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

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Introduction

This chapter introduces sustainable rural development as a confluence of sustainable development and rural development.

1.1 Aim of the study and structure of the chapter

The drive behind the present study is to strengthen the scientific basis of sustainable development in rural areas of developing countries, and to do so as effectively as possible within the limited budget of a PhD study. The aim of this study is ***to contribute significantly to the growth of sustainable rural development as a systematic field of enquiry.***

Sustainable rural development is a hybrid concept. Focused on the rural areas in the developing countries, it is an attempt to merge sustainability goals, i.e. the safeguarding of natural capital in a broad sense, with development goals, i.e. economic progress in a broad sense. Likewise, the science underpinning sustainable rural development may be viewed as a confluence of two scientific fields, one with its starting point in the sustainability concept and one with its starting point in the rural development concept. Figure 1.1 is the graphic representation.

To be effective as a confluence discipline, sustainable rural development should combine the strengths and fill the missing elements of the two parents. The present chapter is therefore largely devoted to an overview of these two parents that helps identify these strengths and missing elements, differentiating between substantive aspects and methodological aspects, as Figure 1.1 shows. Sections 1.2 and 1.3 focus on sustainable development. Sections 1.4 and 1.5 focus on rural development, as also noted in the Figure.

Based on these overviews, Section 1.6 takes stock of what out of the parent fields should be combined to make the blend of 'sustainable rural

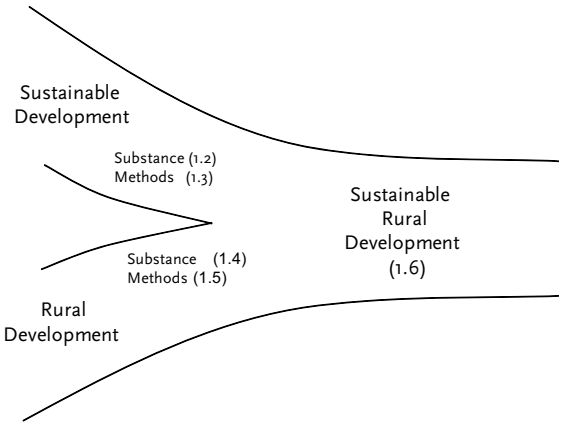

Figure 1.1 'Sustainable rural development' (substance and methods) as a confluence of substance and methods from 'Sustainable development' and 'Rural development'. The numbers refer to sections in Chapter 1.

development' as effective as possible. Section 1.6 also takes a position in a broad methodological sense, contending that sustainable rural development should be structured as a *discipline* (a "systematic field of enquiry") rather than a mere agglomeration of applied studies. In this section, the aim of the study acquires its strategic content.

Section 1.7 then translates strategy into action. Based on Section 1.6 and the desire to serve the new discipline as effectively as possible – implying a focus on significant gaps and major opportunities – the section formulates the main questions of the present study. Rounding off the chapter, Section 1.8 supplies an overview of the study as a whole.

1.2 Substantive aspects of sustainable development

Defining sustainable development

Sustainable development has been defined in many ways, but the most adhered to is from the report of the World Commission on Environment and Development (Brundtland) 'Our Common Future' (1987): *Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs*. Why was this definition a turning point in development thinking? Development has long had a single focus of growth. The sustainable development concept lays bare that growth needs limits. The limits proposed by Brundtland are that growth in the present should not under-

mine society's adaptation or growth potential in the future. This definition of sustainable development does not add new aspirations to the development ideal. Rather, it adds a relatively simple minimum standard ("without compromising ...."). We will find this conceptual structure back in many places of this study, e.g. at the very end, where the development indicator contains three minimum standards (on risk, external effects and quality of life).

In the years after 1987, the sustainable development concept has been 'upgraded' to an umbrella concept capturing not only the protection of the future generations against the greed of the present (intergenerational equity), but also the protection of the poor against the rich – in fact the protection of all vulnerable groups in society. On a more theoretical level, the sustainable development concept can now be seen as a Rawlsian ethics (e.g. Zylicz, 2007), set to strike a balance between *equity* (protection of the weak such as future generation and the basic needs of the poor) that serves as a minimum standard for the pursuit of *efficiency* ('development', the good of the system as a whole). If equity is assured, no great harm can be done by defining "development" simply as economic growth, prosperity or profit. The result is the well-known formulation of sustainable development as "PPP" (People-Planet-Profit) or as a balanced growth serving economic rationality, social justice and ecological equilibrium at the same time (Lehtonen, 2004).

Sustainable development builds on a wide range of natural science, social science, technological and humanities disciplines, plus branches of study that have specialized specifically on environmental issues since the 1970s in various ways. The latter comprise environmental science, political ecology, industrial ecology, conservation biology, sustainable agriculture, ecological anthropology and so on. 'Sustainability science' may be used as a broad umbrella term, first because it expresses the linkage with sustainable development quite well, and second because it denotes a recent attempt to build a broad but systematic 'meta-discipline' (see for instance Komiyama and Takeuchi, 2006; the Sustainability Science Program at Harvard and the new Centre for Sustainability Science and Society at Groningen University).

Themes in sustainable development research

The UN Division for Sustainable Development lists 43 areas as coming within the scope of sustainable development, which are categorized by broader subject and briefly described underneath. The categorization is primarily by system type (global, nature-dominated, mixed and human-dominated).

- **Earth system**

Although basically all themes in sustainable development have their own global level component (global biodiversity hotspots, global food market, global pollution flows etc.), the Earth System policies and sciences focus fully on getting a grip on the world system as a whole. The global climate and all it entails (climate models, sea level rise, mitigation and adaptation options, international agreements, energy and emission predictions etc.) is the main focus of Earth system work.

- **Biodiversity and natural resources**

Nature is usually regarded as carrying its own ('intrinsic') value and is as such part of the equity component of sustainable development. Biodiversity conservation is strongly linked with the sustainable use of natural resources (forests, soils, wetlands, capture fisheries etc.) for societies, connected as they are through issues such as viable minimum populations, ecosystem services and institutional arrangements, e.g. 'co-management' of nature by the state and communities together.

- **Land, water, food**

Systems of land and water use (agriculture, animal husbandry, groundwater management, peri-urban landscape management etc.) are focal points of human-environment interactions. Due to its equity drive, sustainable development policies here tend to focus on areas and issues of scarcity, unsustainability, resource conflict and basic needs, especially food. On the science level, sustainability science adds a stronger 'planet' element to the primarily human-oriented sciences of agriculture, geography, rural development and food security studies.

- **Pollution, sanitation, waste**

Pollution abatement is a classic theme in environmental science and technology, connected to waste management, sanitation issues, health and urban system issues in general. 'Sustainable cities', 'cradle-to-cradle' product design and likewise innovation-oriented actions and theories are the latest leaf on this tree, which is of great relevance not only for the industrialized world but also for the rapidly industrializing and urbanizing developing countries.

- **Human drivers and human impacts**

Change in any human-environment system, from the global climate to village-level land use change, has human impacts as well as human causes. These causes are often studied as parts of the themes mentioned above. They may also be studied and addressed separately, however. The latter makes sense especially if drivers and impacts are broad and interconnected. Poverty, often being a cause as well as an effect of

environmental degradation, is one example. Other typical elements here are demography, changing consumption patterns when nations develop and urbanize, public visions of nature and the "greening" of business and culture.

- **Conceptual enquiry**

What is the good of economic growth at all? How can future generations, i.e. entities that do not exist, have rights? The 'ecological footprint' is a strong metaphor but how can it be made operational in a balanced manner? What is a 'green GNP'? Conceptual issues such as these are not only core business of sustainability science but also play a basic role in the public foundation and the political negotiation of sustainability policies.

In almost each particular case of sustainable development policy or sustainability science, the themes of sustainable development appear to be interconnected. To mention one example, policies and studies which focus on the future of the African drylands start out with interconnections between land, water, food, biodiversity and natural resources but then also encounter the effects of climate change, shifting world markets and large cities as drivers of land use change. Another example is the policy issue of biofuels development that starts out from the global (energy and climate) theme but then also encounters issues of biodiversity, food, green consumers and so on. As a result, there is a strong drive to build sustainability science as an interdisciplinary *meta*-discipline, able to overarch and integrate contributions from many others.

The present study, focusing as it does on rural areas, finds its main footing in the sustainability science themes of land, food and natural resources. The human drivers theme is also presented, e.g. in the explanation of land use and the 'social extension' of material flows in Chapters 2 and 3. Conceptual enquiry in this study focuses mainly on methodological issues in later chapters, e.g. on induction versus deduction.

1.3 Methodological aspects of sustainable development

Because of the need to integrate themes and disciplines, sustainability science has a strong methodological thrust. The focus here is on two major elements: frameworks and indicators.

Frameworks

Its interdisciplinary and overarching nature makes sustainability science a highly 'frameworked' discipline. In the present study, a 'framework' is any relatively broad prescription for how to structure research, e.g. specifying key concepts, causal relations and research steps.[1] Some major examples will now be discussed.

The Drivers - Pressures - State - Impacts - Responses (DPSIR) framework, developed by Rapport and Friend (1979) and further sophisticated for instance by the OECD (1991) and the UN (2001), may be called the mother of all environmental frameworks. It displays that *Driving* forces (i.e. human activities and factors that result in environmental change) exert *Pressures* (e.g. unsustainable resource exploitation, emissions to the environment) that lead to changes in the *State* of the environment. This then leads to *Impacts* that may induce societal *Responses*. Responses of society (spontaneous or through environmental policy) to real or predicted environmental change are the feedback mechanism from impacts back to driving forces. DPSIR thus shows the environmental effect chain and the human-environmental interface.
Many frameworks in environmental science elaborate specific parts of the DPSIR structure. One example is Environmental Impact Assessment (EIA) that focuses on the causal chain between proposed activities (a project or policy) on various components of the environment (e.g. air, biota) and onward to the impacts on society (e.g. in terms of public health or landscape quality). In order to support political decision-making, various policy or project scenarios are usually scored on a number of criteria in a multi-criteria analysis (MCA) structure (Edwards-Jones et al., 2000).

In the Industrial Ecology branch of sustainability science, the frameworks of Life Cycle Analysis (LCA) and Material Flow Analysis (MFA) are used to analyze and assess the environmental effects of changes in the flows of materials in society. LCA assesses the potential environ-

[1] See for instance the Oxford Advanced Dictionary: a framework is "part of a structure that give shape or support" or the freedictionary.com: a framework is a "skeletal support" or a "fundamental structure". Compared to frameworks, 'methods' then are the more concrete research prescriptions, e.g. how to make a sample or how to interview, and 'tools' are all means to apply the methods, e.g. a weighing scale or a software package. The terms of 'system' and 'model' are applied more loosely, a system being any collection of elements with some degree of coherence, and a model being any representation of a system. Both systems and models may be either substantive or methodological. A framework may also be called a methodological system, for instance.

mental impacts of a product or service all along its production, use and waste phases ('from the cradle to the grave'; e.g. Guinée, 2002; Bouman et al., 2000). Based on theory of social-industrial metabolism (Ayres and Simonis, 1994), MFA is a form of material input-output analysis of social-environmental systems, e.g. countries. LCA and MFA can be seen as methodological elaborations of the Pressures and some length of the State and Impact elements of DPSIR (Kleijn et al., 2008: 267; Tsetse, 2008), focusing as they do on material flows and stocks in societies and their emissions to the environment. MFA and can be used, for instance, to signal environmental issues, trace back their origins of flows in society and estimate future flows and stocks. Material flow accounting is one application of MFA, developed in order to counterbalance the national economic accounts providing indicators for problem-relevant subjects such as environmental pressure (Eurostat, 2001).

The Problem-in-Context (PiC) framework developed by De Groot (1992) is an expansion of the DPSIR scheme in three directions. First, it takes full account of the normative character of environmental science and adds a 'norms chain' parallel to the effect chain. Second, the impact variables such as human health, biodiversity or economic growth are acknowledged as depending on ethical (self-)reflection, called 'normative contextualization'. Finally, it supplies a full sub-framework to develop the 'Drivers' element of DPSIR. This Action-in-Context (AiC) framework is designed for the explanation of human activities. One characteristic of the framework is 'progressive contextualization' (Vayda, 1983), meaning that the application starts out from the activity (or deliberate non-activity) to be explained and then works its way 'outward' into an ever-widening context of actors, societal structure, cultural factors and so on. One element in AiC broadly overarches what micro-economics (e.g. Simon, 1979), social psychology (e.g. Fishbein and Ajzen, 1975) and other causally oriented actor-based disciplines offer to study decision making (e.g. Long and Long, 1992). A second element, the 'actors field' is a unique in AiC, however. It depicts the interlocking of 'actors behind actors' causing the action in question. PiC has recently been expanded to OPiC (Tsetse, 2008) that adds more attention to creative search for options for solutions outside those directly generated by the problem analysis and problem explanation.

In the present study, Chapters 2 and 3 will apply and interconnect the MFA and AiC frameworks. Chapters 4 and 5 will develop frameworks of their own.

Indicators

In Dubin's (1978) book in theory building, all quantifiers (all 'metrics') that make concepts operational are called indicators. This terminology is theoretically justified but in practice different terms apply. Quantifiers that seemingly express the concept in question directly are simply called variables, and quantifiers that still lie fairly close to the concept are called 'proxies' or suchlike. The term 'indicator' is then reserved for cases in which a certain tension is felt between a big concept ('development', 'sustainability', 'poverty', 'health', ...) and the simple number that supposedly expresses that big concept.[2] Indicators play a key role in sustainable development policy making. Making things measurable is also essential for scientific development. Scientific progress requires that theories may be tested, and testing requires valid quantifications.

Indicators may be classified on two levels of methodological sophistication. First, there are the *aggregate* or *composite* indicators that merely add up, with or without weighing, the scores on a number of components that are all supposed to 'contribute' to the concept (e.g. sustainability) but without significant grounding that these are indeed the valid components or that adding up is their most defendable relationship. An example from the field of nature conservation is the indicator of 'conservation value' of areas, which simply adds the scores of size, optimum population, diversity and several others (Edwards-Jones et al., 2000: 105).[3] Another example is ESI, the Environmental Sustainability Index (Hák, 2007) that adds up scores on air quality, reduction of population growth, private sector responsiveness and so on. Although it is interesting to see the Netherlands positioned way below Albania on this indicator, Hák concedes that "as is often the case with composite indices, ESI is difficult to interpret". Nevertheless, the vast majority of the array of sustainability indicators inventoried in Hák et al. (2007: 369-381) is of the composite kind.

On a higher level of methodological sophistication lie what I call *synthetic* indicators. Synthetic indicators are structured along the lines of an underlying descriptive or causal model or framework (*cf.* Dubin, 1978: 164; OECD, 2008). The framework of Material Flow Accounting, for instance, generates synthetic indicators such as total material flows

[2] This definition excludes what are often called 'ecological indicators', which are biological occurrences (e.g. the abundance of a species group) that serve as indicator of some feature of an ecosystem as a whole, such as water quality, air pollution or total biodiversity (e.g. Newman and Schreiber, 1984).

[3] See also Smith and Theberge (1987) for more examples and a discussion.

per capita or per dollar of GNP of economies (Eurostat, 2001). The Life Cycle Assessment framework calculates 'total toxic potential' indicators of products based on a coherent model of the total toxic impact of pollutants (Guinée, 2002). The ecological footprint (Rees, 1992) forms another example of a synthetic environmental indicator. It converts all consumption of a social entity (household, town) into the area of land needed for the sustainable production of this consumption plus the area of land needed to sequester the greenhouse gasses produced.

Synthetic indicators are open to criticism as are the composite ones. Concerning the toxic potential of a group of substances, for instance, it may be questioned whether the toxic impact arises out of the addition of the effects of all emissions ($tox_a + tox_b + tox_c + ...$), or out of the one most dangerous emission ($MAX[tox_a, tox_b, tox_c, ...]$). Another example concerns the global warming element in the ecological footprint (e.g. Fiala, 2008). In stead of calculated the surface needed to sequester the CO_2 emissions, it could have been chosen to calculate the surface area of solar cells that would have been needed to avoid this emission at all, resulting in a very different footprint for the same activities (De Groot, 1992). Or, to mention an example from economics, GNP is usually seen as representing a nation's wealth. If a large percentage of GNP is in fact spent on repairing environmental damage, however, would that really be wealth? All such discussions on the quality of synthetic indicators are intrinsically superior to the discussions on composite indicators, however, because they do not propose alternative intuitive choices on how to add components but propose alternative theory and models, which are open to scientific scrutiny.

In the present study, Chapters 4 and 5 develop framework-based, synthetic indicators for sustainable rural development.

1.4 Substantive aspects of rural development

Rural development is a multidisciplinary field of enquiry informed by the need for poverty alleviation in the rural areas of developing countries. Rural development includes contributions from geography, agriculture, economics, political science and social anthropology. Ellis and Biggs (2001) provide an overview of ideas that have pervaded the discipline of (Anglo-Saxon) rural development studies from the 1950s to the present. These ideas comprise rapidly evolving mixtures of normative objectives ("poverty eradication", "free markets"), ideas on causes and solutions of rural problems ("lazy peasants", "state-lead credit", "rural safety nets"), research lines ("gender and development", "farming sys-

tems research") and methods ("participatory rural appraisal", "stakeholder analysis"), running up to the present-day livelihoods approach. The present section also provides a thematic overview but with a different purpose. In view of the aim of this study as a whole, we need to identify substantive core themes rather than Ellis and Biggs' (2001) mixture of substance, methods and values. Furthermore we need to move away from the fleeting fashions of the scientific trade and focus on themes that are sufficiently perennial to serve as loci for the systematic accumulation of theory and policy wisdom (e.g. with the help of synthetic indicators).

The focus of this section is therefore on general themes in rural development research rather than on themes with only a local[4] or partial[5] character. I will discuss the concepts of development, poverty, food, globalization, household strategies and farming styles, land use dynamics and common properties and participation.

- **Development**

The concept of development is widely used as to make the world a better place, especially for the poor (see the yearly Human Development Reports of the UNDP and the World Bank's World Development Reports[6]). In his reflections on the concept, Chambers (2005) contends that a personal dimension is needed. The objective of development is well-being of all, including social, psychological, spiritual and material aspects (Chambers, 2005: 193). Several of these aspects were already included in the Basic Needs approach (Streeten, 1979) that will be discussed further in

[4] Local themes are often salient or even hot issues, but on a relatively restricted, less-than-global scale. One example is that in the densely populated areas of Asia, rapidly expanding cities gobble up prime agricultural land (Döös, 1992). Another local theme of rural development concerns the relationship between agriculture and nature conservation, which comes to the fore specifically in and around protected areas; see for instance numerous articles in journals such as *Environmental Conservation*. 'Co-management' of natural resources jointly by government and local communities or user groups is an important issue in this field (Borgerhoff Mulder and Coppolillo, 2005). Thirdly, issues of identity 'versus' development are a main theme in all areas where indigenous and mainstream cultures meet (Persoon et al., 2004). Other local themes of rural development concern, for instance, post-war recovery and natural disasters.

[5] Partial themes often have the form of 'the role of X in rural development'. One example concerns the role of land tenure, with the work of Platteau (2000) as a well-known overview. Another important factor theme is the role of gender in rural development, with Shiva (2006) as one of the prolific authors. Other themes concern the role of (fictional) narratives in nature conservation (De Groot and Zwaal, 2007), the role of HIV/AIDS in (under)development and the role of politics of natural resource management (Bryant and Bailey, 1997; Vayda and Walters, 1999).

[6] See for Human Development Reports URL http://hdr.undp.org/en/reports; for World Development Reports URL http://go.worldbank.org/LOTTGBE910

Chapter 5. Development theory has a macro-economic basis (Todaro, 1994), focusing as it does on growth of nation-wide GNP. The rural development discipline has not added anything substantial here on its own, rural level. One interesting (qualitative) element is worthy to note, however, namely the "development narratives" concept introduced by Roe (1991) and made popular by Leach and Mearns (1996). Development narratives are the stories that development organizations tell to justify their existence and funding. One example are the Malthusian narratives about population growth that leads to land degradation and poverty, persistently told about rural areas where in fact no such mechanism is visible at all (e.g. Carswell, 2004).

- **Poverty and food security**

Poverty is in many ways the negative of development. If development is understood as a multidimensional process (improvement of 'total' human well-being), poverty is defined as a lack thereof. If development is seen primarily as an economic process, so is poverty seen as primarily a lack of economic means. Two key notions in rural development studies with respect to poverty are the poverty trap and its opposite, the out-of-poverty phenomenon. People are said to be caught in the poverty trap if they have to spend all their energies on sheer survival, without anything left to invest in a better future. Out-of-poverty strategies are seen as the active investments of poor households for improving their lot, e.g. through education or land improvement. Seen this way, there is a crucial difference between poverty as merely having little to spend and poverty as having lost the capacity to invest (*cf.* Sen, 1999). Food security is a basic need and therewith strongly linked to poverty. It holds a special place in rural development studies because it is often the most salient aspect of rural poverty (e.g. in famines). On the positive side, food surpluses are usually a cornerstone of rural progress.

- **Globalization, localization, commoditization**

Globalization can be divided in cultural and economic globalization, to which political globalization is sometimes added (Boli-Bennett, 1980; 87). Cultural globalization denotes the emergence of a global field of culture (values, images) where Western culture has a strong influence on nations, communities and individuals worldwide (Arnett, 2002). 'Localization' is often mentioned as a response to this influence, referring to communities or people that counterbalance the globalization tendencies by re-asserting their own cultural identities (Appadurai, 1990). Economic globalization denotes the creation of a world market into which more and more communities and people are taken up, both for buying and supplying goods and services. For farming communities, the allied terms of 'incorporation' or 'commoditization' can be used to denote

their degree of involvement in external markets on both the input and output side of the farming system (Galjart, 1986; Manno, 1999). Incorporation at the input side (e.g. for seeds and fertilizer) is often viewed as bringing about a deeper dependency than incorporation on the output side, i.e. selling on the world market without relying on external inputs (Zuiderwijk, 1998; Bolhuis and Van der Ploeg,1985).

- **Household strategies and farming styles**

A prime focus in rural development studies concerns farming household choices. In his classic study on the Russian smallholders, Chayanov (1966) studied the household cycle and subsistence production. In this tradition, Scott (1976) describes the fear of food shortages, explaining the 'safety first' strategy of peasants who will always first provide in their subsistence security and only then take a look at external markets and maximize economically. Contrarily, Popkin (1979) argues that peasants tend to act much more rationally (profit maximizing) overall. The Scott/Popkin peasant strategies are related to Van der Ploeg's (1991) concept of farming styles, which are based on different *calculi*. An example are the "I" and "E" calculi, in which farmers highly value the health of their farm or the size of their bank account, respectively. This gives rise to different farm development pathways, which may co-exist in the same region.

- **Land use dynamics**

Land use dynamics are the higher-level patterning, often called 'emergent properties', of the choices, often called 'strategies', of many rural households together. Theories on land use change therefore have a basis in household decisions, on to which they add their own large scale and long-term perspectives. Some theories emphasize a region's internal dynamics, of which the Malthusian spiral of increasing population, increasing resource exploitation intensity, resource degradation and increasing poverty is the most well known. Homer-Dixon's (1999) theory of conflict is a modern, 'neo-Malthusian' version. Strong opposition against this notion has been voiced by Boserup (1965) and more radically by neo-Boserupians such as Tiffen et al. (1994) who point at the many cases where farmers and whole regions have successfully gone through a transition to sustainable intensive agriculture under circumstances of rising population density. Other theories put the external influences on land use at center stage, especially markets, to which neo-Thünian perspective (Walker and Solecki, 2004; De Groot, 2006) adds the geographic perspective of growing cities and moving frontiers, e.g. of extensive and intensive agriculture. In the same vein, Rahman et al. (2008) discuss the transition-inhibiting effect of institutional disconnection between farmers and urban markets. In most empirical studies of

land use change, internal and external factors are shown to interact. Burger and Zaal (2009), for instance, study the investments of farmers in the quality of their land and their institutions, and all factors are shown to converge in these investments. In the same vein but on a scale of inter-regional comparison in Africa, Hyden et al. (1993) present good soils, good external markets, attachment to the land and flexible institutions as key factors in agricultural intensification, which rings the same bells as the conclusions of Diamond (2005) on the fates on rural-based civilizations as a whole.

- **Common property, social capital, institutions**

In reaction to the all-pervading 'tragedy of the commons' narratives (e.g. Hardin, 1968) and free market and central state ideologies, many scholars have written about the ability of people to organize themselves for collective action and work together towards a common goal. Ostrom's (1990) 'Governing the Commons' is the classic example, focusing on environmental management, and the World Bank's attention to village-level social capital as a key to rural development is the most salient policy result. Social capital points at institutions for collective action. In the same vein, Agrawal (1999) has argued to replace the vague and romanticizing notion of 'community' by a focus on local institutions.

- **Exclusion and voice**

Exclusion and voice are key concepts in a critical subcurrent that flows through much of rural development. The general pattern is: if we have something that is actually or potentially good (e.g. development, social capital or gender policies), who is then in fact excluded from that good? Whose voice is never heard, and through what mechanisms of power? One example is Cleaver (2005), in a paper called 'The inequality of social capital and the reproduction of chronic poverty', which focuses on how the poorest are excluded, passively and actively, from investing in and taking advantage of building village-level institutions.

1.5 Methodological aspects of rural development

Methodological issues do not play a prevalent role in rural development studies. Consequently, the methodological content of the discipline is less impressive than its substantive achievements. We take only a brief look, therefore.

- **Indicators**

How to measure development, poverty, food security? These questions are essential for rational policy making. As a result, a wide array of indi-

cators exists for each core concept of rural development. Well-known poverty indicators are those 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; Wodon, 1997). These indicators measure poverty at the micro (household) level, and each of these indicators may be lifted to the macro level in many ways in order to express poverty distributions over society. For food security, Hoddinott (1999) counted about 450 indicators proposed and in use by policy and other organizations, focusing on food supply, food access or food intake. On top of that, indicators of 'community food security' (Kantor, 2001) focus on social, economic and institutional factors that underlie a community's food situation.

