondents with definitive land tenure title are more likely to answer that limiting large landowners is a good way to reduce deforestation, but not mechanization of the agriculture. They are more comfortable with the regulation measures. People originating from the South and Centre-West regions of Brazil are less likely to cite mechanization as a way to reduce deforestation. Respondents with a larger

number of cattle are less likely to cite regulation measures to reduce deforestation.

Land tenure is also an important variable to consider in addressing why a monetary transfer can reduce deforestation. In addition, the origin of the respondent is important for those who cited that a monetary transfer is good as it reduces reliance on agriculture.

Older respondents are more likely to say that a monetary transfer is not a good idea as they value their independence and think that the result of a monetary transfer can be more agricultural production. Respondents that cited "laziness" have a higher income proportion from transfer but a lower time of residency in the community. Land property and land tenure are significant variables influencing responses regarding other effects of a monetary transfer.

Similarly, land tenure is important to understand the responses for the distributional aspect of a monetary transfer program. Respondents without property title are more likely to say that a pro-poor distribution scheme would be better for the community. Conversely, respondents with a property title are more likely to say that an equal distribution among households of the community would be better. Age is also a significant variable, as older respondents are more likely to say that an equal distribution between households would be better.

Regarding the question on being independent from the government, it is hard to find relevant variables. Respondents from the NorthEast region of Brazil do not prefer to be independent while respondents from the Pará state prefer to be independent.

Opportunity costs of land use

Table 2.4 – Annual production value of one hectare of Cassava, Beans, Rice and Corn (BRL)

	N	Mean	Median	Std.Dev
Cassava	31	962	887	516
Beans	23	216	200	144
Rice	34	953	815	494
Corn	31	253	250	145

Table 2.4 shows the average annual production value of each traditional culture in the study region. These values represent the average income for each type of production, and they can be interpreted as the minimum socially acceptable amount for a monetary transfer. Cassava and Rice represent the highest values. Cassava is highly productive despite a volatile price. Rice has both a good productivity and an attractive price. Beans and Corn have lower per hectare values. Beans have a good price but productivity is low in the region while corn has a low price all year. N in Table 2.4 represents the number of households where full information was available in order to calculate the annual production values.

These values serve as a base to the estimation of a minimal payment that would be socially acceptable by local population in order to limit deforestation on their land. Since values are not equal within each other, it would be preferable to establish a payment using an average value since it would be difficult to follow the cycle of plantations over several years for each household.

Discussion

Incentive program and monetary transfer

This study shows that in order to reduce deforestation in the region, a new cash transfer program could represent a powerful incentive. Job creation, monetary transfer and limiting large landowners are the most cited responses. Economic diversification could help achieve these goals by putting forward other activities or by investing in family-scale sustainable agriculture (Toniolo and Uhl, 1995).

In fact, respondents are more concerned by developing and supporting the region than by protecting the environmental and benefiting from ecosystem services. In that sense, a new PES program in the region is really seen as a pro-poor, pro-development tool.

Results also pointed out that a majority of the local population would accept a monetary transfer program in order to reduce their agricultural activities. In the same way, that monetary transfer is perceived more as a development tool to cover the opportunity cost of not deforesting than a PES as such.

Distribution

Regarding equity and distribution, this study showed that the local population is more willing to accept an equal distribution between households of a monetary transfer. This underscores that the developmental aspect of the money transfer is important for the local population. Pascual et al. (2010) pointed out the importance of equity in the distribution schemes of PES. They

stressed the fact that there is a fine equilibrium between equity and efficiency and that it is important to clarify the role of the different actors in a PES.

In the same way, they underlined the fact that several PES are designed as “pro-poor” and they wonder whether the poor stakeholders can adequately play the role of environmental services providers. That question is relevant in the context of this study as a good fraction of the local population is vulnerable being affected by poverty.

Hausknot et al. (2017) even claimed that PES can be a political project as such and can offer an analytical tool for investigating power relations. This analysis can also be applied to the study region as policies are often leveraged in time of elections and are exploited in order to achieve political projects (Hausknot et al. 2017).

Land tenure

This study shows that land tenure is an important variable regarding the perception of a PES in the region. Vatn (2010) stressed that the lack of a property title increases uncertainty for ecosystem services buyers, and it can impede the implementation of a PES in a region. Vatn (2010) also pointed out that the land tenure situation could have an impact on poor households as it may create an obstacle to participation. The present study tends to confirm that respondents without property title are more likely to say that a pro-poor distribution scheme would be better for the community. Conversely, respondents with a property title are more likely to say that an equal distribution scheme would be better.

For ES to become commodities, two criteria ought to be met: they need to be owned (individually or commonly) with the right to trade them, and they need

to have well defined boundaries (Vatn, 2010; Kosoy and Corbera, 2010). The question of boundaries is fundamental and also limiting for the effective implementation of a PES program.

In that sense, different patterns of property rights could lead to different patterns of behaviour because in the PES mechanism, property rights help to clearly define who holds the respective right over ecosystem services (Fauzi and Anna, 2013). This could be problematic in many regions in Brazil, especially in the Amazon where property rights are not always well defined and are often contested. This problem can be avoided by using a proper institutional arrangement such as a farmer's association responsible for the management of the PES locally. In the study communities, there are different property titles with different rights and obligations. There are also many lands formerly occupied, but without proper title or exhibiting many different property claims. However, it is possible to include amongst PES land users those who are not necessarily landowners by providing alternative income opportunities to local people (Veronesi et al. 2015).

Social performance and Transaction costs

When designing a PES program, it is important to take into consideration the social performance attached to the program. Beyond the environmental objectives that underlie the whole program, there is a social effect, particularly in developing countries. Those social impacts are often expressed in terms of quality of distribution between groups and within groups as well as the increase in the general wealth of households (Legrand et al. 2013). In fact, PES tend to exclude small landowners unless there is a local or regional organization that can help maintain a certain equity. This phenomenon is due to transaction costs and information access where large landowners are more

likely to be able to overcome those difficulties. This situation exists in the study region, where access to services is hard for the poorest. In that case, Bosselmann and Lund (2013) argued that the presence of an intermediary institution can increase the inclusion of small landowners by overcoming those difficulties. Legrand et al. (2013) stated that to enhance value-added and social performance of a PES program, it is better for the PES to be coupled with regulation measures to ensure environmental protection as well as social development. This situation can partly explain why in the responses of this study there is an emphasis on the importance of developing the infrastructures. For respondents, it is at least as important to create jobs and to encourage mechanization of agriculture than to implement a PES program.

In addition to social performance, transaction costs are important to take into account when designing a PES program. They are a significant component of most PES schemes. Jindal and Kerr (2007) found that transaction costs in a PES could range from 6% to 45% of the total PES costs. They can be defined as the costs of establishing and protecting property rights and the costs to get access to the resources and services offered by the PES (Fauzi and Anna, 2013). When property rights are not clearly defined, that can create an increased pressure on transaction costs because of the multiple claims and the difficulty to quantify, control and monitor the provision of ES (Sattler et al. 2013).

Moreover, in the study region, access to services like banking and public service is difficult. In order for people from small communities to get access to these services, they often have to commute into larger settlements or cities. By doing so, they often lose one or several working days monthly and they have to pay for transportation to and from the city (Tremblay, 2010).

Clements et al. (2010) compared several PES experiences in regard to their institutional arrangements, the distribution of costs and benefits and the environmental results observed. They found that the individual contract is the simplest, presents the lowest administrative cost, and, at the same time, reaches the environmental objective. However, the lack of a local organization fails to build an understanding of the environmental goals. On the other hand, PES that were managed by a local organization were more effective in garnering local support and developing an understanding of the environmental objective. A PES that includes a local organization is probably the most sustainable in the long run. Clements et al. (2010) conclude that strong institutions are harder and more expensive to build, but they can be guarantors of the efficiency, equity and sustainability of a PES program. Regarding the transaction costs in the study region, a strong local organization is essential in order for a PES to be liveable. The transaction costs being prohibitive, it is important that remote area is included in the program development and that proper institutions are implemented.

This study showed that in the Tapajos River region, respondents were interested in a potential PES program. They are aware that there is a conditionality attached to a PES program and that it implies an important investment in the region. However, it is important to note that there is a non-negligible proportion of the respondents (51.8%) that said they would prefer to be independent from the government or any assistance program.

Opportunity cost

Consideration of the opportunity costs of avoiding deforestation is important to determine the amount of the payment in a PES. In the study region, new deforestation is essentially caused by slash-and-burn agricultural practices (Fioravanti, 2008). So, the annual opportunity cost for a household of not deforesting is represented by the annual value of the avoided production. This study calculated the mean and median production values for four common crops in the region, and it considered those values as a minimum compensation payment in order for households not to deforest for agricultural purposes. According to Delacote et al. (2014), access to information is crucial in order to determine the opportunity cost for different actors. Then a minimal compensation amount can be set for a PES program. In the study's communities, 20% to 30% of household income comes from agricultural production.

Calculated values for the opportunity costs of avoided production differ from one crop to the other (Table 2.4). This can be explained by the different productivity of one hectare of each crop as well as the market price. Generally in the region, cassava and rice have a better value than corn and beans for the same area. This underpins that policy-makers should adapt the program and the amount paid in relation to the regional characteristics (Delacote, 2014).

Even if opportunity cost is not always sufficient to evaluate the amount of the payment needed (Gregersen et al. 2010), it gives an interesting estimation of the minimum payment required to meet the expectations of the local populations. Gregersen et al. (2010) stated that in some case, the opportunity cost is a good measure of what it costs to society to reduce deforestation in a

particular area. They claimed that in place where removal of forest is permitted by law and where property rights are well defined, opportunity cost is a good measure. In the study communities, depending on the state of the property and the property title, the owner of the land can or can not be authorized to deforest.

Conclusion

This study showed that there is a social acceptance of a potential PES program in the study communities. The characteristics of the program should include an equal distribution between households whilst ensuring a minimum social and economic development. Other solutions that involve an investment in the region to prevent deforestation were also cited by respondents: job creation, mechanization of agriculture and technical help for family agriculture.

The general result of this study is that households are ready to limit deforestating for agriculture as soon as they are compensated for their production losses, with a payment or with another form of investment. Nevertheless, a non-negligible proportion of households would prefer to keep their independence, especially from the government. The minimum compensation of not deforesting a hectare was calculated in this study as the opportunity cost of avoided agricultural production for small farming households. This opportunity cost is the annual market value of the crop and is a key to the social acceptance of a payment program. This helps establish a minimum compensation in the eventuality of the creation of a PES program in the region.

The results of this study also suggest that investment in rural economic diversification could be a way to avoid deforestation if alternatives to slash and burn practices are adapted to the context in which live communities. Land tenure situation of households is important in this context as it plays an important role for the social acceptance of a PES program.

In order to ensure the success of a PES program in the region, policy-makers should focus on the opportunity costs of avoided deforestation. They should also focus on land tenure conditions and transaction costs that can have an influence on the perception of a PES program. This would permit to ensure a social acceptance of a PES and increase the chances that the PES responds to the value-added and social performance criteria.

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CHAPTER 3 - Adverse environmental effects of cash transfer programs: the case of the Family Allowance Program (*Bolsa Familia*) and retirement pension in the Brazilian Amazon

Adverse environmental effects of cash transfer programs: the case of the Family Allowance Program (*Bolsa Família*) and retirement pension in the Brazilian Amazon

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Abstract

Cash Transfer programs are designed to achieve various environmental and social objectives. Conditional Cash Transfer (CCT) is based on conditionality to promote a change toward a certain desired behaviour and they experience an increasing popularity around the world. The family allowance program in Brazil (*Bolsa Familia*) is the most important CCT program in Latin America. It increases the general wealth of poor households along with other social assistance programs. In the same way, Unconditional Cash Transfer programs, such as the retirement pension program in Brazil are designed for poverty alleviation and social welfare. Through an income-effect, undesired behaviour may occur within those conditional and unconditional programs and have an impact on the environment. This study assessed this income-effect using six themes: Forest extractivism, agricultural production, livestock production, transportation, migration and other effects. Results show that this income-effect exists for agricultural and livestock production as well as transportation. This income-effect creates a change in behaviour of several households while these changes may have an impact on the landscape. Variables increasing this income-effect are the total family income, the proportion of family income attributable to cash transfers and the time of residency. Taking into account the transferred amount and its effect on the household budget is crucial to understand the side effects of cash transfer programs.

Keyword

Cash Transfer Program

Bolsa Familia

Environmental Impacts

Brazilian Amazon

Introduction

Cash Transfer (CT) programs are now recognized as a way to achieve various objectives in developing countries. They are a way to redistribute wealth among the poorest and to promote a minimum investment in human capital (Rodriguez et al. 2011).

Conditional Cash Transfer (CCT) and Unconditional Cash Transfer (UCT) are similar in their functioning: they are targeted to a number of selected payment receptors and a payment amount is transferred. However, for CCT payment receptors must comply with a set of conditionalities (Rodriguez et al. 2011). Some authors even say that CCT and UCT are equivalent except in their final objectives (Zilberman et al. 2008).

In 2008, 29 developing countries (mainly in Latin America) had at least one CCT program in place, with many more planned (Persson and Alpizar, 2013; Fiszbein and Schady, 2009).

UCT programs are also growing in many developing countries around the world. Those proposals have varying objectives, including poverty alleviation and environmental protection. They can take the form of guaranteed minimum incomes, child benefits or retirement pensions (Cavalcanti and Correa, 2014; Angelucci, 2012; Slater, 2011).

CCT and Bolsa Familia

Conditional Cash Transfers provide money to poor families on condition that they make investments in human capital such as sending children to school or bringing them to health centres on a regular basis (Rawlings 2005).

CCT has many individual and collective benefits in the regions where it is implemented. It can significantly improve health as it helps to increase the use of health prevention services and to gain access to healthcare (Ranganathan and Lagarde, 2012). It reduces child mortality and malnutrition as well as diarrheal and respiratory infections (Rasella et al. 2013). CCT is also recognized as a way to increase food security and diversity (Miller et al., 2011).

The main objective of CCT is to obtain a change in a specific behaviour in return for a monetary contribution. This conditionality is at the core of these programs and is crucial for the assessment of the desired and non-desired effects of a program (Engel et al. 2008).

The Brazilian Family Allowance program (Bolsa familia) (BF) is one the largest CCT programs of Latin America. It was created in 2003 by integrating four existing cash transfer programs destined to poor households of the country. The main objectives of the program are: to strengthen access to public services, particularly to education, health care, and social assistance; to fight hunger and to promote nutritional and food security; to enhance the ability of families to overcome vulnerability and poverty; to fight poverty; and to promote integration, complementarity and synergy of social policies (Simoes and Sabates. 2014).

Cash transfer varies according to the family's level of income and the number of eligible family members (usually children and expectant or breast-feeding mother). The BF has the particularity that the amount is paid to female heads-of-household at first. The payment varies from R\$ 70 to R\$ 236 monthly (with an average of R\$ 152). Conditions of eligibility for the program are: children

below seven years of age have to be vaccinated and have frequent visits to health care centres, pregnant women between 14 and 44 years of age are required to attend pre and post-natal care visits, a minimum attendance rate of 85% at school is required for children aged 6 to 15, and 75% for youths aged 16 and 17 (Lindert et al. 2007). These conditions are monitored by the health care centre or by the school responsible for the region. Public transfers in Brazil have accounted for the main source of non-work income in the past few years (Foguel and Ulyssea. 2007). Bolsa Familia specifically has a positive impact on the reduction of income inequality and poverty in Brazil (Cury et al. 2009).

The Brazil's retirement pension program was created to ensure quality of life of the beneficiary who has reach the age considerer as a social risk. This age is 65 for men and 60 for women in urban areas and 60 for men and 55 for women in rural area. The beneficiary receive the minimum wage decreed by the federal government (622R\$ per month at the moment of the study and 788R\$ per month in 2015). The beneficiary only have to show a proof of age and a proof of rural activities, for rural workers.

Income effect

The link between income or wealth and the environment is well established in the literature, at least at a macroeconomic level. Some studies showed that there is a positive relation between the income level and environmental quality and concerns (Knight and Messer, 2012; Dunlap and York 2008; Ekins, 1997). This relationship, also known as the Environmental Kuznets Curve (EKC), has however been questioned, especially in developing countries and subsistence context.

