

## Peasants in the Amazon: Interrelationships between ecosystems and social systems in the use and the conservation of tropical rain forests

Manfred Nitsch

Institute of Latin American Studies, Free University of Berlin, Berlin, Germany

### ABSTRACT

Within a general systems approach covering ecosystems as well as social systems, peasant agriculture in the Bragantina region of Northeast Pará is being investigated in a cooperative effort of botanists, agronomists and economists. Economic viability as well as ecological sustainability of secondary forest ("capoeira") farming turn out to depend in a wide range of variables, including organization in peasant associations ("sindicatos"), credit through specialized funds and land-use planning by "ecological-economic zoning".

### RESUMO

Dentro de uma abordagem geral de sistemas que cobre ecossistemas e sistemas sociais, a agricultura do pequeno produtor na Zona Bragantina no Nordeste do Pará é pesquisada num esforço comum de botânicos, agrônomos e economistas. Viabilidade econômica e sustentabilidade ecológica da agricultura de capoeira dependem de uma ampla gama de variáveis que incluem a organização em sindicatos, o crédito via fundos especiais e o ordenamento territorial por meio do "zoneamento ecológico-econômico".

### ZUSAMMENFASSUNG

Im Rahmen eines allgemeinen systemtheoretischen Ansatzes, der sowohl Ökosysteme als auch soziale Systeme umfaßt, wird die kleinbäuerliche Landwirtschaft in der Zona Bragantina im Nordosten von Pará in Kooperation zwischen Botanikern, Agronomen und Ökonomen untersucht. Die ökonomische und ökologische Nachhaltigkeit der Sekundärwald-(“capoeira”)-Bewirtschaftung hängt von einem breiten Spektrum von Variablen ab, einschließlich der Organisation in Bauernverbänden (“sindicatos”), des Kredits über spezielle Fonds und der Landnutzungsplanung durch “ökologisch-ökonomische Zonierung”.

### INTRODUCTION

For many years the secondary forests (in Portuguese: *capoeira*) of the Bragantina Region in the Northeast of Pará have been studied by botanists and agronomists, and for the last few years also within the SHIFT ENV 25 project. Since 1994 our socio-economic ENV 44 project intends to supplement those research endeavors with an analysis of the peasant agriculture of that region, particularly in the Municipality of Igarapé-Açu. In addition, the wider context of peasant as well as plantation agriculture and cattle ranching is investigated, such as the organization of small farmers in *Sindicatos dos Trabalhadores Rurais*, their income from transfers such as pensions, their access to credit as well as market outlets for their products.

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The traditional *capoeira* economy which had developed after the slump in rubber prices around 80 years ago and the consequent economic stagnation of the Bragantina, will hardly survive, because the long fallow periods are becoming economically unfeasible. In order to defend soil fertility, biodiversity and high biomass volumes per hectare on the side of nature as well as the interests of the poor peasants on the social side, various strategies employed in and suggested for the region are being explored: *Enrichment* of the secondary forest through planting of woody species, composting and chaff-cutting instead of burning; biological fertilizing, sustainable agro-silvi-pastoral-forestry in small holdings with mixed crops, strict enforcement of land conservation and water protection measures, etc.

The economic performance of local farmers varies greatly, from *entrepreneurs* with the will and the capabilities of accumulation to *survivors* who barely eke out a living, and *losers* who have to give up their farms and migrate to the cities or to other agricultural *frontiers*. The determinants of that performance also vary widely, from individual preferences and calamities to structural social factors, such as cultural support groups, access to cheap credit and organization in local peasant associations, particularly *Sindicatos dos Trabalhadores Rurais*. For the elderly and their families, pensions turn out to be of great importance. That is why a wide array of studies on youth and on the elderly, on community organizations and *sindicato* associations as well as on the marketing of important fruit, such as maracuja, have been advanced within our project.

Details are given in parallel papers about the endeavors of our Brazilian partners from the Núcleo de Altos Estudos Amazônicos (NAEA) of the Federal University of Pará in Belém to locate the experience of Igarapé-Açu within the Northeast of Pará and the Amazon in general, and to make sure that comparisons are made in a serious way.

