Introducing Functional Time Use (FTU) Analysis: A Gender-Sensitive Approach to Labor Time

by

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Abstract

This paper introduces and applies the functional time use (FTU) analysis towards understanding inequalities in a developing country context and the relevant relationships among the use of time, gendered divisions of labor, and the household economy. In so doing, it proposes one way of approaching time poverty, a concept increasingly used in the development literature. An empirical study from the Tsimane' village of Campo Bello, a remote indigenous community in the Bolivian Amazon, provides an analysis of the people's daily time use with a special interest in their use of labor time. The findings illustrate a heavier overall labor burden on the female population across all age groups. The paper also argues for FTU analysis as tool for gender-sensitive analysis that has the potential to inform the work of development practitioners.

Biography

Lisa Ringhofer, PhD, is a Program Manager for Latin America and Development Research Officer at Hilfswerk Austria International, an Austrian NGO which works in the field of poverty alleviation in over 30 countries worldwide. Trained as a sociologist, her research focuses on theoretical, analytical, and empirical aspects of society-nature interactions within the framework of sustainability science and the development discourse. She is especially interested in local level biophysical resource management including time use and has worked extensively with indigenous peoples in Bolivia, Nicaragua, and Colombia. She is also working as a lecturer at the Institute for International Development and the Department of Anthropology at the University of Vienna. For correspondence: lisa.ringhofer@univie.ac.at.

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INTRODUCTION

Inequality is a major challenge to development. It may take different forms, from income inequality, restricted social, economic, and political rights, to unequal access to and control over property and resources. These forms often have intrinsic gender dimensions. One form of inequality that has received substantially less attention in the development literature is the distribution of time burdens within a population. The application of a time lens can enrich the understanding of poverty and inform poverty alleviation strategies. The allocation of time among men, women, and children in the household and in the economy is indeed a major gender issue in the evolving discourse on time poverty (Charmes 2006, Blackden and Wodon 2006, Kes and Swaminathan 2006).

In broad terms, "time poverty" can be understood as the burden of competing claims on a person's time that constrains his or her ability to choose how individual time resources are allocated. This, in many cases, leads to an increased workload and to trade-offs among various tasks (Kes and Swaminathan 2006: 16). These may be short-term trade-offs between different productive activities, market and household tasks, or between meeting short-term economic and household needs, and long-term investments in future capacities and human capital. The negative impact of these trade-offs can be observed in various dimensions of poverty such as food security, child nutrition, health, and education.

Examining time use in a developing country context is important for at least three interrelated reasons: First, empirical time use data show what people actually do in their daily lives and therefore provide valid information on work and labor allocation. Second, gaining insights into a gendered labor division also enhances our understanding of poverty. Third, time use studies also reveal the existence of a whole realm of human activity, namely the "household economy" that is a largely invisible domain and unaccounted for in economic data and in the system of national accounts.[1] A gender-sensitive time use analysis of the allocation of unremunerated household work is a field of research that is still nascent and insufficiently explored, but which performs the critically important function of providing policy makers and development practitioners with a much more complete picture of a household's short-term time opportunities and constraints.[2]

In light of this, the paper has two goals. First, it introduces and applies functional time use (FTU) analysis in order to understand inequalities in a developing country context and the relevant relationships among the use of time, gendered divisions of labor, and the household economy. Second, the paper makes a case for the application of FTU analysis as a method for gender-sensitive analysis in development fields. Toward this end, the paper argues for FTU analysis as one way of approaching the concept of "time poverty." I begin by introducing the theoretical concept and methodology of FTU analysis, followed by a description of the case study, a Tsimane' village called Campo Bello in the Bolivian Amazon. The research findings are organized in the following manner: Initially, the potentially disposable time for labor at the village level for different age/sex groups throughout their life-cycle is discussed. In a next step, I go more deeply into the number of person hours—in terms of sex and age groups—invested in

each of four functional systems: the *person system*, the *household system*, the *economic system* and the *community system*. Then I consider the local tools and tactics for increasing time efficiencies in Campo Bello. Finally, I will assess the potential of FTU analysis for informing the work of development practitioners.

FUNCTIONAL TIME USE (FTU) ANALYSIS: THEORY AND METHODOLOGY

Functional time use analysis was originally developed as part of the Material-and-Energy-Flow-Analysis (MEFA) framework, which describes the interaction between social and natural systems and establishes quantitative indicators on the use of materials, energy, land and time. In this context, a social system (e.g. human society) is functionally differentiated and has clear boundaries in relation to outside elements (for more information see Fischer-Kowalski and Haberl 2007, Singh et al. 2010). More recent attempts have detached FTU analysis from the MEFA framework as one possible methodological approach to operationalizing the concept of "time poverty" (Ringhofer 2011). This paper contributes to the latter efforts since it examines the burden of competing claims on the people's time in the Tsimane' village of Campo Bello.

Conceptually, FTU analysis departs from the fact that human time is a fixed and evenly distributed resource: each individual has 24 hours per day at his or her disposal. One fraction of daily time needs to be expended on certain metabolic functions (like sleeping or eating) necessary for an individual's basic reproduction, while the remainder is used according to sociocultural norms, economic necessities, or simply individual preferences. Rather than analyzing the use of time as a personal resource of individuals, the FTU analysis considers human time as a resource at the system level. In a certain social system (e.g. a village), the total amount of human time is "created" by demographic reproduction (the birth of new individuals) on the one hand, and an individual's life expectancy (total hours over the lifespan), on the other hand. Based on a detailed demographic analysis, FTU analysis therefore offers a macroscopic look at how human time is used throughout a 24-hour period on the village level. Such a holistic systemic approach, which contrasts with previous time use traditions within sociology and anthropology,[3] gives insights into the amount of (potential) labor time available in the whole village system and hints to the specific constraints, but also to opportunities in terms of time use. Since the lifetime/labor time ratio is calculated for all the age/sex groups in the system, FTU sheds light on the "labor burden" or "time poverty" some of these groups are bearing.

Methodologically, I distinguish four time-relevant subsystems of the social system: (1) the *person system*, (2) the *household system*, (3) the *economic system*, and (4) the *community system.* I allocate the time spent on various activities to the respective functional system that is being reproduced. In terms of coding and classification, Johnson's[4] (1975) activity code was taken as a base (see the codes below assigned to individual activities). In a further step, every activity, together with its specific code, was assigned to one of the four functional systems.[5]

The *person system* functionally serves personal reproduction and includes all those activities that cannot be delegated or "outsourced" to others. It holds all the physiologically necessary functions for a person's self-reproduction, such as sleeping and eating, and it encompasses functions for extended reproduction, such as studying, leisure activities or idling. Breaking down into single activities, the *person system* comprises sleeping (SL), eating (ET), hygiene (HY), rest and idleness (ID), leisure activities (LE), and study and education (SC). Hygiene may, for

instance, involve river bathing, or the morning toilet. Rest and idleness generally entails periods of inactivity. Study and education constitutes the time spent at school and the time for doing homework or studying for exams. Leisure refers to periods of deliberate self-entertainment.

The *household system* serves as the organizational frame for biological reproduction and fulfils the function for basic day-to-day reproduction as a group (like child rearing and food preparation), and the functions that ensure the long-term maintenance of the household (like repair/maintenance work). The *household system* is typically organized as an exchange of unpaid labor according to the sociocultural norms regulating age and gender roles in society. Time use for the *household system* contains the following activities: care for dependents (CC), food preparation (FP), house building (HB), repair/maintenance work (MR), and domestic chores (D). Care for dependents involves child care and care for the sick and elderly. Food preparation entails all activities related to food processing (e.g. the husking and peeling of rice). House building hosts the collection and preparation of wood and other forest items for the construction of infrastructure. Repair and maintenance constitutes all activities required to sustain the physical household infrastructure such as the manufacture of household appliances, for instance. Finally, domestic chores considers shopping, the fetching of food and water, firewood collection, or clothes and dish washing.