In fact, in certain situation, low-income households have a greater concern about environmental degradation and the risks it can bring. As the material insecurity increases, the perception of the danger of environmental degradation increases too (Lo, 2014). That is not necessarily the case with richer households as they have a stronger financial and social safety net to protect themselves against environmental degradation (Lo, 2014).

At a microeconomic level, there is less evidence that this link exists. However, Billard et al. (2014) showed that there is a link between socioeconomic conditions of small-scale farmers in the Amazon and the impact of their activities on the landscape.

Through the analysis of the income effect, this paper aims to analyse the on-field secondary effects of the social welfare programs (Family allowance program and retirement pension) in four communities of the mid-Tapajos region. Six themes were analysed in order to understand the changes in the economic behaviour of the households under these CCT and UCT programs: forest extractivism, agricultural production, livestock production, transportation, willingness to migrate and other impacts. The study also analysed changes in behaviour in regard to socioeconomic variables in order to see if there is a pattern of responses among individuals in the study region. We analyze the income-effect related to the cash transfer to determine the possible adverse impacts of that cash transfer on the landscape. The main assumption of this study is that the change in behaviour is positively correlated with the amount allocated.

Material and Methods

Study site

This study was conducted in four communities of the mid-Tapajos region in the Brazilian Amazon. Data were collected in the communities of São Tomé, Agrovila de Araipá, Nova Estrela and Vicinal da Batata. The first three are located in the municipality of Aveiro, and the fourth is located in the municipality of Trairão. The first two are accessible by waterways while the last two are accessible by road. Agrovila de Araipá and São Tomé are about 50 km away (by waterways) from the main regional city of Itaituba. Nova Estrela and Vicinal da Batata are respectively 90 km and 175 km away (by road) from Itaituba.

The choice of the Tapajos region is relevant due to the high subscription rate to the BF program in the region. The region is also characterized by endemic rural poverty. Between 1980 and 2013, the population of the municipality of Aveiro, within which three study communities are located, doubled from 7.700 to 16.000 (IBGE. 2013). The majority of this population relies on subsistence agriculture (Farella 2005). In the municipality of Trairão, the population doubled from 1990 to 2013 to reach a little more than 17.500 persons. In terms of wealth, in 2011 the municipality of Aveiro had a GDP per capita of R\$3.388; while the GDP per capita was R\$11.493 for the Pará state and R\$21.535 for Brazil. In the municipality of Trairão, the GDP per capita in 2011 was R\$5.349 (IBGE. 2011).

This study is part of a broader research project (the Poor Land Use, Poor Health (PLUPH) project) that aims at studying two emergent health issues in small-scale farming populations of the Tapajos region: mercury exposure

through contaminated fish consumption and transmission of Chagas disease. It has been demonstrated that these two health issues are related to environmental degradation. In the study region, this degradation is primarily due to slash-and-burn practices (Roulet et al. 1998; 2000. Romana. 1999).

Sampling

Fieldwork was conducted in January-February 2011 and January to March 2012. During both periods, every adult head-of-household (men and women) of the four communities was interviewed. The census for the communities of São Tomé, Agrovila de Araipá and Nova Estrela undertaken by Valadão (2009) was used for those communities. The census for the community of Vicinal da Batata was realized during these fieldworks. Techniques used entailed semi-structured interviews and direct face-to-face surveys.

The process of data collection proceeded as follows: 1- Respondents were asked about a series of socioeconomic variables, and 2- Using a semi-structured interview approach, respondents were questioned about how their economic behaviours changed in each presented category since they received the Family allowance program and/or the retirement pension. Spontaneous responses and those given after a discussion were both considered. Responses were then categorized, using a thematic approach.

The six themes to be analysed were: forest extractivism, agricultural production, livestock production, transportation, willingness to migrate and other. The themes can be further described as follows: 1- Forest extractivism: changes in the necessity to rely on forest products. 2- Agricultural production: changes in inputs or outputs of agricultural production. 3- Livestock production: changes in inputs or outputs of livestock production. 4-

Transportation: changes or improvement in means of transportation. 5- Willingness to migrate: Increase or decrease in the willingness to leave the community. 6- Others: Financial effects: influence on the state of the household's general budget situation. Consumer goods: Access to material for the improvement of the household's house.

In this study we consider the Family Allowance and the retirement pension programs in order to include more households in the analysis as well as to ensure a variance in the transfers, since retirement pension transfers are higher than the Family Allowance transfers. The difference between the two transfers is considered in the statistical analysis.

Figure 3.1 shows how the conceptual model for this study was built. The income effect is at the heart of the model. This income effect can have an impact on six chosen elements of the life of the population under study. These elements were selected according to the literature. Several explanatory variables can modulate the income effect and then have a greater or a smaller effect on the decision making process of the person.

Figure 3.1 : Conceptual framework and variables

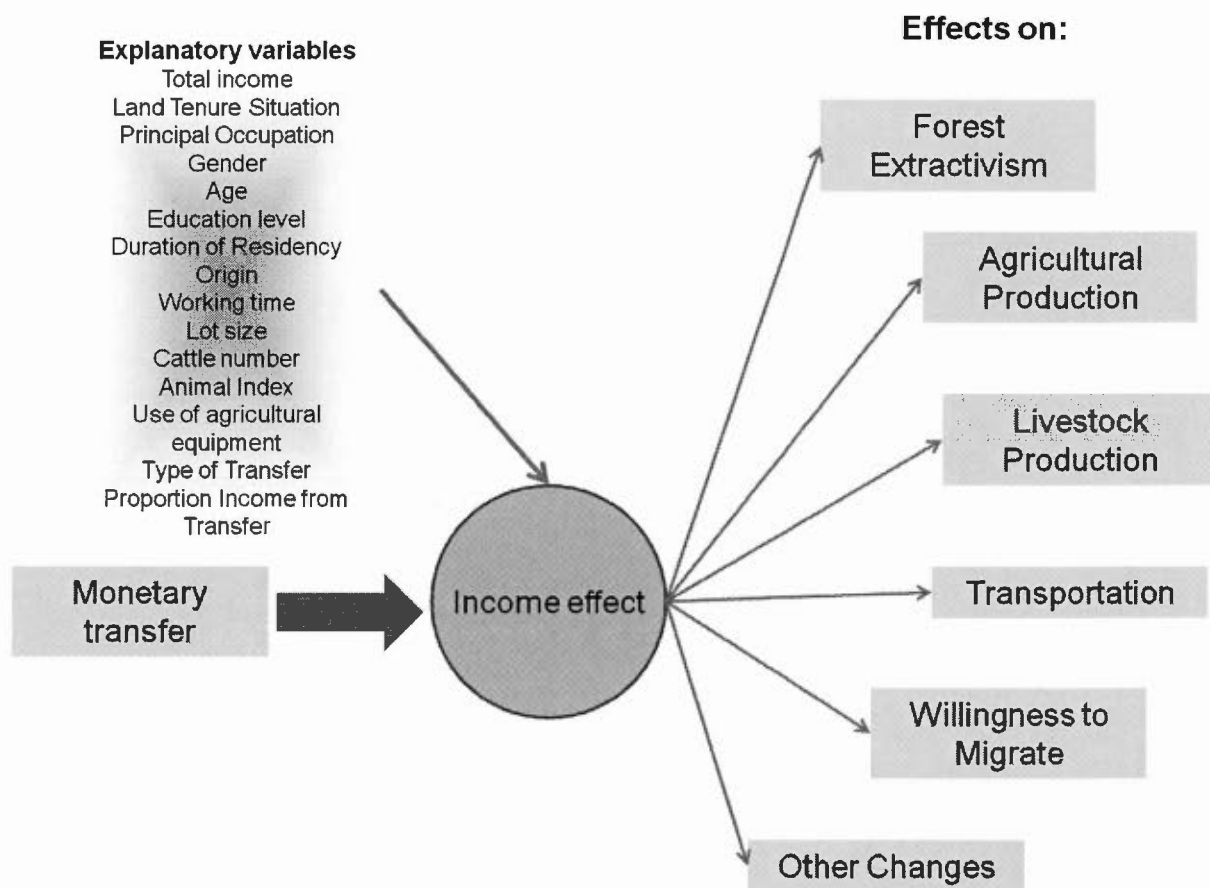


Table 3.1 shows the responses given and how they were categorized for the purpose of the study.

Table 3.1 – Categorization of the responses given in the interviews

Forest Extractivism	Does not need to go in the forest anymore Does not need to go hunting anymore Stopped going in the forest Stopped hunting	Decreased
	Still going in the forest Still not going in the forest	No Changes
Agricultural Production	Increase in the use of fertilizers Start using fertilizers	Fertilizers
	Hiring more agric. Employees Start hiring agric. Employees	Hiring Agric. Employees
	Buying new equipment	Equipment
	Buying more seeds Start buying seeds	Seeds
	Spend less time working on agriculture	Less Agric. Work
	Decrease in agricultural production	Decrease Agric. Production
	Stopped agricultural production	Stopped Agric. Production
	Nothing changed since in agricultural production	No Changes
Livestock Production	Increase quantity of food for cattle	Food for Cattle
	Increase quantity of antibiotics for cattle Start using antibiotics for cattle	Antibiotics for cattle
	Spend less time working on Livestock production	Less work to livestock production
	Decrease in livestock production	Decrease livestock production
	Stopped livestock production	Stopped livestock production
	Nothing changed since in livestock production	No Changes

Transportation	More traveling by boat More traveling by bus	Boat/Bus Tickets
	Purchase of a horse Purchase of a mule	Horse/Mule Purchase
	Start purchasing fuel Increase quantity of fuel purchased	Fuel Purchase
	Canoe purchase Canoe motor purchase Moto purchase	Transportation equipment purchase
	Nothing changes in transportation	No Changes
Willingness to migrate	Willingness to leave the community increased	Increased willingness
	Willingness to leave the community decreased	Decreased willingness
	Nothing changed in willingness to leave	No Changes
Others	Possibility to get access to credit	Credit Access
	Feeling richer Can buy more products in general Can buy more services in general	Income Effect
	Less financial anxiety Budget stability	Financial Security
	Oven/Stove Television Washing Machine Refrigerator/Freezer	Home Appliances
	Scholar Material	Scholar Material
	Renovation of the house Construction of an annex Construction of a shed	House Improvement
	Clothes Purchase	Clothing
	No other changes	No Changes

Data analysis

Data were stored and organized using a MySQL database. After consolidation and pre-screening of data, 139 individuals were kept in the analysis, out of a possible 149 individuals (in CT effects data as well as explanatory matrices). Using CANOCO for Windows, a correspondence analysis (CA) was performed on every theme, except for Forest extractivism and Willingness to migrate. The CA was undertaken to detect the similarities of responses inside a theme. Then, a canonical correspondence analysis (CCA) was performed on those themes too using the explanatory variable matrix. A stepwise permutation test enabled retention in the analysis of the most significant variables.

A contingency analysis was performed on the Forest extractivism and Willingness to leave elements. The same analysis was also performed on Agricultural and Livestock production themes, in addition to the CA. This was undertaken to refine the analysis for those themes. To do so, responses were categorised as shown in Table 3.2.

Table 3.2 – Re-categorisation of agricultural and livestock production themes for Contingency analysis

Theme	Changes	Category
Agricultural Production	Fertilizers	Increased Production
	Hiring Agric. Employees	Increased Production
	Equipment	Increased Production
	Seeds	Increased Production
	Less Agric. Work	Decreased Production
	Decrease Agric. Production	Decreased Production
	Stopped Agric. Production	Decreased Production
	No Changes	No changes

Livestock Production	Food for Cattle	Increased Production
	Antibiotics for Cattle	Increased Production
	Less Work to Livestock Prod.	Decreased Production
	Decrease Livestock Prod.	Decreased Production
	Stopped Livestock Prod.	Decreased Production
	No Changes	No changes

Limitations of the study

This study is limited in its interpretation principally because of the local scope it has. The study was designed to thoroughly understand the microeconomic conditions in which households make their decisions. However, the four communities studied presented similar characteristics in terms of livelihoods, public services and infrastructures. In the region, and in other regions of the Amazon, there are similar communities with the same environmental, health and social issues. Even if the comparison may not be direct, the results and recommendations of this study are applicable to communities with similar context.

Regarding the quantitative approach for data analysis, a choice in that sense was made in order to consider the whole population of the communities and to consider the variety of the responses. This analysis offers powerful tools to aggregate and link these responses to socioeconomic factors represented in the explanatory variables.

Results

Distribution of responses of the changes linked to CT

Table 3.3 shows the distribution of responses given for the effects of cash transfer programs on households.

Forest extractivism

Regarding forest extractivism, 68% of the respondents said that receiving a cash transfer program did not change anything in their need to rely on forest extraction, while 32% of the respondents said that it led to a decrease in the use of forest products.

Agricultural production

As for agricultural production, there were two general categories: one that combines responses that lead to an investment or an increase in the agricultural production and another one that combines responses that lead to a decrease in agricultural production. In the first category, purchase of agricultural equipment and hiring new employees accounts for 37% on the responses. Seeds and fertilizers each account for less than 8% of the responses. In the second category, a decrease in agricultural production accounts for 15% of the responses while a complete stop in the production accounts for 6.25% of the responses.

Livestock production

In the same way, for livestock production, there are two categories of responses: one that combines responses that lead to an investment or an increase in agricultural production and another one that combines responses that lead to a decrease in livestock production. In the first category, purchase of antibiotics for cattle accounts for 33% of the responses, food for cattle counts for 9%. In the second category, a decrease in livestock production is cited in 15% of the responses and less than 4% of the responses were a complete stop of livestock production while receiving a CT. It is important to note here that 35% of the responses were that there were no changes in the livestock production while receiving a CT.

Transportation

Responses linked to transportation in general were also important. Fuel purchase to use in boats, motorcycles or cars constituted 24% of the responses. A little less than 24% of the responses involved the purchase of boat or bus tickets. 19% of responses included the purchase of transportation equipment, mainly little two-stroke engines to help propulsion of little boats. 4.5% of the responses indicated the purchase of an animal for transportation.

Willingness to migrate

Concerning the willingness to migrate, 60% of the respondents said that receiving a CT did not change their willingness to migrate (whether the willingness to stay in the community or to leave it). 30% said that it increased their willingness to migrate, while 9% said that it decreased their willingness to migrate.

Others – Financial impacts and Consumer goods

When asked if there were other effects linked to the fact that they receive a CT, respondents gave, for this theme, the greatest number of responses. Those responses can be divided into two categories: Financial effects and consumer goods. The second, consumer goods, accounts for 75% of the responses. Among them, the most cited were clothes and school material buying followed by house improvements and home appliances buying. As for financial effect, the income effect is the most important. Credit access and financial security come second. These effects can create a spread effect on the environment through an increased access to monetary assets.

