# FSR's possibilities and shortcomings – the necessity of learning from and with farmers' knowledge and worldviews. Insights from a Case Study in Peru[1]

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## Abstract

A FSR study was conducted in two villages and describes the socio-economical conditions for the current agricultural production and its profitability. The paper discusses the shortcomings of such an FSR-study in understanding the farmers' reality and their farming system. In order to understand this, the research suggests a need to move the focus from *what?* to *why?* One way to do that is to include the topics of farmers' knowledge, farmer's worldview and to use interactive farmer participation as a point of departure for the research design. Farmers' knowledge is a resource when searching for new possibilities of small-farm development, which is grounded in the farmers' worldview, and involves farmers' interactive participation. If development research is striving for a focus on local problem description and wants to acknowledge the various knowledge systems that contribute with different insights, the farmers' world-view and knowledge should be welcomed and useful contributions for future research. This FSR-study was made as a part of a more extended research project on resilient land management in the Western Amazon.

## 1. Introduction

This FSR-study has been performed in the Peruvian part of the Amazon in order to "read the context" before starting up more specialised work in the area of soil conservation. The research is part of a research project on resilient land management strategies in the Western Amazon. Joint objectives for this study have been to define the boundaries for the coming work, to test an FSR-approach and to analyse its advantages and shortcomings.

The Peruvian Amazon is divided into the highland jungle (*selva alta*) and the lowland jungle (*selva baja*). The highland jungle is on the final hillside of the Andes where it meets with the Amazon forest. The temperature in the highland jungle is cooler and not quite as humid as further down the basin. This is a hilly area with a lot of small rivers flowing into the bigger rivers (like the Huallaga River) and finally into the lowland jungle and the Amazon River. The lowland jungle on the other hand is a flat area where the big rivers often inundate large areas. The area where this project is carried out is in the highland jungle, in the province of San Martín. Small-scale farmers working on marginal lands, wide-spread deforestation, decreasing fallow periods, field burning, soil erosion, land degradation, and heavy immigration are all real problems in San Martín, as well as in large parts of the tropics. San Martín is also a biodiversity "hotspot" area, which should be prioritised for conservation (Myers *et al.*, 2000).

[1] This paper is a selection of parts of a larger report made during fieldwork performed in Peru on resilient land management strategies in the Western Amazon. The report has been revised to become a scientific paper. This presentation at the IFSA-conference in April 2004 is a precursor to the scientific paper.

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## 2. Methodology

The study has been carried out in the villages San Miguel and Chazuta, both within two hours travel from the region's largest city; Tarapoto. The villages have been selected due to their differences in livelihood conditions and the possibility to compare different strategies to handle land degradation. The inhabitants in both villages are mainly colonists that arrived to the area two to three generations ago (in the low-land jungle literature often called *rivereños* and in the Brazilian context *caboclos*), but there are also minority groups of the indigenous *Kechwa-Lamista* people. The researcher has worked exclusively with non-indigenous farmers in this study.

The study was performed during the first part of a fieldwork that extended over 29 months. The researcher works together with a local NGO called PRADERA (*Proyecto de Apoyo Rural de la Amazonía*). Introductory meetings were organised where the researcher was introduced to the families in both villages with whom PRADERA cooperates. Later the researcher returned to the villages and made field visits with 8 families in San Miguel and 10 families in Chazuta. During the field visits, semi-structured interviews (Kvale, 1996) were performed exploring topics like family status, ethnographic situation, infrastructure, farm sizes, current situation of erosion and land degradation, use of soil conservation methods and the researcher also performed crop budgets (model supplied from CIAT-Pucallpa). Parallel to this, the researcher has kept a detailed research diary (McNiff, 2002) and summed up her understanding of the agricultural system in rich pictures (Checkland & Scholes, 1999).

## 3. Results of the FSR study

### *3.1 San Miguel and Chazuta*

San Miguel is situated along the Marginal highway, which connects Tarapoto with the coast, in an area that is to a very large extent deforested, degraded and densely populated (densely in a Peruvian Amazonian perspective – meaning around 17 persons per $km^2$). Chazuta, on the other hand, is situated at the border of the river Huallaga, at the end of a poor quality road, with areas of primary forest still accessible to the village.

