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

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6

Discussions on Land Use Studies and Development Indicator Design

This chapter provides a number of discussions that draw on material of the preceding chapters together. Section 6.1 starts out with three substantive discussions and conclusions based on an overview of land use patterns and indicators found in the villages studied in Chapters 2, 3, 4 and 5 and the explanations underlying them. They can be read as three separate essays. In Section 6.2, the utter simplicity of the explanation of land use in Chapters 2 and 3 triggers a critique on the dominant methodology in the land use branch of rural development studies, adding to a theme set by Overmars et al. (2007) and touched upon already in Chapter 1. Section 6.3 concludes the chapter with the exploration of expanding Freely Disposable Time (FDT) to a community-level indicator. This indicator serves as an outlook on a line of further research.

6.1 Three land use themes

Table 6.1 gives an overview of the land use situation in four villages studied in the thesis: Nalang in Laos (Chapter 4), Tat in Vietnam (Chapters 3 and 4), Dy Abra in the Philippines (Chapters 2 and 4) and Kashimpur in India (Chapter 5). The section starts out with a reflection on classification and indicator-making, based on one column in the Table. The second theme is picked up through an overview of the Table as a whole, and ends with a reflection on the status of land use theories. The third theme is again triggered by a single column in the Table, and discusses the need of adequate terminology in rural development.

Column 2: phases of agriculture

In the second column of the Table, the villages have been typified according to the classification of Todaro (1994: 304), who sketches the 'standard' course of agricultural development as a pathway of ongoing commercialization (incorporation in terms of the indicators of Chapter

4). The first phase then is subsistence agriculture (1), after which follows a phase of 'diversified' agriculture (2) in which subsistence activities have become mixed with market-oriented crops. Finally, farmers enter into a phase of fully commercial (3) agriculture in which they specialize on the most profitable crop in their context.

Already the second column on its own gives rise to some reflections. Nalang is certainly on the 'subsistence' extreme here but the art of living in Nalang (which is a place like any other where people like to be able to pay school fees and bus tickets) is to add a good cash earner to the subsistence basis. Since this crop is only for cash there is no need to spread risks and people can choose for the one best option (which happened to be cucumbers in Nalang). In other words, this is more like making a step directly from Todaro's stage 1 towards Todaro's phase 3, rather than first through stage 2. The people in Tat, on the other hand, are fully in Todaro's 'diversified' category (phase 2), growing as they do many crops, raising livestock and extracting many products from the forest, blended into an intricate farming system for market and subsistence. But can this be regarded as a phase, i.e. something on the way of developing towards phase 3? The analyses of Chapters 3 and 4 show

Table 6.1 Overview of land use in four Asian villages

	PHASE in Todaro's (1994) classification	*Natural resource extraction*	*Material intensity*	*Food security risk*	*Long term sustain.*	*Population density*	*Market access*	*Thünian zone*
Nalang (Laos)	1 (+ 3)	High	Low	Low	+	Low	Medium	Ext.
Tat (Vietnam)	2	High	High	High	-	High	Medium	Ext.
Dy Abra (Philippines)	3 (+ 1)	High	Low	Medium	0	Medium	Medium	Ext.
Kashimpur (India)	3 (+ 1)	Low	Medium	Medium	+	High	Very good	Int.

The second column positions the villages in Todaro's (1994) classification, with 1 = subsistence phase, 2 = diversified phase and 3 = commercial phase. The third column refers to extraction of the natural resources without people investing in the maintenance of the resource, such as hunting, logging, gathering firewood and forest products and fishing. The fourth column overviews the amount of material inputs in the agricultural activities. The fifth column refers to the potential autarky indicators of Chapter 4 that denote the dependency on external markets for food security. The sixth column gives an estimation of the long-term sustainability of the land use systems, based on fieldwork knowledge. Explanation of quantifications: 0 = neutral, + = positively and - = negatively corresponding with long term sustainability. The seventh column summarizes the relative population densities. The last two columns refer to the markets. The first summarizes the access to markets and the last column gives the prediction of land use intensity as envisaged by the theory of Von Thünen of land use zones around metropoles. 'Ext.' refers to the extensive zone and 'Int.' refers to the intensive zone.

that Tat is in a dead-end street rather than on a development pathway. The people of Tat are exploiting each and every niche in their environment to rock bottom. And since they live in a diverse environment, this exploitation is diverse. The village of Dy Abra, on the other hand, falls nicely within Todaro's category of commercial/specialized agriculture. It is noteworthy, however, that Dy Abra did not arrive there through a 'diversified' phase. The village had a subsistence focus when, in the late 1980s, it fell *en block* for the yellow corn traders who brought input credits and promises of a stable cash crop market (Hobbes and Kleijn, 2007). Kashimpur village, finally, does not appear to fit into Todaro's classification at all. Lying on the outskirts of the Calcutta metropolis, it grows everything the city needs, from rice to gourds to potatoes to jute to bell peppers and so on, fully commercial but in a wide variety.

This leads to a conclusion that must be quite familiar to many rural development scientists. Types of farms and types of villages do exist, and making typologies can make much scientific sense; see for instance the farming styles concept in section 6.2, the farming intensity indicator of Boserup (1965), or the 'space-based, labor-based, capital-based' classification of section 4.3. This is restricted to a *descriptive* sense, however. Any temptation to put the types on a development sequence, as if farmers logically or usually go from one 'phase' to the other, must be resisted because it can be downright misleading.

The Table as a whole and the status of land use theories

The last three columns of Table 6.1 depict the position of the villages in terms of the spatial/temporal core gradient of two land use theories, discussed in Chapters 2 and 3. One is the population density gradient of the Malthusian/Boserupian theory group, which relates rural development (or disaster) primarily to the effects of rising population density. The second is the proximity-of-markets gradient of Thünian theory that relates rural development primarily to the penetration of urban markets and culture into their rural hinterlands. The third is the level of land use intensity that could be expected, intuitively, from the village's position on the Thünian gradient.