Table 3.3 – Distribution of responses of the changes linked to conditional transfers

Theme	Changes	Number	Percentage
Forest Extractivism	Decreased	44	31.65
	No Changes	95	68.35
	Total number of response	139	100.00
	Total number of respondents	139	
	Response/Respondent Mean	1	
Agricultural Production	Fertilizers	15	7.81
	Hiring Agric. Employees	23	11.98
	Equipment	48	25.00
	Seeds	15	7.81
	Less Agric. Work	6	3.13
	Decrease Agric. Production	29	15.10
	Stopped Agric. Production	12	6.25
	No Changes	44	22.92
	Total number of response	192	100.00

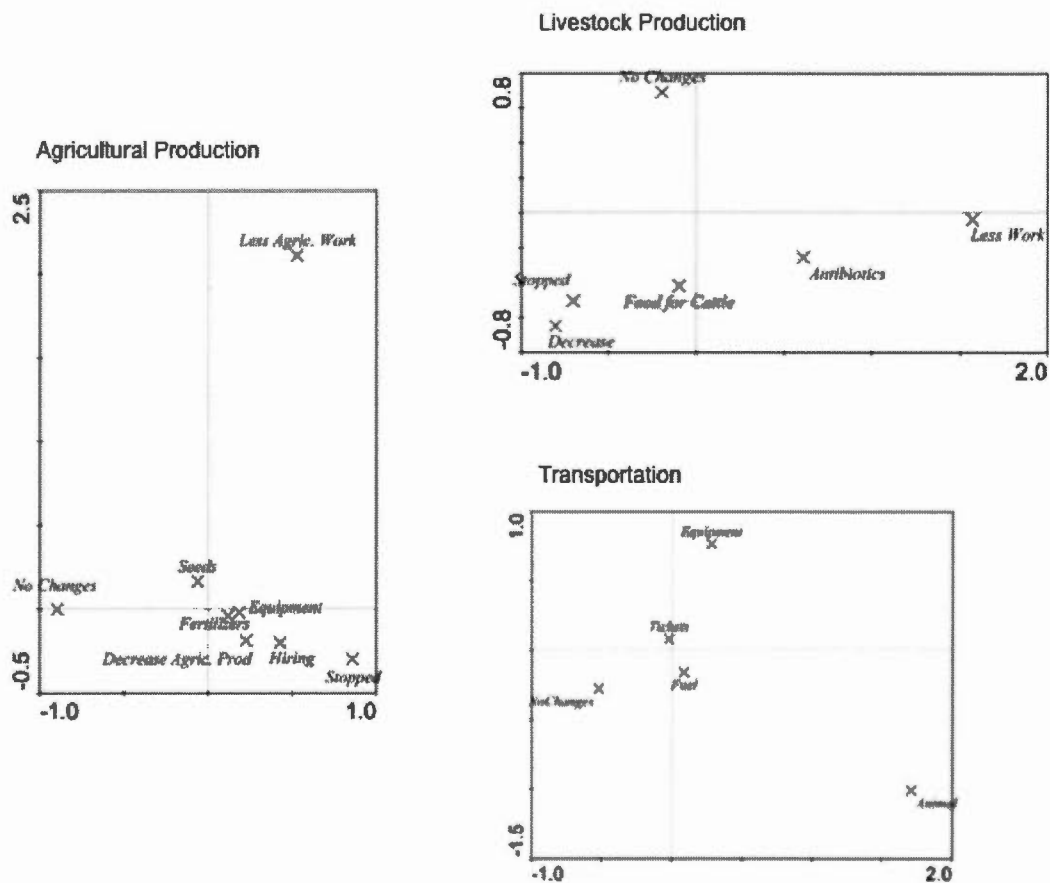
		Total number of respondents	139
		Response/Respondent Mean	1.4
Livestock Production			
		Food for Cattle	14
		Antibiotics for Cattle	50
		Less Work to Livestock Prod.	3
		Decrease Livestock Prod.	24
		Stopped Livestock Prod.	6
		No Changes	54
		Total number of response	151
			100.00
		Total number of respondents	139
		Response/Respondent Mean	1.1
Transportation			
		Boat/Bus Tickets	37
		Horse/Mule Purchase	7
		Fuel Purchase	38
		Transportation Equip. Purchase	29
		No Changes	44
		Total number of response	155
			100.00
		Total number of respondents	139
		Response/Respondent Mean	1.1
Willingness to migrate			
		Increased Willingness	42
		Decreased Willingness	13
		No Changes	84
		Total number of response	139
			100.00
		Total number of respondents	139
		Response/Respondent Mean	1
OTHERS			
Financial Effects			
		Credit Access	19
		Income Effect	22
		Financial Security	19

Consumer goods	Home Appliances	28	11.62
	Scholar Material	41	17.01
	House Improvement	35	14.52
	Clothing	50	20.75
	No Changes	27	11.20
	Total number of response	241	100.00
	Total number of respondents	139	
	Response/Respondent Mean	1.7	

Results of the Correspondence analysis

General results of the correspondence analysis confirm that there are groups of responses inside each theme that were considered for the correspondence analysis. For agricultural production, responses appear similar among respondents who cited an increase in the use of fertilizers, seeds, equipment and labour. Responses linked to a decrease (less agric. work. decreased agric. production. stopped agric. production), are all different from each other (Figure. 3.2). The same pattern of responses exists for livestock production. For transportation, fuel, equipment and ticket purchase also show a similar pattern of responses.

Figure 3.2 – Results of the correspondence analysis (CA) – Agricultural production, livestock production and transportation



Including explanatory variables

Integrating explanatory variables in the analysis, Table 3.4 shows the results of the Canonical Correspondence Analysis (CCA). Table 3.5 shows the results of the Contingency Analysis. Only the variables with $P < 0.05$ are shown in the tables. The column "Confirmation of the main assumption" states if the main assumption of the study (change in behaviour is positively correlated with the amount allocated) is confirmed.

Regarding agricultural production, the analysis of the variables shows that the type of transfer is important to understand the changes in agricultural production. Those who receive the Family allowance program are more likely to make no changes in their agricultural production, while those who receive retirement pension are more likely to increase their production by different means. This last finding is also true with age and time of residency because they are covariables of retirement pension. The increase in total income induces an income effect that permits an increase in agricultural production. Origin is also an important variable. Respondents from the Northeast region of Brazil are more likely to make no changes in their agricultural production while respondents from the state of Pará are more likely to increase their agricultural production. Regarding gender, men are more likely to increase their agricultural production when receiving a cash transfer.

In the same way, for livestock production, those who receive the Family allowance program are more likely to make no changes in their livestock production while those who receive the retirement pension are more likely to increase their livestock production. An income effect is also induced with an increase of the total income. As for forest use, receiving the Family allowance

program has a negative effect on forest use, as people stop their extraction activities.

Regarding willingness to leave the community, it is possible to see that the proportion of income from transfer increases the willingness to leave the community.

Table 3.4 – Results of the Canonical Correspondence analysis

Theme	Variable	Coefficient	P	Confirmation main assumption
Agricultural Production	Origin: North East	0.11	0.002	-
	Type of transfer : Bolsa Familia	0.13	0.004	No
	Age	0.08	0.022	-
	Origin : Pará	0.07	0.024	-
	Type of Transfer : Retirement	0.06	0.03	Yes
	Total Income	0.06	0.044	Yes
Livestock Production	Type of Transfer : Retirement	0.15	0.002	Yes
	Type of transfer : Bolsa Familia	0.26	0.002	Yes
	Total Income	0.09	0.01	Yes
Transportation	Time of Residency	0.14	0.002	-
	Type of transfer : Bolsa Familia	0.1	0.006	Yes
	Education Level	0.07	0.02	-
Others	Type of transfer : Bolsa Familia	0.22	0.002	Yes
	Type of Transfer : Retirement	0.13	0.002	Yes

Table 3.5 – Results of the Contingency analysis

Theme	Variables	Coefficient	P	Confirmation of the main assumption
Increased Agricultural Production	Time of Residency	+5.57	0.01	-
	Origin: : Pará	-12.33	0.01	-
	Type of Transfer:			
	Retirement	+5.22	0.02	Yes
	Gender - M	+4.82	0.03	-
	Age	+3.84	0.05	-
	Type of Transfer: Nothing	-9.25	0.05	Yes
Decreased Agricultural Production	Type of Transfer: Bolsa Familia	-13.71	0.0002	Yes
	Proportion Income from Transfer	-8.89	0.0117	Yes
	Age	-4.97	0.02	-
	Type of Transfer: Nothing	+5.04	0.02	Yes
Increased Livestock Production	Age	+19.52	0.0001	-
	Type of Transfer:			
	Retirement	+30.6	0.0001	Yes
	Type of Transfer: Bolsa Familia	-20.82	0.0001	No
	Proportion Income from Transfer	-11.53	0.02	No
	Time of Residency	+5.17	0.02	-

Decreased Livestock Production	Type of Transfer: Nothing	+17.76	0.0001	Yes
	Type of Transfer: Bolsa			
	Familia	-6.16	0.01	Yes
	Total Income	+7.48	0.0006	No
Forest Use	Type of Transfer: Bolsa			
	Familia	-13.5	0.0002	Yes
	Proportion Income from Transfer	-6.828	0.033	Yes
Willingness to Leave	Proportion Income from Transfer	+17.16	0.0002	Yes
	Type of Transfer: Bolsa			
	Familia	-11.66	0.0029	No
	Type of Transfer: Retirement	+6.098	0.04	Yes

Discussion

The amount of the cash transferred is crucial to understand the side effects of CCT and UCT programs. Generally, the data in the results tables shows that the larger the amount or the proportion of the transfer increase, the more respondents are willing to increase their agricultural or livestock production. Also, we can see that for some respondents, it increases their willingness to leave. This is caused by an income-effect experienced by local population. An income effect may cause concerned households to increase their consumption or their demand for productive lands, resulting in a negative impact on the environment.

Effects on agricultural and livestock production

Two different impacts on the environment were observed. An increase in agricultural and livestock production generally leads to intensification or an increase of the quantity of land under cultivation or pasture. This leads to more deforestation, especially in the study region.

In the same way, there can be an impact on the environment through the effects on the labour supply. This study did not show directly the impacts of an income-effect on the labour market, but it is one of the covariable. The majority of the studies on the topic focus on the drop in labour supply caused by an increased access to transfer programs (Foguel and Barros. 2008; Firpo et al. 2014). Albeit real, the relation between CT programs and the labour market can be the inverse under certain circumstances. Large landowners who are also recipients of a CT program can be tempted to hire more workforce as they experience an income-effect. Consequently, hiring more workforce can lead to an increase in the agricultural production of large landowners and then having a negative impact on the environment.

Moreover, this study showed that as with the increase in total income, there is an increase consumer goods as well as an increase in agricultural and livestock production (Table 3.4). Miller (2011) showed the same thing as they confirm an increase in expenditures on food and basic necessities, which is generally the objective of the programs. This observation is also corroborated by Haushofer and Shapiro (2013) as they affirm that transfers allow poor households to build several types of assets, especially those linked to agricultural and livestock production. Furthermore, transfers increase consumption in general, diminish hunger and increase psychological wellbeing.

In the same way, this income effect exists for populations living on the small-scale extraction of natural resources (timber and non-timber forest products). An additional amount of money can create an income-effect that will lead to an intensification of the extraction activity due to an investment in capital or labour (Gamez. 2015). However, that relation was not found in this study as the increase in transfer leads to a decrease in forest extractivism or, at least, no changes in forest extractivism (Table 3.5 and Table 3.3).

Multiplier effect

In the same vein, transfers play a role of income multipliers by catalyzing the productive dimension of beneficiary households. As shown in this study, an increase of transfer leads to an increase in agricultural and livestock production. This phenomenon shows that the capacity of households to get out of poverty does not come necessarily from the formal labour market, but by the self-employment generated by the beneficiaries themselves (Jones. 2015; FAO. 2014). This last observation applies to the economic structure of the study region, as access to formal jobs is limited and subsistence agriculture is the main occupation of a majority of active households. This being said, it is therefore more important to take into account the multiplier effect in the region as the effects of transfers on the environment can be higher than expected.

However, the outcomes from the transfer's multiplier can be different from one region to another, depending on the growth-mediating processes (Barrientos. 2012). In the study region, access to credit and liquidity is growing precisely because of the presence of the transfers that plays the role of a guarantee to banks (Bosselmann and Lund, 2013). In developing

regions, those processes could also be consumption and asset security and household resource allocation. Credit constraints are important to consider while evaluating a cash-transfer program, because the existence of such access could multiply the income effect (Del Rey and Estevan. 2013).

Billard et al (2014) showed that link between small-scale farmers revenue and deforestation at the scale of a community. They also showed that access to credit in that community is linked to a greater rate of deforestation on the land of the households included in the study. These results are similar to what has been discovered here, but with a different methodology.

Effects on migration

Concerning the effect of CT programs on migration and willingness to leave, this study showed that transfer increases the respondents' willingness to leave as the proportion of income from transfers increases. In developing regions, as the general wealth of a region increases, the migration rate use to increase at the same time (Rudel et al. 2002), as people are looking for a better quality-of-life. That same phenomenon applies in this study to people who receive retirement pension (Table 3.5). CT can have an impact on the expected wage at destination, depending on the amount paid and the transaction costs (Angelucci, 2012).

In terms of the impacts on the environment, the final effect of migration is uncertain. It can lead to a definitive opened landscape with a succession of actors until reaching a landscape dominated by large landowners (Pacheco, 2012) or land abandonment and a permanent growth of secondary forest (Rudel et al. 2002). According to data gathered by Tremblay et al. (2015A), the first phenomenon applies in the study region, as there is a concentration

of the land to large landowners. Gamez (2015) calculated that around 40% of rural families in the state of Pará are not owners of their land.

The microeconomics effects of cash transfer programs are multiple. Results of this study showed that CT improves education, housing, health, and transportation conditions. Jones and Presler-Marshall (2015) found that CT promotes the development of human capital as well as it leads to economic growth. This economic growth must however be done in a sustainable form in order to take into account the environmental impacts. In another way, Gamez (2015) stated that the presence of one or many transfer programs can lead to the weakening of the social network and create a dependency on transfers as the payments take a bigger place in the household budget. In this study, the proportion of income from transfer mean is about 16% and it is distributed from 0 to 77%, with a standard deviation of 20.

The dependency on government transfers is steadily increasing since the 70s in the Brazilian Amazon. This could be explained by the fact there is no secondary transformation of agricultural products (Gamez. 2015), permitting higher income from agricultural production. Tremblay et al. (2015B) came to the same conclusion regarding fruit-based agroecosystems.

Nevertheless, a cash transfer program can have an egalitarian effect among households. Garcia-Amado et al. (2011) observed that this egalitarian effect applies within specific groups but not necessarily between groups. They showed this fact between landowners themselves and landless groups. Data used in this study do not permit to verify this phenomenon, as there is no relation between total income and income from transfer.

Beyond the fact that the amount of the transfer itself has an important impact, several socioeconomic conditions also have an impact on the effects of a cash transfer programs. This study has shown (Tables 3.4 and 3.5) that the origin and the age of the respondent are determinants under certain circumstances. In that case, age is a covariable of the type of transfer (Family allowance or Retirement pension). For the origin, there is a difference between people originating from the Pará state and those from the Northeast region of Brazil. This can be explained by the fact that people from the Northeast are more often recent migrants than those originating from Pará (Oestreicher et al. 2014).

The land tenure conditions are at the core of the problem when it comes to CT and their effects on the environment. In this study, land tenure conditions were not a significant variable when it came to the effects of cash transfer programs (Tables 3.4 and 3.5). However, they are crucial when it comes to institutional arrangements for the implementation of a CT program in the region. Transaction costs and communication processes are also important in that sense (Kosoy et al. 2008; Vatn. 2010).

Additionality and opportunity costs

One important measure of CT program success is the extent to which the program is able to induce additional investments in human and environmental capital. This criterion of additionality is important as it can measure the efficiency of a program regarding its main objectives (Garcia-Amado et al. 2011).

Although there have been no rigorous analyses of the respective costs and benefits of conditional versus unconditional transfers, there are many

indicators that conditionality is the key to the success of these programs (Schubert and Slater, 2006). Measuring the changes in human or natural capital is crucial to the efficiency of these programs. This underpins the understanding of causal pathways between an action and the desired change in human or natural capital. In the case of the Family allowance program, the additionality criterion is the investment in education and health. Results of this study show that there was actually an investment in education and health (Table 3.3).

This criterion could help us to better understand the effects of a cash transfer program on the environment, and it can clarify the way to better assess the efficient amount to be paid for the conservation of ecosystem services. This amount should at least be sufficiently high to reach the additionality point but not so high as to incur a too high income-effect. Without proper evaluation of ecosystem services, especially provisioning and regulating, there is a risk that the amount paid in a CT is not sufficient to cover the opportunity costs of not clearing the land, in the case of a PES. As a result, farmers are more likely to clear more forest than would be considered desirable by society (Grieg-Gran et al. 2005).

Conclusion

The issue of the amount paid in a conditional or unconditional cash transfer program is crucial in terms of the environmental side effects it could create. Whether a transfer program is created for poverty alleviation, environmental protection or for household's welfare, it is important to evaluate the effects on the economic decisions of households. The expected effects could be significantly different from the real effects. The proportion the transfer represents in the total income of a household determines the amplitude of the income-effect. This phenomenon was showed in this study by the type of transfer received.

