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Figuring rural development : concepts and cases of land use, sustainability and integrative indicators

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Freely Disposable Time: a System for Time and Cash Integrated Livelihood Assessment

Abstract
This chapter develops a system of livelihood assessment that integrates cash flow and time use data of any household into a single indicator that expresses how much time the household adults have left after satisfying the household's basic needs (e.g. physiological, social, food, fuel, shelter) that they need to provide. This 'freely disposable time' (FDT) may be put to any use such as work for extra consumables, leisure, savings or to invest in the future (education, soil conservation etc). Therefore, FDT is a key condition for any out-of-poverty strategy and for a household's resilience to adapt to changing circumstances. The universally applicable FDT indicator is tested on peri-urban farming livelihoods in India and some typical Dutch households. Used as a poverty indicator, FDT is intrinsically superior to monetary or food-based indicators.

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5.1 Introduction

Creating sustainable livelihoods to eliminate poverty is today's adage in rural development (Singh & Gliman, 1999; Hussein, 2002; Ellis, 2000). As a format to capture the notoriously complex intricacies of rural livelihoods, the Sustainable Livelihoods (SL) approach has evolved from the late 1980s onwards, based on Sen's (1981) entitlements and the work of Chambers and Conway (1992), Scoones (1998) and Ellis (2000). Various SL frameworks are now in use, e.g. by the FAO, DFID, World Bank, CARE and UNDP. Designed primarily as a guide towards a richly textured qualitative understanding (Scoones, 1998), the SL frameworks have only a limited value for comparative objectives. The qualitative results of SL analyses cannot be benchmarked against quantitative standards such as poverty lines and they cannot be used to compare different rural household types within a single region, or households across regions or nations, or to characterize households' development over time. It would be quite useful, therefore, if the livelihoods approach would be enriched with a system that generates a *universally applicable indicator that integrates fundamental aspects* of any livelihood strategy outcome. This is the thrust of the present chapter.

Universal applicability implies that the indicator system should be applicable to all livelihood types and levels (rich and poor, rural and urban, developing or industrialized countries). This criterion rules out all indicators expressed in terms of food or health, because these become largely invariable above a certain income level. The criterion of integration of fundamental aspects of livelihoods, in our view, implies that the indicator should integrate livelihood outcomes in terms of *cash and time*. A household income may be low, for instance, but if this household still avails of time to invest in more income generating activities, learning, leisure, tree planting or anything else it may desire, it should be assessed as fundamentally less poor than a household with the same income that needs al its time to provide that income.

Universally applicable indicators are already in wide use. Well-known examples are GNP per capita, the Human Development Index and poverty/wealth indicators that relate incomes or expenditures to standards of basic needs, such as the 'one dollar per day' poverty indicator, the food energy intake method and the cost-of-basic-needs (CBN) method (Ravallion, 1994; Ravallion & Bidani, 1994; Wodon, 1997). The CBN approach establishes the cost of a fixed or a locally variable bundle of needs as foundation of the income poverty line, abstracting away from the question if this income actually results in basic needs provision of all household members (Streeten, 1979: 137).

All these indicators suffer from a lack of integration. The economic indicators lack the time dimension. Bardasi and Wodon (2006) are another example of non-integration, focusing as they do on the time aspect while leaving out the cash element. The Human Development Index lacks true integration because it aggregates its components in an arbitrary manner. The same holds for multi-dimensional poverty indicators that tend to just add up the various 'life satisfactions' (Rojas, 2008).

The present chapter proposes an indicator that integrates all needs that are readily translated in monetary terms (e.g. cost of food, healthcare or school) as well as basic needs that are primarily expressed in time terms, *i.e.* hours per day needed for sleep, care, community participation and so on. Besides, it satisfies the criterion of universal applicability (defined previously), as will be proven later. Its synthetic result is named *freely disposable time* (FDT). FDT is not leisure time. FDT describes *the number of hours per day that a household's productive adults have left after fulfilling the basic needs (of food, shelter, physiological needs, social obligations, care of the children, elderly and sick, etc.) that they need to supply for themselves and their dependents*. FDT is a resource that may be put to many uses. One is leisure, but others are for instance to work more hours for luxurious goods or to send a child to college. The key of FDT assessment is that cash expenditures are converted into their time equivalent through the income per hour of the household. High-income households will therefore have a higher FDT than low-income households with the same basic needs. These same high income households may of course display low levels of leisure and rich people may be very busy. In FDT terms; these households have a profile of spending little of their FDT on leisure.[32]

We have chosen for the time dimension to express the indicator because of time's foundational and universal character. Since time can usually be exchanged, fully or partially, for cash on the local labor market, FDT outcomes may be translated to locally valid cash outcomes ('freely disposable income') if desired.[33]

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[32] We prefer the term 'profile' over the term 'strategy' used in Sustainable Livelihoods frameworks. 'Strategy' wrongly presupposes that all that households do is the result of future-oriented planning. The SL approach does not differentiate between basic needs and freely disposable elements and therefore the SL 'strategy' is all that people are seen doing, while the FDT 'profile' is what people are seen doing *with their freedoms*.

[33] It should be noted that FDT and incomes are sometimes strongly fenced in by regulations and context; someone living on social security for instance, is not allowed to work and the FDT is therefore not transformable into cash. Besides, often people have to work a minimum amount of hours to keep their jobs.[0]

Against this background, the objective of this chapter is to develop, document and illustrate a universally applicable system that assesses Freely Disposable Time of households as an outcome of the household's relevant behaviors. In our examples, some bias will be towards relatively poor farming households because these households provide the technically most difficult nut to crunch, e.g. due to subsistence production that often provide a large proportion of people's actual wealth status. The chapter focuses first of all on the *structure* of time and cash integrated assessment, implying that issues of quantification of basic needs are of only minor concern here. In the illustrations of the FDT system, we will use quantifications of basic needs that are grounded in common sense, field data and relevant literature, but without lengthy justifications.[34]

The chapter is structured as follows. The next section will address some theoretical issues in order to give more depth to the system's basic choices. In section 5.3, we discuss two precursors of the FDT system. Section 5.4 gives the formal description of the FDT system. Section 5.5 focuses on the characteristics of FDT compared to other livelihood indicators, illustrated through a hypothetical example. Section 5.6 then discusses the application of the FDT system in Kashimpur village (near Calcutta, India), with some households from the developed world added for comparison and to prove the system's universal applicability. Section 5.7 provides a lean version of FDT designed to minimize data intensity. A discussion of the system's characteristics, position and applicability rounds off the chapter.

5.2 Stocks, flows and poverty lines

Noteworthy of the economic (or food) indicators of poverty and wealth is that they all represent concepts of *flow* (calories per day, dollars per year etc.) rather than concepts of *stock* (assets, capabilities, capacities, capitals, resources). The FDT indicator also belongs to the flow-based category. A focus on flows is something that the developers of the livelihood approach have explicitly tried to avoid. It is emphasized that flow measurements only represent specific points in time and should therefore not be regarded as fundamental (Carter & Barret, 2006). This argument does not seem quite pervasive, however. First, because flows can serve as asset indicator, if sufficiently averaged over time and space

[34] FDT adds some basic needs specified in time terms (e.g. care needs) but we assume that these are not intrinsically more difficult to assess than present basic needs specified in cash (CBN) or food (FAO) terms.

(Reardon & Vosti, 1995: 1497). Second, because flows are future-oriented. They can be extrapolated to reveal asset dynamics. Households may be poor (in assets) but getting richer (in flow terms), for instance, or the reverse. Third, although assets do add to short-term resilience, especially poor households survive primarily on flows. Their assets are usually simply not substantial enough to bridge time spans of a year or more, which is the very reason that they usually rely on 'maximin' strategies rather than maximizing average outputs. Besides, as described by Reardon *et al.* (1994) for Africa and Romero (2006: 192) for the Philippines, farmers often even *invest* from flows, e.g. constructing terraces little by little each year as incomes allow. This is the "autarchic accumulation" mentioned by Carter and Barret (2006: 189).

On the philosophical plane, the 'flows stocks' issue relates to the Basic Needs *versus* Capabilities debate, since basic needs are made operational as flow parameters such as income or, as we will do below, of hours (of care, leisure, social contacts etc.) per day. Capability theorists such as Sen (1987) and Alkire (2002) criticized the basic needs approach (e.g. Streeten, 1979; Streeten *et al.*, 1981; Stewart, 1985) for being commodity-focused, insensitive to the importance of freedom, too relativistic to be made operational, and so on. As elegantly analyzed by Reader (2006), however, the basic needs approach is in fact in no way inferior to the capabilities theory on all these accounts. We conclude that an indicator of freely disposable time in flow terms (i.e. hours per day), used as stand-alone parameter or additional to stock measurements, is certainly worth a try.