In the population density column, there are two 'highs' (Tat and Kashimpur). Both are interpretable in terms of the population-centered theories, albeit quite different ones. Tat is a Malthusian place, with the population wedged in a narrow valley floor between steep mountain slopes, and the unsustainable land use system heading for a crash. The strong ethic identity of the people in Tat is an obstacle to out-migration, so that a fully Malthusian scenario of ever-deepening degradation and poverty is likely to develop. The situation in Tat looks in many respects like the mountainous 'areas of refuge' in Africa such as the Mandara mountains in Cameroon (Zuiderwijk, 1998), where people managed to develop intricate farming systems that could sustain high numbers of people. When population densities rose even higher, many of these areas escaped from Malthusian disaster because the surrounding plains were pacified by the colonial powers, which allowed the mountain people to settle there. Other areas were saved when rising population densities combined with a strong expansion of nearby urban markets and an influx of urban ideas and capital, creating, for instance, the seminal 'miracle of Machakos' (Zaal and Oostendorp, 2002). No such favorable contextual factors are visible for Tat, however.

Lying close to Calcutta, Kashimpur presents a different endpoint of rising population density. It is a product of Boserupian 'involution' (e.g. Geertz, 1963), where people go through a long process of ever-increasing labor intensity on ever-smaller plots, coupled with a slow but irrevocable decline of labor productivity – but without system crash. The proximity of the city is probably decisive here. It forms a secure market for a wide variety of crops with which every micro-niche in the land use system can be filled; it can absorb excess labor and supply off-farm income; and it guarantees relatively high land prices so that farmers are not immediately at rock bottom if they sell out.

Table 6.1's columns on natural resource extraction, food security and especially long term sustainability do point at this fundamental difference between Tat and Kashimpur. This is one of the reasons why assessing these elements is essential for any village-level analysis. Another, more indirect way to distinguish Tat from Kashimpur is to compare the actual intensity of land use (column 4) with what it should be according to Thünian (geographic-economic) logic, i.e. the village's position in a national-level Thünian zonation of extractive, extensive and intensive land use (column 9). Tat shows up as an anomaly in this respect. There is no Thünian logic for land use to be intensive, and yet it is. This points at a community for which it is impossible (in this case due to physical and ethnicity reasons) to spread out and find an extensive land use equilibrium with the environment.

It may be noted that in this analysis, land use theories such as the Thünian and Boserupian perspectives on agricultural intensity and development have been used without any reference to their actual truth content. Are these theories true or not? (And, by the way, should not all 'grand theories' be rejected to begin with?) Taking 'common property theory' (or the 'tragedy of the commons' as it is usually known in the environmental community) as his point of departure, Brox (1990) recommends to stop the endless bickering about the truth content of this and any other grand theory. In stead, he proposes to regard these theories as schemes that lie fully in the *methodological* realm. They can then be applied as analytical tools to find out which part of the studied world complies with the theory and which part of the studied world deviates from the theory, and then ask why. This is exactly what I have done here with Thünian theory, wondering why Tat's land use intensity deviates from the Thünian expectation. The same was done in Chapters 2 and 3 with respect to the explanation of land use in the Philippines and Vietnam case studies. (All the while, it may make sense to continue discussing the theories' truth content, but that is quite another matter.)

Column 3 and the need of adequate terminology for rural development

This section ends with a discussion of the units of analysis in rural development. Do we study farmers, land users or people's livelihood activities? A discussion on the need of adequate terminology follows.

Column 3 of Table 6.1 displays the level to which the inhabitants of the villages rely on the extraction of natural resources (mainly logging and gathering of non-timber forest products) in addition to their farming (arable and livestock) activities. As shown in Chapters 2, 3 and 4, the contributions of the extractive activities to people's livelihoods are substantial. In terms of biomass flows, the share of extracted products in the village total is even greater. It is only in the peri-urban village of Kashimpur that extraction (mainly of some firewood) drops to a minor component (Chapter 5).

Rural areas in developing countries are supposed to be populated by "farmers". But where are they, really? Only the inhabitants of Kashimpur, the least rural of our four villages, can be said to be farmers in the way they use the land. All the others are land users involved in a mixed farming/extraction land use system.

Countless are the examples of farmers that have been given wheelbarrows to help them haul manure from the stables to the fields, and then immediately put the wheelbarrows to work to start a petty trade and move out of farming as quickly as possible. Because, why farm? Being a taxi driver can be so much more prestigious, comfortable, secure and profitable. It is very much a Western notion, rooted in our romantic view of the countryside and our desire that an occupation ('beroep', in Dutch) should somehow also be a calling ('roeping', in Dutch) to assume that people who are seen engaged in farming activities also want to be a farmer and define themselves as such.

True, many people also in the developing countries do comply with this Western notion to some degree. In Brazil, being cattle rancher on an unending *latifunda* is truly a calling (Cleuren, 2001). In the Philippines, many older land owners who invest in trees and terraces express that leaving a healthy farm to the next generation is something intrinsically good (Romero, 2006). And in Africa, many densely populated areas are regions of "deep attachment" which is a factor that greatly supports people's propensity to invest in the land (Hyden et al., 1993). For so many others, however, farming is just something you happen to do to make a living at the place where you happen to be, exchangeable with any other thing you might do or place you might move to. In my field notes of a case study among the Pala'wan indigenous people from the uplands of Palawan (Philippines), respondents declared that their great dreams were (1) a road to the plains and (2) education for the children so that these could get non-farming jobs. Calling *all* these rural dwellers "farmers" loads their land-based activities with unjustified normative connotations and confines our vision on their motivations. In fact for many millions of rural dwellers, any sensible out-of-poverty strategy is an out-of-farming strategy.

Thus, for general use, the terms of 'land user' and 'land use system' are superior to the terms of 'farmer' and 'farming system' for the two reasons of precision (including as they do people's non-farming land use types) and freedom of normative loading (a land user is someone who uses land, without implicit connotations of that this should somehow be a person's identity or desire).

Because of the dominance of the 'farming' perspective on the rural areas, the enormous importance of non-land based incomes to rural dwellers has been slow to gain recognition in the rural development discipline. One example is remittances. The relaxed and sustainable nature of Cape Verdean agriculture, for instance, may have to do less with Cape Verdean soils and markets than with the constant influx of remittances from Cape Verdeans abroad, massively converting their *soudade* into cash flows. As noticed already in Chapters 2 and 3, non-land incomes, either self-generated or received from other areas, play a key role in many land use decisions, e.g. enabling people to invest in the land and switch to sustainable land use. This forms a methodological reason to broaden the perspective from 'land use' to the whole of rural people's livelihood activities. As has been explicated in Chapter 3, in order to arrive at a decision with respect to any livelihood activity (e.g. to plant rice), people tend to compare the merits of that option with those of others out of, potentially, their *whole* livelihood repertoire. In other words, a grounded explanation of any livelihood activity (land or non-land) requires insight in the whole of people's livelihood repertoire.

This can be said to be the achievement of the Livelihoods Approach, discussed in Chapter 5. It focuses the rural researcher on this whole array of what rural people can do, based on the full array of their assets and capabilities ('capitals'). To the outsider of rural development studies, all this may sound like a vague play of shifting words. There is a very basic sort of progress, however, in approaching rural areas as places lived in by rural dwellers engaged in a rich array of livelihood activities rather than as places lived in by farmers engaged in farming systems.

If we see people doing what they are doing (farming, other land use, other livelihood activities), how will we call that whole of their activities? At this juncture, it serves to note the general drive of rural development scientists (and anthropologists etc.) to defend 'their' farmers against the arrogance of corporations and governments that depict third world farmers as stupid, uninterested in the future, the root cause of all underdevelopment and unsustainability problems, i.e. as people that may only be forced or at best 'uplifted into' the solutions thought out by the development professionals. Countless are the works of rural development scientists devoted to the elucidation of local knowledge systems, the great capacities of farmers to respond to change, methods to do respectful research with farmers, and so on, and quite justifiably so (e.g. Chambers et al, 1989; Van der Ploeg, 1991; Warren et al., 1995; Scoones et al., 2007; Mortimore, 1998).

A less fortunate outcome of this phenomenon has been that the 'wholes of what people are doing' tended to become described in respectful terms. One example is when Blaikie and Brookfield (1987) wanted to move away from the term of 'farmer' for the reasons I just described, they did not choose for the neutral 'land user' but for the respectful 'land manager' (*cf.* Walker, 2005). Who, however, in our four villages are land managers? In Kashimpur, probably, all land users may be called that way, handling as they will tend to do their tiny lots with great care. In Dy Abra, the home gardens may probably be called 'managed', as may be the corn fields to some extent. As for the forest, however, people will just run in and log as many trees as they can as long as the weather is good and the authorities look the other way. The same picture holds for Tat, where people overall are involved in maximum exploitation rather than management. Blindly labeling all this as land management is self-deceiving.

In the Sustainable Livelihoods Framework (see Chapter 5), the whole of livelihood activities that people carry out is called their 'livelihood strategy'. The same criticism of misplaced respect applies here. Even if people could be assumed to have strategies to some extent, it is nonsensical to assume that *what they happen to do during a day* is equal to that strategy, without any place for contingency, inconsistency, ephemeral aims, mistakes, escapism and all those things that make humans human. For the same reasons, we should refrain from the term 'livelihood system'. Purely descriptive terms such as 'livelihood profile' (cf. the 'FDT profile' of Chapter 5) could be used to characterize livelihood differences or dynamics.

If we define development as the improvement of livelihoods, rural development may now be said to be about the improvement of the livelihoods of rural dwellers that may display various livelihood profiles. The degrees to which these people or livelihoods may be described as 'farmers', 'land use systems', 'managers' or 'strategies' are open questions to be addressed empirically (if of any interest at all).

6.2 Rational choice and the wave of inductivism

This section offers an expansion of the discussion on indicators, frameworks and theories already touched upon in Chapter 1.

Chapters 2 and 3 have shown that a fully satisfactory explanation of the land use decisions of the land users in the studied villages is reached by the rule that the farmers first fully exploit their most profitable option, then the next most profitable, and so on. In others words, rational choice theory offered a fully adequate explanation. In retrospect, this is nothing surprising. Though rational choice has been criticized for a myriad of (often good) reasons (e.g. Elster, 1985; Green and Shapiro, 1996), this attack has not made any real inroads into the domain where rational choice theory was originally designed for in the 1950s (e.g. Friedman, 1953), which was the aggregate choice of actors in market situations. Aggregate choice is obviously what has been the focus of Chapters 2 and 3; nothing there is about the particular choices of particular farmers. So, what we in fact find is that the land use choices of the land users are, to them, economic choices. This, as said, is not surprising.

Why is the prevalence of rational choice, with all the advantages of good explanations and straightforward predictions that it brings along, not found by so many more land use studies? It is quite unlikely that land use choice for all land users in the world except the ones living in the villages of Chapters 2 and 3 would be un-economic. Non-economic considerations might prevail on some land indeed, such as people's front gardens or multi-purpose home gardens, or sacred forest, or land in conflict situations and suchlike (Pugh, 1996). Other land may not have been touched significantly by human decision-making at all yet, such as tropical forest or desert. But for regular agricultural land, i.e. land used by actors that somehow make a living off this land, why should not all this land be used with principles of rational choice prevailing?

The 'standard' methodology of explanatory land use studies in developing countries has the following general structure (see Overmars et al., 2007: 440). First, some village or region is selected, along with some dependent variable, e.g. crop choice or investment intensity. Then, a number of 'candidate' explanatory (independent) variables are listed, such as the age of the head of household, the off-farm income and the soil type. Subsequently, heads of households are interviewed to estimate these variables for their household and land. Then follow a lot of correlations between the independent and the dependent variables. Many of these correlations will be statistically insignificant, but some of them may not, indicating that, for instance (e.g. Romero, 2006),

- older household heads have a little more propensity to plant corn
- sandy fields are a bit less under corn
- sloping fields are also a bit less under corn
- households with a somewhat higher income have a higher propensity to also plant some trees.

Jointly (in some composite formula that basically adds up the factors), these factors then explain a certain percentage of the variance of the dependent variable.

What have we learned here? We have not learned, for instance, that farmers plant corn simply because it is the most profitable crop in this region, except when the soil is too sandy or too sloping. We have not learned that trees here are simply the most profitable long-term investment, so that farmers with some cash to spare tend to plant them. Because prices and yields of crops are invariable over the region, they cannot be variables in the analysis, and the basic (rational choice) explanation of land use is not accessible with this method. As a result, the method can only reveal some hardly relevant *variations on* the basic explanatory scheme, and not what in fact the basic explanatory scheme *itself* is.

What we have looked at here, methodologically, is a standard case of statistical *induction* in land use studies, as prevails in econometrics and GIS-based geographic work (Overmars and Verburg, 2005). Inductive methods start with observations of reality and then try to find regularities in these data. These regularities are then declared to be a general pattern. Contrarily, deductive methods follow the "empirical cycle" where hypotheses are deducted from theories or causal models and then tested with observations of reality that can falsify or verify the theory or causal model. Overmars et al. (2007) give a more subtle gliding scale between the purely inductive and deductive extremes, but more importantly here, they add proof that working on the same question and the same region, a simple deductive (rational choice) model can generate land use predictions with the same statistical power as inductive analysis. To this they add that, due to its groundedness in causal theory (e.g. a rational choice model), deductively gained explanatory knowledge is truly causal knowledge and therewith intrinsically superior to explanatory knowledge that is inductively arrived at. Besides, deductive results are more relevant for predictive purposes because contrary to the inductive result, the deductive model can predict responses to new phenomena (e.g. new crops). Overmars et al. (2007) conclude that land use studies "should become more deductive". In the same vein, Pugh (1996) concludes that land use studies should primarily follow deductive approaches to the extent that land use is economically driven – which, in my opinion, is a very large extent.

Others have a more outspoken opinion on the wave of inductivism. Bulte (2008) discusses the "econometric [i.e. inductive] approach to cross-country studies" that collect and then regress information on many countries' development on a vast number of variables that may explain the variation. It is not difficult to generate correlations in abundance, and it is "a fun way to pass a rainy afternoon" as Bulte adds, but where is the proof of causality? Where is the insight in mechanisms?

With respect to rural development studies, Marsden (2004: 130) states that while the discipline has generated "quite a flurry of rich empirically engaged work" in the last decades, "actual theoretical development has reached something of a hiatus". Rural development is not only about land use, of course, but the land use side of the discipline does contain a number of theoretical frames, such as rational choice theory and the Malthusian, (neo-)Boserupian, common property and Thünian perspectives on land use change (see Section 6.1) that are highly supportive for a deductive turn of the discipline. All these theoretical elements may become the core of interconnected empirical studies and function as focal points for theoretical progress. One example is the concept of farming 'calculi', developed by Van der Ploeg (1991). Calculi are logically coherent modes of reasoning that all have a rational choice basis but focus on different farming goals (e.g. having a healthy and resilient farm versus having a lot on money on the bank). Calculi and their allied 'farming styles' may co-exist for a long time in the same region and are quite relevant when it comes to farmers' responses to market and other opportunities. The types, causes and effects of different farming styles may be studied (and in fact are, e.g. Gerritsen, 1995; Van der Ploeg, 2000; Thomson, 2002) and serve as one of the focal points for deduction-driven progress in rural development studies.

6.3 Community development: expanding the FDT indicator

The FDT indicator developed in Chapter 5 is said there to captures people's freedoms, people's capacity to invest. This suggests – because development can be seen as the results of investments – that some rather direct link must exist between FDT and development. In this section, the potential to use FDT as the basis for a development indicator is explored. The term 'explored' should be taken quite literary here. Contrary to FDT itself, the expanded indicator is only a first result, as yet not scrutinized and untested. The indicator being of the synthetic kind, however, it is based on explicit assumptions and a coherent line of reasoning, which makes it open to conceptual and theoretical progress. In line with the preceding section and the explanatory schemes derived at in Chapters 2 and 3, rational choice theory supplies the underlying model.

Sustainable rural development usually speaks about the world of the relatively poor in developing countries for which development is a prime goal. And, focusing as it does on rural areas, it is to a large extent not only about individual farmers and households but also about rural communities. For an indicator on community development, communities should be defined as the sum-total of the individual households plus the community-level features ('system characteristics'). Examples of the latter are cultural features, the physical infrastructure (roads, community buildings, village irrigation scheme etc.) and the institutional infrastructure (rules and organizations). The importance of the community-level features is well illustrated by Romero (2006), who studied the investments of Philippine farmers in the quality of their land. Even though all these investments were essentially individual actions (making terraces, planting trees etc.), the econometric analysis showed a large influence of the 'village dummies', that is, the village where the household was located, as a factor independent from the household-level factors. In other words, even individual investment actions have a community-level influence. This influence will of course be even greater when investment actions are essentially collective actions, e.g. the improvement of the village road, the restoration of the village irrigation scheme or establishing a village cooperative. For this reason, we take it that rural development is *community* development, defined as the economic betterment of individual households and community-level features *together*, in some mixture where either the individual or the community level may predominate.

How does economic betterment come about? It may be due to luck, e.g. when terms of trade improve. Or it may be due to external support, e.g. development aid. The most general and fundamental development, however, is internally rooted, i.e. based on people's own agency and investment. It is on this type of development that this section will focus.

The investments of rural people and rural communities may be of many kinds. They are individual or collective actions aiming at physical, cognitive or institutional improvement, with typical examples of planting trees, making terraces, learning to improve nutrient management, building a primary school, sending children to secondary school, building a village cooperative or restoring a village irrigation system. Investments such as these may be unsuccessful. Newly built terraces may wash away, the newly established village council may be usurped by the state, or the new irrigation scheme may become infested with malaria mosquitoes. On the whole, however, rural communities are not stupid and not inclined to take much risk. We may take it, therefore, that on the community level and over time, investments such as these will contribute to development indeed. We may say, therefore, that the higher the investment level (e.g. in dollars or hours per year), the steeper will be the development curve. In other words, investment level is associated with *rate of development*. If we add the assumption that all developmental investments will have basically the same developmental effect (the same internal rate of return, the economists would say)[43], we end at the equation that is the basis of the community development indicator:

- Level of investment = rate of development

Sometimes, investments generate instantaneous results. Paying a contractor to construct a drinking water well, for instance, may immediately create better child health and higher female FDT (due to the reduction of water fetching time). Quite often, however, investments take time to pay out, e.g. when planting trees, creating a village lending scheme or send-

[43] It could also be taken that if developmental actions are collective actions, social capital of the community should be factored in. If social capital is low, investment in collective actions does not result in much development. In the present section, we work the other way around, with social capital factored into the investment concept. If people spend energy (FDT) on collective action and social capital is low, the resulting actual investment will be low. Either way, social capital enters into the final result (the 'maxDEVrate' formula), and in the same manner.

ing a child to college. This time lag may be safely ignored, however, if we look at a somewhat longer term and on a collective level such as a village. On the village level, one household will start in one year and another in the next, so that the total effect will be evened out over the years. In other words, even though the time lag may be important for specific actions of individual households, a long-term community level indicator may safely work with the basic, 'timeless' equation.

Development is generally supposed to be something good. An important question for the (self-)analysis of a community therefore is: what *could be the maximum* rate of development here, i.e. the maximum investment level?

The key to the answer has been given already in Table 5.1 of Chapter 5. One column there depicts an actor who lets go of all above-basic leisure, housing, care giving, food etc. and spends all his freely disposable time (FDT) on income generation to create a largest possible cash surplus (i.e. cash above what is needed for basic needs). This cash surplus equals FDT **x** maxEFF, in which maxEFF is defined as the efficacy (net wage, profit etc.) of the actor's best income-generating activity. Since FDT is written in hours per day and maxEFF in dollars per hour, the cash surplus level is in dollars per day. The whole cash surplus can be spent on developmental investments. In other words, the maximum level of investment is found as FDT **x** maxEFF dollars per day.

Cash surplus generation cannot satisfy all possible development needs. It may be, for instance, that the actor himself or herself has to acquire new skills, which can be realized largely only through the investment of *time* rather than cash. The same 'time route' as opposed to the 'cash route' may come about by the actor's preference, e.g. when wanting to plant one's trees himself rather than paying others to do it. How may this be expressed in monetary terms, so that the time and cash routes become comparable? The general economic answer here is: through the opportunity cost of labor. Investing is the same as foregoing direct consumption. The actor going to school could have spent these hours working. In general terms, the foregone consumption when spending one hour on any activity equals what one could have earned if that hour had been spent working for wage or profit, which is equal to maxEFF in our definitions.[44] In practice, there will always be some mixture of both

[44] This is not one of my favorite assumptions. Would going to a training course in the evening hours indeed have this opportunity cost in reality or in the experience of the actor? In the present explorative phase of the indicator, it serves to accept the assumption, however.

routes, so that we may define a ratio **m**, being the part of FDT with which the cash route is chosen, compared to (1-**m**) that describes the part with which the time route is chosen. The total maximum rate of investment can now be written as

- **m x** FDT **x** maxEFF + (1-**m**) **x** FDT **x** maxEFF

which equals FDT **x** maxEFF for any **m**. In other words, even though the two routes have a quite different appearance for the actors and in the field, the degree to which the one is chosen or the other (**m**) does not make a difference for the overall level of foregone direct consumption, i.e. investment level.

Development should be sustainable. In terms of the previous paragraph, an investment cannot be considered an investment in a better future if the investment itself undermines this future. This holds even if the investors themselves would not be concerned. In other words, this condition expresses the normative position of the outsider, in this case the indicator designer. From the same position, it can be said that external effects of the investments should stay within certain bounds. An example is that if restoration of a village irrigation scheme would have the effect that a downstream community now suffers from severe water shortages, the village action should not qualify as development. A third normative condition concerns quality of life in the community during the investment period. For a single actor and on a short term, it cannot be said that anything would be basically wrong if the actor would spend all his/her FDT on maximally productive work in order to generate and invest as much as possible. After all, the FDT concept guarantees that all the actor's basic needs are still met. For a whole community and on a longer term, however, it would appear that we cannot simply add up all available FDT of the households and then assume this can all be put to maximally productive work. Many children need more than basic care, for instance, and many people cannot work in just any activity. Somehow, some safety margin needs to be built in to guarantee an acceptable quality of life on the community level. In summary, the formulation of this normative aspect is that for investments to be able to classify as developmental, they should lie within acceptable boundaries of risk (on sustainability, health etc.), of external effects (on biodiversity, other communities etc.) and of reduction of quality of life during investment. In the formulas below, we will follow a notation of **!! RISK**, **!! EXT** and **!! QL** to express the notion of 'within acceptable boundaries of risk, external effects and quality of life reduction'.

We can now make the first step to move from the single-household level (with FDT **x** EFF) to the community level, i.e. a sum of households plus the community features. The sum of households first of all generates a sum of FDTs (**Σ FDT**). Because all households have different skills and different access to employment markets (e.g. through private social capital), they all have a different best possible paying job or self-employment (maxEFF). Taking this up in the indicator would make the formula (and the fieldwork) hopelessly complicated however. For quick-scan applications of the indicator, it will make sense to work with one generalized maxEFF for the whole village, e.g. taking the locally general wage for semi-skilled labor as a proxy of the efficacy of any sensible action that people might undertake (on-farm, off-farm, individual or collective). If the indicator would be applied in a more elaborate assessment of development options in a specific locality, we may take a weighted average of the efficacies (wage, profitability) of a number of different but all locally sensible activities, e.g. factory work, basic agriculture or agroforestry.[45] Under these assumptions, the sum-of-households element of the community generates a 'sum-of-households maximum development rate' of **ΣFDT** multiplied by the general or weighted **maxEFF.**

In order to grasp the community-level element (system characteristic) of the community, we first need to introduce a factor **α**, defined as the degree to which an action is a collective action. This factor is 1 for purely collective actions (e.g. restoring the village irrigation system or building a village cooperative) and 0 for purely individual actions. However, in the light of Romero's (2006) finding in the Philippines, purely individual actions may in fact not exist in rural areas in developing countries. Thus, the minimum of **α** might be taken as 0.2 or so. For other actions, **α** can be chosen on an intuitive basis, e.g. based on fieldwork. Success of collective action depends on collective social capital (**CSC**).[46] As the World Bank puts it, collective social capital refers to the norms and networks that enable collective action (http://go.worldbank.org/C0QTRW4QF0). This includes the presence of trust, rules and leadership that enable people to prevent having to build up trust, overcome

45 If data allow, more differentiation is possible, e.g. distinguishing between household types and action types. If the maxEFF option is only of limited availability, households may be set to cascade down to the next profitable activity, as shown in Chapters 2 and 3 concerning land use options.

46 Here we follow De Groot and Tadepally (2006) in the explicit distinction between private social capital *sensu* Bourdieu (1986), denoting the resources the actor has access to through his or her social relations with others, and collective social capital *sensu* Putnam (1993) as a characteristic of groups that facilitates cooperation for mutual benefit.

rifts and jealousies, design constitutional and operational rules (Ostrom, 1990) and find leadership from scratch if collective action would be required. In other words, collective social capital can be regarded as the absence of collective action transaction cost. There are several formal and intuitive ways to assess collective social capital (e.g. De Groot and Tadepally 2006, and see the World Bank site above).

In the indicator formula below, **CSC** is built in as another multiplicative factor. This implies that for use in the indicator, the **CSC** factor should be set between 0 and 1. If **CSC** = 1, everything in the village is fully set for the collective action already. There are no transaction cost that subtract from the sum-total of individual capacities. On the other extreme, if **CSC** = 0, collective action is *de facto* impossible even if the sum of individual capacities (**ΣFDT**) would be high; people simply loose all their FDT energies in quarrelling about trust, rules and leadership.

In the formula below, **α** and **CSC** are combined in the form of [1 **- α** (1 **- CSC**)]. This relatively complex form is only technical; it prevents unnatural definitions, e.g. that CSC should be put at 0 if collective social capital is high. The formula shows that if **CSC** = 1 ('perfect' social capital), the outcome of the formula is 1 for any **α**, meaning that all FDT can be put to productive work. The same outcome is arrived at if the action is purely individual (**α** = 0). If collective social capital is only half-way good (**CSC** = 0.5) and the action has a collective component of 40 percent (**α** > = 0.4), the portion of ΣFDT that can be put to productive work is [1 – 0.4 (1 – 0.5)] = 0.8 (80 percent). The other 20 percent is dissipated in organizing the collective action component.

The formula of maximum development rate on the community level now becomes:

- **maxDEVrate = ΣFDT x maxEFF x [1 - α (1 - CSC)] !! RISK !! EXT !! QL**

in which:
- **maxDEVrate** [$/day] = maximum development rate = the maximum rate of development attainable by a community
- **ΣFDT [h/day] = the sum of all freely disposable time = total time left after satisfaction of all basic needs of all productive household members and the basic needs of the dependents that accrue to them; see Chapter 5.**
- **maxEFF** [$/h] = the general or weighted efficacy (wage, profitability) of well-productive actions accessible to the households.
- **α** [1] = degree to which an action generating maxEFF is a collective action.

– **CSC** [1] = collective social capital = the degree of absence of collective action transaction cost.
– !! **RISK** = provided the action stays within acceptable risk boundaries.
– !! **EXT** = provided the action stays within acceptable external effect boundaries.
– !! **QL** = provided that quality of life remains on an acceptable level.[47]

This formula represents the conceptually most perfect expression of the community-level maximum development rate. One further step may be advisable, however, that makes the formula less perfect but more substantive. This concerns the !! **QL** element. The element could be replaced by a 'standard' norm that households should be left with at least 2 hours of freely disposable time in order to take care of above-basic life qualities. The time available for productive work would then be reduced to FDT – 2 hours per day. Accepting this arbitrary choice, the !! **QL** element can be dropped and the formula becomes:

- maxDEVrate $= \Sigma(\text{FDT} - 2) \times \text{maxEFF} \times [1 - \alpha\,(1 - \text{CSC})]$!! RISK !! EXT

in which all elements have been defined already.

In these expressions, the !! **RISK** and !! **EXT** operators remain theoretically vague. This should not be really frightening however. If the indicator is applied in specific villages, it will usually be easy to assess if an activity is too risky. Tree planting, regular agricultural work, improved water management or off-farm factory work are very unlikely to have significant risks, implying that the !! **RISK** condition is satisfied. On a higher level of sophistication, the !! **RISK** component may to an important extent be assessed through the rMFA framework elaborated in Chapter 4, especially with respect to food security. Jointly, the rMFA indicators of potential degree of food self sufficiency, actual food autarky and potential food autarky give insight in the short-term and long-term risk entailed in land use options, especially those connected with market failures. Also for rural situations, a simple sustainability assessment may be added, e.g. through the local balances of major natural resource flows, soil nutrients and soil organic carbon. The rMFA of Chapter 4 gives some principles already, and other MFA approaches are available for this purpose too, such as (simplified versions of) Van der Voet's (1996) nitrogen flow analysis or the NUTMON framework of Wageningen University (www.nutmon.org). The !! **RISK** threshold could be set that none of the balances should be significantly below zero, i.e. no sig-

47 For a single actor and purely individual action, there is only one FDT, $\alpha = 0$ and !! QL may be dropped, so that the indicator collapses into FDT x maxEFF !! RISK !! EXT.

nificant net depletion. The externalities component !! **EXT** may be quite important for rich cities that pollute much and use up much land elsewhere to satisfy their food and energy needs. For most of the communities encountered in rural development studies however, external effects will often be negligible except in obvious cases such as the upstream-downstream impacts of irrigation water consumption or when communities engage in illegal logging or extraction of resources on the territory of other villages, such as Dy Abra and Tat discussed in Chapters 2 and 3.