The key finding of this study is that the income-effect can change behaviours in unexpected ways. In developing countries, the proportion of income that comes from transfers could be sufficiently important to cause an income-effect. Data showed that agricultural production, livestock production and willingness to migrate could change in an undesired way under the income-effect. Even if the final effect on the environment could be difficult to predict, this study showed that respondents increased their agricultural and livestock production, probably using the same techniques: slash and burn practices and extensive breeding.

Even if the amplitude of the effect can be difficult to define, policy-makers should perform an environmental impact assessment of these transfer programs. This study has shown that in the analysis of the effects of a cash transfer program that is designed for poverty alleviation or environmental protection, the question of the amount paid and the conditionality are crucial to determine the real effects of the program.. In the study region, this happens with an increase of deforestation by agriculture and livestock

production. Therefore, it is important for policy-makers to assess the effects of a transfer program in order to comply with the efficiency and additionality criteria. The results of this effects assessment should be included in the institutional arrangements to avoid side effects of CT programs on the environment.

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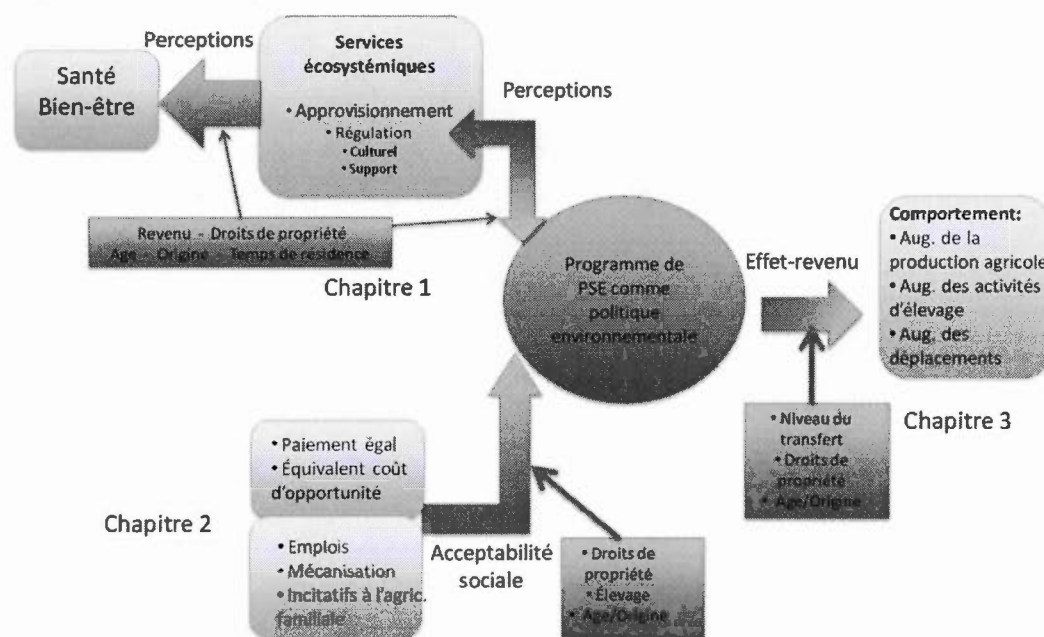
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CONCLUSION GÉNÉRALE

En guise de conclusion, nous compilons pour chaque chapitre les principales contributions à la science apportées par cette thèse. Par la suite, des thèmes transversaux liés aux éléments microéconomiques explicités au cours des chapitres de cette thèse seront abordés permettant ainsi d'avoir une vision d'ensemble de la problématique et de formuler des recommandations.

La Figure 4.1 réunit les principales conclusions de cette thèse. Il est possible de voir les conclusions propres à chacun des chapitres de même que les éléments microéconomiques transversaux influençant l'interprétation dans l'ensemble de la problématique de recherche.

Figure 4.1 – Principales conclusions



Il est possible de voir que les services écosystémiques d'approvisionnement et de régulation sont importants dans la perception du lien entre environnement, santé et bien-être. Ce sont sur ces éléments que devraient se concentrer une politique ayant pour objectif de protéger l'environnement dans la région à l'étude. De la même façon, les éléments favorisant l'acceptabilité sociale d'un programme de PSE sont un paiement égal entre les ménages, un paiement équivalent au coût d'opportunité de renoncer à pratiquer l'agriculture de subsistance et des investissements favorisant la création d'emploi, la mécanisation et la transition vers une agriculture familiale plus durable. Les principaux impacts non-prévus créés par un effet-revenu dû à la présence de programmes de paiements de transfert dans la région sont une augmentation des activités agricoles et des activités d'élevage de même qu'une augmentation des déplacements de personne.

La figure montre également que plusieurs éléments de nature microéconomique ont un impact sur l'ensemble. La question des droits de propriété de même que le niveau de richesse des ménages est important à considérer dans l'élaboration, l'implantation de même que l'évaluation des impacts des politiques environnementales, notamment les programmes de PSE. Ce sont principalement sur ces éléments que portent les recommandations principales de cette étude présentées plus loin.

Perceptions des services écosystémiques

La méthodologie basée sur l'étude des perceptions des agriculteurs familiaux dans la région de la rivière Tapajós a permis de cerner les liens existants entre la santé et le bien-être des populations locales et l'environnement. Les résultats de cette étude démontrent la place centrale qu'occupent les services écosystémiques d'approvisionnement dans la perception des

répondants (chapitres 1 et 3). Ces observations confirment l'hypothèse selon laquelle il existe une dépendance perçue envers l'environnement de la part des familles participantes à l'étude.

Les perceptions des populations locales face à l'environnement dépendent non seulement de facteurs socioéconomiques (Case et al. 2005), notamment le niveau de revenu mais également comme nous le montrons dans le chapitre 1 et 2 du fait de posséder ou non un titre de propriété pour sa terre. Ces facteurs affectent les attitudes par rapport à l'environnement, notamment en ce qui a trait à l'adoption de pratiques agricoles qui pourraient limiter la dégradation de l'environnement (Trakolis, 2001).

Par la présente étude, il semble que l'origine géographique des répondants a une nette influence sur leurs perceptions face à l'environnement (chapitres 1). Ainsi, les répondants provenant de la région du Nord-Est du Brésil ont une perception davantage utilitaire de leur environnement puisqu'ils constatent des liens moins forts entre l'environnement et leur santé et bien-être de façon générale. Ceci n'est en général pas le cas pour les répondants dont l'origine est l'état du Pará. Cela peut s'expliquer notamment par le fait que les migrants provenant d'autres régions du Brésil apportent souvent avec eux tout un éventail de techniques agricoles basées sur la coupe et le brûlis de la forêt, alors que les résidents de longue date du Pará adopte davantage une utilisation de l'environnement axée sur l'extractivisme et l'agroforesterie.

De façon inverse, comme nous le montrons dans le chapitre 2, les répondants dont l'origine est le Nord-Est du Brésil ont moins tendance à réclamer leur indépendance face à l'État. Ils voient d'un bon œil l'intervention de l'État dans leurs activités économiques, à tout le moins en ce qui concerne la principale technique agricole utilisée.

Il est important que les politiques publiques tiennent compte des perceptions des populations vis-à-vis de l'environnement dans l'élaboration des politiques à être implantées, particulièrement si celles-ci ont un impact direct sur leur mode de vie et leur environnement immédiat. C'est à partir de ces perceptions qu'il sera possible d'établir des lignes directrices pour faciliter l'acceptabilité sociale.

Acceptabilité sociale de programmes de paiement pour services écosytémiques (PSE)

Un des résultats saillant de cette thèse est que l'acceptabilité sociale d'un programme de PSE passe essentiellement par une distribution équitable des transferts de même que par un paiement équivalent au minimum au coût d'opportunité lié à l'agriculture familiale (chapitre 2). Il existe d'autres alternatives à l'amélioration du bilan environnemental dans les communautés à l'étude selon celles-ci : la création d'emplois, la mécanisation de l'agriculture et l'aide technique à l'agriculture familiale. La mise en application d'un de ces trois éléments mène à une incertitude quant à l'effet sur la déforestation. Les répondants dans cette étude sont restés vagues sur la nature des emplois souhaités bien qu'ils faisaient davantage allusion à des emplois liés au service public, à la construction ou au transport. Dans tous les cas, cela pourrait mener à une diminution du recours à l'agriculture de subsistance par un effet-revenu. La mécanisation de l'agriculture s'accompagnant d'intrants et de techniques agricoles adaptées devrait permettre aux agriculteurs familiaux de continuer à occuper la même parcelle de terrain plutôt que de poursuivre le cycle de coupe et brûlis plus en avant dans la forêt. Dans ce cas, le taux net de déforestation pourrait alors diminuer.

Les interprétations tirées des données présentées au chapitre 2 suggèrent que l'aide technique serait probablement l'option la plus probable et la plus adaptée au contexte de l'agriculture familiale. Celle-ci pourrait s'articuler autour de la mise en place de nouveaux systèmes agroforestiers ou de plantations pérennes adaptées au contexte local (cultures fourragères par exemple). Plusieurs exemples de ces systèmes durables ont été mis en place au cours des années dans la région, notamment par le projet PLUPH.

Parmi les éléments favorisant l'acceptabilité sociale locale, il est démontré au chapitre 2 que le coût d'opportunité de la terre constitue un facteur clé. Une compensation minimale, en termes monétaires ou en termes de services, doit au moins couvrir ce coût d'opportunité. Ce dernier est lié au renoncement à déboiser un espace forestier primaire ou secondaire à des fins d'agriculture familiale. La présente étude établit donc que la compensation doit au moins être équivalente au revenu tiré de la culture sur coupe et brûlis. Elle montre que le calcul de ce coût d'opportunité est lié au contexte local, notamment en termes d'accès aux marchés, de coûts de transaction et de droits de propriété. D'autres éléments, notamment liés aux arrangements institutionnels sont souvent cités dans la littérature. La présente étude a pris en compte les aspects de distribution mais non pas les aspects liés au niveau de la gestion d'un programme de PSE (Sattler et Matzdorf. 2013).

Dans le cadre de cette thèse, le mode de vie (ou l'activité économique principale) du répondant n'a pas permis de distinguer une variation significative dans l'acceptabilité sociale d'un programme de PSE. D'autres études par contre ont montré que le mode de vie est une variable très importante autant dans la perception des services écosystémiques que dans l'acceptabilité sociale d'une politique environnementale (Carcamo et al. 2014). L'absence de relation entre le mode de vie et l'acceptabilité sociale

dans la présente étude peut être expliquée par la faible variabilité des modes de vie dans trois des quatre communautés à l'étude. Par conséquent, il est important que les politiques environnementales prennent en compte ces différentes variables ayant un impact sur l'acceptabilité sociale, notamment celles en liens avec les aspects d'équité de même que celles en lien avec les coûts de renoncement.

Impacts et effet-revenu de programmes de transfert conditionnel

Cette thèse a aussi abordé les impacts et l'effet-revenu de programmes de transfert conditionnel (chapitre 3). Ces programmes sont créés particulièrement dans un objectif de changer un ou des comportements économiques précis. Or, comme dans toutes politiques publiques, il existe des effets indésirables ou imprévus par la politique. La plupart des études qui se sont penchées sur un tel problème l'ont fait à une échelle régionale ou nationale. La présente étude, quant à elle, aborde ce phénomène au niveau familial et communautaire dans quatre communautés définies et appartenant à un contexte particulier de frontière de développement. On montre ainsi que le montant payé par le programme est un élément central pour mesurer le changement de comportement (Chapitre 3). En effet, la proportion de ce montant par rapport au revenu des ménages détermine le niveau de l'effet-revenu provoquant le changement de comportement. Cependant, ces comportements imprévus peuvent parfois aller dans le sens inverse de changements désirés par la politique. Cette étude souligne donc que, sous certaines conditions, des effets-revenus sont observés parmi les bénéficiaires de programmes de transfert conditionnel et qu'ils entraînent un changement de comportement ou une action non-désirée par la politique. Plus précisément, on observe des changements en lien avec la production

agricole et l'élevage de même que la migration. Ces changements pourraient avoir des effets significatifs sur l'utilisation du territoire et donc sur le paysage. Bien qu'il soit difficile de prévoir la portée des changements environnementaux, il est possible d'affirmer que l'adoption de nouvelles pratiques agricoles ou d'élevage entraîne un changement dans le paysage, quels qu'ils soient. Cela est particulièrement observé dans le cas des programmes de paiement non-conditionnel où la conditionnalité ne vient pas entraver les possibilités de changements de comportement chez les acteurs. Ceci est d'autant plus vrai que dans le cas de la présente étude, les programmes de transfert peuvent représenter une part importante du revenu des ménages bénéficiaires.

Il est important que les politiques publiques tiennent compte des effets non prévus des impacts de programmes de transfert conditionnel, particulièrement lorsqu'ils génèrent de forts effets-revenus. Dans le contexte d'une région frontrière, des entrées monétaires comme celles de l'allocation familiale (*Bolsa Familia*) ou de la pension de retraite, peuvent modifier sensiblement la structure du mode de vie des populations de même que la structure économique d'une communauté (chapitre 3).

Recommandations finales

Régularisation des titres de propriété foncière

Le thème des droits de propriété foncière est ressorti comme un élément central de cette thèse. Près de la moitié des agriculteurs familiaux de la région de la rivière Tapajós sont confrontés à une incertitude qui perdure depuis des années quant à leurs droits de propriété foncière. Cet état de fait mène à une différenciation dans les perceptions des liens entre l'environnement, la santé et le bien-être des ménages. Cela a également un impact sur l'acceptabilité sociale et influence les impacts liés aux programmes de paiements de transfert. Tout comme l'avait déjà souligné De Oliveira (2008), cette incertitude mine la situation sociale et provoque des migrations, autant en région frontrière que dans des zones urbaines et a des conséquences sociales et environnementales. Les règles qui établissent l'usage de la terre doivent être révisées afin d'éviter les conflits ou l'appropriation illégale des terres. Ne pas le faire n'envoie pas un bon signal quant à l'usage des ressources (Vatn, 2010).

La régularisation des titres de propriété foncière permet de garder des terres disponibles pour les ménages plus pauvres et vivants de l'agriculture de subsistance. La non-régularisation des titres provoque présentement une concentration des terres entre les mains de grands propriétaires terriens accélérant du même coup le rythme de migration des familles plus pauvres vers la ville ou vers de nouvelles régions frontières (Pacheco, 2012). Les migrations successives des familles pauvres les empêchent de constituer un capital économique et un capital social, leur permettant de sortir de la pauvreté (Fearnside, 2007) et de créer des modèles agricoles de subsistance qui seraient plus durables (Rudel, 2006).

L'effet sur l'environnement des cycles successifs de migration a été clairement démontré (Kroger, 2016 ; Pacheco et al. 2012 ; Rodrigues et al. 2009). Il existe essentiellement deux possibilités quant à l'effet net des migrations sur l'environnement : une succession d'acteurs menant à l'ouverture définitive du paysage ou une reprise de la végétation secondaire. La première possibilité implique qu'avec la migration des familles vivant de l'agriculture de subsistance, d'autres acteurs prennent la place sur les terres ainsi abandonnées. Avec le déclin de la productivité des sols lié à l'ouverture du paysage, ces familles quittent ces terres pour défricher une nouvelle terre dans une nouvelle frontière de colonisation, ou alors elles s'établissent dans les villes, la plupart du temps dans les bidonvilles en périphérie. Ce faisant, des grands propriétaires terriens reprennent les terres défrichées pour pratiquer l'agriculture à grande échelle ou l'élevage intensif. En Amazonie brésilienne, cette première hypothèse semble s'avérer la plus courante (Moran et al. 2000, Pacheco, 2012). La seconde possibilité implique qu'avec la migration, majoritairement vers les villes, on assiste à une reprise de la végétation secondaire sur les terres ainsi abandonnées. Ce phénomène a été observé notamment en Europe et en Amérique du Nord, mais également dans l'Est amazonien. Cependant, la fertilité naturelle plus faible des sols amazoniens pourrait empêcher cette régénération naturelle, particulièrement dans les zones déjà fortement dégradées (Roulet et al. 1999).

Il a été clairement démontré dans cette étude que la volonté de migrer des populations vivant de l'agriculture de subsistance est influencée par des variables socioéconomiques en lien avec le mode de vie mais aussi avec des paramètres externes qui relèvent essentiellement des politiques publiques. Les droits de propriété en sont le meilleur exemple.