As Chazuta is located close to the border of the lowland jungle, the climate here is more humid than in most parts of San Martín. Statistics from the 1970´s from SENAMHI (*Servicio Nacional de Meteorología e Hidrología*) shows perceptions around 1400-2000 mm per year and temperatures around 24-26°C. In San Miguel precipitation is around 1000 mm per year and the temperature is around 27°C (Rengifo *et al.*, 1993).

### *3.2 The local agricultural system*

The most common agriculture practice in San Martín is bush-fallow agriculture. The study collected information about the labour distribution throughout the year, and this information was elaborated into farming calendars. These farming calendars show two periods of land preparation; namely during the dry seasons (in March to June and September to October in San Miguel, and in February and August in Chazuta). Preparation for a cropping cycle normally starts with the farmer cleaning the smaller vegetation within the forest or fallow (*el rozo*) with machete. The larger trees are cut down with an axe (*la tumba*). Some of the larger trunks are taken care of for firewood or constructions and the rest of the plant material is chopped in to smaller pieces (*el pachqueo*). When the slashed plant material has dried the field is lit on fire with several smaller fires directing the fire up the hilly slopes (*la quema*). When the field is burnt the farmer sows in the incompletely burned plant material and the ashes.

The normal size of cultivated land in San Miguel and Chazuta is1-2 hectare of land and the rest is left in fallow. About 70% of the cultivated land in Chazuta and 50% in San Miguel (Arévalo, 2002, personal communication), is occupied by the staple crops for self-subsistence such as cassava (*Manihot esculenta*), plantain (*Musa* spp.), maize (*Zea mays*), rice (*Oryza sativa*) and several kinds of beans (*Vigna unguiculata, Vicia faba, Phaseolus vulgaris, Cajanus Cajan)*. Apart from the subsistence crops the farmers in the region grow an impressive amount of diversity on their fields; vegetables like caiwa (*Cyclanthera pedata*) local tubers like dale dale (*Calathea allouia*), yam (*Dioscorea*), michucsi (*Xanthosoma viridis)*, fruits like guabas (*Inga edulis*), bread fruit (*Artocarpus incisa*), zapote (*Quararibea*), caimito (*Pouteria caimito*), cocona (star apple) (*Solanum sessiliflorum*), avocado (*Persea americana*), rose apple (*Syzygium*) etc. During earlier work in the region, the researcher together with PRADERA, recorded over 50 different crops in the villages downstream of San Miguel (Marquardt, 1998).

Both in San Miguel and in Chazuta *choba-choba,* a traditional system of interchanging labour, is still commonly used. When working *choba-choba* the participants does not receive a salary but the host farmer has to give the workers two meals, also including the accompanying *chicha* (maize beer). Normally the farmers take most of the products for the lunch preparation from their fields; hens, plantain, cassava, vegetables, rice, chilli-peppers, maize and the only thing they buy is oil and dried fish. Including all costs, to invite the *choba-choba* members for breakfast and lunch, most farmers spend more than $1.00 per person.

The last decades have meant large changes in the locally developed agriculture, turning from a mainly subsistence agriculture to a commercial agriculture where, to a great extent, farmers have left their poly-cultured fields and instead focused on maize and cotton production. Continuous cropping of cotton and maize have in most cases not succeeded, as the yields have dropped drastically (Arévalo *et al.*, 1999). Many farmers state that they do not perceive erosion as a problem, although land degradation and "tired fields" are something that most see as an urgent problem. The farmers' opinion is that there is very little to do about this, as it is an inventible process that the fields have to pass through. Most farmers are well aware of the green manure effect of plant material left on the field and now this plant material is not burned to same extent as it was before. Some farmers with medium size farms are experimenting with permanent agro-forestry systems with coffee, cacao, and fruit trees.

### *3.3 Farm sizes*

The interviewed farmers have properties from 1 hectare to 60 hectares (see Fig. 1). All farmers have legal papers on their land. One can distinguish farmers in three different size categories. The small farms are about 1-2 hectares. It is obviously very hard to manage rotational forest fallow system with one or two hectares as it is impossible to let the fallow rest enough time to grow up to forest again. The farmers in this situation often try to find alternative incomes or look for additional land. One example of alternatives in this area can be to process sugarcane juice into *aguardiente* (sugarcane alcohol), sewing cloths or having a small shop etc. Another alternative for farmers with little land is to search for a farming system that does not need much rotation. One farmer in San Miguel for example, with only 1 hectare has specialized his production in plantain, which means that he does not have to burn the land each year as he maintains his plantain fields up to 15 years. Farmers with that small area of land is quite normal in San Miguel but less common to find in Chazuta.