## NATIONAL AND INTERNATIONAL FACTORS

The struggle for land and for access to credit by the peasants has dimensions which reach far beyond the confines of the Municipality of Igarapé-Açu. The Brazilian *Amazônia Legal* is a region which largely depends on fiscal and other transfers from the Centre-South of the country. Access to those transfers is often more important for economic success - and, one might add: for ecological disaster or sustainability - than soil fertility, good weather and competent farm management. The *Fundos Constitucionais*, federal funds which are based on constitutional law, are in the centre of attention in this regard, because they channel very important sums of money into „productive investment“ all over the Legal Amazon region. One of the doctoral theses in our project is dedicated to the analysis of the *Fundo Constitucional de Financiamento do Norte (FNO)* and its appendix, the *FNO-Especial*, which is directed toward the small producers.

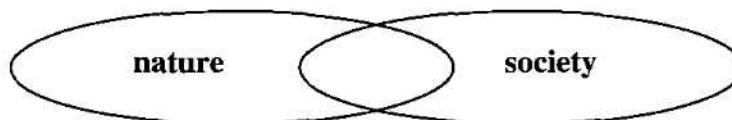
Land use planning also forms part of the *Pilot Program for the Conservation of the Brazilian Rain Forest* of the *Group of Seven (PP-G7)*, to which SHIFT is planned to be connected as an „associated program“. Within PP-G7, there are projects of demarcation of indigenous territories, of national forests, etc., and a general effort is promoted to introduce ecological-economic zoning („*Zoneamento Ecológico-Econômico*“) in the various States of the Brazilian Amazon. Here again, the interface between *nature* and *society* comes into play, with the Legal Amazon as the „given area“ of *nature* and the social systems with their special logic, especially politics and the economy, as determinants of the way *society* relates to itself and to

Finally, the larger social and political conditions of economic life and resource use and conservation in the Amazon Region are the object of attention.

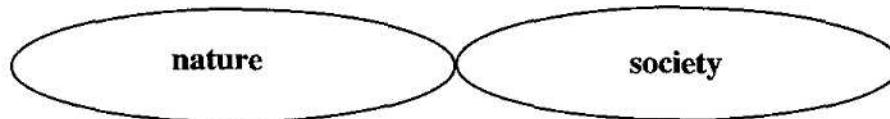
In the next section, the „systems approach“ which underlies our research, will be explained, followed by a short summary of the general lines and the specific projects.

## THE „SYSTEMS APPROACH“ TO ECOSYSTEMS AS WELL AS SOCIAL SYSTEMS ANALYSIS

Modelling man-nature relations has traditionally been a difficult academic task which cuts across the boundaries of various disciplines of the „two cultures“ - the natural and the social sciences. From the side of the natural sciences, the *ecosystems* approach tends to construct an *intersection* between nature and society (Figure 1). On the other hand, when analysing environmental challenges, sociological systems theory stresses the closedness of *auto-poietic* (from the Greek: self - autos, to make - poiein) social systems, such as the economy or the judicial system, which communicate through specialized media, such as money or court sentences, in a binary mode: He who pays more, receives the good at an auction, or a court decides whether a claim is valid or not, or whether a certain action is subject to penal sanction or not. Both of those social systems - the economy as well as the judiciary system - are *per se* blind and deaf with regard to nature. Modern society is no longer reigned by age-old taboos and all-pervading, holy mysteries encapsulating nature, man and society, but by differentiation and specialization in the social division of labour. States of nature must be detected and transformed into human *communication*, before they can find *resonance* in society. The basic model is the precarious *interface* between the fundamentally different systems of nature and society (Figure 2).