Planification des services publics afin de réduire des coûts de transaction

Les programmes de PSE doivent également s'accompagner du développement et de la planification des services publics. L'absence d'infrastructures de base peut avoir un impact important sur les communautés et les individus. En effet, celles-ci ont un pouvoir d'attraction et de rétention des populations, surtout depuis l'instauration de l'allocation familiale (*Bolsa Familia*), notamment. On assiste récemment à l'émergence de petits centres urbains qui servent essentiellement de lieu d'accès aux services publics, dont la santé, l'éducation, mais aussi les services bancaires. Bien qu'il soit difficile pour les services publics d'exercer un contrôle et d'assurer une accessibilité aux services sur tout le territoire, cela est une condition essentielle à la mise en place de politiques de développement (Fearnside 2007).

Les conclusions et recommandations de cette thèse ne peuvent être mises en place que s'il y a planification des services publics. La migration désorganisée peut créer des impacts sociaux importants, notamment dans les villes de petite et moyenne tailles. Un exemple concret de cette réalité est la ville d'Altamira dans le centre de l'État du Pará qui a connu un accroissement particulièrement rapide de sa population et un développement depuis l'annonce de la construction du barrage hydroélectrique de Belo Monte (Fearnside, 2016). Dans les années récentes, cette ville subit aussi une augmentation importante de la criminalité et les familles déplacées en milieu urbain voient leur qualité de vie grandement diminuée (Randell, 2016). Le cas d'Altamira est extrême, certes. On assiste cependant à la répétition de cette croissance rapide de la population dans des centres de plus petite taille. Dans la région à l'étude, les villes de Brasília Legal (environ 1000 personnes) et de Divinópolis (environ 3000 personnes) connaissent un essor important

notamment à cause de l'accessibilité aux services publics. La municipalité de Rurópolis dans laquelle se trouve Divinópolis a vu sa population passer de 27 000 à 41 000 habitants entre 2004 et 2016 (IBGE 2016).

Il a été clairement démontré dans cette étude qu'il existe un désir de la part de la population locale de voir une intervention accrue des pouvoirs publics dans la région. Cela peut passer par un programme de PSE, mais aussi par des investissements dans d'autres secteurs qui permettent un développement durable.

Faciliter la transition agricole et abandonner les cultures sur coupe et brûlis

Un des objectifs principaux des PSE est de limiter la déforestation en réduisant l'utilisation de la technique d'agriculture sur coupe et brûlis. Dans la présente thèse, il est notamment mis de l'avant qu'un paiement fait aux familles pour qu'ils cessent cette pratique ne constitue pas nécessairement une solution unique. La mise en place de différents moyens permettant une transition agricole apparaît nécessaire. Le transfert des connaissances est au cœur des obstacles qui empêchent cette transition agricole. Le savoir traditionnel dans la région à l'étude est essentiellement constitué de ces techniques sur coupe et brûlis. Des programmes d'assistance technique comme ceux de l'ONG CODETER BR-163 (Collège de développement territorial de la route BR-163, ou EMATER (Entreprise d'assistance technique et de développement communautaire – Gouvernement de l'État du Pará) existent dans la région, mais il est difficile pour les ménages habitant dans des communautés éloignées d'y avoir accès.

Des systèmes agroforestiers sont envisageables dans la région, car ils permettent aux familles de poursuivre la culture des espèces traditionnelles (manioc, fèves, riz, maïs) tout en permettant une diversification des cultures et un maintien des sols (Béliveau 2016 ; Tremblay et al. 2015). De plus, ces systèmes sont compatibles avec la mise en place de programmes de PSE tels qu'ils ont déjà été appliqués en Amazonie brésilienne, une part du paiement étant généralement réservé à la formation ou à des projets de nature communautaire (Fundação Amazonia Sustentável).

C'est à travers de telles initiatives provenant à la fois d'initiatives communautaires que de politiques publiques nationales et étatiques qu'il sera possible d'assurer un développement qui soit socialement acceptable et durable du point de vue de l'environnement et qui permettra l'épanouissement culturel en Amazonie brésilienne.

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ANNEXES

ANNEXE 1 - Questionnaire de la collecte de données de 2011

INTEGRADO

Questionário PLUPH Social 2011 – Comunidade:	
IDI:	Se sem IDI, criar aqui:
Nome Entrevistado:	Apelido:
Entrevistador:	Data :
Coordenadas Casa: UTM X UTM Y	

1. DADOS SOCIO-DEMOGRÁFICOS

1.1. Família, Composição (Confirmação dos membros; S significa sim e N significa Não. Preencher antes de fazer a entrevista e confirmar com a dona/dono da casa) (Mulher) (**A família significa todas as pessoas que moram na mesma casa**)

Nome + IDI	Sexo (M/F)	Ano de Nasc.	Frequenta a escola? (S/N)
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2. MODOS DE VIDA E EMPREGO:

ATIVIDADES GERAIS

METODOLOGIA DAS SEMENTES (OU PEDRAS) (Serão distribuídas 20 sementes de feijão e uma gravura com as atividades abaixo descritas. O entrevistado deverá distribuir os feijões (somente os 20) nas atividades colocando mais feijões nas atividades que tomam mais tempo na sua vida normal. O entrevistador deverá colocar o número de feijões correspondentes em cada atividade na gravura).

- Explicar que trabalho remunerado é aquele em que o trabalhador recebe um salário (em dinheiro).
- Trabalho local é aquele em que a pessoa pode voltar pra dormir todos os dias em sua casa na comunidade.
- Trabalho migratório é todo trabalho em que a pessoa não tem condições de voltar para dormir em sua própria casa na comunidade.

2.1. Quanto **TEMPO VOCÊ** passa fazendo essas atividades? (individual) (Se não realiza a atividade, preencher com zero)

Cuidar da casa	Cuidar do quintal	Agricultura
Pecuária	Trabalho remunerado (migratório)	Trabalho remunerado (local)
Pesca	Caça	Coleta de produtos na mata

Outro, qual:

EMPREGOS E RENDA NA COMUNIDADE (MULHER)

2.2. A renda **da família** é formada por empregos

☐ Locais (na comunidade) Se local, vá para a questão 2.3.

☐ Migratório (fora da comunidade por um longo tempo/se precisa mudar) Se migratório, vá para a questão 2.7

SE LOCAL

2.3. No último ano, a renda **da família** foi formada por quais atividades?

2.4. Qual é a renda dessas atividades/quanto ganha por ano/mês?

2.5. Desde quando a família trabalha nessa atividade?

2.6. Você vai sempre, de vez em quando, ou é um bico?

2.3. Tipo de emprego	2.4. Salário/Renda (R\$/mês)	2.5. Desde quando (ano)	2.6. Frequência
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☐ comércio

☐ professor

☐ servidor público (agente de saúde,
barco, etc.):

☐ Outro:

☐ Aposentado

☐ pescador

Se pescador, recebe auxílio
desemprego na época do defeso?

Sim ☐

Não ☐

SE MIGRATÓRIO (FORA DA COMUNIDADE)

- 2.7. No último ano, a renda **da família** foi formada por quais atividades?
- 2.8. Qual é a renda dessas atividades/quanto ganha por mês (ou semana)? *(especificar se o valor declarado é por mês ou por semana)*
- 2.9. Qual a frequência de trabalho para cada atividade? *(A frequência deverá ser escrita juntamente com a unidade)*
- 2.10. O **membro da Família** sempre trabalhou nesse período, com essa frequência?
- 2.11. Onde é o local de trabalho?
- 2.12. Desde quando a família trabalha nessa atividade?

2.7. Tipo de emprego	2.8. Salário/Renda (R\$/mês)	2.9. Frequência	2.10. É sempre assim? Sim ☐ Não ☐ Se não, que frequência é normal:	2.11. Onde trabalha?	2.12. Desde quando (ano)
Mineração			Sim ☐ Não ☐ Se não, que frequência é normal:		
Madeiras			Sim ☐ Não ☐ Se não, que frequência é normal:		
Cidade (comercio, construção)			Sim ☐ Não ☐ Se não, que frequência é normal:		
Outro:			Sim ☐ Não ☐ Se não, que frequência é normal:		

2.13. A **família** recebe algum apoio de um parente na cidade?

Se sim, no ultimo ano, quanto recebeu?

Sim ☐ Não ☐

3. ASSOCIATIVISMO (individual)

3.1. Você participa de Alguma Associação, Grupo, Conselho? Sim ☐ Não ☐

3.2 Se Sim, Qual(is)?	3.3 Qual é a sua participação? Membro/Associado (A) Cargo Formal (F)	3.4 Como é a sua participação nas reuniões? Todas (T); a maioria (M); algumas (A); Nenhuma (N)
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3.5. Você frequenta alguma Igreja? Sim ☐ Não ☐ (individual)

3.6. Qual? (Caso seja evangélica, escrever o nome da igreja) Católica ☐ Adventista ☐ Evangélica ☐ Outras ☐ Qual?	3.7. Com que frequência você vai à igreja? ☐ menos de 1 vez por mês ☐ 1 vez por semana ☐ mais de 1 vez por mês ☐ mais de 1 vez por semana
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4. PROPRIEDADE RURAL (HOMEM)

- 4.1. A família tem um lote? Sim ☐ Não ☐
 (o lote significa a propriedade rural completa, com a área de plantio, casa, mata, capoeira). (A família significa todas as pessoas que moram na mesma casa; e Lote principal significa o lote mais usado) (1 hectare = 4 terefas)

4.2. Quantos lotes tem?

DETALHES DOS LOTES	lote principal	outro	outro
4.3. Qual é o tamanho? (colocar a unidade)			
4.4. Há quantos anos vocês ocupam o lote?			
4.5. Em que ano você começou a roçar o lote?			
4.6. Se os lotes são terra própria, como é o título das propriedades?	Sem título ☐ Definitivo, em seu nome ☐ Definitivo em nome de algum familiar ☐ Com título em nome outro ☐ nome: Título recebido por meio de compra dado pelo antigo dono ☐ nome antigo dono:	Sem título ☐ Definitivo, em seu nome ☐ Definitivo em nome de algum familiar ☐ Com título em nome outro ☐ nome: Título recebido por meio de compra dado pelo antigo dono ☐ nome antigo dono:	Sem título ☐ Definitivo, em seu nome ☐ Definitivo em nome de algum familiar ☐ Com título em nome outro ☐ nome: Título recebido por meio de compra dado pelo antigo dono ☐ nome antigo dono:
4.7. Se tem título, em ano que foi emitido?			
4.8. Onde fica o lote (nome da comunidade/cidade)?			
4.9. A família usa a terra dos outros para cultivo ou pastagem? Sim ☐ Não ☐ 4.10. Se sim, a terra é de quem (colocar nome +ID)? 4.11. Qual é a sua relação com esta pessoa? 4.12. E o que você dá em troca por poder usar a terra do outro/ou qual é o acordo de vocês?			

5. DESCRIÇÃO DO LOTE PRINCIPAL DA FAMÍLIA (HOMEM)

Desenho do lote principal da família com distribuição espacial dos diferentes modos de utilização atual, os elementos seguintes devem ser abordados. (Pode dar uma pagina branca ao agricultor para que ele desenhe ou o entrevistador pode desenhar com os indicações do agricultor)
5.1. Tipos de uso (roça, capoeira, pastagem, mata) e idade de cada tipo. Identificar a roça atual da família.
5.2. Tamanho dos tipos de utilização (unidades: ha, linhas, braços)
5.3. Tipo de solos (escrever em geral o tipo de solo - arenoso, barro vermelho/terra roxa, barro amarelo, terra preta associado com cada uso)
5.4 Outras informações gerais do lote: casa, criação de animais, estrada, rio, lago, igarapé, casa de farinha
5.6. Em geral, quais são as razões pelas quais você decidiu de cultivar aqui (referente ao desenho feito) e não em outro lugar em seu lote? (nesta questão as respostas não deverão ser citadas ao entrevistado).
tipo de terra ☐ declive ☐ distancia da casa ☐ problema com vizinhos/animais ☐
idade da mata: capoeirinha ☐ capoeirão ☐ mata bruta ☐ outro:

INSTRUÇÕES DO DESENHO

- Os tipos de uso deverão ser escritos no desenho;
- As seguintes legendas deverão ser utilizadas no desenho:

1) Roça atual ●

2) Escrever os Tipos de Solos:

Solo arenoso	Barro vermelho/terra roxa
Barro amarelo	Terra preta

3) Indicar o nome dos vizinhos (esquerda, direita, frente e atrás)

DESENHO DO LOTE

6. PRODUÇÃO AGRÍCOLA FAMILIAR (HOMEM)

Gostaria de saber mais sobre a produção da família. E só roçado ou a **família** produz algo também no quintal? SIM ☐ NÃO ☐

6.1. Qual a quantidade de cada produto a **família** tem produzido desde o começo da última estação de chuva? Não essa estação de chuva de agora (que iniciou em out/Nov 2010), mas a anterior? (**família** *significa todas as pessoas que moram na mesma casa*).

6.2. Sempre produz essa mesma quantidade? Se não, como é a sua produção normalmente?

(Completar a tabela para cada lote, mesmo se a família usa o lote de outra pessoa para roçar, referir as respostas das perguntas 4.1. e 4.10.)

(Anotar todas as variedades que plantaram. Para a produção, anotar a quantidade e a unidade, não é necessário saber a produção de cada variedade).

Nome da variedade	6.1. Quantidade produzida			6.2. É sempre assim/é comum?
	Lote 1 (Principal)	Lote 2(ou lote de outro)	Lote 3 (ou lote de outro)	
Arroz				Sim ☐ Não ☐ Se não, que quantidade produz em geral:
1)				
2)				
Mandioca (maniva)				Sim ☐ Não ☐ Se não, que quantidade produz em geral:
1)				
2)				
Farinha				Sim ☐ Não ☐ Se não, que quantidade produz em geral:
1)				
2)				
Milho				Sim ☐ Não ☐ Se não, que quantidade produz em geral:
1)				
2)				
Feijão				Sim ☐ Não ☐ Se não, que quantidade produz em geral:
1)				
2)				
3)				
Banana (em cachos)				Sim ☐ Não ☐ Se não, que quantidade produz em geral:
1)				
2)				
3)				
Outro				Sim ☐ Não ☐ Se não, que quantidade produz em geral:
Outro				

6.3. Do total produzido, quanto foi vendido desde o começo da última estação de chuva? Não essa estação de chuva de agora (que iniciou em out/Nov 2010), mas a anterior?

6.4 Qual o valor total arrecadado para cada produto em todo ano? (É a soma das vendas feitas para a quantidade total vendida).

6.5. A maior parte dos produtos, onde a família vende?

6.6. A maioria do tempo, é por que meio? *(Insistir em verificar se a venda é direta mesmo. Às vezes o agricultor fala que é direto, mas vende por meio de atravessador mas não menciona).*

	6.3. Quantidade vendida	6.4. Valor total arrecadado com a venda no ano (R\$)	6.5. A maior parte, onde vende Cidade ☐ Qual: Na comunidade mesmo ☐ Outra comunidade ☐ Qual:	6.6. A maioria do tempo, por que meio Atravessador (barco) ☐ Atravessador (estrada) ☐ Direto ☐
Arroz				
Mandioca				
Farinha				
Milho				
Feijão				
Banana				

			Outra comunidade ☐ Qual:	
Outro			Cidade ☐ Qual: Na comunidade mesmo ☐ Outra comunidade ☐ Qual:	

6. Produção agrícola familiar e relação com o consumo (Mulher)

A **família** faz agricultura? Sim ☐ Não ☐ E só roçado ou a **família** produz algo também no quintal? Sim ☐ Não ☐

Dos produtos produzidos pela família (*referir á tabela anterior*):

6.7. Que quantidade de cada produto você acredita ter comprado para o consumo **em família** desde o começo da última estação da chuva? Não essa estação de chuva de agora (que iniciou em out/Nov 2010), mas a anterior?

6.8. Qual o valor pago para a quantidade comprada de cada produto?
(SEMPRE ESCREVER A UNIDADE)

Produto	6.7.Quantidade comprada para consumo familiar	6.8. Preço (R\$)/unidade
Arroz		
Farinha		
Milho		
Feijão		
Banana		
Outro		
Outro		
Outro		

6. Quantidade comprada para produzir HOMEN

Dos produtos produzidos que você já mencionou (*referir á tabela anterior*):

6.9. Que quantidade de cada produto você acredita ter comprado para produzir **em família** desde o começo da última estação da chuva? Não essa estação de chuva de agora (que iniciou em out/Nov 2010), mas a anterior?