The *economic system* reaches beyond the household even if part of its function consists in supplying households and persons with life-sustaining commodities (with economic "food provision" being sometimes hard to distinguish from the household's "food preparation"). The *economic system* reproduces, in a division of labor and functional interdependence beyond the household, the society. In market-based societies, it usually functions on the basis of paid labor. In small-scale non-industrialized societies (such as the case study to be discussed), economic activities may simply be an additional function of households or communities. Economic activities include all preparatory tasks for economic investments (e.g. manufacture and preparation of working tools, general repair, handicraft for subsequent sales), as well as directly productive tasks (e.g. harvesting, fishing, hunting). The following activities are distinguished: agriculture (AC), hunting (H), fishing (F), gathering (G), trading (TD), wage work (W), kitchen garden (HG), manufacture of handicraft (MF), and animal husbandry (AN). For agriculture/ horticulture (AC), the range of activities included should reflect the entire agricultural cycle from land preparation to cultivation, weeding and harvesting of crops. The time for gathering (G) may sometimes be difficult to measure since especially men do not necessarily engage in separate gathering trips but do gathering as a side activity during hunting expeditions. Trading (TD) may involve the bartering of produce or monetary transactions on the market. Wage work (W) includes all kinds of paid work, from short-term to more permanent placements. Kitchen garden (HG) subsumes all activities related to its maintenance, and manufacture of handicraft (MF) entails both the manufacture of tools for hunting, fishing or agriculture as well as the making of items for direct market sale. Finally, animal husbandry (AN) considers both the direct (e.g. feeding or milking) as well as indirect reproductive activities (e.g. building and fixing stables, fencing, etc.).

Finally, the *community system* is the reference system for activities contributing to the reproduction of services on the community level, reciprocal relationships, social cohesion, politics and religion. It subsumes public sports and games (PL), visiting friends and relatives (VS), ceremonies and festivals (RI), communal work and political participation (PO).

With these conceptual and methodological foundations in mind, the next sections examine the implementation of a FTU analysis in the empirical case setting of Campo Bello, Bolivia. I will first provide some background on village life, followed by a discussion of the research findings.

A STUDY ON TIME AND LABOR: THE CASE OF THE TSIMANE' (BOLIVIA)

The Study Site: The Village of Campo Bello

The indigenous Tsimane' community of Campo Bello is situated along the lower Maniqui River in the Bolivian Amazon plains. The village lies within the buffer zone of the Beni Biosphere Reserve and is about a day's canoe journey downriver from the market town of San Borja. In the absence of proper roads, the community can be accessed only by canoe, motor-driven boats or on foot. The households are dispersed along both river banks and dwellings are built in the immediate vicinity of the water, mostly on elevated alluvial terraces. The villagers tend to live in single-family dwellings within extended family clusters. Families regularly practice *sobaqui*, visiting relatives for extended periods that may last for several days. Group gatherings and communal feasts are important leisure activities. Such gatherings are marked by ubiquitous quantities of manioc beer, which may exclusively be produced by skillful women.

The contemporary Tsimane' belief system has somewhat merged its traditional spiritual domain with Christian elements that have been introduced by missionaries fairly recently. Campo Bello's natural resource use, however, is still regulated by a traditional norm system. The land, the river, the shore, the forest and all game and plant resources within the village compound are under communal ownership and transformation from communal to private property can only take place through the input of human agricultural labor (Godelier 1986). Once a forest patch is cleared for gardening by community members, it becomes theirs and people are automatically granted traditional tenure rights.

Campo Bello's village economy rests upon four main pillars: (1) slash-and-burn agriculture, (2) fishing and foraging, (3) small livestock farming, (4) and occasional wage labor. Slash-and-burn farming takes up the central place (in terms of time use, labor, and monetary inputs) and consists of cultivating crops for one to two years in plots cleared from old-growth forests, after which lands remain fallow and the forest is allowed to regenerate. Rice as the most important crop makes up for approximately 40% of all cash income in the community, but the villagers also grow other staples like plantains, maize, and manioc, as well as some peanuts, sugar cane, and sweet potato varieties. Every year, one to two new fields are opened per household with an average size of about 0.1 ha/cap (hectare per capita).[6] The technology employed in agriculture is simple, using only machetes, hoes and rice seeders for the sowing of rice. Much of the rice is sold on the market for cash immediately after the rice harvest, while plantains are generally marketed throughout the year. Manioc and maize are largely grown for subsistence and only occasionally bartered or sold on the market.

The local diet is complemented by protein sources from fishing and foraging that account for about one-fifth of total nutritional energy inputs into the village system (Ringhofer 2007, 2010). At various seasons of the year, entire families engage in fishing trips, either to the river, the close lagoon or to one of the smaller streams nearby. They use a variety of fishing techniques ranging

from hooks, bow and arrows to more elaborate fishing nets. Hunting is an exclusively male domain and requires a large repertoire of specific skills and spiritual knowledge. Small livestock farming is only of minor importance to the community and is restricted to poultry farming and some pig rearing.

About two-thirds of all the local households engage in temporary outside labor migration with an annual average length of 38 working days per household. At the time of research, most wage laborers worked as agricultural farmhands, cattle ranchers, in road construction and with logging firms all outside the community. In 2004, wage labor opportunities were exclusively carried out by men, though a handful of women joined the wage labor market indirectly, as companions of their husbands for longer working periods on cattle farms. The most intensive agricultural wage labor period, between August and November, coincides with the highest agricultural labor needs in the village. Hence, when peak opportunities overlap, households with a greater number of economically active members are in a better position to diversify and exploit multiple sources of income. Wage labor is usually sold by younger men, with a peak period in a man's twenties. While cash earnings from agricultural exports tend to be spent for everyday household commodities that likely benefit the whole family, cash from wage labor is controlled by men and usually spent on status goods like a radio, a watch or a bicycle. It is not typical for the Tsimane' to send remittances back while away on wage labor, since they are frequently paid a lump sum at the end of their labor commitment.

Campo Bello's population has been growing in recent years, at an annual rate of 3.8%.[7] Age distribution resembles that of a fast-growing society, with many infants and youths and relatively few elderly people.[8] At the time of study, a total of 231 individuals living in 41 households comprised the village population.

Over the past decades, the village has witnessed a number of development projects introduced by the local administration and nongovernmental agencies. Development efforts include the construction of a school building made of concrete in 1993 and the installation of several individual latrines and concrete wells. In 2006, a project involved various families in the cultivation of pigeon beans accompanied by the raising of chickens in order to enhance nutrition. More recently, farmers who had participated in experimental studies on cash crop cultivation were provided with rice seeders to shorten the rice planting process.

The Research Framework

The aims of this empirical research on functional time use analysis were three-fold. Based on a detailed demographic village-level analysis, the first aim was to gain insights into the potentially disposable time for labor of the different age/sex groups in Campo Bello. Which age/sex group faces most time constraints, and where lie most opportunities for labor throughout a person's life-cycle? This entails a discussion on culturally transmitted and socially ascribed gender roles and the stringency of sexual labor division. The second aim was driven by the interest in which age/sex group invests how much of their daily time in each of the four subsystems: the *person system*, the *household system*, the *economic system*, and the *community system*. This analysis illustrates the specific labor time contribution of the different age/sex groups. The third aim was to examine local tactics for increasing the efficiency of time and who benefits from these tactics.

Building on the discussion of these findings, I also examine the potential of FTU analysis as a gender-sensitive tool for informing development practice.

Methods of Data Collection

Data collection took place between August 2004 and February 2005, followed by additional observations in April and May 2006 in order to capture seasonal variations, however slight. Observational methods (continuous observation and random visits/spot checks) and self-reporting methods (household interviews) were both used for cross-checking. Concerning observation, the sample consisted of 18 individuals from different households who, on random days in 2004 and 2005, were each observed for a 14-hour daytime period (6:00am to 8:00pm).[9] This observation was repeated in 2006 for a subset of seven individuals from the same sample. The data from these individuals were then combined into averages to create a generic profile of the specific age/sex category.[10]

To increase data reliability and validity, additional spot checks, household interviews, and repeated observations of certain activities were used. For the spot checks, I largely followed Johnson's (1975) strategy for selecting households and chose a sample of 14 households within 20 minutes of my own residence. These households generally welcomed my visits (visiting is an intricate part of Tsimane' social life) and accepted my observational behavior. Each household was visited at four randomized times of the same day for a 15-minute period each time and notes were taken of what the active household members present at the time were engaged in.[11] This was repeated for all the selected households, arriving at a total of 112 spot check observations.

Furthermore, a total of 11 random household interviews were conducted and cross-checked with other empirical data. In these interview settings people were asked about the main activities they engage in during the course of a week. This method proved particularly useful for getting a better idea of the duration and frequency of (especially) productive tasks. For the study of labor time inputs for the main agricultural activities, a focus group was organized at the end of my field visit. The group setting consisted of 18 women and men, all of whom had also been previously involved in the time use studies. The participants were asked about the number of work days required to do all the different tasks within the entire rice production process. All household interviews and the focus group were carried out with the support of a local translator bilingual in Spanish/Tsimane'. Certain activities, especially those related to the agricultural cycle, were also observed repeatedly. Activity records include frequent observations of manioc beer production or the planting of manioc and who participated in them (in terms of age and sex). These activities were then weighted according to their annual frequency and thus the average daily hours calculated.

Some Methodological Challenges

Some of the methodological problems encountered were the lack of night-time sampling, the difficulty with measuring multiple and discontinuous behaviors, as well as, at certain instances, a clear distinction between activities related to economic food provision and a household's food preparation.

First, due to a lack of night time sampling, the time spent during the night time hours is based on grounded estimates. Second, people frequently engage in several overlapping activities. Confronted with this problem plus the practical unfeasibility of timing the sequence of some activities (e.g. hunting and gathering), I followed White's (1976) recommendation by allocating half of the period to each activity. On occasions when the dominant activity was obvious, at least in my subjective perception, only the sequence of the primary activity was accounted for. Third, probably the most taxing challenge was the functional distinction between economic food provision and a household's food preparation. This may especially be the case when activities are performed out of the usual surrounding. For instance, what if manioc tuber is peeled directly in the field where it is uprooted? Would this be accounted for as food preparation time or still as part of a woman's agricultural activities? For this analysis, it was decided to account for it as part of the food preparation process within the household system, regardless of the spatial performance of tasks. Similarly, the time invested in commodities manufactured for both the *household* and *economic systems* (e g. the fabrication of a mortar and a pestle for husking rice, part of which gets sold at a later stage) was subsumed under the *household system*. Only the time invested in the manufacture of directly productive commodities, such as hunting or fishing gear, or handicraft destined for later selling, was subsumed within the *economic system*. Fourth, travel time was not accounted for separately but added to the activity with which it was associated. This decision was due to the fact that distances (to gardens and fallow fields, neighbors, etc.) were relatively short.[12]

SOME EMPIRICAL FINDINGS

The Potentially Disposable Economic Labor Time throughout the Life-Cycle

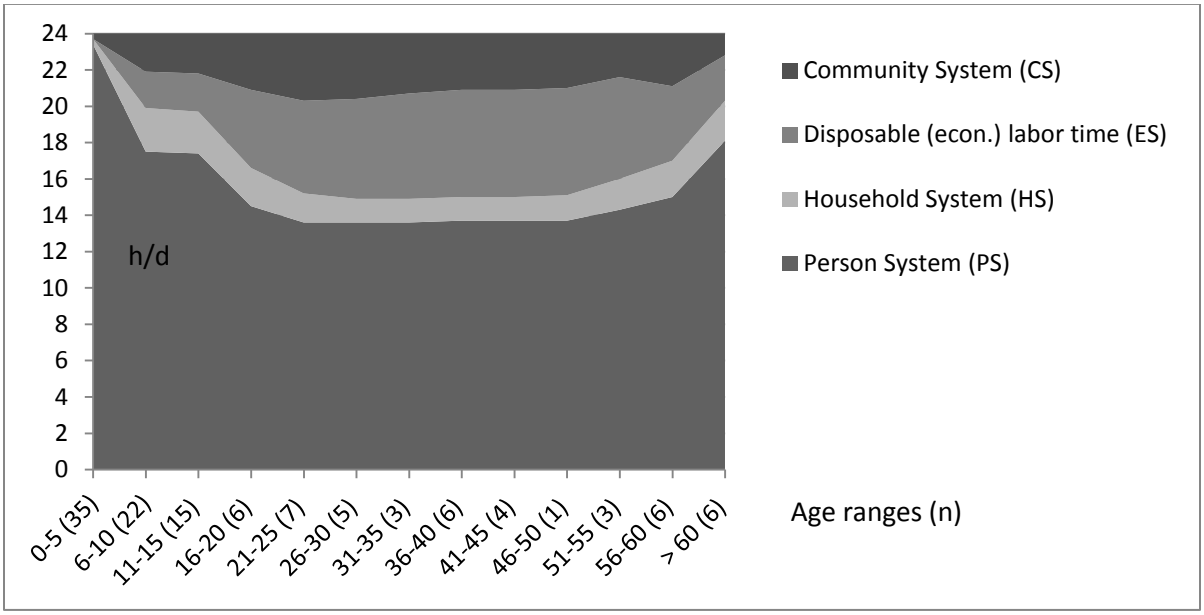

Figure 1: Male time use by age group, Campo Bello, 2004, 2006

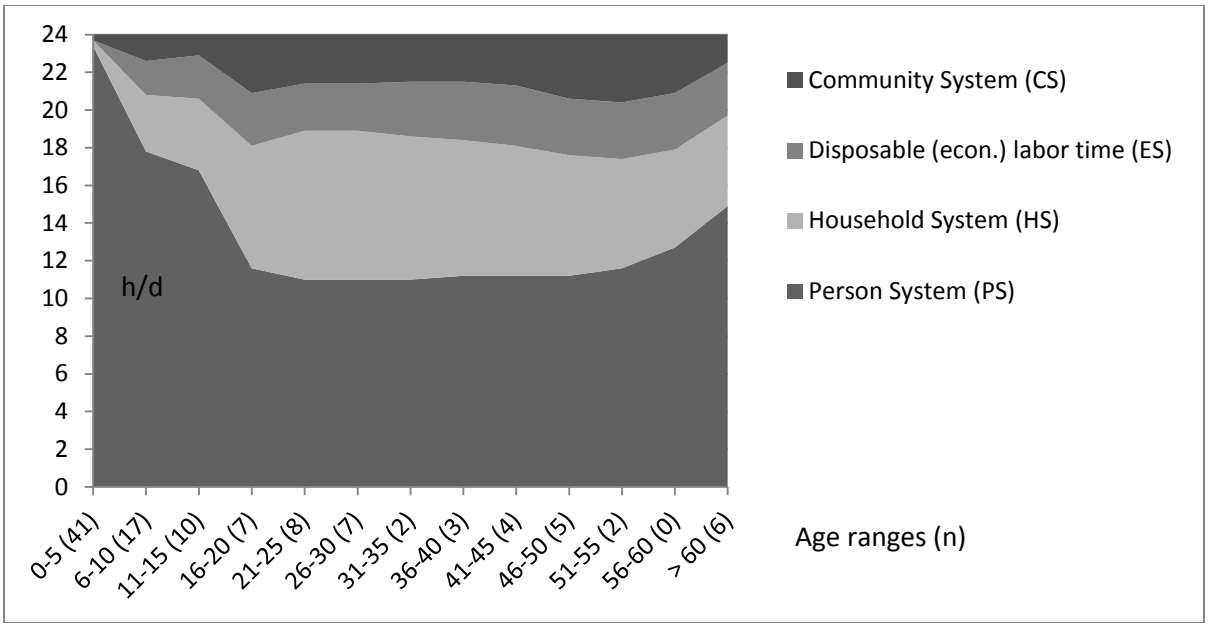

Figure 2: Female time use by age group, Campo Bello, 2004, 2006

Figures 1 and 2 show how much time a person in Campo Bello can potentially invest in economic labor throughout his/her life-cycle, coupled with population numbers per age range. This demographic data needs consideration when examining which age/sex group faces most capacity and capability constraints and where most opportunities for economic labor lie.[13]

With the Tsimane', the transitional process for children from completely dependent recipients of parental time to more active economic producers starts at a relatively early age—sometime around the age of 4 or 5. The age group 0- to 5-year-olds has the highest number of individuals of both sexes but has limited (physical) resources to contribute to the community's labor time. The next age group, 6- to 10-year-olds (22 boys/17 girls), constitutes the second highest labor time contributors due to their large population and indeed they present an important workforce in terms of domestic chores, child care and light agricultural tasks. But besides the physical constraints it is the educational demands that limit this age group's disposable labor time. School classes take up four hours daily and most children aged 6 to 10 attend regularly.

For both sexes, this age range represents a crucial socialization period. Boys generally aid with house building and maintenance work and engage in agricultural activities, while girls aid their mothers in sewing clothes and, most importantly, care for younger siblings. The sexual division of labor takes place rather gradually and, at least in the initial stages of this socialization process, is not imposed too stringently. By ages 11 to 15, children are turning into adolescents—physically and socially. Around the age of 12, a boy starts to cultivate his own agricultural fields, even if this seems to be more of an educational activity. With physical capacity constraints diminishing, educational demands still present the most limiting factor for the disposal of more labor time. In 2004, the proportion of boys and girls from 11 to 15 still attending school classes accounted for almost 80%.

For the Tsimane' girls, the transition to married life is more abrupt than for boys. By the age of 16 or 17, most girls are married or have an infant. Boys this age, however, may engage in erratic

wage labor away from the community and those who remain in the village begin to work in agriculture in earnest, often tending several active fields at the same time. From the ages 21 to 25, the investment of male labor is to a large extent used up in outside wage labor. A few are pressured to do so by former employers due to the accumulation of debts from previous labor engagements, but the majority of men seize casual labor opportunities elsewhere because they want to. In a Tsimane' man's lifecycle, this is probably the most flexible and "freest" time of his life, while a woman's time resources are largely used up by reproductive activities for the *household system*. With small children to take care of, a woman almost exclusively has to bear the time costs of child rearing. It is in fact one of the most time-consuming and difficult stages of a woman's life, and more so for a woman in a nuclear family who has to cope without the help of an elderly woman in the house. If the husband is away on temporary labor, a woman of this age not only bears the reproductive workload but also assumes the productive burden to provide enough food for her infants. In the Tsimane' culture, not all the work ascribed to men can be taken over by a woman, even if she is able to expand her workday. Hunting, for instance, is solely considered a male activity. In order to prevent food or nutritional shortages for the woman and her family, the extended family network is likely to step in and provide a "safety net."

The reproductive workload for women starts to decrease steadily over the following years as older children gradually step in and take over some of the activities. One important way for children to contribute their time and effort is to tend younger siblings, thereby imposing fewer time demands on their mothers. When this is the case, mothers are freed to dedicate their time to more productive activities such as gathering or agriculture. Men, on the other hand, may still dedicate some of their time resources to occasional wage labor; however, the largest fraction of their working time is now used up by agricultural activities. From the age of 35, the following years are for both sexes considered the most productive years for agricultural labor. By that time, both men and women are free from many physical, educational and social restraints. At the same time, they most likely have older children by now who are useful farmhands, while younger children take over some of the household tasks.[14] Figures 1 and 2 illustrate, however, that the community's population numbers with the potentially highest disposable labor time are extremely low. As for men, only 26 individuals, or 22%, are above the age of 35, while the female numbers above age 35 account for a mere 18% of the total female population.

This discussion reveals the importance of examining in detail the demographic profile of the entire community, rather than looking only at an individual's capabilities. In theory, the potential contribution of additional labor may be highest in an age group that is most free from physical, educational, and social constraints. Figures 1 and 2 show that, in reality, the number of men and women in their potentially most productive years (in terms of economic labor allocation) is limited. But this also works the other way around. If we look at the 6- to 10-year-olds that comprise the second-largest population number, this age group would indeed be able to provide a substantial amount of labor if only aggregate numbers are scrutinized. Nonetheless, they are largely constrained by physical limitations as well as the educational demands that have become strongly embedded in the local culture in recent years.[15]

Time Investments in the Four Functional Systems

In a next step I am interested to know the person hours invested in (1) the *person system*, (2) the *household system*, (3) the *economic system*, and (4) the *community system*. This analysis seeks to

illustrate the specific labor time contribution of the different age/sex groups, including also household labor. First, the general time investment in the four systems per average adult will be examined, followed by an analysis of the specific labor input of women, children and the elderly population in the economic and the household system.

General Time Investments per Average Adult

Daily Hours invested by Average Adult					
Person System (PS)	***13.21***	***55%***	***Household System (HS)***	***3.79***	***16%***
Sleeping	7.90		Care for Dependents	1.59	
Eating	1.59		Food Preparation	1.07	
Hygiene	0.99		House Building	0.26	
Rest and Leisure	2.57		Repair/Maintainance Work	0.34	
Studying & Education	0.16		Domestic Chores	0.53	
Community System (CS)	***2.31***	***9%***	***Economic System (ES)***	***4.69***	***20%***
Public Sports and Games	0.09		Agriculture/Horticulture	2.53	
Visiting Friends and Relatives	1.56		Hunting, Fishing, Gathering	0.98	
Ceremonies and Festivals	0.39		Trading	0.43	
Community and Politics	0.27		Wage Work	0.27	
			Handicraft	0.41	
			Animal Husbandry	0.07	
			Daily Working Time HS+ES	***8.48***	

Table 1: Daily hours invested in the functional systems per average adult, Campo Bello 2004, 2006

As Table 1 illustrates, more than half of all the available daily time resources of an average adult is invested in the *person system* (55%). This is hardly surprising, since certain tasks for basic reproduction require some regular time investment by each community member and cannot be delegated or transferred to others. The *community system*, on the other hand, is allocated the least daily time, accounting for only 9% of the available daily time of adults. However, the cultural importance of visiting close kin and other relatives—the so-called *sobaqui*—is still reflected in the peoples' time use profile, constituting more than two-thirds of all time investments in the *community system*. Still deeply ingrained in the local social fabric, regular visiting is highly important for sustaining reciprocal relationships among extended family networks. Time investments in the "ceremonies and festivals" category are fairly limited, as village feasts do not normally involve a lot of preparation time. Most days, people listen to a religious radio program emitted in their language during other activities like cooking or handicraft manufacturing.[16] Since the formation of the Tsimane' Council in the mid-1990s, village politics has gained importance, but remains a small time investment.

Twenty percent of all daily time resources of an average adult are invested in the *economic system*, requiring almost five hours daily from each adult in the community. The largest time fraction is invested in agriculture/horticulture, accounting for more than 50% of all the time spent in the economic system. Labor requirements reach their peak with the rice harvest between March and May every year. Foraging and fishing activities account for a mere hour of an adult's day, while cash producing activities (trading, wage work and the production of saleable handicraft) account for just over an hour daily. Finally, the *household system* requires almost four hours, or 16%, of the available daily time of adults for its upkeep. Contrary to the *person*

system, certain labor tasks can be shared or, in fact, delegated completely to other household members. Care for dependents and food preparation take up the lion's share, as both are necessary for the day-to-day reproduction of the household.

If we now sum up the daily labor hours invested for the reproduction of both—the *household* and the *economic system*—we arrive at 8.48 hours for adults. If we only take the labor time used for the *economic system* (4.69 h/d), we arrive at an annual working time of 1,711 hours per adult, which compares closely to about 1,800 hours annually per economically active adult in the US and Japan and is above the averages for the European Union (Groningen database 2005).[17]

Labor Time according to Age/Sex Groups

	Boys 6-15	Male Adults 16-60	Male Adults >60	Girls 6-15	Female Adults 16-60	Female Adults >60
Population Size (n)	*37*	*41*	*6*	*27*	*38*	*6*
Household System (HS)	***1.8***	***1.1***	***2.2***	***2.9***	***6.8***	***5.0***
Economic System (ES)	***2.6***	***5.8***	***2.5***	***2.6***	***3.5***	***2.3***
Daily Working Time HS+ES	***4.4***	***6.9***	***4.7***	***5.5***	***10.3***	***7.3***

Table 2: Daily labor time (household and economic system) according to age/sex groups, Campo Bello 2004, 2006

If we now examine the data in terms of age/sex groups as presented in Table 2, we find the *household system* mainly in the hands of the female population, who invest almost three times as much time as their male counterparts. The lion's share (6.8 h/d) is contributed by adult women between 16 and 60 years, followed by female adults above 60 years (5.0 h/d) and girls aged 6 to 15 years (2.9 h/d).The presence of an elderly female substantially relieves the daily workload for the younger women in the household by contributing five hours of household labor. This goes especially for child care, the preparation of food and the important manioc beer, as well as the manufacture of indispensable household appliances like floor mats and baskets.

While the *household system* is largely a female domain, women also contribute quite significantly to the economic workload: female adults (16 to 60 years) work 3.5 h/d (as compared to 5.8 h/d invested by their male counterparts) and are a particularly important workforce in agricultural/horticultural activities. Women cultivate manioc but are also valued for their contribution in rice production. Compared to, for instance, the indigenous Matsigenka of the Peruvian Amazon (Johnson 2003), who cultivate similar staples as the Tsimane', adult women in Campo Bello invest more than twice as much daily agricultural labor time as Matsigenka women do. While men are in charge of general field preparation (opening of new plots from dense primary/secondary forest with the burning of the debris, and the planting of rice), women engage in the often laborious tasks of weeding and rice harvesting. Fishing and food gathering are also activities frequently taken up by women, while hunting is only done by male residents.

This difference in labor input is less visible for the children aged 6 to 15, yet tendencies in the same direction may be observed. Children in Campo Bello already start at the age of 4 or 5 to engage in "enabling labor" activities,[18] as they perform physically undemanding tasks like carrying bowls of water, fetching items or shooing chickens. While little boys also help with child care or domestic chores, the sexual division of labor starts at about the age of 9 or 10. As the data in Table 2 illustrates, boys aged 6 to 15 already contribute about an hour less per day than girls to the day-to-day reproduction of the household: 1.8 h/d and 2.9 h/d, respectively. As concerns the *economic system*, however, we find that both sexes invest the same amount of time (2.6 h/d) in economic activities: girls already start to become active in food gathering and fishing at an early age, while boys invest their time resources in agricultural tasks and the fabrication of hunting and fishing gear.

We have documented elsewhere (Fischer-Kowalski et al. 2010) that the share of children in the communities' overall time budget accounts for 61% in Campo Bello.[19] Thus in terms of available hours, children below the age of 15 are important potential labor providers. Fischer-Kowalski et al. (2010) have calculated that, in terms of time, children invest only one-third less labor time than a working-age adult (aged 16 to 60). Thirty percent of the total labor hours performed at the community level is contributed by children—this is quite a substantial contribution. Children do lighter work, and they may do it less efficiently than adults, but the high fertility rates in Campo Bello certainly seem to be an economically rational response of parents.

Table 2 also illustrates the overall daily labor input in the *household* and *economic system* of the different age/sex groups. We find female labor time to be consistently higher than male labor throughout their entire life-cycle. Girls 6- to 15-years-old already work about an hour more per day. This may be an expression of the fact that an "attractive" future wife is defined by her expert skills in the household and economic sphere, while a "good" husband is one who satisfies the woman's sexual desires and fulfills his hunting obligations. Industriousness is therefore an important attribute for a daughter. Interesting is also the fact that, despite their higher daily workloads, girls normally do not stay away from school for work reasons even in the peak labor season (e.g. for rice harvesting). For some of the children, workloads will likely decrease over the next years as their younger siblings[20] step in and take over certain household chores like water fetching or cleaning. Moving up the age ranges, we again find adult women (aged 16 to 60) also work longer hours than men; now the difference in labor time accounts for more than three hours. The labor time of the elderly population above age 60 is also comparatively high, especially for the female population. While women work more than seven hours daily, an elderly man's labor contribution accounts for almost three hours less. The high labor time of women above 60 may also be explained by the fact that at the time of research, there were no women between 56 and 60 years and only two women aged between 51 and 55 living in Campo Bello. The high household labor contribution of elderly females may well be a consequence of the low numbers of women aged between 51 and 60 years.

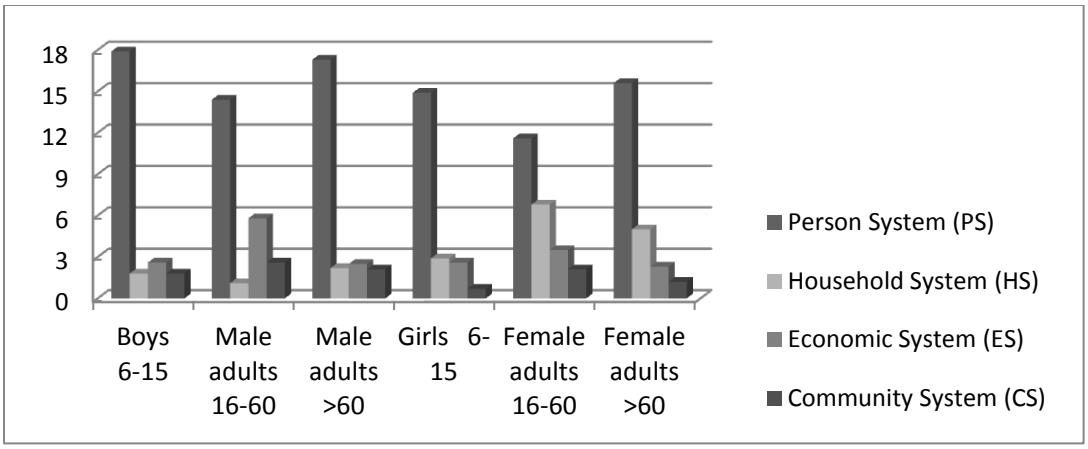

Figure 3: Age/sex group segregation in time use, Campo Bello 2004, 2006

Figure 3 provides insights into the time investments of these age/sex groups in all *systems*. In so doing, we gain a deeper understanding of how time use is structured around labor time. All age groups invest most of their time resources in the *person system*, as it constitutes the basic metabolic functions for personal reproduction (sleeping, eating) as well as studying, rest and leisure. Female adults (age 16 to 60 years) invest the least time resources in the *person system*, as most of their daytime is taken up by the *household*. Detailed empirical data show that none of the adult women in Campo Bello invest time in studying, while some of the adult men do. This lack of human capital development, however, is not carried forward to the next generation as all girls and boys between the ages of 6 to 12 attend the local school. Furthermore, though not explicit in Figure 3, local female adults (age 16 to 60 years) get almost one hour less sleep per night than their male counterparts. At the same time, they also only use half the time for rest and idleness during the day as compared to the local men (1.6 h/d and 3.2 h/d, respectively).

We also find boys invest almost three times as much of their daily time in the *community system* as girls their age. This time is mainly used for public sports games like football or baseball, for which boys invest 1.5 h/d, as compared to 0.5 h/d invested by girls. Girls have also less time for leisure visits to kin and friends outside the community as this often involves staying away for a few days. Though it is difficult to say how much leisure or free time a person needs, one can say that a person who does not get enough leisure is under time stress. In other words, time stress or time poverty can be viewed as "not having enough time to do what one wants to do" (Hirway 2010: 28).

What we find for the local women is work intensity and competing claims on their time that further constrain their choices on how to allocate their time. The latter leads to trade-offs among various tasks. This continuous time stress for the women will sooner or later impinge on their health and, in the long run, may also lead to premature death, and periods of social unrest or conflict.

Local Tactics to Increase the Efficiency of Time

Throughout history we have been able to observe trends that societies strive to invent and produce time-saving assets in order to increase the efficiency of time. And every society has its own local tactic to do so, usually shaped by its distinctive economic and sociocultural context. I

will look at Campo Bello's tactics in improving time efficiency through the lens of cash investments in order to then evaluate whether the benefits are equally shared by both sexes.

	No. of Items	US$/per Item	Total US$	Function	
				Time-saving	Socialization
Labor Amplifiers					
Rice Seeder	23	5.434	125	x	
Machete, Axe, Spade	176	6.039	1,063	x	
Shotgun	34	18.117	616	x	
Fishing Net	21	10.857	228	x	
Transport Amplifiers					
Bicycle	17	21.764	370	x	
Status Symbols					
Radio	34	9.676	329		x
Watch	24	7.250	174		x
Clothes, Shoes	50	6.040	302		x

Table 3: Cash investments in Campo Bello, 2004

All households spend money on basic tools that are necessary for agricultural production. Without the indispensable machete, for example, no fields could be cleared or plantains harvested. What we see in Table 3 is that quite substantial amounts of cash are spent on technological "amplifiers" (Fischer-Kowalski 2007: 11) like rice seeders and agricultural tools to relieve human labor inputs in agriculture. The introduction of rice seeders has cut the workload tremendously during the planting stage, in fact by almost 90%.[21] Also, while the traditional rice cultivation method requires the input of more people, manual rice seeders are employed by one person only. At the time of research, only 23 out of the 41 households were in possession of such a device.[22] Yet contrary to other tools, rice seeders are frequently borrowed among extended families.[23]

From a gender perspective, we find that women do not necessarily benefit to the same extent as their male counterparts from labor efficiency technology. Rice seeders merely substitute manual sowing, an activity largely undertaken by men. Women's labor, like weeding and harvesting, is not reduced by this technology. The same goes for hunting technologies. Shotguns and rifles have largely taken precedence over the use of more traditional hunting devices. As hunting is an exclusively male activity, women only benefit indirectly (in terms of higher game returns) from these technological amplifiers. Nylon fishing nets are another item which entails time efficiency gains. With such a net, substantially more fish can be caught in a much shorter time frame. Apart from higher fish returns, time efficiency gains generated by fishing nets largely benefit the men in the community. Women still engage in fishing using traditional armory like hooks and lines or machetes. However, the mending of fishing nets is predominantly assigned to women, thereby adding to their "labor burden" rather than reducing it. Finally, the use of a bicycle has become a popular means of commuting within and between neighboring villages. A bicycle equally provides an opportunity for transporting agricultural products (e.g., rice and plantains) to the market, and in doing so, also increases the efficiency of travel time. All 17 bicycles at the time of study were exclusively owned by men and some of whom would spend considerable time and

effort in repair and maintenance. This exclusive male ownership may be explained by the fact that the acquisition of a bicycle is innately linked to cash and only wage laborers are most likely able to afford a bicycle, since they are usually paid a lump sum at the end of their commitment. As women generally do not engage in wage labor, they simply lack the necessary financial means for such an acquisition. Women gain cash by exchanging manioc or selling a chicken and likely spend returns on cooking pots, clothes, and school material for the children.

CONCLUSION AND OUTLOOK

What have we learned from FTU in terms of understanding inequalities in a developing country context, thereby offering an approach to operationalize the concept of time poverty? To what extent does FTU have the potential as an analytic tool to inform the work of development practitioners?

The analysis of the lifetime/labor time ratio per age/sex group has revealed some interesting results. To start with, the most opportunities for economic labor are found with the age group starting at around 35, when men and women are most free from physical, social and educational constraints and most likely have various children who contribute to the household's labor force: older children help with productive tasks, while their younger siblings contribute to household labor. What we find though is an extremely low number of people in their potentially most-productive years, accounting for only about 20% of the total population numbers for both sexes. At the same time, the ages with the highest number of individuals are the 0- to 5-year-olds, who are also the group facing the highest capacity and capability constraints. However, they will soon become economically active with skillfully undemanding labor, thereby relieving their older siblings' workload. For a Tsimane' man, the period from 16 to 25 years of age is probably the most flexible and "freest" time in his life, as he can chose between staying in the community and preparing for a family (through house building and agriculture) or leaving the village for some temporary wage labor. Contrary to boys, for a Tsimane' girl the transition to becoming an adult and getting married is much more abrupt. Therefore, the period from 16 to 25 years of age is probably the most labor-intensive and difficult stage in her life, as her time is largely used up by setting up a household and reproductive activities. She almost exclusively has to bear the cost of child rearing. In the absence of an older woman in the house or if her husband is away on wage labor, the young woman must increase her own time investment in order to compensate for that of the absentee. For some activities, this would mean increasing her workday; often to the detriment of sleep or other functions for personal reproduction.

Moreover, we have gained insights into the labor contribution of an average adult, followed by a specific contribution of women and children. Both men and women in Campo Bello spend most of their daily time in the *person system* and this is not likely to change, since basic metabolic tasks like sleeping or eating cannot be outsourced. Time allocation in the other three systems is more flexible, although the general use of time in the *household* and *economic system* is regulated by a rather stringent sexual division of labor. The daily working time in Campo Bello is rather high and, extrapolated onto a year, compares to the annual work hours per economically active person in the US and Japan. Children's contribution to the community's labor time is also high; 30% of the total labor performance in Campo Bello is in fact contributed by children.

A gender-sensitive analysis informs us of the "labor burden" borne by the female population. We find female labor time to be consistently higher than male labor throughout their entire life-cycle. Girls from 6- to 16-years-old already work about an hour more per day than boys of this age. Boys and girls get involved at an early age in enabling household maintenance activities, including child care and food preparation. It is noteworthy that boys start to move away from the day-to-day running of the household at around the age of 9 or 10, while girls in the same age group continue to invest their labor time in fairly equal shares between the household and economic system. This pattern is carried through to adult life. Adult women invest more than three times as many daily labor hours as their male counterparts in household labor. But their contribution to the *economic system*, especially agriculture, is also important, as it accounts for almost two-thirds of the labor time invested by adult men.