The FDT concept is applicable to the rich and the poor alike, and may therefore be used as a universal poverty or wealth indicator. What is the fundamental poverty line? This is when FDT = 0 h/day, meaning that people need all they can do, *i.e.* all the time they have and all the cash they can generate with it, to satisfy their basic needs. At this level, people are trapped in poverty, without time or cash left to allocate to improvement in the future. Below the FDT = 0 line, people live in chronic deficits of sleep, food, care or cash.

Reardon and Vosti (1995) have proposed the term 'investment poor' for households that avail of only a little more than bare basic needs satisfaction, assuming that they will spend this little surplus on expanded consumption rather than investment (in knowledge, in soil and water conservation, social capital etc.) Investment poverty may easily be translated in FDT terms, e.g. setting FDT = 2 h/day as the 'investment poverty line' over the FDT = 0 h/day as the absolute poverty line.

Very high incomes imply that the acquisition of basic needs requires only very little time in income generation activity. Yet, everybody has only 24 hours per day and needs some 10 of those for sleep, self-care and leisure. On a scale of 24 hours per day, therefore, all very high incomes will converge between 13 and 14 h/day of FDT, while the relatively poor will be assessed in an area between FDT = 0 h/day and, say, 6 h/day. This pattern differentiation is good if we are interested more in the poor than in the rich. Moreover, this pattern expresses the decreasing marginal utility of income at high income levels.

5.3 Precursors of FDT

Two rural assessment systems have laid the foundations for the FDT.

Rural Material Flow Analysis (rMFA)

Material Flow Analysis (MFA; Eurostat, 2001) assesses material inputs, outputs and stocks, e.g. in kilos per capita per year, of social systems on scales varying from sub-national to supra-national regions. MFA has been applied, for instance, to analyze the 'material intensity' of economic growth of various countries (Matthews *et al.*, 2000). Under the label of 'rural material flow analysis' (rMFA), Hobbes (2005) adapted the MFA principles for application on the level of rural households, with the objective to generate indicators that relate material flows to various themes in rural development, such as incorporation in external markets, productivity and food security. Basic needs play a key role especially in the food security indicators, because the human caloric and protein needs are the common denominators of all of them. The five food security indicators of rMFA express actual and potential food sufficiency and autarky (in case of failing markets). Hobbes (2005) applied the rMFA system on three villages in Laos, the Philippines and Vietnam. The villages showed up with quite different profiles in terms of the food indicators that well reflected not only their present food security position but also their deeper characteristics of resilience and risk. Thus, rMFA is an example of how a consistent set of relatively simple data can yield quantitative insights of key importance, and much of its structure has been carried over into the present chapter.

Land-time budget analysis

Giampietro (2004) has developed a rural household assessment system called 'land-time budget analysis'. Central in this analysis is the performance of the time and land budgets that people have available. The ap-

proach covers the whole portfolio of livelihood activities. The starting point of the analysis is the total amount of hours per year available in the studied group (society, village, household). Various categories that resemble basic needs are deducted from this amount. The first category is the time needed for maintenance by sleeping, eating, etc., followed by time needed for reproduction (e.g. for leisure and education, plus the total time of the non-productive household members such as the children, disabled and elderly), called 'social overhead', and by the time needed for household chores, farming for auto-consumption and to pay for taxes and agricultural inputs. The time left can be used to produce cash, either on or off farm. Giampietro suggests applying a parallel system for the availability of land, and combining the outcomes of two assessments would enable the calculation of 'net disposable cash', which is a key economic performance indicator of the group under study.

Land-time budget analysis does not offer a coherent system of data categories and calculation rules, which hampers application in empirical cases (Pastore *et al.*, 1999; Gomiero & Giampietro, 2001; Grünbühel & Schandl, 2005). Moreover, the analysis does not make a consistent choice to distinguish basic needs from freely disposable resources. Basic food needs are not subtracted from net disposable cash, for instance, irrespective of whether the household grows its own food or buys it on the market (Giampietro, 2004: 396). In other cases (e.g. Pastore *et al.*, 1999), the whole food expenditure is subtracted from net disposable cash without reference to whether this expenditure is basic or not. Yet, the principle of household-level time budget analysis that spans all livelihood activities and needs has been a major source of inspiration of the present chapter.

5.4 The FDT assessment framework

The FDT system uses data on how people spend their time and cash on various categories. All cash expenditures are converted to time expenditures using the household's income per hour. For instance, if five hours of work bring in 100 $, then spending 100 $ is the equivalent of spending five hours of work. The present section will describe the details of the FDT system. It is able to incorporate many real world complexities, such as that (1) households are multi-people entities with different basic needs per person, (2) farming households may produce fully or partly for subsistence, (3) people may live temporarily or chronically with deficits of basic needs, (4) income elements consist not only of wages but also of own firm or farm profits, remittances, rents and gifts, and (5) households may also receive or give aid in time or material forms. On

the other hand, simplifying measures have been taken in order to save space. We refrain from intra-household differentiation of FDT, for instance (just like monetary indicators usually do).[35]

Research units

The composition of a household is important for FDT. A young child, for instance, adds to the household's basic needs but its freely disposable time does not make a relevant difference for the household. Therefore, the FDT assessment focuses on the freely disposable time of only the 'productive adults' (PAs), with the other members of the household present in the analysis in the form of adding to the basic needs (of food, care etc.) that these PAs have to provide. Some non-PA members may also help out in several respects, e.g. doing chores or adding minor income components. This then is added as gifts or aid to the PAs' account. This way, the FDT system is fully sensitive to household composition and the poverty impact of handicaps and chronic illness. The time span of the appraisal should preferably cover a full year, so as to include seasonal variation. The time and cash expenditures are expressed per day, however, so that the summation of time expenditures and time balance of the time/cash equivalents over all categories both equal 24 hours.

Livelihood activities and basic needs

Table 5.1 provides the classification of livelihood activities used for the field study in Kashimpur, India. The list is exhaustive and blends the most important categories in time allocation studies (Shelley, 2005) and the main expenditure components of consumer-expenditure surveys (BLS, 1997). Most of the categories have a basic need component, expressing a relatively broad definition of the term that includes, for instance, the care need of children and a minimum of leisure time, e.g. to maintain social contacts. For the Kashimpur case study, the caloric food needs have been quantified following international standards, while the other basic needs have been based on the local situation using key respondents, e.g. the minimum time it takes to keep up a basic house or cook a basic meal, differentiated by household size, or the minimum amount of cash needed to have access to a mobile phone for

[35] It may be noted that even though the FDT system as presented here does not differentiate between male and females in the household, non-monetary contributions to the household (care, cooking, chores, fetching water etc.) are fully accounted for in the FDT system. Contrary to monetary indicators, FDT does not suggest that making money (usually a male job) is the only thing that counts.

Table 5.1 Categories of human activities and basic needs (referred to as A, B, C...i in Figure 5.1) to be provided by the producing adults (PA) of the households in the Kashimpur case study, India complemented with values used in the Dutch case study. Basic needs mainly follow guesstimates based on minimum requirements in the local situation estimated by key respondents and secondary sources, such as the social welfare minimum in the Netherlands. Cash is expressed in US$ per day (1 US$ = 40 INR = 0.7 euro). Care basic needs exclude care that can be given simultaneously with cooking, chores etc.

Activities & needs provided by PA	*Basic needs in Indian case study*	*Basic needs in Dutch case study*
Physical inactivity (h/d)	8 per PA (guesstimate)	same
Leisure (h/d)	2 per PA (guesstimate)	same
Self care (h/d)	0.75 per PA female, 0.4 for PA male (guesstimate)	same
Care (h/d)	1 for non-active elderly, plus 2 if 1 or 2 children, 3 if 3 or 4 children (guesstimate)	same
Chores (h/d)	1 for small, 1.5 for average, 2 for big household (guesstimate)	same
Cooking (h/d)	1.5 for small/average, 2.5 for big household (guesstimate)	1 per household (guesstimate)
Food	1200 kcal/d for 0-4years, 1700 kcal/d for 4-8years, 2000 kcal/d for 8-12 years, 1967 kcal/d for PA female, 2540 kcal/d for PA male, etc. (FAO/WHO/UNU,1985)	1.4 $/d for 0-4years, 2.1 $/d for 4-12 years, 2.6 $/d for PA female, 2.9 $/d for PA male, etc. (guesstimate)
Water consumption	15 liter/d for small household, 24 for average household, 36 for big household (guesstimate)	Included in non-caloric consumption
Fuel for cooking	10 GJ/cap/y (Sanga & Jannuzzi, 2005).	Included in non-caloric consumption
Shopping (h/d)	0.3 per household (guesstimate)	same
School for PAs (h/d)	0	0
School for dependents ($/y)	10 per child of primary school age (guesstimate)	70 per child of primary and secondary school age
Non-caloric consumption ($/d)	Between 0.05 and 0.16 per household, depending on household composition (based on guesstimates on sub-categories)	Between 24 and 33 per household, depending on household composition (based on guesstimates on sub-categories)
Durable goods renewal / depreciation ($/y)	18 for small, 19 for average, 20 for big household (guesstimate)	429 per household (guesstimate)

Activities & needs provided by PA	*Basic needs in Indian case study*	*Basic needs in Dutch case study*
Saving and investment	0	0
Income generation	0	0
Interest/rents/gifts paid ($/y)	32 per household (guesstimate)	71 per household (guesstimate)
House taxes, mortgage, rent, renewal ($/d)	0.03 per household (no taxes, only building materials guesstimate)	15.8 (social well-fare minimum rent & cost taxes)
Community work (h/d)	0.2 per household (guesstimate)	0.1 per household (guesstimate)
Religious activities (h/d)	0.1 per PA (guesstimate)	0 (guesstimate)

emergencies and to acquire a second-hand bicycle. The basic need figures for the Dutch case study have been added. The needs expressed in time are kept equal to the Indian case study, except for cooking. For the Dutch monetary basics we used our own guesstimates, combined with data on minimum wage, governmental subsidies for housing, and minimum welfare standards. Access to internet and a TV have become basic, for instance, to participate in Western societies.

Formal principles of the FDT system

Figure 5.1 shows the FDT assessment framework. It starts out with the classification of categories (A, B, C, ...i) on which households may spend time and/or cash. The first (upper left-hand corner) element of the Figure is the calculation of the basic needs that have to be provided for by the PAs, based on the household composition.

The three blocks in the upper left-hand corner together assess the degree to which, within each category, the productive adults have *'acquired'* more or less than the household's basic needs, *i.e.* a surplus or deficit in that category. 'Acquired' is defined as self-produced plus received as remittance, rent, help or aid (in cash, time or equivalents). 'Self-produced' may denote cash from the labor market or food from the farm but also self-'produced' hours of sleep, leisure, self-care or care given to dependents. 'Help' may refer to, for instance, the grandmother assisting with the children. 'Aid' may be food aid from the government or free seedlings supplied by an NGO. The deficit/surplus calculations will often require conversions between the field-level data and the units in which the basic need is defined, e.g. from bags of rice to calories. As the Figure shows, surpluses and deficits are kept separate. Each category has either a surplus with the deficit set at zero, or the reverse. This allows keeping track of how households may suffer chronic deficits or may create more time for work and other categories may by accepting

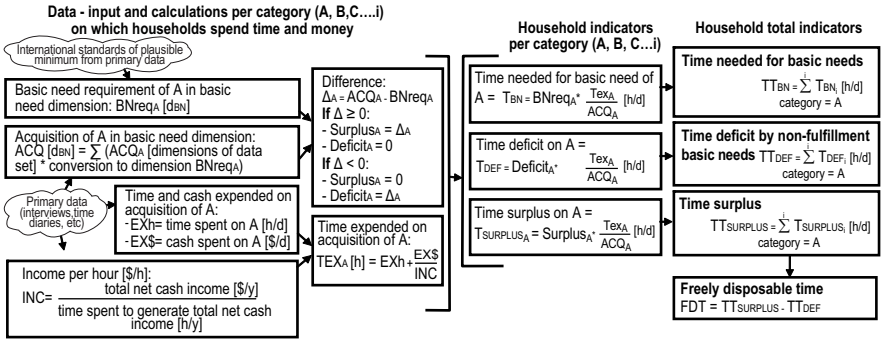

Figure 5.1 Freely disposable time: the empirical system (livelihood assessment). All elements are expressed per producing adult (PA) member of the household per day.

- A, B, C....i = categories of time and cash expenditures of the household (e.g. sleep, food, care).
- $BNreq_A$ [d_{BN}] = basic need requirement of A for the household to be provided by the producing adults (PA) in the basic need dimension (e.g. hours, cash, kcal, liters).
- ACQ_A [d_{BN}] = acquisition of A; total available of A for the household calculated by summing all that is provided by the household and aid received. If it concerns a category with a positive basic need element, it is expressed in the basic need dimension by using conversion factors (e.g. kcal per food product, wage paid for buying labor time).
- ΔA = difference between what is acquired and required of A.
- $Surplus_A$ = ΔA if more is acquired than required of A; DeficitA = -ΔA if less is acquired than required of A.
- EXh = time spent on A by the producing adults (PA) (summation over all categories equals 24 hours).
- EX$ = cash spent on A by the household (e.g. A bought, labor bought for A, support of labor bought for A). (For the income generation category, EX$ reveals the net earnings and rents with a negative sign, because "received" = – "expended").
- INC = net cash income of the household per hour. INC includes all cash influx into the household.
- TEX_A = time/cash integrated time equivalent expended on acquisition of A by buying and self-provision by the producing adults (PA) expressed in hours by using INC (summation over all categories equals 24 hours).
- TBN_A = time/cash integrated time equivalent needed to satisfy the basic need of A.
- $TDEF_A$ = time/cash integrated time equivalent deficit on A by non-fulfillment of the basic need of A.
- $TSURPLUS_A$ = time/cash integrated time equivalent surplus on A after fulfillment of the basic need of A.
- TTBN = total time/cash integrated time equivalent needed for satisfying all basic needs.
- TTDEF = total time/cash integrated time equivalent deficit by non-fulfillment of basic needs.
- $TTSURPLUS_A$= total time/cash integrated time equivalent surplus after satisfying all basic needs.

temporary deficits. Categories with a basic need at zero automatically show surpluses, except for the savings/investments category where a deficit will show up for households with a negative cash balance.

The next three (lower left-hand corner) blocks of the system assess the time equivalence of the time and cash that the productive adults *spend on* the acquisition of each category. Expenditures may be incurred in time (EXh), in cash (EX$) or both, e.g. if such care is self-produced (EXh) and supplemented by hiring a nanny (EX$). Cash income is defined as negative cash expenditure, so that over all categories including income generation and savings, the EX$'s add up to zero. As Figure 5.1 shows, all cash expenditures are converted to the equivalent hours of working time by using the cash income per hour of the household (INC) as conversion factor, with INC including all cash influx components (wages, marketed farm produce, remittances, pensions, rents etc.), divided by the numbers of hours involved in getting that income. This is then added to the direct time spent on the category (EXh) to obtain the time/cash integrated time equivalents expended (TEX) on the category. In formula, TEX = EXh + EX$/INC. Over all categories, TEX adds up to 24 h/day per PA, because EXh expresses all that the PA actually does during the day and the sum of all EX$'s is zero.

The income per hour may be very high, and hence the EX$/INC factor very low, for households that live primarily on rents, welfare, remittances or other non-labor income, since they spend hardly any time on its acquisition.[36] Note however that INC cannot be used to calculate what the household might earn if it would convert some of its FDT into cash; the wage that should be taken then should reflect the household's position on the local labor market.

This system with acquisition and expenditure running parallel for each category can handle all real-life complexities and is conceptually robust, e.g. if basic needs are added or set to zero. The parallelism is found back, for instance, in that if the actor sleeps for 8 hours, this is entered into both accounts; the actor has acquired 8 hours by spending 8 eight hours. The most complex example is mixed subsistence/commercial agriculture. Of its subsistence part, the harvest is entered into the acquisition account (e.g. in the food category as kcal), its time expenditure is entered as EXh in the expenditures and its cash inputs are entered as

[36] Households that live on non-labour income only could be said to need zero hours for its acquisition, creating an infinite INC and error flags all over the database queries. This is only a technical problem, however, solved by allocating any minor time slot to the acquisition.

EX$ in the food category. The commercial part of the agriculture is an element in the income-generation activities (Table 5.1), with the net profits entered in the acquisition account and (with negative sign) in the expenditure account (EX$). The time spent on it is again an EXh in the expenditures account. Regular farm maintenance is under the time and cash spent as inputs but if farmers are really investing, e.g. in land acquisition or terracing, this could be kept separate under the savings/investments category to keep this visible.

With these inputs, the next column of Figure 5.1 calculates the time/cash integrated time indicators per category. The structure of the formulas is simple. If, for instance, the basic food need of a household is 4000 kcal/day per PA and if the actual acquisition is 6000 kcal/day per PA, and if the PAs spend a time/cash equivalent (TEX) of 3 hours per day on this, the *time needed to acquire the basic food need* (TBNfood) is two-thirds of this time or, formally in the system,

$$(4000 \text{ kcal/day}) * \frac{3 \text{ h/day}}{6000 \text{ kcal/day}} = 2 \text{ h/day for each PA.}$$

Along this line, we get:

- TBN, being the time/cash integrated time equivalent required per PA to satisfy the household's basic need in the category.
- TDEF, being the time/cash integrated time equivalent per PA expressing the degree to which the household lives with a deficit compared to the basic need in the category.
- TSURPLUS, being the time/cash integrated time equivalent per PA expressing the degree that the household lives with a surplus compared to the basic need in the category.

Finally, the household's aggregate indicators sum the outcomes of the indicators per category over all categories. Keeping the time deficits and surpluses separate can help identify chronic problems of households and also enables a tracing of how households may use temporary deficits e.g. to create more working time in harvest, disaster or sickness periods. Basic needs would not be basic needs if this could continue for a long time, however. In the longer run and in a principled outlook, deficits should subtract from the surpluses. Therefore, the aggregate of all surpluses minus all deficits is called freely disposable time (FDT).

5.5 Characteristics of Freely Disposable Time

In this section, we will give a simplified numerical example to illustrate the FDT system and investigate what it says about poverty compared to some widely used poverty indicators. Table 5.2 shows an FDT assessment of a single-actor household living a life composed of only six time/cash categories, focusing on five different profiles of how this actor spends his/her FDT.

Illustrating FDT with a simplified example

Table 5.2, first column, starts out with the six categories of on which the actor spends time and/or cash.

The overarching columns each assess one livelihood profile. The first is an arbitrarily set initial profile, the second gives the FDT profile for if the actor would devote all his/her energies on the accumulation of savings, and so on. For each of those, five columns summarize the FDT assessment. The first columns show the basic needs requirements (BN) on all categories. The second and third columns depict all the time and cash the actor spends on the categories (EXh and EX$). The TBN and TSUR reflect the time/cash integrated time equivalents needed to satisfy the basic needs and the surplus times left after the basic needs have been fulfilled. Because the actor has no time deficits, the total of the time surpluses equals FDT.

In this example the category of sleep, self-care and leisure has a basic need requirement of 10 h/day in total. In the initial profile, the actor spends 14 h/day on this category, meaning that this category contained 4 h/day of surplus time. The basic need to keep the household in order without any household appliances is 2 h/day and the actor's time expenditure is indeed 2 h/day. Consequently, this category contains no surplus or freely disposable time. There is no basic need for labor, so that these hours are freely disposable time. This time is always cancelled out, however, irrespective of wage and hours worked, by the cash received for it (EX$ with the minus sign). In our case, working for 8 hours results in (8 h/day) – (8 $/day) / (1 $/h) = 0 h/day of surplus time. The cash earned is spent on other categories, to buy food for instance, and may make FDT visible there. Indeed, the actor spends 5 $/day on food which, at the given wage of 1 $/h, is equivalent to 5 hours of work. The BN of the food category has been set at 4$/day, equivalent to a 2000 kcal/day food basket. Thus, out of the 5 hours time/cash integrated time, 4 h/day is needed to satisfy the basic need (TBN) and 1 h/day could be spent on other categories (TSUR). Further, we see that the

Table 5.2 Freely disposable time (FDT) profiles of a hypothetical single-person household

	Initial profile					*Full savings/investment behavior*					*Effect of household appliances*					*Effect of deep investment*					*Effect of food crisis*				
	BN	*EXh*	*EX$*	*TBN* (H)	*TSUR* (H)	*BN*	*EXh*	*EX$*	*TBN* (H)	*TSUR* (H)	*BN*	*EXh*	*EX$*	*TBN* (H)	*TSUR* (H)	*BN*	*EXh*	*EX$*	*TBN* (H)	*TSUR* (H)	*BN*	*EXh*	*EX$*	*TBN* (H)	*TSUR* (H)
Sleep, etc.	10h	14	0	10	4	10h	10	0	10	0	10h	14	0	10	4	10h	14	0	10	4	10h	10	0	10	0
Chores	2h	2	0	2	0	2h	2	0	2	0	1h	1	0	1	0	2h	2	0	2	0	2h	2	0	2	0
Labor	0	8	-8	0	0	0	12	-12	0	0	0	9	-9	0	0	0	8	-16	0	0	0	12	-12	0	0
Food	4$	0	5	4	1	4$	0	4	4	0	4$	0	5	4	1	4$	0	5	2	0.5	10$	0	10	10	0
Other goods	2$	0	3	2	1	2$	0	2	2	0	2$	0	4	2	2	2$	0	10	1	4	2$	0	2	2	0
Saving/inv.	0	0	0	0	0	0	0	6	0	6	0	0	0	0	0	0	0	1	0	0.5	0	0	0	0	0
TOTALS		24	0	18	6		24	0	18	6		24	0	17	7		24	0	15	9		24	0	24	0
FDT (h/d)			6					6					7					9					0		
Income ($/d)			8					12					9					16					12		
Expend. ($/d)			8					6					9					16					12		
Poverty line ($/d)			6					6					6					6					12		
Income above PL ($/d)			2					6					3					10					0		

Only six cash/time categories are distinguished for ease of calculations. The overarching columns denote various behavioral choices of the actor. For each choice, the columns show the basic needs (BN), the empirical behavior in time and cash expenditures (EXh and EX$), the resulting time/cash integrated time equivalents needed to satisfy the basic needs (TBN) and the surpluses (TSUR) per day. FDT equals the sum of the surpluses (because there are no deficits in this example). For comparison with FDT, the last four rows mention monetary indicators. The poverty line equals the cost of basic needs. The last row is income above the poverty line.

actor spends the remaining 3 $/day on other goods, which is equivalent to 3 h/day of time/cash integrated time. Assuming a basic need of other goods of 2 $/day (for light, heating, clothes etc.), 1 h/day is FDT. All cash now being spent, nothing goes to the savings category. Note that three balances are under full control here. One is the *time* balance of how the day is actually spent (EXh) adding up to 24 hours over the six categories. The second is the *cash* balance (EX$) adding up to 0 $/day. The third is the *time* balance of the time/cash equivalents, the summation of TBN and TSUR over all categories, adding up to 24 h/day. Adding up all time surpluses, FDT is 6 h/day; the actor may be poor but not desperately so, because 6 hours per day available to make choices with is substantial. The choice the actor apparently makes, then, is to spend much of this capacity on leisure.

What could this actor do alternatively with his freely disposable time? By way of illustration, the next profile in Table 5.2 shows the effect of a rigorous 'savings/investment strategy' in which the actor gives up all above-basic sleep, leisure, food and goods and puts all FDT to work for the savings/investment category. The actor now works for 12 h/day (24 minus the basic needs for sleep, self-care, leisure and chores), which brings in 12 $/day, out of which 4 $/day is needed for the basic needs of food and 2 $/day for other goods. The remaining 6 $/day, equivalent to (6 $/day) / (1 $/h) = 6 h/day of FDT, is in the savings category. Note that all the while, the FDT total has stayed the same 6 hours per day. In the FDT system, the actor does not get better off (higher FDT) by working more hours, and neither does he get poorer when foregoing luxuries in order to save or invest. He does get a higher FDT, however, when wages rise compared to basic need prices, or when investments begin to pay off. The next two profiles are examples.

The third profile in Table 5.2 depicts the situation after the actor has decided to buy time-saving household appliances from the saved cash. The basic need of the chores has now dropped to 1 h/day. Consequently, FDT rises to 7 h/day. If the actor then decides to go back to the original levels of sleep, self-care, leisure and food, he/she can work one hour more and spend the extra 1 $/day cash on goods, rising to 4 $/day.