The second size category, farmers with middle-sized land, which means about 7-8 hectares of land, is the biggest group of farmers in San Miguel. With 8 hectares you can still rotate and you can leave the fallow to develop a bit, however without skilful maintenance it will soon become "tired", degraded land. The fields

vary in what shape they are. Some farmers cultivate the same land that their fathers have done and it is still producing well. Others' lands are very depleted of nutrients, and the fallows do not produce more than bushes anymore.

The bigger farms are larger than 15 hectares. In San Miguel few farms are of this size and it does not necessarily means that these farmers still have primary forest on their land. In Chazuta this farm size is not uncommon and most farmers in this size have primary forest.

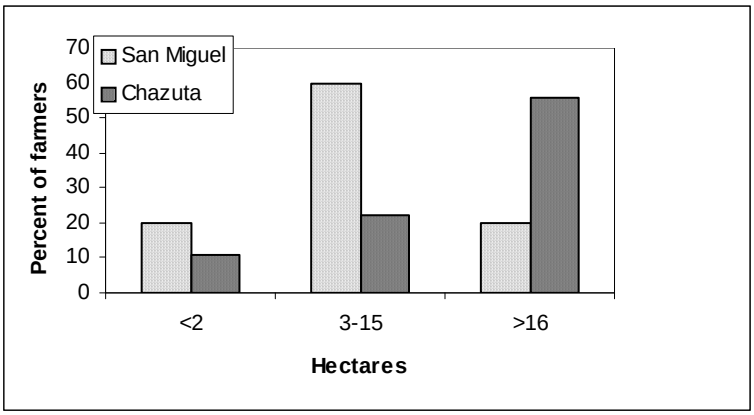


**Figure 1. Distribution of farm sizes in San Miguel and Chazuta**

Access to primary forest has been, and still is, an important natural resource for the households. The forest is an important protein source for many farmers by hunting animals in the forest. In the forest the farmers also get the lianas for constructions, medical herbs, honey etc. In San Miguel few farmers still own primary forest. Of the interviewed farmers 20% have primary forest, though this primary forest is comprised of small islands of forest or located in other areas further into the valley. In Chazuta more than half of the interviewed farmers own primary forest, and some farmers have up to 10 hectares of primary forest. In Chazuta even farmers without primary forest have access to it, and it is common to walk further into the mountains in order to hunt. In San Miguel hunting is quite a limited activity. To go and hunt today means a trip that last for days or a week. However many farmers trap smaller animals like rabbits and wild guinea pigs in their fields. The farmers in Chazuta fish a lot during certain seasons (mainly July- August), depending on the flooding in the Huallaga River. In San Miguel the fishery is a minor activity, mainly limited to crab fishing in smaller streams.

### *3.4 Variation in socio-economical realities - different strategies*

Today it seems that many farmers in San Miguel have realized the risk it involves to be dependent on only maize and/or cotton and several farmers are coming out from the "monoculture fever", and are once again concentrating on having a diverse field (Arévalo, 2002, personal communication). Though the area is very degraded from a biological point of view, according to PRADERA, there has been an incipient cultural revival going on in the San Miguel area for several years. When asked which three crops that give the most income to their household, the answers given by farmers in San Miguel were surprisingly broad (see figure 2). In San Miguel, cotton is still an important cash crop, but fruits (such as papaya, avocado, mandarin), coriander and plantain are as important for the household economy as maize. Many farmers from San Miguel sell their products in San Miguel or take their products to the market in Tarapoto, depending on the price.

In Chazuta the scene is different. When asking the question of which are the three most important cash crops to the farmers in Chazuta, the answers were very homogenous (in contrast to San Miguel). All

farmers mentioned maize and most farmers also said plantain. Several farmers had problems to mention a third crop that gave them any major income. The farmers from Chazuta almost exclusively sell their crops to agents in Chazuta. Only a few farmers process their crops into products like *almidon* (cassava flour) and *fariña* (small grated pieces of cassava that one puts in coffee) and go to Tarapoto with their products when the price makes the trip worthwhile.