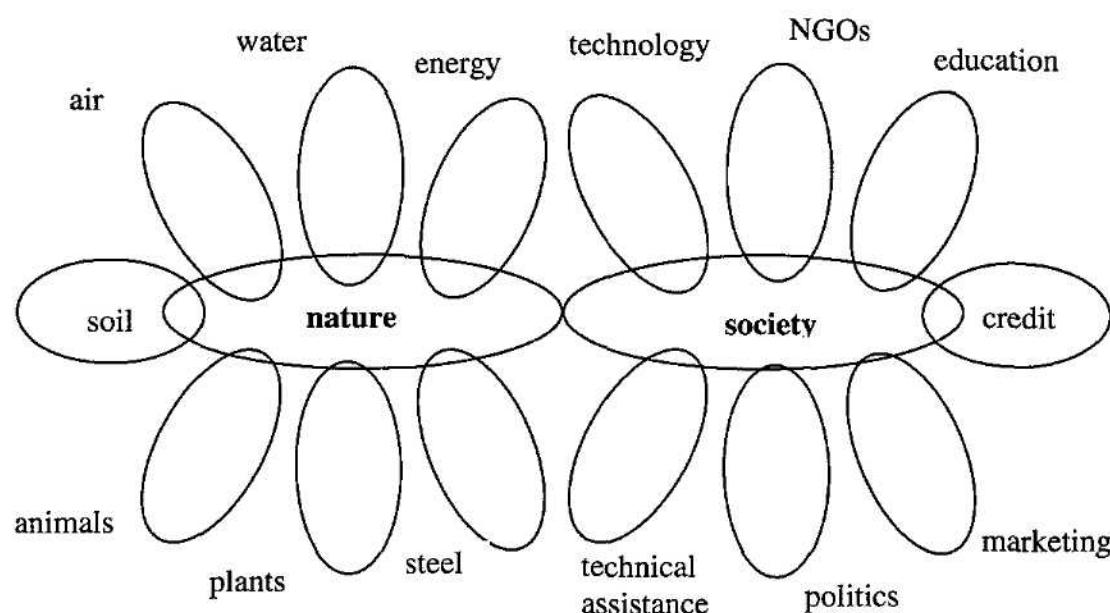
**Figure 1**



**Figure 2**

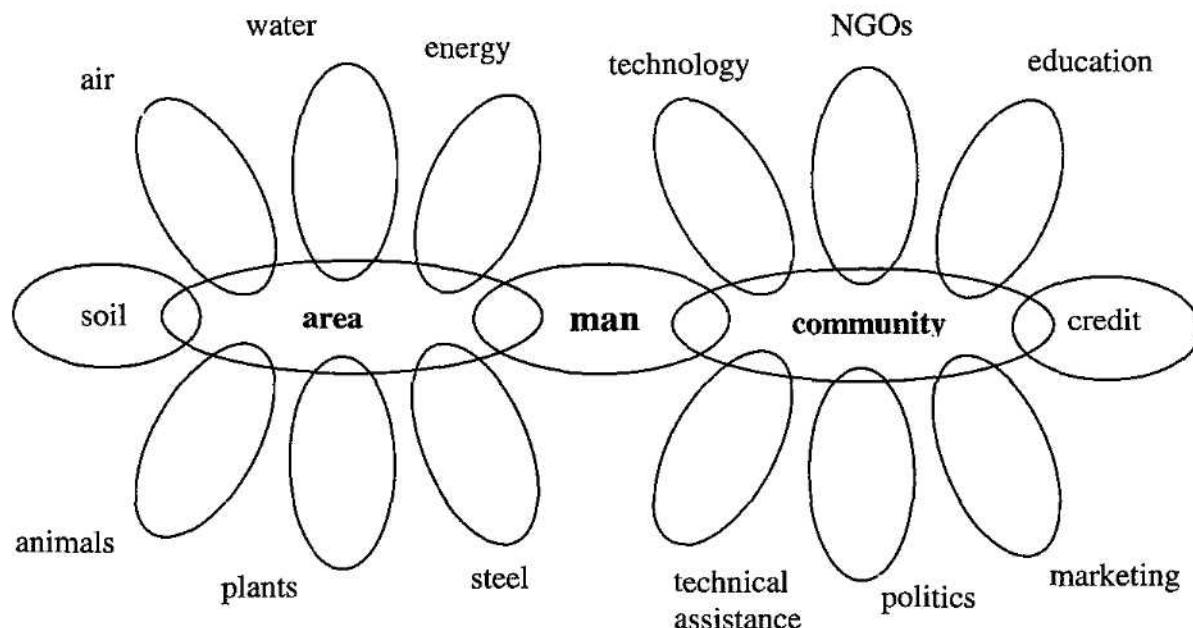
Both approaches are not undisputed in their respective sciences: Apart from the *ecosystems* view with its suggestive *holism* (from the Greek: whole - holos) and interdependence between all the elements and their relations in a given area, there exists the biological theory of self-reproduction and precarious coupling between different bio-physical systems and partial systems. After all, *auto-poiesis* is a biological concept which was borrowed by the sociologists. On the social science side, too, the view of social systems as only specialized,

closed, self-reproducing circles has been challenged by drawing attention to *integrative* social systems with a large variety of functions, media and expressions, such as the family and the community, in which common language is used which provides a multi-functional intermediate, *holistic* social system of communication between the individual and modern society at large with its specialized subsystems (Figure 3).



**Figure 3**

A combination of both approaches (on both sides) is suggested as a way to bridge the gap between nature and society, putting man in the centre: The *holistic* approach is applied to the natural bio-physical ecosystem as well as to society with all its dimensions in a *given area*, i.e. the area under study, defined by the observer. Thus defined, the *ecosystem* is relieved of its connotations of *reproduction*, *self-reproduction* and *harmony*, since biological beings, water, energy flows and other *auto-poietic* subsystems *intersect* with the local ecosystem under observation, but follow their own reproductive logic. For instance, local birds or fish might migrate and reproduce many miles away. On the side of society, the boundaries of a municipality may be taken as the limits of the relevant area for field research, because the observer is interested in political and administrative structures. These boundaries, then, define the *given area* both for nature and society. *Intersecting* with the local, multi-functional community, the judicial system and the economy, the educational system as well as the mass media, and all the other specialized subsystems of modern society follow their own, specialized codes according to their logic of behaviour and their means of communication, largely determined by their own history. No coherent whole can be expected, neither between nature and society, nor between *auto-poietic* biological or social systems so that the precarious *interface* provides a pervading metaphor for life in the modern world on an endangered earth (Figure 4).



**Figure 4**

### LOCAL PEASANT COMMUNITIES IN THE ZONA BRAGANTINA

For empirical research, this double systems approach turns out to reflect nothing revolutionary new: Every questionnaire relates data on crops, animals and land use on the side of nature to prices, property rights and origins of migration on the side of society. However, socio-economic field research becomes somewhat more transparent, and communication between natural and social scientists as well as between the target groups and the academics is facilitated by a clear focus on *the whole* of nature and society to be studied in the *given area*, and on the special logic of (self-)reproduction of the natural as well as the social subsystems *within* this area and/or intersecting with it.

Field research has been carried through about peasants, farmers and plantations in the Municipality of Igarapé-Açu in the Bragantina region of Northeastern Pará. The predominant mode of agriculture has been the use of secondary forests with slash-and-burn methods, leaving the area after 3-8 years of cultivation for a fallow period of 7-25 years. As already mentioned, the botanists and agronomists of the SHIFT ENV 25 project have been studying the botany and the reproduction of *capoeira* for many years so that a fruitful cooperation could be advanced.

From the socio-economic side, the traditional local *capoeira* economy seems to be threatened by the inroad of cattle ranching and plantations of larger farms buying up the land. On the other hand, small producers have begun to plant and cultivate fruit trees and semi-perennial crops, such as maracuja and pepper, alongside their traditional annual maize, manioc and rice. They have also turned to animal products, such as eggs, poultry and milk. All in all, land prices tend to rise, because the growing city of Belém is radiating into the surrounding countryside.

nature via legal instruments, *planos diretores* and administrative measures as well as infrastructure investment, particularly those within the *Brasil em Ação* program.

Of course, not everything can be covered, between literal grassroots research on the local level and global governance measures, such as following how the World Bank administers the PP-G7, - but the interplay between those various levels cannot be ignored, when the wider objectives of SHIFT research are taken seriously.