Alternatively, the actor may decide to invest the saved cash in some 'deep', out-of-poverty strategy, e.g. through vocational training or building terraces for new crops. In Table 5.2 we assume that as a result of the investment, the wage has risen to 2 $/h. Bringing his sleep, self-care, leisure, chores and labor time back to the initial levels, the actor earns 16 $/day, out of which he/she spends 5 $/day to bring food con-

sumption back to the 2500 kcal/day level. This now only costs 0.5 h/day of FDT due to the doubled wage. Of the remaining 11 $/day, the actor spends 10 on other goods, leaving 1 $/day (0.5 h/day) for savings. FDT now stands at 9 h/day.

Real poverty, as said, is when FDT = 0. In Table 5.2 this has been simulated by a food crisis that puts the price for the basic food basket at 10 $/day. The only option left for the actor is to work maximum hours for bare survival.

FDT versus monetary poverty indicators

The two lines below FDT in Table 5.2 show the incomes and expenditures (on food and other goods) of the various profiles and circumstances, allowing a comparison of FDT, income and expenditure as poverty indicators. One striking difference is that with the income indicator, the actor following an investment strategy is assessed as better off than before he decided to do so, even though the only thing the actor in fact does is work all his/her hours, neglecting everything else in life. According to the expenditure indicator on the other hand, the same actor is assessed as poorer than before (cf. Van Campenhout 2006: 410). All the while, the only thing that in fact has happened is that the actor spends his/her freely disposable time (the same FDT of 6 h/day) in a different manner.

Even more saliently, the totally stuck actor without any options left (FDT = 0) due to the food crisis is assessed as better off than before by both the income or expenditure indicators. This major problem can be circumvented when basic needs are included in the picture, e.g. subtracting the cost of basic needs from the actual income. The cost of basic needs in the first four columns is 4 + 2 = 6 $/day. In the last column it is 10 + 2 = 12 $/day. The bottom line of Table 5.2 gives the incomes above the poverty line. The last column now stands at zero, in accordance with FDT. Note however, that this is only the case if the rise of basic needs is indeed a rise in *monetary* expenditures (e.g. for food). If the actor would be confronted with a crisis in *time* terms, e.g. when being disentitled to gather firewood in a nearby forest or when burdened with the care for a HIV/AIDS patient, the cost-of-basic-needs method is liable to miss this mark completely, contrary to the FDT assessment.

5.6 Empirical test of the FDT system

Applications of the FDT system to hypothetical households may serve to illustrate many of its characteristics, as shown in the preceding section. We also found it necessary, however, to confront the system with real-word cases in order to develop it fully and test its workability and coherence in practice. Farming households in the village of Kashimpur, at some 40 km north-east of Calcutta, India, were selected for the field test. The main reason for this choice was the complexity of livelihoods. The households in Kashimpur grow many different of crops in three different seasons. Some land is owned; other land is share-cropped. Some of the harvest is used for subsistence; another part is sold. Most households have some cattle that they feed from all kinds of sources and use to supply milk for the family but also to sell. Several farmers are also part-time milk middlemen, going round the village to sell their own but also their neighbors' milk. Other household members are factory workers or part-time sewers, shopkeepers, students, teachers or singers. Others have a petty trade such as selling biscuits at the markets. Some households gather firewood for cooking; others buy firewood, or gas, coal or dung cakes. Some households hire labor for house cleaning or agriculture; others hire draught animals for plowing. Some have their own wells for irrigation; others do or do not pay to receive water from private or village wells. Local measurements contain 'maunds', 'paunds', 'bighas', 'bunches', 'bags' and many others. If the FDT system could handle this, it could handle anything.

Thirty-three households were randomly selected from a list of inhabitants containing all households engaged in farming. One dropped out during the field work, resulting in a sample of 32 households, comprising 116 productive adults[37] and 27 dependents. Productive adults were interviewed, with elderly supplying additional details. Data gathering was carried out by the third author (economist) and a research assistant during 2005 and 2006, focusing on the livelihood components, with overall time use (3-day recall) and cash flows added. Interviews for the time study were held in a 10-day rhythm, while the others were scattered over time. Data were entered in an Access database structured through the FDT framework.

[37] Productive adults were defined as all non-handicapped or chronically ill individuals between 13 and 60 years of age. The 13 years limit was chosen because schooling up to 12 years of age was set as a basic need. Above that age, the choice to work or go to school is free, *i.e.* part of FDT.

Two households were added from the industrialized world. One is the first author's own in the Netherlands, chosen because of perfect data availability. This is a household with three young children, a somewhat higher than modal income and no special features in expenditure pattern. Two situations were studied, one with *au pair* help and one without, in order to show the effect of this choice on FDT. The second household is only semi-empirical because the data were compiled from informal information. It represents a single mother in the Netherlands, full-time employed for a minimum wage, receiving some subsidies on house rent, child care and child support. Table 5.1 shows the underlying basic needs figures.[38]

The methodological experience gained in the empirical study was that the database design had to be adapted several times to accommodate newly found complexities but that it worked smoothly in the end, generating the FDTs from the primary data with a few mouse clicks. The substantive results are summarized in Table 5.3, showing the time/cash integrated time needed to satisfy basic needs (TBN), time/cash integrated time surpluses (SUR) and deficits (DEF) for five Kashimpur households and the three Western cases. We will discuss some of the categories.

Taking a look at the 'food' row first, it shows that most productive adults (PA) in Kashimpur spend some 2 to 3 h/day on its provision, depending on their households' composition, the efficiency of their subsistence agriculture and their cash income per working hour (INC). The richest household in Kashimpur has only one member with a very high income; hence only 0.3 h/day for basic food need. Several Kashimpur households display significant food deficits. This is often found in food studies in India (Chandrasekhar & Ghosh, 2003).The food surpluses in the Dutch households refer not so much to extra calories but to the use of more luxurious food products (the basic need in Table 5.1 was assessed as cost of basic food basket).

The "school" category has basic needs as per Table 5.1 that depend on the number of children in primary school age as well as the PAs' in-

[38] To deal with children being sent to daycare in these households, we divide care need for children into 'family care' and 'daycare'. The former includes time needed for helping children to dress, bring them to school, read a bedtime story, etc., which can only be provided by people in the house, e.g. PA's, au-pairs or grandparents. Daycare then refers to the need for children to be looked after for the rest of the day at daycare or school or as a secondary activity during the household chores or leisure time. The time expenditures and needs on this category have been left out in the examples, but the financial costs of daycare are taken up as basic need in the non-caloric consumption category.

Table 5.3 Time/cash equivalent time expenditures and total time/cash integrated indicators and incomes of eight empirical households

	Kas. poor 1 (2 PA, 2 dep.)			*Kas. poor 2 (2 PA, 3 dep.)*			*Kas. middle 1 (3 PA)*			*Kas. middle 2 (5 PA)*			*Kas. rich (1 PA)*			*Dutch middle 1 (2 PA, 3 dep.)*			*Dutch middle 2 (2PA, 3dep.,helper)*			*Dutch poor (1 PA, 3 dep.)*		
	TBN	SUR	DEF	TBN	SUR	DEF	TBN	SUR	DEF	TBN	SUR	DEF	TBN	SUR	DEF	TBN	SUR	DEF	TBN	SUR	DEF	TBN	SUR	DEF
Phys. Inac.	8.0	0.2	0	8.0	0	0.1	8.0	0.6	0	8.0	0.6	0	8.0	0	0.4	8.0	0	0.0	8.0	0.3	0	8.0	0.0	0
Leisure	2.0	0.0	0	2.0	0	0.3	2.0	1.4	0	2.0	1.4	0	2.0	3.5	0	2.0	0.3	0	2.0	1.2	0	2.0	0.0	0.5
Self care	0.6	1.9	0	0.6	2.5	0	0.6	2.6	0	0.6	2.7	0	0.4	3.5	0	0.6	0.7	0	0.6	0.7	0	0.8	0.6	0
Care	1.0	2.0	0	1.5	1.0	0	0	0	0	0	0	0	0	0	0	1.4	3.6	0	0.7	3.7	0	3.0	1.0	0
Chores	0.8	0.5	0	1.0	0.3	0	0.5	0.4	0	0.4	0.4	0	0.5	0.2	0	1.0	0.1	0	0.3	0.4	0	1.5	0.2	0
Cooking	1.0	0.7	0	1.3	0.3	0	0.7	0.4	0	0.5	0.3	0	1.5	0.2	0	0.5	0.0	0	0.3	0.1	0	1.0	0.0	0
Food	3.4	0	0.6	2.4	0	0.3	3.0	0	0.4	2.3	0.1	0	0.3	0	0.0	0.2	0.6	0	0.3	0.6	0	0.6	0.1	0
Non-cal. cons.	0.5	0.0	0	0.6	0.6	0	0.5	0.1	0	0.3	0.4	0	0.0	0.1	0	0.9	0.7	0	0.8	0.7	0	2.8	0.2	0
Dur. goods	0.1	0.0	0	0.1	0.1	0	0.1	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.1	0	0.0	0.1	0	0.1	0.1	0
Saving/inv.	0	0	0.0	0	0.8	0.0	0	0	0.2	0	2.0	0	0	0.4	0	0	0.7	0	0	0.5	0	0	0	0.0
School	0.1	0.0	0	0.1	0.0	0	0	2.3	0	0	1.0	0	0	0	0	0	0	0	0	0	0	0	0	0
Housing	0.1	0.0	0	0.1	0.1	0	0.1	0.1	0	0.0	0.0	0	0.0	0.0	0	0.3	0.9	0	0.3	0.9	0	1.5	0.0	0
Others	1.2	0.5	0	1.0	0.5	0.0	0.7	0.5	0	0.4	0.5	0	0.6	3.2	0	0.2	1.1	0	0.2	1.3	0	0.3	0.6	0.0
TOTALS	18.6	6.0	0.6	18.5	6.2	0.7	16.3	8.3	0.6	14.6	9.4	0.0	13.3	11.2	0.4	15.2	8.8	0.0	13.5	10.5	0.0	21.7	2.8	0.5
FDT		5.4			5.5			7.7			9.4			10.8			8.8			10.5				
Inc./hh ($/d)		1.0			2.4			1.1			5.3			7.3			230			230			58.8	
Inc./cap ($/d)		0.25			0.48			0.37			1.06			7.25			46.0			38.3			14.7	

The Kashimpur (Kas.) households in India include a variable number of producing adults (PA), dependents (dep.), consisting of children and elderly, and have mixed livelihoods that include farming. The Dutch middle class household is composed of university employees with three young children. The Dutch poor household represents an unskilled single working mother with three young children. TBN = time/cash equivalent time needed to acquire basic needs (as defined in Table 5.1). DEF = time/cash equivalent time due to non-fulfilment of basic need. SUR = time/cash equivalent time spent on above basic-provision. TOTALS refer to totals of TBN (TTBN), TDEF (TTDEF) and TSUR (TTSURPLUS). FDT= freely disposable time = total time surpluses minus total deficits. All numbers except the incomes are in hours per day per PA, averaged over the PA and over the year. The incomes (per household or per capita) are cash after taxes, in US $ per day (1 US$ = 40 INR = 0.7 euro).

come per hour. Surpluses express that not only children but also PA's go to school, e.g. a 14 years old going to high school. "Savings and investments" expresses the household's cash balance, divided by the income per hour. The net incomes per household and per capita are taken up in the last two rows for comparison with FDT. One major difference between the FDT and income indicators is that the three poorest households in Kashimpur are way below the 1 $/day poverty line, but not destitute in FDT terms. With freely disposable time of some 5 to 8 hours per day for each productive household member, they have substantial time left that can be spent on various uses, such as (in Kashimpur), wage labor, leisure or care for their children. A second difference is in the sequence of the second and third household. The second is much higher in income but much lower in FDT. The household composition plays a major role here.

The first column of Table 5.3 overviews the poorest household in Kashimpur. This household creates some 10 percent of its time surpluses through the food deficit. It spends its 6 hours of surplus time on above-basic care, self-care, cooking, chores and religion. The profile of this household is to keep the female PA away from wage work and concentrate on keeping up a well-organized, clean and proper family, despite of very low cash income.

The second household of Table 5.3 represents another way of being poor, and yet not so poor, in Kashimpur. Its higher income reflects its stronger market orientation; the male PA is involved in milk sales and van driving. Much of the time surpluses are created by this and is again put to care, self-care and other non-cash activities, but not fully as in the previous household; 0.6 hours per day is spent on 'luxury' goods (non-caloric consumption surplus) and 0.8 hours per day to savings (15 percent of surplus time).

The third column in the Table introduces the middle-level households in Kashimpur. As the low income illustrates, it has a low involvement in the market, a characteristic that it shares with the first household. The major difference between the two is that the middle class household is investing, albeit not in savings but in sending one teenage PA to school (see the surplus of 2.3 hours per day in that column).

The fourth household is around the FDT median of Kashimpur. The relatively high income of 1 $ per capita per day is mainly derived by marketing farm produce, cottage industry and trade. The surplus time is spread relatively evenly to support one PA student, to save, to buy some surplus food and non-caloric goods, to enjoy surplus sleep and leisure,

and to give above-basic care. This 'flat' profile is the sum of what the preceding two households do with their lower surplus times.

The next three columns summarize the richest household in Kashimpur. It concerns the traditional landed gentry (*zamindar*) of the village, in a single person household. This person leads a materially simple life, without spending significant parts of his FDT on surplus non-caloric consumption or food. Combined with this, half of this income (equivalent to 0.4 h/day) ends up in the savings and investments category. His surplus time is largely spent on very high levels of leisure, self-care and community work, a large part of which may be interpreted as maintenance and investments in social capital.

The two Dutch middle class cases differ only in the presence of an *au pair* helper. The rise in FDT indicates the overall efficiency of this choice. Per separate category, the major effect of the helper is that some savings are sacrificed (lower surplus) to have more rest, more leisure and a better organized house (higher surpluses).

The final household in the Table represents the poor in the industrialized world: a single mother with three children working full time for a minimum wage. She has a leisure deficit due to all the hard work. Whereas the Indian household hardly spends time on housing, this mother still has to work 1.5 hours per day for her basic housing need despite government house rent subsidy; the costs of housing are much higher in the Netherlands than in India. It should be noted here that the children are sent full-time to daycare, so that the mother is able to work. This is only affordable due to high government subsidies; the costs that the actor herself has to pay is taken up as basic need in the non-caloric consumption. Still, the FDT is lower than those of the poor of Kashimpur; being a single mother she has to work continuously to make both ends meet on the basic need level. Without the house and child subsidies, her FDT would become negative.

5.7 An option for minimizing data intensity

The FDT assessment system developed here offers full insight in the key elements of livelihood strategies. The data requirements are high, however, and it serves to explore if a lean version could be designed for broad FDT surveys without sacrificing the core principles and too much empirical insight. We explore one option here. It drops detail for instance in the contributions of non-productive household members and

in possible deficits per basic need category, but retains all basic advantages of time/cash integration. The protocol runs as follows.
(1) As in the full FDT system, the household composition needs to be known in some detail, to generate all the basic needs elements of the household.
(2) The next step is to translate these basic needs into time and cash requirements for the productive adults, mainly using local data. Examples are (a) the drinking water need will be translated into either water fetching time or water buying cash or a mixture of these, (b) most consumables can be translated directly into cash needs, (c) the food requirement (in kcal/day) can be split into auto-produced food (kcal) and bough food (cash); the auto-produced food in its turn can be translated into hours of work and cash for the necessary inputs. All time and monetary units can now be added up to produce a *cost of basic needs (CBN)*, composed of the requirement *in hours (tCBN)* plus the requirement in *cash (cCBN)*.
(3) The total cash income of the productive adults needs to be known, *i.e.* the sum of net wages, agricultural and other profits, pensions, remittances and so forth, in monetary units per year. Next to be assessed are the total hours worked (per year) by the same adults to general that cash. The division of the two delivers the income per hour *(INC)*.
(4) Dividing first through the number of productive household members, the *time needed to satisfy the basic needs is: TBN = tCBN + cCBN/INC*. Freely disposable time is: *FDT = 24 – TBN*.

5.8 Conclusion and discussion

This chapter has developed a system of time/cash integrated livelihood assessment that is both conceptually coherent and empirically robust. Because a wide range of basic needs can be incorporated in this system, it is intrinsically superior to any partial system, e.g. those based on monetary or food parameters only.

'Freely disposable time' (FDT) is defined as the time that productive household members have left after satisfying the basic needs of the household that accrue on them, *i.e.* their own plus those that the non-productive members cannot supply for themselves, such as care and food. Freely disposable time can be put to any use allowed by regulations and markets, e.g. to work on the labor market or on farm for above-basic consumables, for savings, for sending a child to college, for investments in landesque capital such as terraces, or to leisure, to build social capital by investing in the community, to join a training course, to migrate out, to give above-basic care to the children and so forth.

FDT is people's freedom to enjoy the present or to invest in the future (*cf.* Alkire, 2006: 246).[39] Relating FDT to some characteristic terms in livelihoods studies, a household's freely disposable time is the basis for its adaptive capacity, its freedoms, its capacity to invest, the cornerstone of its resilience and the negative of its vulnerability.

The particular mixture of FDT spending that households display may be called their FDT profile. An FDT of zero implies that people need all their energies to satisfy their household's basic needs and are trapped in work for bare survival. FDT = 0 is the absolute poverty line in the FDT system. Following Reardon and Vosti (1995) and Carter and Barrett (2006), an FDT above zero (e.g. FDT = 2 h/day) may be necessary for households to engage successfully in out-of-poverty strategies.

The key formula of the FDT system is that for each category that people can spend time or money on, the time/cash integrated time equivalent to satisfy the basic needs equals the time directly spent on it plus the cash spent on it, converted to hours per day through the income per hour. This income per hour comprises all cash income components (wages, profits, remittances, pensions etc.) divided by the time spent on the acquisition of this income. Households can have deficits or surpluses on each category, also expressed in hours per day. The sum of surpluses minus the deficits is FDT.

In order to test if the system could cope with real-world details and surprises, it was applied to complex, peri-urban farming households in India. FDT was assessed as 5.4 and 5.5 hours per day for two poor households, while the median household had FDT = 9.4 and the richest came out at 10.8 hours per day. An example middle-class household in a developed country with three small children was found to have around FDT = 8.8 hours per day and a poor example household in a developed country was found to stand at FDT = 2.3 hours per day.

[39] Looking at land degradation issues more specifically, Reardon and Vosti (1995) assert that the criterion for poverty in environment-poverty analysis should be people's "ability to make minimum investments in resource improvements to maintain or enhance the quantity and quality of the resource base". In the same vein, Burger and Zaal (2009) regard farmers' investments in the quality of the land as the key determinant in the bifurcation between the pathways of Malthusian degradation and neo-Boserupian restoration under circumstances of growing land scarcity. Note that for households to really invest in the future, environmental or otherwise, they do not only need the investment capacity expressed in FDT plus the necessary knowledge, but also a motivation to invest, which will depend largely on expected yields and risks of the investments. In land use decisions, this translates to a high degree to the presence of good soils and markets (Burger & Zaal, 2009; Hyden *et al.*, 1993) but also to risk-reducing institutions (e.g. Rahman *et al.*, 2008).

Poverty indicators may be classified in four directions. First, poverty lines may be set as absolute or as relative to the rest of the population, in which the absolute poverty lines may be international standards or nationally or locally differentiated (Ellis, 2000). Second, poverty indicators may either aim to describe the situation of single households ('micro') or of distributions over larger wholes such as nations ('macro') (e.g. Foster *et al.,* 1984; Grosse *et al.,* 2008). Third, poverty indicators may express either some form of objectified poverty or people's own perceptions, either purely subjective (Rojas, 2008) or 'intersubjective' as in participatory wealth ranking (Van Campenhout, 2006). The FDT concept obviously belongs to the absolute/micro/objectifying group in this spectrum, along with the well-known income, expenditure and cost-of-basic-needs (CBN) indicators. The fourth direction in which poverty indicators can be classified is the distinction between mono-indicator and 'multi-dimensional' poverty concepts (Kakwani & Silber, 2008). Along that line, FDT is found in an intermediate position. It is obviously a mono-indicator system but on the other hand, the basic needs that it can incorporate have a much wider range than the usual monetary indicators, because time-related basic needs (needs for care, social obligations, participation in society etc.) are included; see Table 5.1 as an example.[40]

The relationships between FDT and the other members within the absolute/micro/objectifying/mono-indicator group are easy to investigate, as shown already in Tables 5.2 and 5.3. As are all the indicators of this group, FDT may easily be lifted to the macro level, forming an 'FDT head count' or any other FDT index. With respect to subjective poverty, FDT might show a better correlation with subjective poverty than do the other members of the objectifying group, because of its inclusion of ba-

[40] Another dimension hardly found in the literature is that poverty assessment may be fully empirical or more potential. The FDT system as developed here is of a purely empirical nature, based on the household's actual behavior. Households are not always efficient FDT maximizers, however, e.g. when they choose to spend much time with their children or grow much of their own food *in lieu* of heading full-steam to the most attractive labor market and hire a nanny. The empirical FDT will therefore tend to be somewhat lower than a potential FDT that would be calculated if all 'inefficiencies' would be removed. Potential FDT assessment would result in a more foundational poverty assessment, e.g. if potential FDT = 0, people cannot improve their situation anymore by fine-tuning the efficiency of their behaviors. The same difficulty, by the way, is encountered by the monetary indicators. Households that voluntarily grow their own food are assessed as poorer (less income) than if these households had worked more on the labor market and bought their vegetables in the supermarket. The income analogue of potential FDT is potential income, i.e. what a household *could* earn if it would put all its energies to maximum income generation.

sic needs that are primarily written in time terms (Tiwari, 2008; Floro, 1995). Another promising line for further research is the degree to which FDT might capture important aspects of multi-dimensional poverty in a single indicator.[41] In fact, studies may be designed to assess a wide array of indicators (monetary, FDT, subjective, relative and multi-dimensional) by means of single interviews.

Being a single quantitative measure, FDT is highly suitable for comparisons over places and over time, e.g. to compare nations or to monitor trends. Moreover, a focus on poverty is only one extreme in the whole array of possible applications of the FDT concept. For the rich, the poor and any household in-between, FDT can be used, for instance, in scenario studies, e.g. on (a) the effects of different livelihood strategies (*cf.* Table 5.1), (b) the effects of shifts in prices, incomes or social assistance levels, (c) the effects of time-saving support, e.g. when wells are drilled close to homes or when solar cookers supplant long hours of firewood gathering, (d) the impact of shifts in household-level care needs due to childbirth or HIV/AIDS, and many others. Other FDT applications may work the other causal way around, *i.e.* studying the effect of changes of FDT on, for instance, investments in education, sustainable land use or out-of-poverty action. Another avenue for further research is that FDT may be differentiated between household members, e.g. male and female.

Finally, a note on the universality of FDT. As said, the FDT system is *applicable* to all types of households in all types of circumstances. This does not imply, however, that the *value of* one hour of FDT is the same for all households in all circumstances. Even though time may to a high degree to be said be a universal good, the actions that households may undertake with this time and the effectiveness of these actions will vary much. One element of this has already been acknowledged in this chapter, stating that the degree to which FDT may be converted into cash depends on the local labor market and the household's position on it (e.g. skills). If the household has not relevant skills yet, it may have to invest its FDT first into skills acquisition – but what if there is no accessible

[41] FDT will always remain a broad economic indicator, that may represent economic well-being and the basis that economic well-being may form for non-economic aspects of well-being such as health, reputation or the quality of friendships. In the same broad sense, also poverty is an economic concept. Equating poverty to a lack of total well-being is nonsensical, both subjectively (Tiwari, 2008) and objectively, as if the rich cannot be unhappy or moderately poor people cannot live a full life. The latter is illustrated by Rojas (2008) who first goes to great theoretical length to equate poverty with lack of life satisfaction in all dimensions, and then goes to great empirical lengths to show that this is untenable.

market for skills acquisition either? In fact, it may be said that the transformation of FDT into any kind of output depends on many factors in the local economic and cultural landscape and the household's position in it. The analogue with the monetary indicators is that it is good to have a system of universal applicability to assess incomes but then, the value of what a household can actually do with one dollar still varies much. How much time, for instance, can one dollar buy? Some questions for further research concerning the value of FDT have been put already in the foregoing, e.g. on the effect of FDT on investments and the effect of prices on FDT.