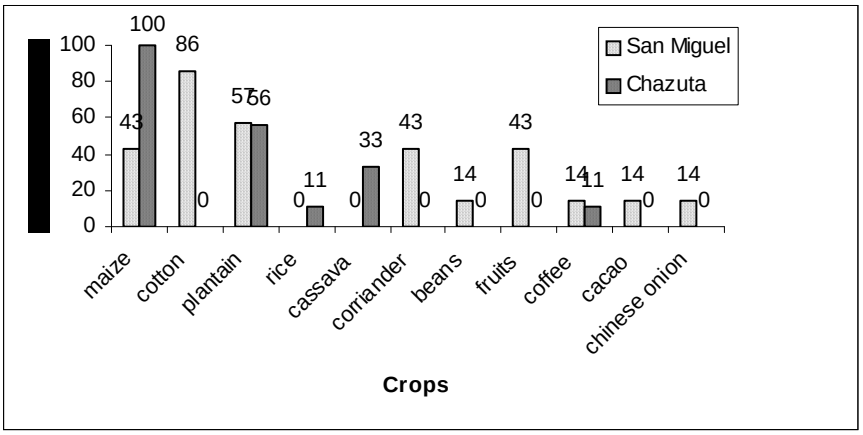


**Figure 2. The most important cash crops in San Miguel and Chazuta. Percent of farmers who ranked a certain crop as one of three most important cash crop**

The difference in farming strategy between the farmers in San Miguel and Chazuta could be referred to as a difference in access to infrastructure and a bigger market. However, another aspect of the situation might be that the level of degradation in San Miguel has forced the *sanmiguelinos* to look for other marketable options than maize. With degraded land, a demanding crop like maize gives a relatively low yield. Maize normally yields around 2500 kilos per ha in Chazuta, whereas in San Miguel it yields about 900 kilos per ha. The cost for producing the maize is also higher in San Miguel as the weed pressure is higher. The degradation, expressed in terms of weed pressure and labour, may be one explanation of the differences in the preferences of cash crop production between the villages. In Fig. 3 the profit per working day is shown for the most important cash crops in both villages. Maize is not a very profitable crop, and neither is cotton, the other traditional cash crop in the region. The tradition of growing maize in the region is deeply rooted, and though maize is a crop that does not pay very well, it does not keep any farmers from producing it. Apart from being a cash crop, maize is appreciated in the households for preparing *chicha* (maize beer), *humitas* and *tortillas* (maize pastries) and for chicken fodder. In contrast, the crops that stick out as being more profitable are plantain and coriander. It seems that plantain is a crop that pays off very well, however most farmers grow plantain primarily for their family needs (which is quite considerable as plantain is a staple food in the whole Peruvian Amazon) and only sell what is remaining from that harvest. Coriander seems to be a promising crop, but only a few families are using it in a more continuous production at present.

Why do the farmers in San Miguel and Chazuta bother at all to grow maize and cotton if the profitability is so low, with the risk of losing money when growing the crops? One main reason might be that many of the farmers' costs are not perceived in money and the farmers' and the family's work on the fields is not valued in monetary terms. Another reason is that these crops give one big harvest and the income is a large sum of money on one occasion (in the case of maize, the farmers can rely on a sure possibility of selling their maize, although sometimes at a very low price). Other crops such as plantain and coriander constantly produce and the farmers sell small amounts and get some money each time. The few farmers that are intensifying their plantain production are mostly farmers with land close to the village or the road, as it is quite a heavy job to carry the stems longer distances. The farmers that have started to grow coriander appreciate the relatively little work-investment in producing coriander.

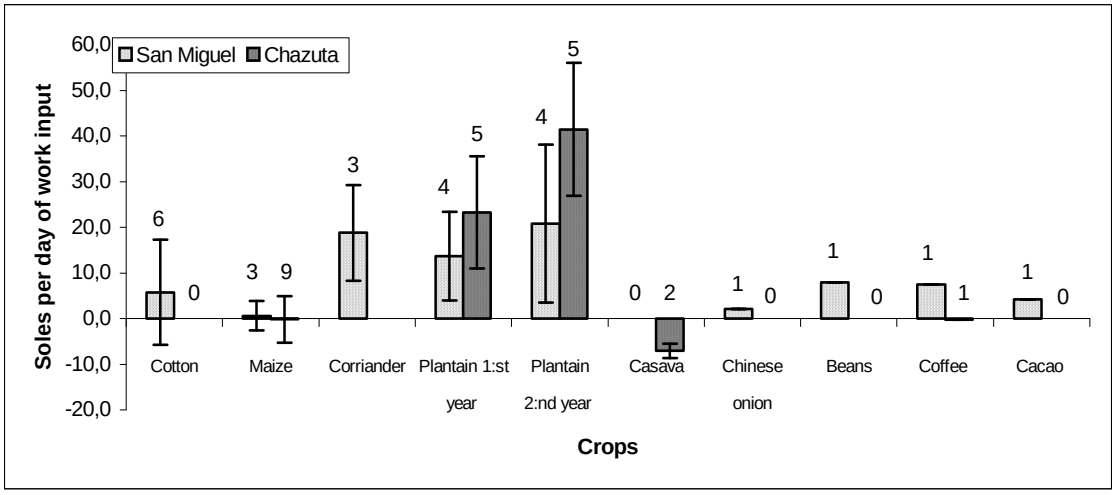


**Figure 3. Profit/labour index in San Miguel and Chazuta. Lines in columns indicate +/- standard deviation. Numbers in diagram are numbers of farms per crop and place, from which average and standard deviation has been calculated. 1,0 USD = 3,5 soles.**

## 4. Discussions on FSR's shortcomings – the human dimension

This FSR-study helps to "read the context" and the results show that there are important differences between the two villages. However it fails to help us to understand the dynamics of *why* they differ. The actual main actors - the farmers and their way of thinking and analysing, their framework for taking decisions, and their visions – have a peripheral role, which is a serious limitation for successful work on land degradation.

In reviewing FSR-literature there are critiques of FSR and how it handles the human dimension. Collinson (2001) suggests that FSR research is focusing on applied research and seeks the technical solutions for ideal management and therefore often misses its target. It leaves out the human dimension of production and the system's flexibility, which often is a prerequisite for successful farming. Collinson (2001) calls for a beneficiary-responsive FSR interface and the need for "*solutions to fit farmers' system"* in terms of their priorities, strategies and needs for flexibility. Striving for a local focus on problem description and acknowledging that there are various knowledge systems that can contribute with different insights, this paper suggest that a classical FSR approach is not enough in order to understand farmers' reality, their farming system and what potential actions they might take in order to prevent land degradation. In order to reach the "solutions to fit farmers' system" the research needs to shift focus from *what?* to *why?* If not, there is a huge risk of research and development work missing their targets. With this article I would like to present three themes that can help us approach this shift.

(1) The importance of adapting research *to include the farmers and their knowledge in the research process* in order to do research relevant for farmers. There are two additional areas, not mentioned in FSR literature, which I have found to be of great importance in my research, that need to be taken account of in order to get a good understanding of the farmers' agricultural reality: (2) The world-view or *cosmovisión* as it is called in Spanish literature, which is the very basis of how we relate to other people, to the nature, to spirituality and (3) "*Non-human knowledge*", an area absent in Western science. In the Peruvian highland jungle farmers explain e.g. that plants speak to them, that seeds may walk away, that the hands may have their own knowledge without processing it through the brain, or that dreams may teach you. How does Western science handle this kind of knowledge?

*4.1 The interconnection between research, farmers and farmer knowledge*

In the contacts with the farmers in San Miguel and Chazuta many of them expressed their disapproval and lack of confidence in agronomists in general, and certain projects and NGOs in particular. To enter a fruitful work on land management with these farmers means a huge investment in trust, for the researcher as well as for the farmer, and the experience of this research is that there is no other way around it than researcher and farmer working in a close collaboration. The very meaning of involving the farmers in the research process implies striving to make the farmer an equivalent and interactive participant and the farmers' knowledge equally valid in the research throughout the whole process. This is seen as opposite to so called passive participation with one-way dialogue; as for example when researchers collect data from farmers through participatory methods, but later the data is processed only by the researchers (Ison & Blackmore, 1997). The researcher needs to hand over some of the control of the process and go for more trust in a joint co-operation. This is what Svensson *et al*. (2002) calls *research with – a joint knowledge production*. A joint knowledge production means to do research together with those involved. In the work there is a constant and reciprocal learning process for both researchers and practitioners. The relation is based on the viewing of each other as subjects and to work as equals. This means involving the farmers in an interactive process from planning, to evaluating the results. It will mean to enter a learning process together with the farmers and to involve oneself as a person.