- **Participatory methods**

Rural development studies draw most of their methods from the general social-scientific pool. Something that the discipline may really call its own, however, are participatory methods, usually grouped under the heading of Participatory Rural Appraisal (PRA; Chambers, 1994). PRA is a family of methods that enable local people and researchers alike to conduct a joint fact finding and appraisal, usually focused on the design or evaluation of a (self-)development project or policy. One example of the PRA repertoire is participatory environmental mapping, in which researchers and local people draw up an informal map of the location (on paper or in the sand), enlivened by the stories of what happens where, why it is so, what it used to be in the past, and so on. On the whole, PRA is an adequate approach to arrive at valid local description. It is less effective for more formal (comparative, explanatory, quantitative) scientific work (Bauer, 2003).

- **Sustainable Livelihoods (SL) framework**

Rural livelihoods in developing countries tend to be very complex. Farming activities intermingle with off-farm work; subsistence production intermingles with market-oriented crops; temporal variation (e.g. between seasons) and spatial variation (e.g. between villages) are often intense. In order to capture these complexities, the Sustainable Livelihoods (SL) approach has evolved from the late 1980s onwards (Sen, 1981; Chambers and Conway, 1992; Scoones, 1998; Carney, 1998 and Ellis, 2000). Central in the SL framework stand the household 'capitals' (capabilities, capacities), composed of natural, physical, human, financial and social capital. Ownership of assets but especially access to non-owned assets such as to the natural environment are seen as the key to poverty elimination and empowerment (e.g. Bebbington, 1999; Leach et al., 1999). Mediated by the context, assets and access result in 'liveli-

hood strategies'. These include the full portfolio of farming and non-farming activities that people undertake to make a living. All SL framework variants end with 'livelihood outcomes', assessed in terms of normative goals and (unquantified) indicators such as described by Ellis (2000: 42) for environmental sustainability and livelihood security, including income level, income stability, seasonality and risk. The SL framework is a causal framework in the sense that the various elements are all depicted as influencing each other. How these linkages actually run is left vague, however. Due to this looseness, the framework is effective in supplying researchers with a common language for qualitative insight, but much less so for quantifying and comparative work.

1.6 A strategy for Sustainable rural development

SARD ('Sustainable Agriculture and Rural Development') is a global initiative that emerged from the Dialogue on Land and Agriculture of the UN Commission on Sustainable Development in the year 2000 (UN, 2000). SARD addresses issues of sustainable agriculture, water, energy, health and biodiversity in a holistic manner. The science of sustainable rural development is the underpinning of initiatives such as these.

Sustainable rural development as a "systematic field of enquiry" as the aim of this study puts it – what should it be, and how to get there? These are the two questions addressed in this section. I distinguish between substantive and methodological issues.

In the foregoing sections, we have come to know sustainability science as a discipline not lacking in substance with respect to rural areas in the developing world. Its knowledge on land, natural resources, human drivers etc. lacks a strong link, however, with the key issues that drive both the people and the policies in these areas, namely, poverty and development. The themes of rural development studies hold a much stronger position here, and a discipline of sustainable rural development, if it wishes to combine the strengths and resolve the weaknesses of the parent disciplines, should give prevalence to the rural development themes. It should add sustainability knowledge to the development themes rather than the other way around.

A reverse picture emerges in the methodological area. The aim of the present volume is to help develop sustainable rural development not as a mere collection of separate studies but as an interconnected, *systematic* field of enquiry. As may be clear from the overview of Ellis and Biggs (2001) (Section 1.4), rural development does not represent the biggest

bulb in the lightshow of systematic disciplines. The concepts are there but largely, the 'metrics' are missing. Sustainability science puts much more energy in the development of systematic frameworks, methods and indicators – compare Sections 1.3 and 1.5. In other words, blending rural development and sustainability science into a real discipline will comprise bringing the power of 'framework thinking' into rural development.

Below, the situation will be explored in some more detail.

What should it be? Substantive issues

As said, an effective substantive confluence of rural development and sustainable development amounts to a large extent to 'bringing sustainability to rural development'. Such a merger does not have dramatic proportions. Both disciplines share a strongly normative culture, focusing on poverty alleviation and sustainability, respectively. Moreover, sustainability is already present to some extent, however implicitly, in rural development – recommendations from rural development specialists normally do not include the clearing of more rainforest or the introduction of highly erosive crops. And reversely, the rise of integrated conservation-and-development projects (ICDP's; Pimbert and Pretty, 1997; Scholte, 2003) proves that even the traditionally misanthropic conservation branch of sustainability science has actively incorporated the poverty alleviation objective.

The relative ease of the merger may also be expressed in terms of the People-Profit-Planet triplet of sustainability science.

- For rural development, 'People' (i.e. social justice) translates into the equity principle of protection of basic needs fulfillment, which is the same, in practice, as poverty alleviation.
- 'Profit' (i.e. efficiency) means very different things for different actors. For a business, it translates into literal profit. For rural development, it translates into system-level economic growth, achievable through effective linkages of land use systems to urban markets, using opportunities for local value addition, effective investment of remittances and other such means.
- 'Planet' for rural development translates into biodiversity conservation, land use sustainability and the avoidance of negative external effects of local actions (e.g. for downstream communities).

Obviously then, the PPP of sustainable development already includes the basic tenets of rural development. A merger of the two disciplines therefore is only a gradual affair, bringing more 'people' to sustainabil-

ity science but especially bringing more 'planet' to rural development. This may also be visualized through the following causal chain:

Land ⟷ land use ⟷ material flows ⟷ economic flows ⟷ economic development

In this picture, the challenge of sustainable rural development is to create a stronger integration between land (including biodiversity) and development, through the intermediary concepts that include land use and material flows.