How is the time use of the different age/sex groups structured around labor systems? Girls invest less time than boys in the *community system*, especially for sports and leisurely family visits. Female adults (age 16 to 60 years) have the least time resources of all age/sex groups for the *person system*, as most of their daytime is taken up by the household. They invest no time in studying, and get less sleep and rest than the local men. Supposing that these choices are the result of competing claims on the women's time, we find the women of Campo Bello to suffer from time poverty. This time stress risks women's health and may lead to premature death and social unrest.

Examining the local tools for increasing time efficiencies in Campo Bello has also generated some interesting findings. To start with, most cash is spent on technological amplifiers to increase the efficiency of agricultural labor. Among these, the rice seeder stands out for its high efficiency when used for the sowing of rice. This technology was initially introduced to the village as part of a larger development program on cash crop cultivation and since then has turned into a highly solicited tool to be bought on the municipal market. A gender-sensitive analysis, however, shows that women do not benefit to the same extent from this technology. Rice seeders only increase the efficiency of rice planting, an activity that is largely undertaken by men. Other labor-intensive crop management tasks like weeding and harvesting, however, largely remain in the hands of women. A similar observation was made with other devices such as hunting technologies, nylon fishing nets, or bicycles, which entail time efficiency gains for men rather than women.

Finally, to what extent does FTU analysis have the potential to inform the work of development practitioners? The functional time use analysis of Campo Bello provides three important insights for development interventions. First, FTU analysis systematically analyzes the socially ascribed time use and gendered labor division patterns of a local *system*. In the absence of such knowledge, even well-intended development projects may lead to adverse (short- or long-term) impacts. One such example was provided by the analysis of labor-saving technologies in Campo Bello. This illustration shows how the benefits of some inputs are not evenly distributed among the projected beneficiary population. Some well-intended development assets (e.g. nylon fishing nets) may even increase the overall "labor burden" of women, with time efficiency gains largely reaped by men only. Second, the gender-sensitive analysis provided by FTU analysis offers a detailed labor time profile for all domains of a local system, including the often invisible sphere of the household economy. This is particularly important, since economic baseline assessments on labor time all too often tend to exclude the household economy. Third, the demographic study

of FTU analysis highlights the age/sex groups with the most and least time constraints throughout their life-cycle. This insight would be helpful for development professionals in overall project planning as well as the definition of beneficiary groups. A well-intentioned educational project for Campo Bello's young women, for instance, would add further time stress on them, as they would have to invest substantial time for capacity-building workshops—time they may simply not have at this age in the current circumstances.

Methodologically, FTU analysis presents an alternative to the commonly used self-reported field assessments. Baseline studies are normally done through random self-reported assessments, usually interviewing those community members who are most publicly visible and accessible, especially in terms of knowing the "development jargon" (e.g. village headman, schoolteacher). Such self-reports have often been critiqued as "quick and dirty anthropology" (Richards 1995: 15) by development critics, as the information provided is likely to distort local realities.[24] In this context, FTU analysis may offer an alternative that increases the reliability and validity of the gathered data, and, in so doing, minimizes the risk of project failure.

NOTES

[1] In her book *If Women Counted: A New Feminist Economics*, Marilyn J. Waring (1988) isolates the gender bias that exists in the current accounting system of calculating national wealth.

[2] With a background of feminist empiricism, Sandra Harding (1991) and the feminist economist Julie A. Nelson (1995) are some of the few scholars who argue for a fuller range of tools and methods to study a wider territory of economic activity beyond masculine-centric approaches. In so doing, their overall claim is for a more rigorous objective science.

[3] Earlier sociological time use studies were rather interested in studying the work/leisure dichotomies (e.g. Sorokin and Berger 1939) and the conduction of quantitative multi-country time use studies (e.g. Szalai 1972, Gershuny 2000). Earlier anthropological time use studies commonly relied more on qualitatively describing the "daily round" of the communities studied and were also generally more interested in analyzing "leisure time" in cultural evolution (e.g. Sahlins 1972, Lee 1979).

[4] Allen Johnson (1975, 2003), a strong advocate of time use studies in anthropology, is considered a pioneer in terms of activity coding and classification among non-market societies.

[5] The resulting activity clusters largely follow the time use categories developed for statistical monitoring of the European Union (Eurostat 2001, 2007) in order to increase comparability.

[6] In 2004, a total of 65 new fields were opened by 41 households, 15 from primary and 50 from secondary forest. The median age of secondary forest fallow was calculated at 4.92 years. The total size accounted for was 48.8 ha or 0.07 ha/cap (primary forest) and 0.13 ha/cap (secondary forest) (Ringhofer 2010: 139).

[7] Roughly one-third of this growth was due to a positive migration balance and two-thirds to births exceeding deaths.

[8] In 2004, around 60% of the entire village population was below the age of 16, 18% between the age of 16 and 30, 17% between the age of 31 and 60, and merely 5% were beyond age 60.

[9] Originally, a sample of 23 individuals (i.e. a 10% sample) from 15 different households was selected for participation in the time use study. As far as possible, the households were selected on the basis of their composition, age structure, cash incomes, and education. Five individuals ultimately decided not to partake in the time use study and the final included 18 individuals: 6 married men (aged 21, 28, 32, 38, 44, and 58), 6 married women (aged 17, 25, 29, 38, 46, and 54), 3 girls and 3 boys (aged 7, 9 and 11 for the boys and 8, 11, and 13 for the girls). For toddlers and the elderly population estimates were taken, consequently cross-checked with interview data and general, but more informal, observation.

[10] The following age categories were used: 0-5, 6-10, 11-15, 16-20, 21-25, 26-30, 31-35, 36-40, 41-45,46-50, 51-55, 56-60, > 60.

[11] The household members sampled were 14 active adults aged from 25 to 45 (7 men and 7 women) and 14 children aged from 5 to 12.

[12] This decision was taken following three trial time use studies that had all accounted for travel time separately. In all these studies, travel time oscillated between 2 and 3% of the observed 14-hour daytime period. Due to this negligent amount of time, it was hence decided to add the travel time to the activity with which it was associated.

[13] To determine the disposable labor time available in Campo Bello, the average duration of each activity was allocated according to the four functional subsystems. By so doing, a time aggregate for each subsystem was obtained by sex. These times were subsequently allocated among the age/sex categories to arrive at a 24-hour period for each age group. The time available for the reproduction of the *economic system* was termed the "potentially disposable economic labor time." In order to arrive at the disposable annual labor time of the different age groups within the community, the disposable daily labor time was multiplied by the amount of people within the age range and the "work" days of the year. For "work" days, a total of 300 were estimated per year, accounting for festive days, days away from the community, and occasional sick days.

[14] Piland (1991: 107) found that families with teenage daughters produce more rice than others, while families with teenage sons produce notably more plantains than families without adolescent sons. This, however, could not be confirmed in my observation.

[15] The first school was built in 1993 and the consciousness for the need of education has been reinforced by various education campaigns in the area. The schoolteacher is highly respected in the community and sending children to school has become common.

[16] Therefore, radio listening has not been accounted for as a separate activity but always been absorbed by other activities (such as cooking, child care or manufacturing).

[17] One should be aware of the difference between "average per adult" (which is everybody above the age of 14), and an "average per economically active," which in OECD countries is about half the adult population above 14. So these working hours in Campo Bello are very high indeed!

[18] The term is borrowed from Cain (1980) as it frees other household members to engage in economic activities that are directly productive.