Small-scale agriculture systems as well as nature are complex and dynamic systems, full of uncertainty. When farmers farm they act in a system that is in constant change; storms, pests, family size growing/reducing, a new buyer of cotton establishing in the village, health problems, NGO projects etc. The complexity and uncertainty in the farmers' agricultural reality suggest that instead of focusing on separate activities within the farming system it is the farmer's *knowledge and learning processes* that should be the hub when looking at farming system (Folke *et al.*, 1998). In Chazuta and San Miguel farmers knowledge is richly expressed in terms of agro-biodiversity, and highly refined skills of seeing, perceiving, hearing and smelling changes in the field and forest. In the middle of the alarming reports of degraded lands in the Amazon, some of the Amazonian farmers farm the same land as their fathers and grandfathers have farmed and it still produces well. As Don Naldo does in San Miguel for example; he sustains his family on 7 hectares that his father and grandfather have worked before him and he states that his fields still produce everything he sows. Many Amazonian farmers have an impressive number of crops and crop varieties in their fields. Only in the valley of Bajo Mayo (where San Miguel is situated) 24 varieties of plantain, 18 varieties of maize, 12 varieties of cassava, 42 varieties of beans, and 38 varieties of chili-peppers have been recorded (Rengifo *et al.*, 1993). There seems to be little doubt that Amazonian farmers' possess valuable knowledge, both in terms of agro-biodiversity and medical plants but also land management, and it needs to be valued and taken seriously into account. Farmers' local knowledge may not be the answer to everything but it has to be the point of departure, because entering topics like land degradation and erosion are to enter complex systems that are hard for an outsider to get an complete overview of. *"We the non-farmers lack the basic understanding of farmers' own research methods, their schemes of information exchange, their informal farmer-to-farmer extension methods, and their approaches to generating new technology or designing new farming systems "* (Stroud & Kirkby, 2000:114). This means that the farmers and the kind of research approach that takes the view of the farmer into account and where farmers can express their knowledge are irreplaceable pieces in the agriculture research puzzle. Concrete applications of not involving the farmers and not adapting the knowledge process to the farmers' context is often seen in projects handled with "top-down" approach, as in the San Martín case when the agriculture experts worked with erosion control methods along River Mayo. The agronomists went out to the villages and handed out tree plants for the farmers to plant in their fields on the slops. However, when the agronomists left the villages most plants landed in the river. *Why* were the farmers, who many times are reforesting on their own initiative, not interested in the expert's plants? The farmers were never involved in the process of how to

handle erosion in the area and the objective of the expert's work was not adapted to the farming context. In order to plant the tree seedlings, many farmers had to carry the plants long distances and without the understanding of *why* the agronomists wanted them to do this, most farmers preferred to get rid of the plants and continue to work with natural re-growth of forest and transplanting of sprouts of local tree species. An interactive discussion about the problems of erosion in the area and the local farming system was not reached and the target of erosion control was missed (though partially covered by the farmers' traditional land management strategies). Explicitly dealing with farmers knowledge is essential for successful research and improved practices (Sinclair & Walker, 1999).

### *4.2 The cultural context*

Cultural different attitudes toward environment have implications for management (Folke *et al.*, 1998). Agriculture is not a neutral activity that takes place separated in time and space but something intertwined in the daily life with work in the fields and in the forest, relations, rituals and fiestas. There is an increasing recognition that the scientifically invented division between nature and culture is not a useful (Scoones, 1999), and here worldview is an important piece. If we do *not* understand the cultural context within which the agriculture is embedded, including its ways of knowing and learning, the probability that actions to support the farmers and their efforts to combat land degradation and erosion including their own experimentation, is very unlikely to become successful. If we want to understand the *why*-part of agriculture, it is necessary to enter the field of world-view, values and attitudes.

#### *4.2.1 Farmers' world-view*

*Cosmovisión* (henceforth translated as worldview) is a concept found mostly in Spanish literature that I find very useful. It may be defined as *"the way a certain population perceives the world or cosmos. Cosmovision includes assumed relationships between the spiritual world, the natural world and the social world. [] …the cosmovision makes explicit the philosophical and scientific premises behind farmers' intervention in nature"* (Haverkort & Hiemstra, 1999:15). Experiences show frequently that one cannot take for granted that all cultures relate to the world and its inhabitants in the same way. Western world-view is strongly anthropocentric, the nonhuman part of life is only given importance in proportion to their usefulness for humans (Gardner & Stern, 1996). Many rural societies are agro-centric, agriculture is put in the centre and life is inseparable from agriculture (Grealou *et al.*, 1991).

In the Western perspective the non-human knowledge is of little importance and in agricultural sciences it is rarely mentioned. However, in the *reality* of the farmers in San Martín it is as important and real as any kind of human aspect of knowledge, e.g. answers how to grow a crop are revealed in dreams, the different moon phases influencing the crop growing, and the different diets in order to sow a particular crop. When preparing the cassava field it is just as important to keep a certain diet and time in the right moon phase, as to sow the tuber in a soil appropriate for its vegetative development. This may be hard for Western science to grasp but has to be treated with the greatest respect and seriousness. These kinds of farmer knowledge are mostly interpreted by modern disciplines as beliefs, metaphors and superstitions. We, the agronomists and researchers, may not believe in this but it will influence our work. This research has evolved into a phase to do collective fallow experimentation together with the farmers and the time plan for the work necessarily had to be coordinated to the moon phases, as most plants according to the farmers in San Martín have to be sown in *mengua* (the days before and after full moon).

Including worldviews in the agricultural system gives us problems with how to define the boarders of the system/organism of the research; through what windows of focus should we look at the system? Looking at the local agricultural system and its production through the FSR-window gave the possibility to read the

socio-economical reality for the farmers in the area, and these experiences will be connected to a longer research project on erosion and land degradation. However, experiences of working in San Martín (Marquardt & Rönnberg, 1997; Marquardt, 1998) and also this FSR study, showed that the topic of soil cannot be successfully treated as something separate in a land management perspective, but has to be viewed in close relation to the cropping patterns, the fallow, the forest and the farmer's worldview.

How should science seriously handle farmers' world-view? Is it possible for an agronomist to handle farmers' world-views with all that it includes and still communicate with the scientific community? Though I believe many researchers with field experience would agree that this is a topic of relevance and importance, many fear getting too close to the topic, and most researchers would not want to be accused of dealing with unserious research and superstitions.

*4.3 How to proceed? A move from what? to why?*

Padoch (2002) states that farmers' logic of land management is not always directly visible for an outsider. Not only are the farm systems diverse, but also the farmers and the transitional stages in change processes. In order to understand a diverse and dynamic landscape, the researcher need to spend considerable time in the field together with farmers and without a close understanding of the farming system and its stewards the dynamism can easily be misinterpreted (Padoch, 2002). The collaborative role of the local NGO PRADERA has therefore been important in this research, as they have a long experience in the area and are highly knowledgeable about the farming system, farmers' knowledge and their worldview. At the same time the researcher's work has been supportive for the local NGO as a reflective discussion partner throughout the process of action learning together with the farmers.

To move forward in the understanding of farmers, farming and land degradation in the Western Amazon the researcher has continued her research with an action research approach. The research strives to facilitate farmers' reflection on land management in a broader context that includes farmer knowledge and farmer worldview. However, this does not mean that the researcher passively accepts the statements and answers from the farmers, rather that there is an interactive dialogue between the researcher, the local NGO and the farmers, where the researcher try to understand the rich variety of actions and the sometimes contradictory statements from the farmers.

One of the challenges of tomorrow's research is how rural realities can be described, within their social constructions and complex embeddedness in their cultural context, from a local perspective (GFAR-conference, 2003). Striving for a local focus on problem description and acknowledging that there are various knowledge systems that can contribute with different insights, farmers' knowledge and world-view should be a welcomed and useful contribution for future research. The FSR is good at mapping the *what?* (what do you grow, what is the labour distribution, what size is the family, what crops are for sale etc.). It is interesting and useful information but not enough in order to improve small-farmers' situation. It is not enough to only understand the essential components of the system, but their interrelations as well when striving towards a more sustainable and resilient agriculture in the Amazon. Farmers' knowledge is a resource when searching for new possibilities of small-farmer development that is grounded in the farmers' worldview and knowledge and includes farmers' interactive participation. It is also a question of democracy and who has the preferential right of interpretation. Striving for a small-farmer development means to "put on the glasses" that will show the researcher the world from a small-farmer's perspective. When doing this, farmers' world-view and knowledge might be tricky to handle but are indispensable pieces of the puzzle.

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