More detail on the directions for sustainable rural development can be found through the major substantive themes of the two mother disciplines (Sections 1.2. and 1.4). Sustainable rural development will have to connect the sustainability issue with the development concept, with poverty and food, with globalization and household strategies, with land use, common properties and exclusion. The theme of human drivers is important as well because of the desire for policy impact that sustainable rural development inherits from both its parents. Knowing the causal origins ('root causes') of sustainability and development problems is conditional for policies that address causes of problems rather than symptoms. Explanatory theory is essential for policy-relevant science.

What should it be? Methodological issues

Method, not substance, marks the difference between science and daily life thinking. Method, therefore, is the essence of the capacity of sustainable rural development to rise above the level of a mere collection of studies. This principle has already led to the insight that in sustainable rural development, the frameworks and methods of sustainability science should have a place of prevalence.

A second methodological issue arising from this principle is the need for a primacy of deductive approaches, i.e. approaches that follow the classic empirical cycle for theory building. Section 6.2 will discuss the superiority of deductive methods on the level of separate studies. The same image presents itself on the level of a discipline as a whole. Disciplines need theories to act as long-term focal points for progress, and testing these theories is the essence of that progress (Overmars et al., 2007). This does of course not preclude that inductive studies have a role to play too, but it does make clear that theories need to be made testable. And that, in turn, implies that their key concepts need to be supplied with the best possible 'metrics', i.e. synthetic indicators (see Section 1.3).

How to get there?

How to contribute to this aim most effectively? Three elements appear to stand out:

1. a substantive focus on the long-term, general themes of rural development
2. a methodological focus on frameworks and framework-based indicators, and
3. a methodological focus on deductive approaches, especially to develop explanatory theory.

These foci are carried over to the next section, where the questions of the present study are elaborated.

1.7 Questions of the dissertation

This section develops the foci of the preceding section into to a number of overall research questions. For ease of reference, the questions are numbered consecutively.

Foci 1, 2 and especially 3

Land use is a key theme for both development and sustainability, and explaining land use is key to design effective policies. Explaining land use combined with a description of the land use system gives insight in development pathways and policy options for sustainability. A common sense hypothesis is that people use the land because it forms a source of income. One then would expect rational choice theory to stand central in the explanations of land use, relating the options of land users to the cost and benefits of these options. In actual practice, however, land use studies rather appear to relate land use to a host of other variables such as age, amount of children, length of residence and so on. What is the matter here? It appears that, even though land use theories have a rational choice basis, neither these theories nor rational choice theory directly are in fact used in land use studies in general. Instead of a deductive approach of testing and using explanatory theories, land use studies approach the explanation of land use in an inductive manner.
Two questions arise:

(1) Can land use be explained in direct relation with rational choice theory and land use theories based on rational choice?
(2) Can plausible development pathways and effective policy options be designed by using explanatory theory and methods?

Foci 1, 3 and especially 2 (frameworks)

Material flow accounting (MFA) is a framework developed in the Industrial Ecology branch of sustainability science. MFA appears to be quite a good candidate for use in sustainable rural development because it studies the material exchanges between an economy and its natural environment. This includes biomass flows that are the intermediaries between land use and economic flows. Though primarily designed for use on national or regional scales, MFA has also been applied on the local village level. At first sight, the outcomes of these studies do not appear to be directly connected to any substantive theme of rural development, however. Moreover in these and other MFA applications, explanations of the described flows are non-existent or only rudimentary.
Three questions arise:

(3) Can MFA be extended so that it may include explanations of relevant material flows?
(4) Does MFA as applied on the local level indeed fail to link up directly with any of the substantive themes of rural development?
(5) If so, can MFA be redeveloped into a framework that does link with key themes of rural development and may generate synthetic indicators for concepts of these themes?

Foci 1 and 2 (indicators)

In order to respond to shifting markets, climate change, natural resource depletion, population growth or any other opportunity or threat, rural dwellers need to have the capacity to invest in the future, e.g. in the sustainability of their farm. Very poor people often do not have this capacity, which is one reason why poverty plays a key role in sustainable rural development, interconnecting the themes of development, food security and sustainability of land use. Poverty is a world-wide phenomenon but difficult to measure. To have good poverty indicators is therefore an issue of great relevance. Existing poverty indicators only cover monetary aspects of poverty (e.g. GDP per capita or cost of basic needs). Poor people are often also very short in *time*, however, or may have time resources left even if having no cash. A capacity indicator that integrates time and cash, i.e. a measure of poverty and capacity to invest that could be truly adequate, is not available anywhere, however. In other words, the most pivotal indicator for sustainable rural development is missing. Such an indicator should primarily be formulated and tested at the household level. Since sustainability and development often require collective action too (e.g. investment in village-level irrigation or forestry), it should be worthwhile if the indicator could also be made valid at that level.

Questions emerging from this are:
(6) Is it possible to develop a universal (and synthetic) poverty/wealth indicator that integrates cash and time, and therewith more truly represents household capacities to invest in the future?
(7) Can this indicator actually be applied through a framework that is robust enough to handle complex real-world situations around the world?
(8) Might this indicator be expanded to include the community level and indicate capacity for sustainable community development?

1.8 Overview of the dissertation

The blending of rural development studies and sustainability science in the present thesis follows a pattern of a certain prevalence of development studies on the substantive side, and a certain prevalence of sustainability science on the methodological side. Abstractly put, all chapters in their own way bring the rigor of natural science methodology to the richness of social science concepts.