6.10. Qual o valor de compra de cada um dos produtos?

	6.9.Quantidade comprada para produzir (para plantar)	6.10. Preço da compra (R\$/unid)
Arroz		
Macaxeira		
Farinha		
Milho		
Feijão		
Banana		
Outro		
Outro		

7. Trabalho na roça (Se o trabalho principal do entrevistado NÃO FOR agricultura, ir para a questão 10.):

7.1. Para finalizar um trabalho completo na roça, quantos dias demora normalmente para? (nomear cada etapa na tabela) (Homem)

7.2. Quantas pessoas ajudam você para cada uma das atividades?(Homem)

(Se não realiza alguma das etapas abaixo, colocar zero nas 3 colunas)

Dias de trabalho	Dias (nº) para o dono (colocar a unidade da área, como linha p.e.)	Dias (nº) com ajudante	Ajudantes (nº)
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Brocar e derrubar a capoeira ou mata e queima

Adubar

Plantar

Capinar

Colher

Processar, transformar

7.3. Lembre quem trabalhou (troca de trabalho e trabalho remunerado) na roça da família no último ano (ou seja, desde o começo da última estação da chuva? Não essa estação de chuva de agora (que iniciou em out/Nov 2010), mas a anterior? (Homem)

Quem? (Nome ou apelido + IDI) Vizinho (V), Parente (P), Empregado (E), Amigo (A)	Esta pessoa sempre trabalhou com você? Ou foi somente uma vez?	Meio de pagamento Pagamento R\$ (P) ou Troca de Diária (D)
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7.4. Lembre quem trabalhou (*troca de trabalho e trabalho remunerado*) com a **família** para fazer farinha no último ano (ou seja, desde o início da última estação de chuva)? (Homem)

Quem? (Nome ou apelido + IDI) Vizinho (V), Parente (P), Empregado (E), Amigo (A)	Esta pessoa sempre trabalhou com você? Ou foi somente uma vez?	Meio de pagamento Pagamento R\$ (P) ou Troca de Diária (D)
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8. FERRAMENTAS, PRÁTICAS E MÉTODOS DE TRABALHO (Homem)

8.1. Quais equipamentos (mecanizados) vocês (na família) utilizam no roçado?	S/N	8.2. Há quantos anos usa?	8.3. É sua (S/N)?	8.4. É de quem (Nome ou apelido + IDI) (especificar também se + de uma pessoa)
Motosserra				
Roçadeira (a gasolina)				
Outro:				
Outro:				

8.5. Você utiliza fogo para fazer seu roçado? Sim ☐ Não ☐

8.6. O que vocês fazem para manter a força do solo?	S/N	8.7. Há quantos anos usa?	8.8. Que produto usa?	8.9. Que quantidade comprou desde o início da última estação da chuva? (colocar a unidade se Kg, sacos, litros..)
Fertilizantes químicos				
Outra técnica:				

8.10. O que vocês fazem para controlar as pragas? (insistir para que o entrevistado fale de outra técnica que ele possa usar para diminuir ou acabar com pragas)	S/N	8.11. Há quantos anos usa?	8.12. Que produto usa?	8.13. Que quantidade comprou desde o início da última estação da chuva? (colocar a unidade se Kg, sacos, litros..)
Inseticidas, fungicidas, pesticidas químicas				
Outra técnica:				

9. EXPERIMENTAÇÕES E MUDANÇAS AGRÍCOLAS (INDIVIDUAL)

(Se o trabalho principal do entrevistado NÃO FOR agricultura, ir para a questão 10.):

9.1. Você já fez algo diferente no seu roçado ou sempre faz da mesma maneira? (o entrevistador deverá falar de cada opção de práticas ao entrevistado para as questões 9.5 a 9.8):

Práticas	9.1. Já experimentou?	9.2. Se não, gostaria de fazer?	9.3. Descrição do que foi feito e resultados	9.4. continua ainda hoje	9.5. Se não, Por que ?
Plantar mandioca, arroz, feijão ou milho em conjunto com arvóres ou outros tipo de plantas (por exemplo, mandioca entre diferente tipo de arvóres)?	Sim ☐ Não ☐ Se sim, Quando?	Sim ☐ Não ☐		Sim ☐ Não ☐	
Trocar plantas que você usa habitualmente para novas variedades (ex : feijão de leite, etc).	Sim ☐ Não ☐ Se sim, Quando?	Sim ☐ Não ☐		Sim ☐ Não ☐	
Organizar seu roçado (Plantar em linhas, com menor espaçamento entre plantas, com cultivos alternados...)	Sim ☐ Não ☐ Se sim, Quando?	Sim ☐ Não ☐		Sim ☐ Não ☐	
Adubar o solo com plantas (p.e. plantar leguminosas e deixar partes da planta no solo)	Sim ☐ Não ☐ Se sim, Quando?	Sim ☐ Não ☐		Sim ☐ Não ☐	

9.6. Você fez alguma outra coisa nova, diferente na sua maneira de roçar ou produzir nos últimos anos? Sim ☐ Não ☐

(caso o comunitário faça referência ao projeto PLUPH, explicar que não necessariamente as formas de cultivar do projeto mas perguntar de qualquer mudança que eles fizeram, qualquer coisa diferente que eles fizeram).

(Nesta questão, não aceitar o primeiro não como resposta, explicar a pergunta e insistir com o entrevistado perguntando: Mas você não mudou nada na sua roça? Não fez nada de diferente, sempre faz tudo igual todos os anos?)

Prática	9.7. Descrição do que foi feito e resultados	9.8. continua ainda hoje Sim ☐ Não ☐	9.9. Se não continua, por que?
		Sim ☐ Não ☐	
		Sim ☐ Não ☐	

9.10. E de onde veio estas idéias de fazer algo diferente na roça ou no quintal? (Se o comunitário citar o nome de alguém, colocar o IDI ou referência da pessoa)

9.11. Se você não fez nada diferente, por que não fez?

10. TROCAS DE SEMENTES, MUDAS, E PLANTAS (GERAIS E TAMBÉM MEDICINAIS) (INDIVIDUAL)

10.1. De quem buscou e obteve mudas, sementes ou plantas de remédio (plantas medicinais) aqui na comunidade?

(A pergunta deve ter uma cadência de conversa, começando com de quem buscou e listar as plantas e todas as demais questões associadas, isto é, deve completar toda a linha para aquela pessoa citada. E por que você escolhe ele pra te fornecer essas plantas e não outra pessoa na comunidade? E como é o acordo entre vocês? Ela te dá a planta ou Você dá algo em troca?)

10.2. Quais plantas buscou? (especificar o tipo, p.e., mandioca – preta, feijão – de leite)?

10.3. Sempre quando precisa, busca essa planta com essa pessoa? (essa questão é para identificar se a pessoa citada é a principal fonte de fornecimento de sementes/mudas/plantas para a pessoa entrevistada, ou se é somente pontual).

10.4. Por que buscou com essa pessoa?

10.5. Por que meio obteve? Dado (D), Compra (C)

10.1. De quem buscou? (nome/apelido+ IDI)	10.2. Quais plantas (<u>variedade</u>) ?	10.3. Sempre quando você precisa destas plantas, pega com essa mesma pessoa? ou foi só uma vez?	10.4. Por que buscou com essa pessoa e não com outra?	10.5. Por que meio?
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10.6 Você já buscou mudas e/ou sementes **fora daqui da comunidade**? **Sim** ☐ **Não** ☐

10.7. Quais plantas buscou? (**quais plantas** deve ser descrita a variedade. Não somente feijão, mas p.e. feijão de leite;

10.8. De quem você buscou essas plantas? De onde é a pessoa de quem buscou? (**de quem buscou** pode ser pessoa de outra comunidade ou um projeto, instituição, programa)

10.9. **SEMPRE QUANDO VOCÊ PRECISA DESTAS PLANTAS, PEGA COM ESSA MESMA PESSOA? OU FOI SÓ UMA VEZ?** (pessoa/projeto/instituição...)?

10.10. Deu algo em troca? Se sim, o que? **Dado (D)**, **Compra (C)**

10.6. De quem buscou? (nome/apelido+ IDI)	10.7. Quais plantas (variedade)?	10.8. Nome da comunidade ou da Instituição/projeto/programa	10.9. Sempre quando você precisa destas plantas, pega com essa mesma pessoa? Ou foi só uma vez?	10.10. Deu algo em troca (S/N)? O que?

11. CRIAÇÃO DE ANIMAIS (HOMEM)

11.1. A família têm gado (Se não, vai para 11.5)? 11.2. Quantas cabeças têm (a família, seja o total dos gados de todos que moram na mesma casa)?
Sim ☐ Não ☐

11.3. Qual é o motivo mais importante pra família criar gado? (pergunta aberta, não dar as respostas. O ajudante deverá marcar em função da resposta aberta).

Venda ☐ Consumo de carne ☐ Leite ☐ Poupança ☐ Outro:

11.4. Se vende, quanto (R\$) ganhou no último ano com a venda de gado?

11.5. Cria outros tipos de animais ? (se a família não tem nenhum animal, ou para os animais que não tem, preencher com zero) (HOMEM)

11.5. Quais?	11.6. A família tem quantos?	11.7. Vendeu no último ano? (S/N)	11.6. A família tem quantos?	11.7. Vendeu no último ano? (S/N)
Ave			Cavalo	
Porco			Cabra	
Outro:			Outro:	

12.1. Pediu?	(A) Sim, pedido do agricultor ou da comunidade/associação	(B) Sim, mas iniciativa da prefeitura, ater, ou outra instituição
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12.3. Qual foi o tipo de apoio financeiro?	(1) Crédito Agrícola	(2) Empréstimo Pessoal	(3) Incentivos (projetos/programas)	(4) Outros				
12.4. E você recebeu (S/N)? 12.5. Se não, Por que não recebeu? 12.6. De que instituição foi emitido o apoio financeiro? (FONTE, P.E., BANCO) 12.7. Qual o nome do programa/projeto de onde pediu o apoio financeiro? 12.8. Se recebeu, quando recebeu? E se pediu e não recebeu, quando pediu? 12.9. De quanto foi o apoio financeiro? (Pode ser em dinheiro ou material)								
(MESMO QUE A RESPOSTA SEJA NAO, A TABELA DEVERA SER COMPLETADA)								
12.1 Pediu?	12.2. Se não, pq?	12.3. Tipos	12.4. Recebeu	12.5. Se não, por que?	12.6. De que instituição foi emitido	12.7. De qual programa/projeto	12.8. Quando? (ano)	12.9. Quanto (R\$, ou material)?

12. SUPORTE TÉCNICO E CAPACITAÇÃO (HOMEN E MULHER)

A família já pediu algum tipo de Suporte Técnico para roçado, produção ou qualquer outra atividade (você, seus filhos, sua mulher)? (MESMO QUE A RESPOSTA SEJA NAO, A TABELA DEVERA SER COMPLETADA)

12.10. Pediu?	(A) Sim, pedido do agricultor ou da comunidade/associação (B) Sim, mas iniciativa da prefeitura, ater, ou outra instituição
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12.11. Se não, descreva por que jamais pediu.

12.12. Qual foi o tipo de suporte técnico?	(1) Capacitação, Formação	(2) Assistência Técnica
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12.13. E você recebeu? (S/N)

12.14. Se não recebeu, por que não?

12.15. Qual o assunto ou em que área foi o suporte técnico?

12.16. Quando foi e qual a duração?

12.17. Quantas visitas, encontros ou aulas teve durante o curso?

12.18. Que instituição deu o suporte técnico?

12.19. Você sabe o nome do técnico que deu o suporte técnico?

12.10. Pediu?	12.11. Se não, pq?	12.12. Tipos	12.13. Recebeu?	12.14. Se não, por que?	12.15. Nome/Assunto	12.16. Quando e duração?	12.17. Frequencia	12.18. Nome da instituição/projeto/programa	12.19. Nome do Técnico(s)
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13. BOLSAS E ASSISTÊNCIAS SOCIAIS (MULHER)

13.1. A família recebe alguma bolsa do governo? Sim ☐ Não ☐

13.2. Se sim, quais são?

13.3. e quanto ganha por mês?

13.4. quando começou o primeiro pagamento? (colocar o ano do primeiro pagamento do primeiro filho).

13.2. Bolsa	13.3. Quanto é (R\$/mês)	13.4. Quando ?
Bolsa família. ☐		
Para quantas crianças ?		
Bolsa jovem. ☐		
Para quantos jovens ?		
Bolsa auxílio natalidade ☐		
Outras: ☐		

14. BOLSAS FLORESTA (INDIVIDUAL)

A bolsa floresta é um programa público para as comunidades rurais que tem como objetivo de preservar uma quantidade definida de mata ou de capoeirão nos lotes particulares ou comunitários. O programa funciona da seguinte maneira: o comunitário se compromete a não cortar uma parte do lote dele em troca de um pagamento mensal. (Falar ao entrevistado que a pergunta é uma suposição, a bolsa não existe no Pará e não há previsão de sua implementação).

14.1 Você já ouviu falar dos programas de bolsa floresta ou de pagamentos para a proteção do meio ambiente que existem no estado do Amazonas e do Acre? Sim ☐ Não ☐

14.2. Se sim, onde ouviu?

☐ Alguém da comunidade

☐ No rádio

☐ Numa reunião (instituição :

☐ Folhetos (instituição:

) ☐ Outros lugares :

14.2. Se você recebesse R\$ 50,00 por mês para preservar uma parte da sua mata, quanto você aceitaria preservar? (em hectares, linhas)

14.3. E você acha que seria melhor que esse pagamento fosse pago totalmente à família, ou fosse dividido metade pra família, metade pra comunidade?

Totalmente à família ☐ dividido com a comunidade ☐ Nada em dinheiro para a família, tudo pago em forma de serviços para a comunidade ☐

15. RELAÇÕES SOCIAIS E PRODUÇÃO (INDIVIDUAL)

(Nas questões de redes e relações sociais, não se deve considerar o primeiro NÃO como resposta definitiva. Deve-se insistir com o entrevistado para falar alguns nome. Geralmente o não é a primeira resposta. Deve-se insistir em uma conversa como p.e.: Mas não tem ninguém na comunidade que você pode conversar a respeito de questões que são importantes pra você?...)

TROCA DE INFORMAÇÕES

15.1. Com quem você conversa **aqui na comunidade** sobre assuntos importantes? Qualquer assunto importante para você.

(se a pessoa não responder, perguntar: mas o que é importante pra você, na sua vida? Então, sobre isso, com quem você conversa aqui na comunidade?)

15.2. Por que você conversa com esta pessoa?

15.1. Nome/ apelido + IDI	15.2. Por que conversa com esta pessoa?
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Se o trabalho principal do entrevistado NÃO FOR agricultura, ir para a questão 16:

Você troca informações com alguém que você acha importante para fazer seu trabalho de agricultura?

15.3. **NA COMUNIDADE?** Sim ☐ Não ☐

15.4. Com quem conversa?

15.5. Por que conversa com esta pessoa?

15.4. Nome, IDI, Sexo (M/F)		15.5. Por que conversa com esta pessoa?
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Você troca informações com alguém que você acha importante para fazer seu trabalho de agricultura?

15.6. com alguém **de OUTRAS COMUNIDADES?** Sim ☐ Não ☐

15.7. Com quem conversa? (Se for alguém dentre as comunidades do PLUPH, São Tomé, Araipá ou Nova Estrela, anotar o IDI também)

15.8. De que comunidade é esta pessoa? Em que comunidade essa pessoa mora?

15.9. Por que conversa com esta pessoa?

15.7. Nome +IDI+ Sexo (M/F)	15.8. Nome comunidade/localização	15.9. Por que conversa com esta pessoa?
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Você troca informações com alguém que você acha importante para fazer seu trabalho de agricultura?