"The !! **RISK** and !! **EXT** assessments will be more difficult if the indicator would be applied on larger scales or without field knowledge. It may then be chosen to drop the normatively laden development concept from the indicator and rename it as 'maximum investment level' (also in dollars per day):

- maxINVlevel $= \Sigma(\text{FDT} - 2) \times \text{maxEFF} \times [1 - \alpha\,(1 - \text{CSC})]$

in which:
- **maxINVlevel** [$/day] = the maximum level of investments attainable by a community

and all other elements have been defined already.[48] It should then be borne in mind, however, that investment is not development *per se* or acceptable on other accounts. The community's actions may now include, for instance, soil mining, biodiversity depletion or groundwater over-exploitation.

One of the advantages of synthetic indicators such as the one developed here is that they do not express some expert's opinion that certain things 'add up' in some way, but that they tell a whole story in which each assumption and each outcome in the storyline is open to discussion, as well as the final, integrated 'plot'. This means that the community development indicator makes sense not only as an assessment tool for the outsider working on the basis of extensive field study and large databases, but also if translated into locally understandable terms and then applied, with each step open for discussion, in a participatory manner. The indicator then acts as a framework for discussion and joint analysis by outsiders and the community together. In other words,

48 It may be noted that the subtraction of 2 hours per day from FDT has been motivated from a normative position before and is yet not dropped from the purely empirical maxINVlevel formula. This follows Reardon and Vosti (1995) who state that people are not likely to invest if they have only very little income above their basic needs; see also Chapter 5.

participatory application of the indicator may deliver many entry points for formal or informal learning between scientists, villagers, authorities and development agents. This would appear to me as a promising avenue for further exploration.

One aspect that may strengthen participatory applications (as well as theory building on the longer term) is that with only a single modification, the investment indicator changes from a capacity assessment into a *reality* assessment, i.e. a statement with an empirically testable truth claim. This modification is the introduction of a factor that we may call 'motivation' (MOT), defined as the degree (between 0 and 1) to which people actually put their available investment capacity to investment action. The formula is:

- **actualINVlevel = Σ(FDT - 2) x maxEFF x [1 - α (1 - CSC)] x MOT**

in which:
- **actualINVlevel** [$/day] = the actual level of investments by a community
- **MOT** = the actual degree to which the community puts its investment capacity (= the foregoing part of the formula) to investment action

and all other factors have been defined already. If desired, the MOT factor may be broken down into a cascade of several motivational subfactors, such as the degree to which people are willing to use their FDT for productive work, the degree to which maximally productive work is chosen, the degree to which the revenues are invested in stead of consumed, and so on (MOT = mot1 x mot2 x mot3 etc.). Going through all assumptions and factors (FDT, maxEFF, α, CSC, mot1, mot2 etc.) and the structure of the formula as a whole will help communities to grasp and work on all their opportunities and choices for (or against) development.

For efficient formal applications, indicators should be supplied with frameworks to estimate the various factors of the indicator formulas. For the indicator developed in this section, only the FDT factor has a coherent framework yet (Chapter 5), but more may be developed. Preferably, single-factor frameworks should be integrated in order to express the indicator in a most efficient manner. This would boil down to finding a single way to formulate all overlapping elements of the frameworks and to shed all elements that do not 'feed into' the overall synthesis. This should be balanced very consciously with the possible disadvantages, however, the most salient of which is that the frameworks would loose too much of their separate relevance. It might be efficient for the present indicator, for instance, to reduce the many variables of rMFA to just the basics needed for the !! **RISK** assessment, but what if later it may turn out that many of the other rMFA indicators cannot be calculated anymore due to lack of just a few but essential data?

Methods for *data gathering* connected to the indicator are quite worthwhile to look into, because costly fieldwork is often necessary due to paucity of documented statistics at the village and household levels in developing countries. Very wide margins between 'precision' versus 'quick scan' methods exist for each separate factor of the indicator. FDT intrinsically needs household-level cash flow and time use measurements but data gathering intensity may vary between daily visits on the one hand versus single-visit assessments of overall incomes, expenditures and time use on a number of typical days; see also the quick-scan section in Chapter 5. Village-level ΣFDT may be assessed by visiting all households but also through a stratified sample, in which the strata may be determined through a factor analysis of a survey but also through a quick PRA-type (people-based) wealth ranking. MaxEFF may be assessed per household member but may on the other extreme, as said, also be guesstimated for a village as a whole. As discussed previously, the same picture holds for the other factors. Combining all data in a single, integrated dataset is not essentially difficult. The database that has been constructed to generate FDT in Kashimpur in Chapter 5, for instance, already contains all data for calculating the whole of Chapter 4's rMFA. All these field-level methodological issues may better wait, however, until a principled discussion on the merits of the development indicator itself has been rounded off. This then is the only place in this whole dissertation, I declare with some pride, where my science is not supply-driven (or fundamental, as others might put it).

References

Blaikie, P.M. and Brookfield, H.C. (1987). *Land degradation and society.* London: Methuen.

Bourdieu, P. (1986). The forms of capital. In: Richardson, J. G. (Editor). *The handbook of theory and research for the sociology of education.* New York: Greenwood, pp. 241-258.

Boserup, E. (1965). *The conditions of agricultural growth: The economics of agrarian change under population pressure.* London: Earthscan, reprinted in 1993.

Bremser and Barsky (2004). Utilizing the balanced scorecard for R&D performance measurement. *R&D Management, 34 (3), pp. 229-238.*

Brox, O. (1990). The common property theory: Epistemological status and analytical utility. *Human Organisation*, 49, pp. 227-235.

Bulte, E. (2008). Weak links. *The broker,* 10, p.28 (www.thebrokeronline.eu).

Chambers, R., Pacey, A. and Thrupp, L. A. (Editors) (1989). *Farmers first: Farmer innovation and agricultural research*. London: Intermediate Technology Publications Ltd.

Cleuren, H. M. R. H. (2001). *Paving the road for forest destructor: Key actors and driving forces of tropical deforestation in Brazil, Ecuador and Cameroon*. PhD Thesis, Leiden University.

De Groot, W. T. (1992). *Environmental science theory: Concepts, methods in a one-world, problem-oriented paradigm*. Amsterdam: Elsevier.

De Groot, W. T. and H. Tadepally (2008). Community action for environmental restoration: a case study on collective social capital in India. *Environment, Development and Sustainability*, 10, pp.519–536.

Dubin, R. (1978). *Theory building*. (revised edition). New York: Free Press.

Edwards-Jones, G., Davies, B. and Hussain, S. (2000). *Ecological economics: An introduction*. Cornwall: MPG Books, Ltd.

Elster, J. (1985). *Sour grapes: Studies in the subversion of rationality*. New York: Cambridge University Press.

Friedman, M. (1953). *Essays in positive economics*. Chicago: Chicago University Press

Geertz, C. (1963). *Agricultural involution: The processes of ecological change in Indonesia*. Berkeley, CA: University of California Press.

Gerritsen, P. R. W. (1995). *Styles of farming and forestry: The case of the Mexican community of Cuzalapa*. Wageningen: Wageningen Agricultural University.

Green, D. P. and Shapiro, I. (1996). *Pathologies of rational choice theory: A critique of applications in political science*. Yale: Yale University Press.

Hobbes M. and Kleijn R. (Editors) (2007). *Local material flow analyses in social context at the forest fringe in the Sierra Madre, the Philippines*. Social Ecology Working Paper, No. 98, IFF, Vienna.

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

Labuschagne, C., Brent, A. C. and Van Erck, R. P. G. (2005). Assessing the sustainability performance of industries. *Journal of Cleaner Production*, 13, pp. 373-385.

Marsden, T. (2004). The quest for ecological modernisation: Re-spacing rural development and agri-food studies. *Socioligia Ruralis*, 44 (2), pp. 129-146.

Mortimore, M. (1998). *Roots in the African dust: Sustaining the drylands*. Cambridge: Cambridge University Press.

Newman, J.R. and R.K. Schreiber (1984). Animals as indicators of ecosystem responses to air emissions. *Environmental Management,* 8 (4), pp. 309-324.

Noorbakhsh, F. (1998). A modified human development index. *World Development,* 26 (3), pp. 517-528.

Ostrom, E. (1990). *Governing the commons: The evolution of institutions for collective action*. Cambridge: Cambridge University Press.

Overmars, K. P. and Verburg, P. H. (2005). Analysis of land use drivers at the watershed and household level: Linking to paradigms at the Philippine forest fringe. *International Journal of Geographical Information Science*, 19 (2), pp. 125-152.

Overmars K. P., de Groot W. T. and Huigen, M. G. A. (2007) Comparing inductive and deductive modeling of land use decisions: Principles, a model and an illustration from the Philippines. *Human Ecology,* 35, pp. 439-452.

Pugh, C. (1996). Methodology, political economy and economics in land studies for developing countries. *Land Use Policy,* 3, pp. 165-179.

Putnam,R. D. (1993). The prosperous community: Social capital and public life. *The American Prospect*, 13(1), pp. 35-42.

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

Rees, W. E. (1992). Ecological footprints and appropriated carrying capacity: What urban economics leaves out. *Environment and Urbanization,* 4 (2), pp. 121-130.

Romero, M. R. (2006). *Investing in the land: Agricultural transition towards sustainable land use in the Philippines forest fringe*. PhD Thesis, Leiden University.

Scoones, I., Thompson, J., and Chambers, R. (2007). *Farmers first – retrospect and prospect: Reflections on the changing dynamics of farmer innovation in agricultural research and development in preparation for the farmer first revisited workshop*. Institute of Development Studies (IDS), University of Sussex, 12-14 December 2007.

Smith, P.G.R. and J.B. Theberge (1987). Evaluating natural areas using multiple criteria: Theory and practice. *Environmental Management* 11 (4), 447-460.

Thomson, D. (2002). Understanding diversity in farming behaviour using "farming styles". *Wool Technology and Sheep Breeding*, 50 (3), pp. 280-286.

Todaro, M. P. (1994). *Economic development*. 5^{th} Edition. Singapore: Longman Singapore Publishers Ltd.

Van der Ploeg, J. D. (1991). *Landbouw als mensenwerk: Arbeid en technologie in de agrarische ontwikkeling*. Muiderberg: Coutinho.

Van der Ploeg, J. D. (2000). Revitalizing agriculture: Farming economically as starting ground for rural development. *Sociologia Ruralis*, 40 (4), pp. 497-511.

Van der Voet, E. (1996). *Substances from cradle to grave: Development of a methodology for the analysis of substance flows through the economy and the environment of a region, with case studies on cadmium and nitrogen compounds*. PhD Thesis, Leiden University.

Walker, P. A. (2005). Political ecology: Where is the ecology? *Progress in Human Geography,* 29 (1), pp. 73-82.

Warren, M. D., Slikkerveer, L. J., and Brokensha, D. (Editors) (1995). *The cultural dimension of development: Indigenous knowledge systems*. London: Intermediate Technology Publications Ltd.

Zaal, F. and Oostendorp, R. H. (2002). Explaining a miracle: Intensification and the transition towards sustainable small-scale agriculture in dryland Machakos and Kitui districts, Kenya. *World Development,* 30 (7), pp. 1271-1287.

Zuiderwijk, A. B. (1998) *Farming gently, farming fast: Migration, incorporation and agricultural change in the Mandara mountains of northern Cameroon*. PhD Thesis, Leiden University.

Cutting up the logged tree in Dy Abra