Chapter 2 of the dissertation describes three villages in the Philippines' forest fringe (see Figure 1.2), focusing on the question of what factors determine land use change. To answer this question, a combination of two methodological frameworks (MFA and AiC) was applied to identify land use transition of villages and put that in their social context. The function of the chapter in this thesis is twofold. First, it is a substantive introduction on concepts of rural development. It describes the meaning of 'rural' by setting the scene of remote farming villages in the Philippines. The meaning of 'development' is introduced by looking at the microeconomics of land use and possible sustainable and unsustainable future land use pathways. Land use change is central in this chapter, and is brought in connection with (rational choice based) theories of land use change that focus on population dynamics (e.g. Malthus *versus* Boserup) and market dynamics ('neo-Thünian' theory). To explain land use, household level decision-making models hold a central place, applying rational choice theory in a multi-criteria form. External markets and traders of corn, timber, etc. represent the theme of economic incorporation. The second function of this chapter in the present study is that it is an example of using frameworks such as AiC and MFA in an almost hidden way to tell a story on sustainable and unsustainable land use change pathways. The result is a substantive story without explicit reporting of the framework methods. The chapter addresses research questions 1 and 2 of the preceding section.

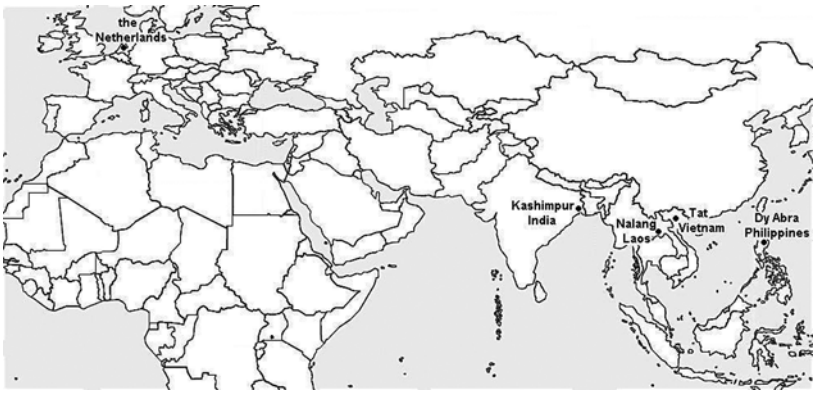

Figure 1.2 Map indicating the locations of the case studies in the study.

Chapter 3 is different from the preceding chapter in that it focuses on one village in Vietnam rather than three in the Philippines, but especially because the MFA and AiC frameworks have now become explicit objects for improvement and reflection, focusing on their combination to form 'Socially Extended MFA'. As in the preceding chapter, land-use patterns are explained using theories on land use dynamics and a household-level broad rational choice model in multi-criteria form. The conclusions of the chapter are both substantive and methodological, addressing research questions 1, 2, 3 and 4. The chapter also offers an example of a village caught in a poverty trap and with that relates to Chapters 5 and 6, where the poverty trap becomes part of a broad capacity indicator.

Chapter 4 focuses on research questions 4 and 5. It continues with many of the data presented in the previous two chapters but starts out from the question of what may be the key concepts of rural development that MFA can be made to connect with. On that basis, the MFA idea is reconstructed to form a new, 'rural MFA' framework that provides material flow categories out of which some 20 indicators are generated, divided in five groups on material productivity, material intensity, material incorporation and food security. The material intensity and productivity indicators refer to agricultural transition. The food security indicators are very different from the existing ones because they are developed from material flow analysis. Through these indicators, rural livelihoods and communities can be positioned in terms of general problems and processes of land use change, globalization and risk. The rMFA framework is applied on three case study villages: Tat in Vietnam, Nalang in Laos and Dy Abra in the Philippines. The indicators give a quantitative comparison between villages in terms of the indica-

tors, displaying their quite different characteristics on a truly comparative scale.

Chapter 5 focuses on research questions 6 and 7. It introduces a framework that generates a synthetic indicator expressing multi-dimensional development capacity and poverty, based on a unique confluence of cash and time budget thinking. The indicator is called 'freely disposable time' (FDT). FDT is how many hours per day the productive members of a household have left after satisfying all the basic needs (sleep, care, food, housing etc.) that they have to supply for themselves and their dependents. The key of the system is the time/cash equivalent, where cash and time are translated into each other through the household's income per hour. A household's FDT may be put to any use such as leisure or doing extra work for extra consumables or better-than-basic housing, or to invest in the future (education, soil conservation etc.). Therefore, FDT is a key condition for any out-of-poverty strategy and reflects the investment capacity for farmers and any other actor to respond to changing circumstances. In terms of the Sustainable Livelihoods approach, FDT can lay claim to being the livelihood outcome indicator *tout court*. Theories on land use dynamics served as a motivation for the development of FDT. The robustness of the framework underlying FDT is tested on complex and variegated farming households in a peri-urban village in India and on a few households in the Netherlands.

Chapter 6 provides a number of discussions that draw on the material from all chapters. It starts out on farm and village typology, then discusses the status of land use theories and subsequently the need for adequate terminology in rural development. The next section moves deeper into a discussion on the importance of deductive research approaches for progress in the rural development discipline. The chapter is rounded off by an example of expanding the FDT indicator to form an indicator called community development. This connects to the social capital theme in rural development and addresses research question 8. This indicator may be a fertile subject for future participatory research in rural development.

Chapter 7 provides the conclusions on all the chapters.

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