15.10. com **ALGUÉM DO GOVERNO (MUNICIPAL, ESTADUAL OU FEDERAL), ONGs, ASSOCIAÇÕES, UNIVERSIDADE, EMPRESAS?** Sim ☐ Não ☐

15.11. Com quem conversa?

15.12. Essa pessoa trabalha onde (instituição)? Qual é a ocupação desta pessoa (cargo da pessoa na instituição citada)?

15.13. Por que conversa com esta pessoa?

15.11. Nome + Sexo (M/F) .	15.12. Instituição/cargo	15.13. Por que conversa com esta pessoa?
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Você troca informações com alguém a respeito de novas práticas agrícolas para seus cultivos e quintais? (aqui, as novas práticas seriam experimentações ou novas maneiras de plantar / práticas que tentam diminuir o uso do fogo, de produtos químicos, que protegem a fertilidade do solo, que aumentam a diversidade de plantas....)

15.16. NA COMUNIDADE? Sim ☐ Não ☐

15.17. Com quem conversa?

15.18. Por que conversa com esta pessoa?

15.19. Você conversa com essa pessoa sobre os plantios do projeto PLUPH?

15.17. Nome + IDI	15.18. Por que conversa com esta pessoa?	15.19. Falam sobre os plantios do PLUPH? (S/N)
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15.20. com alguém de OUTRAS COMUNIDADES? Sim ☐ Não ☐

15.21. Com quem conversa?

15.22. De que comunidade é esta pessoa? Em que comunidade essa pessoa mora? (Se das comunidades do PLUPH, escrever o IDI)

15.23. Por que conversa com esta pessoa?

15.21. Nome + IDI + Sexo (M/F)	15.22. Nome comunidade/localização	15.23. Por que conversa com esta pessoa?
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15.25. Com quem conversa?

15.26. Essa pessoa trabalha onde (instituição)? Qual é a ocupação desta pessoa (cargo da pessoa na instituição citada)?

15.27. Por que conversa com esta pessoa?

15.25. Nome + Sexo (M/F)	15.26. Instituição/cargo	15.27. Por que conversa com esta pessoa?
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16. EXTRATIVISMO DA MATA E DA CAPOEIRA, E DO QUINTAL (INDIVIDUAL)

16.1. Quais produtos **a família** busca na mata e na capoeira?

Madeira ☐ Sim ☐ Não ☐ Animais (caça) ☐ Sim ☐ Não ☐

Produtos de palmeira (Palha, frutos, palmito, etc) ☐ Sim ☐ Não ☐ quais palmeiras:

Frutas ☐ Sim ☐ Não ☐ quais:

Plantas medicinais ☐ Sim ☐ Não ☐ quais:

16.2. Onde a família vai para procurar este produtos? É em sua própria mata ou na mata de outro? ☐ Mata própria ☐ Mata de outro ☐
Se a mata é de outra pessoa, de quem é? Se usa a mata de outras pessoas, há algum acordo para o uso?

16.3. Quais produtos **a família** tem no quintal?

Frutas ☐ Sim ☐ Não ☐ quais:

Plantas medicinais ☐ Sim ☐ Não ☐ quais:

Outro:

16.4 Você nota mudanças no ambiente natural, p.e. número de peixes pescados, o tamanho dos peixes pescados, a condição da floresta (queimada, desmatamento), a disponibilidade (quantidade) de madeira, frutos ou outros produtos ☐ Sim ☐ Não (Individual)

16.5. Quais são essas mudanças? 16.6. Sabe o por que acontece isso? O por que dessas mudanças?

Se você notar mudanças no ambiente natural, vocêalaria com alguém sobre isso? (p.e. número de peixes pescados, o tamanho dos peixes pescados, a condição da floresta (queimada, desmatamento), a disponibilidade (quantidade) de madeira, frutos ou outros produtos)

16.7. **Aqui na comunidade:** Sim ☐ Não ☐

Nome + IDI

Por que conversa com esta pessoa?

16.8. com alguém de outras comunidades? Sim ☐ Não ☐

Nome + IDI + Sexo (M/F)	Nome comunidade / localização	Por que conversa com esta pessoa?
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16.9. com alguém do governo (municipal, estadual ou federal), ONGs, Associações, Universidade ou empresas:

Nome + Sexo (M/F)	Instituição/cargo	Por que conversa com esta pessoa?
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17. EXTRATIVISMO DO MEIO AQUÁTICO (INDIVIDUAL)

17.1. Você pesca? Sim ☐ Não ☐ (se a resposta for não, ir para a pergunta 17.5.)

17.2. Por que pesca? (as alternativas não devem ser ditas ao entrevistado)

venda na comunidade ☐ venda na cidade ☐ venda atravessador ☐ consumo ☐ lazer ☐ troca ☐

17.3. Que quantidade você pescou no último mês?

Kg/mês ou peixes/mes

17.4. Onde você foi pescar no último mês (as alternativas não devem ser ditas ao entrevistado).

Tapajós ☐ Lago Araipa ☐ Na Boca ☐ No Paraná ☐ Lago Grande Enseada ☐ Cupu ☐ Igarapé ☐ Outro ☐

TROCA DE PEIXES (MULHER)

17.5. Quando a **família** quis ou precisou de peixes, de quem buscou? (Se das comunidades do PLUPH, escrever o IDI, se não, escrever também o nome da comunidade).

17.6. Quais peixes buscou desse pessoa?

17.7. Sempre quando precisa, busca peixes com essa pessoa? Ou so foi uma vez?

17.8. Por que buscou com essa pessoa?

17.9. Por que meio obteve? Dado (D), Compra (C)

17.5. Nome, IDI e Sexo (M/F)	17.6. Quais peixes ?	17.7. Sempre quando precisa, busca peixes com essa pessoa? Ou so foi uma vez?	17.8. Por que buscou com essa pessoa?	17.9. Por que meio?
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Nós agora queremos conhecer um pouco mais sobre o seu trabalho como pescador. (se não pesca, ir para a pergunta 18.) (individual)

17.10. Você troca informação com alguém que seja útil para você fazer seu trabalho de pesca? ☐ Sim ☐ Não (com quem você pode conversar sobre o trabalho, os bons lugares pra pescar, as espécies pescadas, o equipamento de pesca, melhor época do ano, melhor horário, etc).

17.11. Com quem conversa? (Se das comunidades do PLUPH, escrever o IDI, se não, escrever também o nome da comunidade).

17.12. Por que você conversa com essa pessoa

17.11. Nome, IDI (ou comunidade) e Sexo (M/F)	17.12. Por que conversa ?
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17.13. Há alguma(s) pessoa(s) **de quem você depende** para fazer seu trabalho de pesca? ☐ Sim ☐ Não (p.e. alguém de quem você empresta voadeira, malhadeira (redes), alguém que você procura pra pescar com você, etc)

17.14. Você depende de quem? (Se das comunidades do PLUPH, escrever o IDI, se não, escrever também o nome da comunidade).

17.15. Por que você depende dessa pessoa?

17.13. Nome, IDI (ou comunidade) e Sexo (M/F)	17.14. Por que depende desta pessoa?
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17.15. Há alguma(s) pessoa(s) **que depende(m) de você** para fazer o trabalho de pesca dela(s)? ☐ Sim ☐ Não (p.e. alguém para quem você empresta voadeira, malhadeira (rede), alguém que solicita sua companhia, presença para pescar, etc)

17.16. Quem depende de você? (Se das comunidades do PLUPH, escrever o IDI, se não, escrever também o nome da comunidade).

17.17. Por que esta pessoa depende de você?

17.16. Nome, IDI e Sexo (M/F)	17.17. Por que?
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18. SAÚDE - QUALIDADE DE ÁGUA E DIARRÉIA (MULHER)

18. SAÚDE (INDIVIDUAL)

18.1. Onde a **família** pega a água? (não deve ser falada as alternativas ao entrevistados, somente anotado o que for descrito). (MULHER)

☐ rio ☐ igarapé ☐ poço próprio ☐ poço de outra pessoa, de quem: ☐ outro:

18.2. O que tipo de tratamento de água a família faz? (não deve ser falada as alternativas ao entrevistados, somente anotado o que for descrito).

☐ cloro ☐ filtro ☐ ferver ☐ outros :

18.3. Quais foram os últimos problemas de saúde **da comunidade** em geral? (insistir um pouco por que ele pode falar de problemas da família primeiro)
(Ind)

18.4. E para resolver os problemas de saúde da comunidade (como este(s) que você citou), o que você fez para resolvê-los? E para problemas de acesso e qualidade dos serviços públicos, médicos e medicamentos você fez algo para resolvê-los? (registrar os passos que o entrevistado tem que seguir até resolver um problema de saúde da comunidade. A resposta seña no sentido de verificar se o comunitário se interessa pelos problemas comunitários de saúde e se faz algo a respeito). (Ind)

18.5. Quais foram **seus** últimos problemas de saúde? (Ind)

18.6. Você teve diarreia nos últimos 6 meses ? ☐ Sim ☐ Não (Ind)

Episódios de diarreia na **família** (A **família** **significa** todas as pessoas que moram na mesma casa). **MULHER**

18.7. Quem na família teve diarreia nos últimos 6 meses? (Nome + IDI)	18.8. Ficou doente quantos dias?	18.9. buscaram serviço de saúde (S/N) onde foram? Brasília Legal (B), Itaituba (I), Aveiro (A), Santarém (S), outro lugar (O)	18.10. Se não buscaram serviço de saúde, por que não buscaram?
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18.11. Que remédio a família usou para tratar esses casos de diarreia? **MULHER**
☐ Plantas medicinais ☐ Medicamentos ☐ Outro:

19. INFORMAÇÕES SOBRE A SAUDE (INDIVIDUAL)

Sobre as questões de saúde da comunidade (sobre as doenças ou problemas recorrentes na comunidade, acesso e qualidade dos serviços públicos, médicos, medicamentos) você conversa com alguém a respeito?

19.1. **NA COMUNIDADE** Sim ☐ Não ☐

19.2. Nome + IDI + Sexo (M/F)	19.3. Por que conversa com esta pessoa?
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Sobre as questões de saúde da comunidade, você conversa com alguém a respeito?

19.4. com **ALGUÉM DE OUTRA COMUNIDADE**? Sim ☐ Não ☐

19.5. Nome + IDI	19.6.comunidade/localização	19.7. Por que conversa com esta pessoa?
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19.8. Você **CONVERSA COM ALGUÉM DO GOVERNO (MUNICIPAL, ESTADUAL OU FEDERAL), ONGs, ASSOCIAÇÕES, UNIVERSIDADE, EMPRESAS**, com quem é? Sim ☐ Não ☐

19.9. Nome	19.10. Instituição/cargo	19.11. Por que conversa com esta pessoa?
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20. QUALIDADE DE VIDA (INDIVIDUAL)

20.1. Você gostaria de continuar a viver aqui na comunidade? Sim ☐ Não ☐ / Quanto tempo mais você acha que vai viver aqui na comunidade?

20.2. Gostaria que os seus filhos ficassem? Sim ☐ Não ☐

20.3. Mas acredita que seus filhos vão continuar na comunidade e viver da terra? Sim ☐ Não ☐

(Para questões 20.4 a 20.6, utilizar o cartão de satisfação e usar a metodologia dos Feijões)

20.4. Você está satisfeito com o tempo livre que tem?

20.5. Você está satisfeito com a sua saúde?

20.6. Você está satisfeito com a sua vida, em geral?

20.7. O que falta para melhorar?

21. PARTICIPAÇÃO EM PROJETOS (INDIVIDUAL)

VOCÊ PARTICIPA OU JÁ PARTICIPOU DE ATIVIDADES DE (A) extração/manejo de produtos da floresta (frutas, madeira,...), (B) de recursos aquáticos (peixes) ou (C) de agricultura? (Escrever na tabela se Tipo A, B, ou C)

Qual atividade? (por exemplo, extrativismo de babaçu, extrativismo de castanha, manejo de Madeira, manejo de pirarucu, projeto de agroecologia, safes, etc) Quanto tempo durou a atividade?

Como começou?

Com quem colaborou nesta atividade?

Por que colaborou com esta pessoa?

Quais os benefícios em colaborar com esta pessoa nesta atividade?

Quais os problemas de colaborar com esta pessoa nesta atividade?

Você participa ou já participou de atividades de: (A) extração/manejo de produtos da floresta (frutas, madeira,...), (B) de recursos aquáticos (peixes) ou (C) de agricultura?

21.1.1. **NA COMUNIDADE:** Sim ☐ Não ☐ (Se o comunitário responder somente o projeto PLUPH, seguir diretamente para as questões 21.31).

Tabela Parte I

21.2. Tipo de atividade	21.3. Nome da atividade	21.4. Duração (ano de início e fim)	21.5. Como começou?	21.6. Com quem colaborou/colabora? Nome + IDI
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Tabela Parte II

Tipo de atividade	21.7. Por que colaborou com esta pessoa?	21.8. Quais os benefícios desta colaboração?	21.9. Quais os problemas desta colaboração?
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Você participa ou já participou de atividades em: (A) extração/manejo de produtos da floresta (frutas, madeira,...), (B) de recursos aquáticos (peixes...) ou (C) de agricultura alternativa/ sustentável?

21.10. juntamente **COM OUTRAS COMUNIDADES**: Sim ☐ Não ☐

Tabela Parte I

21.11. Tipo de atividade	21.12. Nome da atividade	21.13. Com quem colaborou/colabora?	21.14. Duração (ano de início e fim)	21.15. Como começou?	21.16. Comunidade e localização
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Tabela Parte II

Tipo de atividade	21.17. Qual foi a sua função/participação?	21.18. Por que colaborou com esta pessoa?	21.19. Quais os benefícios?	21.20. Quais os problemas?
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Você participa ou já participou de atividades juntamente com pessoas do governo (municipal, estadual ou federal), ONGs, Associações, Universidade, empresas: (A) manejo de produtos da floresta (frutas, madeira,...), (B) de recursos aquáticos (peixes) ou (C) de agricultura?

21.21. juntamente COM PESSOAS DO GOVERNO (MUNICIPAL, ESTADUAL OU FEDERAL), ONGs, ASSOCIAÇÕES, UNIVERSIDADE, EMPRESAS: Sim ☐ Não ☐

Tabela Parte I

Tipo de atividade	21.22. Nome da atividade	21.23. Com quem colaborou/colabora?	21.24. Duração (ano de início e fim)	21.25. Como começou?	21.26. Instituição e cargo
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Tabela Parte II

Tipo de atividade	21.27. Qual foi a sua função/participação?	21.28. Por que colaborou com esta pessoa?	21.29. Quais os benefícios?	21.30. Quais os problemas?
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21.31. Você participa ou já participou de alguma atividade do projeto PLUPH (reuniões, plantio, trabalho, coleta de dados, etc.)

Sim ☐ Não ☐

21.32. Se sim, quais atividades:

Reuniões ☐ Trabalho (diarista, ajudante) ☐ Entrevistas ☐ Entrega de resultados ☐

Coleta de sangue ☐ Despedidas/eventos ☐ Plantios (demarcação/plantar mudas) ☐ Outros ☐

21.33. Você já foi visitar os plantios do PLUPH?

Sim ☐ Não ☐

21.34. Se sim, você foi

somente durante atividades de visita organizadas pelo projeto PLUPH ☐ visitar por iniciativa própria ☐

Por quais razões foram visitar os plantios?

Trabalho ☐ Parentes/vizinho/amigo ☐

Curiosidade/interesse ☐ Outros ☐

Por quais razões não foram visitar os plantios?

Não tem tempo ☐ Distância/acesso ☐

Não tem curiosidade ☐ Outros ☐

21.35. Pra você, quais os principais benefícios desses plantios, sobre a maneira de cultivar que o projeto PLUPH fez?

21.36. Pra você, quais os principais problemas desses plantios, da maneira de cultivar do projeto PLUPH? (Falar ao entrevistado que queremos aprender, queremos melhorar e pra isso precisamos conhecer os problemas que eles vêem nos plantios, as críticas. Tudo isso para não se repetir depois. Mesmo que não seja uma crítica sua, seja algo que ouviu na comunidade, pode expressar aqui).

- Deixar em aberto a pergunta. Caso @entrevistad@ não fale, citar as etapas do plantio e insistir um pouco para ele falar dos problemas.