[19] Out of a total of 231 residents, there are 140 children (76 children between 0 and 5 years; 64 children between 6 and 15 years).

[20] 60% of all girls aged 0 to 15 years are below the age of 5; for boys of the same age range numbers are slightly lower, at 50%.

[21] The rice seeder is applied at the planting stage, where it saves 12 days per hectare of hard labor, reducing the workload from a total of 108 person-days (using the traditional dibble stick)

to 96 person-days per hectare for the entire production cycle. At the planting stage of rice, the rice seeder therefore cuts the workload by almost 90% (from 14 days to a mere 2 days).

[22] The majority of farmers in possession of such a manual rice seeder were given these technologies as they had participated in experimental studies on cash crop cultivation as part of a larger development program in the area.

[23] Rice seeders were lent without any obvious direct payment, monetary or in kind. However, as all transactions among the Tsimane' are based on the principle of reciprocity, I assume that the lender would at a later stage benefit from part of the rice harvest.

[24] This may also be true for female informants, as people tend to remember their own behavior selectively, in terms of cultural models of significant activities. Self-reports on working time, by either men or women, may also be underestimated when opportunity costs of labor are low. Or the involvement of children and elderly household members in productive activities may be underestimated, as in some cultures their labor contribution may not be given the same importance as adult labor.

REFERENCES

Blackden, Mark and Quentin Wodon. 2006. "Gender, Time Use and Poverty: Introduction." In *Gender, Time Use and Poverty in Sub-Saharan Africa*, eds. Mark Blackden and Quentin Wodon, 1-10. Washington D.C.: The World Bank.

Cain, Michael T. 1980. "The Economic Activities of Children in a Village in Bangladesh." In *Rural household Studies in Asia*, ed. Hans P. Binswanger, 218–247. Singapore: Singapore University Press.

Charmes, Jacques. 2006. "A Review of Empirical Evidence on Time Use in Africa from UN-Sponsored Survey." In *Gender, Time Use and Poverty in Sub-Saharan Africa*, eds. Mark Blackden and Quentin Wodon, 39-72. Washington D.C.: The World Bank.

Eurostat. 2001. *Material Use Indicators for the European Union, 1980-1997. Economy-wide Material Flow Accounts and Balances and Derived Indicators of Resource Use.* Working Paper No. 2/2001/B/2. Luxemburg, European Commission/Eurostat, prepared by Bringezu, S. and Schütz, H.

Eurostat. 2007. *Economy-wide Material Flow Accounting. A Compilation Guide*. Luxembourg: European Statistical Office.

Fischer-Kowalski, Marina. 2007. *Ageing, Time Use and the Environment*. Presentation at the workshop: Research Foresight for Environment and Sustainability—Megatrends and Surprises, EEA Copenhagen.

Fischer-Kowalski, Marina and Helmut Haberl. 2007. "Conceptualizing, Observing and Comparing Socioecological Transitions." *In Socioecological Transitions and Global Change: Trajectories of Social Metabolism and Land Use*, eds. Marina Fischer-Kowalski and Helmut Haberl, 13–62). Cheltenham, UK, Northampton, USA: Edward Elgar.

Fischer-Kowalski, Marina, Simron Jit Singh, Lisa Ringhofer, Clemens Grünbühel, Christian Lauk and Alexander Remesch. 2010. *Sociometabolic Regimes in Indigenous Communities and the Crucial Role of Working Time. A Comparison of Case Studies.* Institute of Social Ecology, Vienna: Working Paper 121.

Gershuny, Jonathan. 2000. *Changing Times: Work and Leisure in Post-industrial Societies*. Oxford: Oxford University Press.

Godelier, Maurice. 1986. *The Mental and the Material: Thought Economy and Society*. London: Blackwell Verso.

Godoy, Richard, Victoria Reyes-Garcia, Tomas Huanca, William R. Leonard, Vincent Vadez, Cynthia Valdés-Garcia, and Dakun Zhao. 2005. "Why do Subsistence-level People Join the Market Economy? Testing Hypotheses of Push and Pull Determinants in Bolivian Amazonia." In *Journal of Anthropological Research, 61,* 157–178.

Groningen database. 2005. Groningen Growth and Development Centre.

Harding, Sandra. 1991. *Whose science? Whose Knowledge? Thinking from Women's Lives.* New York: Routledge.

Harvey, Andrew S. and Mark T. Taylor. 2002. "Time Use." In *Designing Household Survey Questionnaires for Developing Countries*, eds. Margaret Grosh and Paul Glewwe, 11-28. Washington D.C.: The World Bank.

Hirway, Indira. 2010. "Understanding Poverty: Insights Emerging from Time Use of the Poor." In *Unpaid Work and the Economy: Gender, Time Use and Poverty in Developing Countries*, eds. Rania Antonopolous and Indira Hirway, 22-57. London: Palgrave Macmillan.

Johnson, Allen. 1975. "Time Allocation in a Machiguenga Community." In *Ethnology*, *14*, 310–321.

Johnson, Allen. 2003. *Families of the Forest: The Matsigenka Indians of the Peruvian Amazon.* Berkley: University of California Press.

Kes, Aslihan and Hema Swaminathan. 2006. "Gender and Time Poverty in Sub-Saharan Africa." In *Gender, Time Use and Poverty in Sub-Saharan Africa*, eds. Mark Blackden and Quentin Wodon, 13-32. Washington D.C.: The World Bank.

Lee, Richard B. 1979. *The !Kung San: Men, Women and Work in a Foraging Society*. London: Cambridge University Press.

Nelson, Julie A. 1995. "Feminism and Economics." In *Journal of Economic Perspectives*, 9 (2), 131-148.

Piland, Richard A. 1991. *Traditional Chimane Agriculture and its Relation to Soils of the Beni Biosphere Reserve*. Bolivia: Master thesis, University of Florida.

Richards, Paul. 1995. "Participatory Rural Appraisal: A Quick and Dirty Critique." In *PLA Notes 24*, eds. Irene Gujit and Andrea Cornwall, 13-16. London: Routledge.

Ringhofer, Elisabeth. 2007. *The Tsimane' in Their Environment: A Socio-ecological Analysis of the Environmental Relations of an Indigenous Community in the Bolivian Amazon*. PhD thesis, Institute of Social Ecology, Vienna.

Ringhofer, Lisa. 2010. *Fishing, Foraging and Farming in the Bolivian Amazon. On a Local Society in Transition.* Dordrecht, Heidelberg, London, New York: Springer Science + Business Media B.V.

Ringhofer, Lisa. 2011. "Introducing the Concept of Functional Time Use (FTU) for Measuring the Labour Burden: A Case Study from the Bolivian Amazon." In *Social Indicators: Statistics, Trends and Policy Development*, eds. Candice M. Baird, 49-74. New York: Nova Science Publishers.

Sahlins, Marshall. 1972. *Stone Age Economics*. New York: Aldine de Gruyter.

Singh, Simron Jit, Lisa Ringhofer, Willi Haas, Fridolin Krausmann, and Marina Fischer-Kowalski. 2010. *Local Studies Manual: A Researcher's Guide for Investigating the Social Metabolism of Rural Systems.* Institute of Social Ecology, Vienna: Working Paper 120.

Sorokin, Pitirim and Clarence Berger. 1939. *Time-budgets of Human Behaviour*. London: Harvard University Press.

Szalai, Alexander. 1972. *The Use of Time: Daily Activities of Urban and Suburban Populations in Twelve Countries*. The Hague: Mouton.

Waring, Marilyn J. 1988. *If Women Counted: A New Feminist Economics*. San Francisco: Harper & Row

White, Benjamin. 1976. "Population, Involution and Employment in Rural Java." In *Development and Change*, 7, 267–290.