In the present chapter, most emphasis has been put on the detailed version of the FDT assessment system. As the simplified protocol has indicated, lean versions of FDT assessment are feasible as well, and intermediate choices can be made. In an overall methodology, broad quickscans can be mixed with a smaller number of in-depth assessments in order to enhance empirical quality within budget limits (Lanjouw & Lanjouw, 2001). For international and comparative work with FDT, it is important that studies work with a comparable set of basic needs categories and levels.[42]

All in all, we hope to have shown that the Freely Disposable Time concept is a promising avenue for further investigation, combining as it does the conceptual rigor and comparability of single-parameter livelihood indicators with the empirical detail and groundedness of multidimensional approaches. Since FDT captures household capacity to invest in the future, FDT assessment can play a role in many research and policy contexts.

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[42] To a large extent, equality in basic need assumptions is more important than exact empirical grounding. FDT is sensitive, for instance, to sleep and self-care requirements of humans. Setting the basic need at 8 or at 9 hours per day makes a full hour difference in the FDT. Apart from what is actually true or not, it is important that FDT studies make the same choice.

References

Alkire, S. (2002). *Valuing freedoms.* Oxford: Oxford University Press.

Alkire, S. (2006). Needs and capabilities. In S. Reader (Ed.), *The philosophy of need* (pp: 229-251). Cambridge: Cambridge University Press.

Bardasi, E. & Wodon Q. (2006). Measuring time poverty and analyzing its determinants: Concepts and application to Guinea. *Economics Bulletin,* 10(10), 1-7.

BLS, Bureau of Labor Statistics (1997). BLS Handbook of methods. http://www.bls.gov/opub/hom/homtoc_pdf.htm

Burger, K. & Zaal, F. (Eds.) (2009). *Sustainable land management in the tropics: Explaining the miracle.* Ashgate Publishers.

Carter, M. R. & Barratt, C. B. (2006). The economics of poverty traps and persistent poverty: An asset-based approach. *Journal of Development Studies,* 42(2), 178-199.

Chambers, R. & Conway, R. (1992). *Sustainable rural livelihoods: Practical concepts for the 21st century. IDS Discussion Paper,* No. 296. Brighton: Institute of Development Studies.

Chandrasekhar, C. P. & Ghosh, J. (2003). The calorie consumption puzzle. The Hindu Business Line, Feb.11.

Ellis, F. (2000). *Rural livelihoods and diversity in developing countries.* Oxford: Oxford University Press.

Eurostat (2001). *Economy-wide material flow accounts and derived Indicators: A methodological guide.* Luxembourg: Statistical Office of the European Union.

FAO/WHO/UNU (1985). *Energy and protein requirements. World Health Organization Technical Report Series* 724. Geneva: World Health Organization.

Floro, M. S. (1995). Economic restructuring, gender and the allocation of time. *World Development,* 23(11), 1913-1929.

Foster, J., Greer, J. & Thorbecke, E. (1984). A class of decomposable poverty measures. *Econometrica,* 52(3), 761-766.

Giampietro, M. (2004). *Multi-scale integrated analysis of agroecosystems.* Florida: CRC Press.

Gomiero, T. & Giampietro, M. (2001). Multiple-scale integrated analysis of farming systems: The Thuong Lo Commune (Vietnames uplands) case study. *Population and Environment, 22*(3), 315-352.

Grosse, M., Harttgen, K. & Klasen, S. (2008). Measuring pro-poor growth in non-income dimensions. *World Development,* 36(6), 1021-1047.

Grünbühel,C. M. & Schandl, H. (2005). Using land-time-budgets to analyse farming systems and poverty alleviation policies in the Lao PDR. *International Journal of Global Environmental Issues, 5*(3/4), 142-180.

Hagenaars, A. & De Vos, K. (1988). The definition and measurement of poverty. *The Journal of Human Resources,* 23(2), 211-221.

Hobbes, M. (2005) Material flow accounting of rural communities: Principles and outcomes in South East Asia. *International Journal of Global Environmental Issues, 5*(3/4), 194-224.

Hussein, K. (2002). *Livelihoods approaches compared: A multi-agency review of current practice*. Department for International Development, Overseas Development Institute, UK: Finesse Print.

Hyden, G., Kates, R. W. & Turner, B. L. (1993). Beyond intensification. In B. L. Turner, G. Hyden & R. W. Kates (Eds.), *Population growth and agricultural change in Africa*. (pp. 410-439). Gainesville: University of Florida Press.

Kakwani, N. & Silber, J. (2008). Introduction: Multidimensional poverty analysis: Conceptual issues, empirical illustrations and policy implications. *World Development*, 36(6), 897-991.

Lanjouw, J. O. & Lanjouw, P. (2001). How to compare apples and oranges: Poverty measurement based on different definitions of consumption. *Review of Income and Wealth*, 47(1), 25-42.

Matthews, E., Amann, C., Bringezu, S., Fischer-Kowalski, M., Hüttler, W., Kleijn, R., Moriguchi, Y., Ottke, C., Rodenburg, E., Rogich, D., Schandl, H., Schütz, H., Van Der Voet, E., & Weisz, H. (2000). *The weight of nations: Material outflows from industrial economies*. Washington: World Resources Institute.

Pastore, G., Giampietro M., & Ji Li. (1999). Conventional and land-time budget analysis of rural villages in Hubei province, China. *Critical Reviews in Plant Sciences, 18*(3), 331-357.

Rahman, S. A., De Groot, W. T. & Snelder, D. J. (2008). Exploring the agroforestry adoption gap: Financial and socioeconomics of litchi-based agroforestry by smallholders in Rajshahi (Bangladesh). In D.J. Snelder & R.D. Lasco (Eds.), *Smallholder tree growing for rural development and environmental services* (pp. 227-243). Dordrecht: Springer.

Ravallion, M. (1994). Measuring social welfare with and without poverty lines. *The American Economic Review, 84*(2), 359-364.

Ravallion, M. & Bidani B. (1994). How robust is a poverty profile? *The World Bank Economic Review,* 8(1), 75-102.

Reader, S. (2006). Does a basic needs approach need capabilities? *The Journal of Political Philosophy,* 14(3), 337-350.

Reardon, T., Crawford, E. & Kelly, V. (1994). Links between non-farm income and farm investment in African households: Adding the capital market perspective. *American Journal of Agricultural Economics, 76*(5), 1172-1176.

Reardon, T. & Vosti, S. A. (1995). Links between rural poverty and the environment in developing countries: Asset categories and investment poverty. *World Development*, 23(1), 1495-1506.

Rojas, M. (2008). Experienced poverty and income poverty in Mexico: A subjective well-being approach. *World Development,* 36(6), 1078-1093.

Romero, M. R. (2006). *Investing in the land: Agricultural transition towards sustainable land use in the Philippines forest fringe*. Unpublished doctoral dissertation, Institute of Environmental Sciences, Leiden University, Leiden.

Sen, A. K. (1981). *Poverty and famines: An essay on entitlements and deprivation*. Oxford: Clarendon.

Sen, A. K. (1987). *The standard of living*. Cambridge: Cambridge University Press.

Sen, A.K. (1999). *Development as freedom*. New York: Knopf Press.

Scoones, I. (1998). *Sustainable rural livelihoods: A framework for analysis. IDS Working Paper,* No. 72. Brighton: Institute of Development Studies.

Shelley, K. J. (2005). Developing the American time use survey activity classification system. *Monthly Labour Review,* June 2005.

Singh, N. & Gilman, J. (1999). Making livelihoods more sustainable. *ISSJ 162/1999. UNESCO.* Oxford: Blackwell Publishers.

Stewart, F. (1985). *Basic needs in developing countries.* Baltimore, MD: Hopkins University Press.

Streeten, P. P. (1979). Basic needs: Premises and promises. *Journal of policy modeling,* 1, 136-146.

Streeten P. P., Burki S. J., ul Haq, M., Hicks, N. & Stewart F. (1981). *First things first: Meeting basic needs in developing countries.* New York: Oxford University Press.

Tiwari, M. (2008). Poverty and wellbeing at the 'grassroots': How much is visible to researchers? *Social Indicators Research,* Online First, DOI 10.007/s11205-008-9316-6.

Van Campenhout, B. F. H. (2006). Locally adapted poverty indicators derived from participatory wealth rankings: A case of four villages in rural Tanzania. *Journal of African Economies,* 16(3), 406-438.

Wodon, Q. (1997). Food energy intake and cost of basic needs: Measuring poverty in Bangladesh. *Journal of Development Studies,* 34(2), 66-101.

Group interview in Masipi