- Etapas: Escolha dos donos das áreas dos plantios, escolha dos lugares/lotês para os plantios, escolha das plantas/ composição florestal, calendário e época dos plantios, inclusão de toda a comunidade nas atividades do plantio.

ANNEXE 2 – Questionnaire de la collecte de données 2012 et Guide à l'intention des intervieweurs

Questionário familiar Campo de pesquisa PLUPH 2012

IDI :

Nome :

Data da entrevista : (/ /)

Entrevistador(es) :

Parte 1 – Relação entre o meio ambiente, a saúde e a renda

1.1 Você acha que existe uma relação entre estes elementos do meio ambiente e a sua vida em geral, a sua família. (Sabendo que o objetivo é de entender o efeito na saúde e na renda?)

1.2 Se tiver uma relação, explicar o processo, como que o acontece, segundo você

1.3 Se tiver uma relação, qual é a importância deste vínculo para a família?

Colocar um enfoque em efeito na **saúde** e na **renda/subsistência/lucro**

Elementos	1.2 Processo – Descreva a maneira, porque tem uma relação, como que acontece	1.3 Importância da relação
Água (Consumo, limpeza, Peixes)	Resposta espontânea	Resposta após conversa
		Nenhuma () Pouca () Média () Grande ()

	Resposta espontânea	Resposta após conversa	
Mata/Capoeira			Nenhuma () Pouca () Média () Grande ()
Roça/Pasto			Nenhuma () Pouca () Média () Grande ()
Plantio definitivo/Quintal			Nenhuma () Pouca () Média () Grande ()

Ar/Clima	Resposta espontânea	Resposta após conversa	Nenhuma () Pouca () Média () Grande ()
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Parte 2 – Saúde

2.1 Para cada problema de saúde, indicar quantos dias cada membro da família ficou doente nos últimos 6 meses. (Se não for doente, coloca “0”)

2.2 Quando esta pessoa ficou doente, ela continuou a atividade principal dele/dela?

Pergunta : Nos últimos 6 meses, alguém da família teve (...) Sim ? Quem? Sim ? Quantos dias?

2.3 Para cada problema de saúde, indique o que a família fez para tratar este problema, a última vez que aconteceu a um dos membros da família. Se usou mais que um meio de tratamento, escreve em sequência do que foi feito.

Categorias : Medicamentos comprados (M), Remédio caseiro, natural (C), Hospital (H), Posto de saúde (P), Nada (N)

2.4 Para cada problema de saúde, indique o que a família faz para se prevenir deste problema? (Só aqueles em branco)

Problema de saúde	Membro da família	Quantos dias	Continuou trabalhar / ir na escola? (Atividade principal)	Meio de tratamento	Meio de prevenção
Gripe			S () – N ()		
Dor de cabeça			S () – N ()		
Febre			S () – N ()		

Malaria				S () – N ()		
Reumatismo				S () – N ()		
Asma (crônica)				S () – N ()		
Problemas respiratórios				S () – N ()		
Acidente de trabalho				S () – N ()		
Machucado				S () – N ()		

Parte 3 - Bolsas e pagamentos condicionais

Agora vamos falar de bolsas, auxílios ou de outros tipos de programas públicos de pagamentos.

A idéia é de saber a sua opinião sobre este tipo de programa de bolsas do governo.

3. A sua família recebe bolsa, auxílio ou outra forma de pagamento do governo?

() – Sim

() – Não

Qual?

Qual é o valor mensal?

3.1 Para receber uma bolsa família, aposentadoria ou outras bolsas do governo, tem que fazer inscrição, cadastro. Para fazer todo este processo de cadastro quais são as principais etapas?

Quanto tempo demorou?

Comentários :

3.2 Aqui, quando as famílias recebem bolsa família ou aposentadoria, tem que ir pegar no banco todo mês?

() – Sim

() – Não

Como que se faz? O que você acha disso?

3.2.1 Para você, ir na cidade para ter acesso ao dinheiro é :

() – Impossível

() – Difícil

() – Chato

() – Fácil

3.2.2 Quanto custa para você ir na cidade? (Ida e volta + refeições)

De dinheiro : () R\$ e de tempo : () Dias, horas

3.3 Desde que você recebe bolsa família ou aposentadoria (ou outra bolsa), o que mudou. Até qual ponto?

3.3.1 Na sua alimentação?

3.3.2 Na sua produção agrícola? Uso de adubos? Ferramentas? Equipamentos?

3.3.3 Na sua produção pecuária?

3.3.4 Na vontade de sair ou de ficar na comunidade? Do seus filhos?

3.3.5 Na necessidade de ir na mata (Pegar frutos, palha, caçar etc...)?

3.3.6 Na sua saúde?

3.3.7 No transporte?

3.3.8 Outras coisas?

Agora vamos falar do meio ambiente e de bolsas :

3.4 O que seria uma boa maneira de limitar o desmatamento aqui na comunidade, falando de programas, incentivos do governo ou investimentos de qualquer forma?

3.5.1

Você acha que dar uma bolsa para as famílias rurais é uma boa maneira de limitar o desmatamento, de derrubar menos?

Sim () – Não ()

5.5.2 Porque?

3.6 Além de evitar o desmatamento, como você acha que ajudaria as famílias daqui? (Em termo de coisas para fazer com o dinheiro)

3.7 Falando de bolsa para evitar o desmatamento, se tiver aqui na comunidade e que o valor total na comunidade está limitado (no sentido que tem que dividir um valor total que recebe a comunidade). Como que deveria ser?

() – Distribuídos igualmente com todas as famílias da comunidade

() – Distribuídos igualmente com todos os adultos da comunidade

() – Relativos ao esforço de cada um, ao trabalho que cada um faz, como que cada um se dedica.

() – Relativos ao tamanho do lote de cada família

() – Uma maneira de ajudar as famílias mais pobres, com menos renda. (Por exemplo : as famílias mais pobres receberiam mais bolsas ou capacitações que as outras.

() – Outra maneira

3.8 Se tivesse alguma ajuda agrícola ou pecuária em termo de capacitação, apoio técnico e de dinheiro, você concordaria fazer menos roça ou menos criação de animais e, no lugar disso, fazer em vez :

(Perguntar cada possibilidades)

Plantio de frutas	S () – N ()
Plantio consorciado	S () – N ()
Produção de mel	S () – N ()
Produção de óleo (Andiroba, copaíba)	S () – N ()
Artesanato	S () – N ()

3.9 Para não derrubar um hectare, você acharia justo de receber o equivalente da renda dum hectare de mandioca ou de arroz, em dinheiro?

() – Sim

() – Não

3.9.1 Se não, seria justo :

() – Mais

() – Menos

3.9.2 Porque?

3.9.3 Em lugar disso, você acha melhor de não receber dinheiro do governo, de viver da sua terra? De ser independente?

() – Sim

() – Não

Comentários:

Questionário familiar Campo de pesquisa PLUPH 2012

Guia do entrevistador

Este guia foi preparado para ajudar os entrevistadores em fazer uma entrevista boa e que seja igual em cada vez. São apenas indicações em como perguntar e como direcionar a conversar para ter respostas validas e de qualidade. Não é necessário seguir exatamente o que está escrito aqui, é um guia para se referir no caso.

Tem três partes :

1. Relação e percepção do vínculo entre o meio ambiente, a saúde e a renda
2. Saúde da família
3. Bolsas e pagamentos condicionais

Parte 1 – Relação entre o meio ambiente, a saúde e a renda

Nesta parte, a ideia é de ter uma conversa sobre o meio ambiente ao redor da comunidade e o meio ambiente em geral com ligação à saúde das pessoas e das famílias.

Perguntando, é importante deixar a pessoa falar duma maneira espontânea em primeiro. No caso for difícil para a pessoa responder, pode discutir um pouco sobre o assunto e dar exemplos duma situação ou explicar duma maneira pictórica.

Perguntas:

- 1.4 Você acha que existe uma relação entre estes elementos do meio ambiente e a sua vida em geral, a sua família. (Sabendo que o objetivo é de entender o efeito na saúde e na renda?)
- 1.5 Se tiver uma relação, explicar o processo, como que o acontece, segundo você
- 1.6 Se tiver uma relação, qual é a importância deste vínculo para a família?

Sempre colocar um enfoque nos efeitos na saúde e na renda/subsistência

Definição dos elementos do meio ambiente

Água :

- Tudo que é relativo à água na vida do entrevistado : Rio, igarapé, lago, nascente, poço, cacimba.
- Os usos e os benefícios e desvantagens percebidos pelo entrevistado e que tem uma ligação com a saúde e a renda dele e da família.

Mata/Capoeira :

- A mata mesma (floresta) e as capoeiras.
- Os usos e os benefícios e desvantagens percebidos pelo entrevistado e que tem uma ligação com a saúde e a renda dele e da família.

Roça/Pasto :

- A roça, o pasto, juquiras, solo nu, e as atividade que se pratica neste lugar : roça, criação de animal.
- Os usos e os benefícios e desvantagens percebidos pelo entrevistado e que tem uma ligação com a saúde e a renda dele e da família.

Plantio definitivo/Quintal

- Os plantios que não são roça ou algo parecido e que é definitivo (as plantas ficam através do tempo) (Exemplo: plantio de cacau, de frutíferas). Pode ser também o quintal perto da casa.
- Os usos e os benefícios e desvantagens percebidos pelo entrevistado e que tem uma ligação com a saúde e a renda dele e da família.

Ar/Clima

- Tudo que é relativo ao clima tanto no local, na região e no geral. As condições do tempo (chuva, seca, calor, frio, vento), qualidade do ar e também os efeitos na roça, plantio, criação, transporte etc..
- Os usos e os benefícios e desvantagens percebidos pelo entrevistado e que tem uma ligação com a saúde e a renda dele e da família.

Parte 2 – Saúde

Para esta parte, é só perguntar sobre os problemas de saúde que houve **nos últimos 6 meses**. É importante anotar bem o nome da pessoa que teve o problema e quantos dias demorou para curar (ou ficar melhor), se esta pessoa continuou ou não a atividade normal dele/dela (seja trabalhar ou cuidar da casa para os adultos ou ir na escola para as crianças/adolescentes) e o meio de tratamento que foi usado. Ao final, perguntar sobre os meios de prevenção usados neste momento de doença ou duma maneira geral.

2.1 Para cada problema de saúde, indicar quantos dias cada membro da família ficou doente nos últimos 6 meses. (Se não for doente, coloca “0”)

2.2 Quando esta pessoa ficou doente, ela continuou a atividade principal dele/dela?

Pergunta : Nos últimos 6 meses, alguém da família teve (...) Sim ? Quem? Sim ? Quantos dias?

2.3 Para cada problema de saúde, indique o que a família fez para tratar este problema, a última vez que aconteceu a um dos membros da família. Se usou mais que um meio de tratamento, escreve em sequência o que foi feito.

Categorias : Medicamentos comprados (M), Remédio caseiro, natural (C), Hospital (H), Posto de saúde (P), Nada (N)

2.4 Para cada problema de saúde, indique o que a família faz para se prevenir deste problema?

Parte 3 - Bolsas e pagamentos condicionais

Esta parte é dedicada as bolsas que recebem as famílias da comunidade. Falamos tanto do Bolsa Família, Auxílio maternidade, Bolsa estudos, Aposentadoria. No começo, é bom falar das bolsas duma maneira geral, para abrir a conversa.

3. A sua família recebe bolsa, auxílio ou outra forma de pagamento do governo?

() – Sim

() – Não

Qual?

Qual é o valor mensal?

3.1 Para receber o bolsa família, aposentadoria ou outras bolsas do governo, tem que fazer inscrição, cadastro. Para fazer todo este processo de cadastro quais são as principais etapas?

Quanto tempo demorou?

Comentários :

3.2 Aqui, quando as famílias recebem bolsa família ou aposentadoria, tem que ir pegar no banco tudo mês?

() – Sim

() – Não

Como que se faz? O que você acha disso?

3.2.1 Para você, ir na cidade para ter acesso ao dinheiro é :

() – Impossível

() – Difícil

() – Chato

() – Fácil

3.2.2 Quanto custa para você ir na cidade? (Ida e volta + refeições)

De dinheiro : () R\$ e de tempo : () Dias, horas

3.3

A partir daqui, falamos especificamente da/das bolsa/bolsas que a família recebe cada mês.

A ideia é de entender as mudanças no dia a dia da família desde que eles recebem a bolsa.

É bom ter certeza mais do que uma vez que a mudança foi causada pela bolsa mesma, por causa duma aumenta na renda geral da família.

Definição dos temas:

Alimentação : Se tiver uma mudança na alimentação geral da família. Diversidade de alimentos, alimentos industriais, alimentos para bebês, quantidade, qualidade

Produção agrícola: Se tiver uma mudança na produção agrícola (roça) no geral. Aumentou, diminuiu, parou, equipamentos, gasolina, diarista, adubo.

Produção pecuária: Se tiver uma mudança na produção pecuária (criação de gado) no geral. Aumentou, diminuiu, parou, equipamentos, diarista, alimentos.

Vontade de sair ou de ficar: Se tiver mudança na vontade do entrevistado ou da família de se deslocar da comunidade. Por onde? Ou de ficar. Porque?

Na necessidade de ir na mata: Se tiver mudança na necessidade de ir pegar produtos da mata. Caça, frutos, medicina tradicional, castanha, bacaba, palha, madeira etc...

Saúde : Se tiver mudança no nível geral da saúde do entrevistado ou da família duma maneira geral em comparação à situação anterior.

Transporte: Se tiver mudança na maneira de se deslocar da comunidade para ir para outras comunidades ou para a cidade. Aumentou, diminuiu, mudou o meio de transporte.

Outras coisas : Se tiver outras coisas que mudaram desde que recebe bolsa.

3.4 – Bolsa e meio ambiente

Esta parte é dedicada ao meio ambiente e as bolsas. É importante começar a conversa sobre este assunto sem falar diretamente de programa que já existe em outros lugares como Bolsa Floresta ou Proambiente. Vai ter gente que vão falar deste programas porque já conhece e vai ter gente que não conhece.

3.4

Pergunta:

O que seria uma boa maneira de limitar o desmatamento aqui na comunidade, falando de programas, incentivos do governo ou investimentos de qualquer forma?

- Deixar a pessoa falar e explicar as ideias dele para diminuir o desmatamento em geral na comunidade

3.5.1

Pergunta:

Você acha que dar uma bolsa para as famílias rurais é uma boa maneira de limitar o desmatamento, de derrubar menos?

Sim () – Não ()

3.5.2 Porque?

3.6

Pergunta:

Além de evitar o desmatamento, como você acha que ajudaria as famílias daqui? (Em termo de coisas para fazer com o dinheiro)

3.7

Pergunta:

Falando de bolsa para evitar o desmatamento, se tiver aqui na comunidade e que o valor total na comunidade está limitado (no sentido que tem que dividir um valor total que recebe a comunidade). Como que deveria ser?

- () – Distribuídos igualmente com todas as famílias da comunidade
- () – Distribuídos igualmente com todos os adultos da comunidade
- () – Relativos ao esforço de cada um, ao trabalho que cada um faz, como que cada um se dedica.
- () – Relativos ao tamanho do lote de cada família
- () – Uma maneira de ajudar as famílias mais pobres, com menos renda. (Por exemplo : as famílias mais pobres receberiam mais bolsas ou capacitações que as outras.
- () – Outra maneira

3.8

Pergunta:

Se tivesse alguma ajuda agrícola ou pecuária em termo de capacitação, apoio técnico e de dinheiro, você concordaria fazer menos roça ou menos criação de animais e, no lugar disso, fazer em vez :

(Perguntar cada possibilidades)

Plantio de frutas	S () – N ()
Plantio consorciado	S () – N ()
Produção de mel	S () – N ()
Produção de óleo (Andiroba, copaíba)	S () – N ()
Artesanato	S () – N ()

3.9

Pergunta:

Para não derrubar um hectare, você acharia justo de receber o equivalente da renda dum hectare da sua roça (seja: mandioca, arroz, milho, feijão), em dinheiro?

() – Sim

() – Não

3.9.1 Se não, seria justo :

() – Mais

() – Menos

Quanto:

3.9.2 Porque?

3.9.3 Em lugar disso, você acha melhor de não receber dinheiro do governo, de viver da sua terra? De ser independente?

() – Sim

() – Não

Porque?

Comentários: