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Securing Livelihoods in Marginal Environments: Can NGOs Make a Long Term Difference?..

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Policy in the Making

Poverty and food economy: ASSESSING LIVELIHOODS

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Save the Children 

UK

London

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PREFACE

An understanding of the social and economic lives of the people with whom we work underpins any decision SCF makes about programmes. But, what do we need to know - and what can we know?

Julius Holt begins to answer this question (as well as elaborating on why we should bother in the first place), for rural communities at least. With a pragmatic hand, he guides us through a thoughtful framework of how we might go about piecing together a picture of people's livelihoods (and lives). The following two papers demonstrate how similar questions have been answered - in Mali and Ethiopia - using different methodological approaches, by people with very different backgrounds. In Mali, William Moseley describes various approaches adopted to preserve and strengthen livelihood systems in marginal environments. In Ethiopia, Barbara Hendrie outlines how nearly two years of anthropological research have enabled her to begin disentangling the nuances of social strata, welfare exchanges and relative wealth in the northern region of Tigray, and how these are closely inter-related. The final paper, by Pemy Allen, provides a more practical perspective for those wishing to embark on this sort of analytical assessment: - What are the key questions? Who should one talk to? What is the process of assembling an overview?

All the papers share two themes: firstly they highlight the importance of the links between social and economic life: the two are tightly interwoven, and both are important in determining people's survival during times of crisis. Secondly, all the papers highlight the value of qualitative, questioning investigations within some sort of framework - fundamental to an analytical rather than a descriptive approach. Numbers simply can't be made to 'add up' without having a structure within which they can be interpreted.

And what of children? Whatever the approach adopted or the questions asked, the central importance of children in SCF's work is brought out in all the papers. The issue of children's welfare and well-being, children's place within the social and economic make-up of family life and children as sources of information are all discussed.

SECURING LIVELIHOODS IN MARGINAL ENVIRONMENTS: Can NGOS Make A Long-Term Difference?

INTRODUCTION

This paper presents an analysis of investment strategies relevant to vulnerable rural populations living in marginal areas. The strategies seek to decrease food insecurity by helping villagers to better exploit terms of exchange, make sustainable improvement to production systems, diversify sources of revenue and improve local capacity. The paper secondly examines the sustainability of such investment strategies and the connections between the policy environment and the long-term success of such investments. The paper draws heavily on examples from Save the Children's work in Mali, West Africa, where land and resource tenure issues, as well as the approach of government agencies to rural extension, represent significant obstacles to the long-term success of such investments. On the other hand, decentralization, the possibility to develop more appropriate credit institutions and the potential impact of disseminating certain types of agricultural production information represent substantial opportunities. The paper concludes by examining some of the larger questions that NGOs addressing rural poverty need to consider namely the issue of wealth gains and child welfare (and the impact on children), as well as the importance of understanding the local rural economy.

COPING IN MARGINAL ENVIRONMENTS

SCF works in a number of areas around the world today that for one reason or another are considered marginal. This marginality is often defined in terms of limited agriculture or natural resource potential. In most instances, the people living in these areas have developed ingenious ways of coping with this marginality strategies that are often highly adapted to a specific context. For instance, while marginal lands may appear to be uniformly unproductive to the outsider, they frequently contain a mosaic of agro-ecological zones that come into production at different times of the year. Furthermore, in some instances marginal zones may contain a few highly productive micro-environments (stream corridors, natural springs, seasonal flood zones) that are amenable to much more intensive production. Local people's knowledge of this variation and ecological intricacy is what allows them to survive where others cannot.

Indeed, it is often very difficult to separate the complex understanding of local environments from the culture which generated it. In Mali, human cultures have

grown Up around the **exploitation of** certain **ecological niches**. AS such, one can find a variety of specific **production-based ethnic groups co-existing** in the same area (eg **farmers, Pastoralists, agro-pastoralists, fishers and agro-fishers**). The members of each **production group** seek to **produce** a sufficient quantity of food while minimizing the **risks** (eg **herders bartering milk for grain**). In addition to a **rural producer's** main activity, he or she may frequently depend on a variety of other side activities or coping **strategies to bridge the gap in difficult years** (eg **collection of wild grains and tuber, seasonal employment in urban centres etc**).

VULNERABILITY, ENVIRONMENTAL CHANGE AND FOOD SECURITY MONITORING

The problem is that the human and natural **features** of marginal **lands** are changing. Droughts, the pressures of **market** economics and growing human populations have **increased the vulnerability** of once stable **livelihoods**. One characteristic of the **Malian Sahel** is its highly **variable rainfall from one year to the next**. As **such, local coping strategies often involved building up** small reserves in the good years (in the form of **grains and animals**) that would carry people through in the bad years. Unfortunately, **the good years seem to be less frequent** than they were in the past. **Furthermore, agro-ecosystems are increasingly** so degraded that rural **producers frequently** do not even produce a surplus in years of good **rainfall**¹. **This said, rural people are rarely complacent** in their attempts to cope. They may spend increasing amounts of time away from home working in an **urban centre**, wild **foods** may become an annual staple as opposed to a famine food and, in some instances, an entire way of life may be abandoned for another (eg **fisherfolk becoming farmers**). Tire question is how long can **this** continue? How much flexibility will rural people continue to have in attempting to feed their families? **Are** people from these cultures destined to a cycle of poverty and food aid or can **NGOs** like Save the Children work to reverse these trends?

One thing is certain as marginal **environments** degrade, people's structural vulnerability to food insecurity **increases**. in many parts of the **world**, including Mali, SCF has **set up** food security monitoring systems to let local governments and donors know, with reasonable notice, when people are no longer capable of coping. In recognition of many of the intricacies described above, **SCF-Mali's** food security (or SADS - Suivi **Alimentaire Delta Seno**) project **developed** a monitoring methodology in Mali based on the analysis of different producer groups, their coping strategies, market prices and local people's knowledge of food security conditions. **This** attention

¹ The lack of a surplus in good rainfall years (such as 1994) is also related to the fact that such years are now so rare that people are out of the habit of planting in anticipation of such rains.

to different producer groups **forced** policy makers to recognize the diversity and complexity of **different** food and income **sources**. **Most** importantly, it got people away from the simplistic notion that a famine will ensue every **time** there is a crop failure.

WORKING TO DECREASE VULNERABILITY IN MALI

Being able to monitor food security to know when people are in trouble (information that is often narrowly used **for** food aid decisions) is only part of **the equation**. Perhaps more important is to be able to develop a coherent **programme of** sustainable interventions and policies that keep people **out of trouble and** less vulnerable to food insecurity in **the** first place. Since developing a **food** security monitoring system in the late '80s, SCF Mali's **food** security project has set about tackling this second issue.

Lessons learned from the food security monitoring phase played a significant role in the project formulation of development initiatives at village level. A major finding was that **food** was generally available **in** the **region**, due to a variety of production systems, but at too high a cost to **the** needy **local** consumer. **Secondly**, it was found that **families had often** sold off productive capital (eg **ploughs, donkey carts and oxen**) as a coping strategy in hard **times**; a move which diminished **future** productive capacity. Finally, many coping strategies were an attempt to **diversify** sources of revenue or food, and as such were quite **sound** responses to food insecurity (SADS 1989). **These** problems, and others identified during later phases of the **project**, are currently tackled under a rubric of credit and training interventions that can be **classified** as follows: terms of exchange investments, productivity **investments, diversification** investments and local capacity-building investments. In **effect**, these four categories represent the major conceptual avenues through which the **SADS** project has attempted to **tackle** food insecurity at the village level.

Terms of Exchange Investments

A "terms of exchange investment" is an intervention that seeks to help a **rural** producer sell or gain access to goods when **prices** are most **favourable**. It responds to the earlier project observation that **food was** often available in the zone but **at** too high a price for the needy **consumer**. A cereal bank is a good example of **an SCF** intervention of this type. A **timely** loan allows villagers to purchase cereals at the cheapest time of the year (**harvest time**), later **re-selling** the **cereals** during the hungry season at a slight margin to cover **cost**. For the villagers, the bank allows **them** to sell (villagers often have to sell at **harvest** time to pay off incurred debts) and purchase cereals at a reasonable **price** and **in** closer proximity to their homes (saving both time and money). The money saved may mean that the family does not have to sell a valuable means of production (eg **a plough**) while the time saved from not having to travel during the hungry **season** in **search** of cereals (which coincides with the year's

most intense agricultural activity) can be spent, for example, **ploughing, seeding and weeding in the fields. Other examples of terms of exchange investments, which work on the same principle, include animal feed banks and fishing cooperatives (for the stocking and sale of dried fish). Strategies for ensuring, and problems related to, long-term access to credit for these types of investments are discussions in the sections on Local Capacity Building Investments and the Banking Sector, below.**

Productivity Investments

The objective of a "productivity investment" is to improve food production at the local level. These investments can be divided into those made in physical or natural capital. SCF's first venture in this area was to make credit available for the purchase of physical capital that would **enhance** food production fishing nets, **ploughs**, donkey carts, etc. As mentioned earlier, it had been noted that many of these **means** of production had been sold off during difficult **years** and their absence now limited production. The project took **two different** tacks when giving loans for this type of equipment. Loans for fining **equipment** were **given** to the village as a whole for the collective purchase and **management** of such **goods**. Loans for fishing **nets**, on the other hand, were divided up among individual families. **In this** instance, the village acted as the guarantor of the loan while the **onus** of repayment was placed on the individual family. Perhaps not surprisingly, **the** second arrangement has been much more successful. It is now planned that **future** fining equipment loans will take this form as well.

The second type of productivity **investments** are those **in natural** capital (fields, forests, pastures and fisheries). The notion of investing in natural capital was largely ignored in the earlier stages of the project. These investments are **necessary** because there is a certain complementarity that exists between natural **and** physical capital that must be respected (complementarily in this **context**, meaning that one form of capital must **be** accompanied by another in order to have a productive **outcome** (Daly 1991)). For example, a **plough** or ox are only productive to the extent that one has fertile soil to till; or fishing nets are most productive when **one** has a healthy fishery to exploit etc. Recent research by the **project** using **participatory rural appraisal techniques** has shown **resource degradation** (particularly declining soil **fertility**, wind erosion and depleted fisheries) to be a primary cause of food insecurity.

Both human over-exploitation and drought **have** served to degrade natural capital. SCF's approach to the problem, still in its nascent stages, will involve a two-pronged approach: 1) the organization of several village **communities** around the more rational use, or better management of, common property **resources**; and 2) a training **programme** focusing on **regenerative agriculture** techniques. **The** first approach is based on an awareness that **many cases** of human over-exploitation are primarily a management problem. Both pastures **and** fisheries in Mali's Mopti region represent

classic common property resources. While these resources were once **managed** by local, indigenous institutions, they **were** made **open** access (available to all Malians) resources by the colonial and Post-colonial governments. This has basically led to "a tragedy of the commons" scenario. Everyone fishes or grazes their animals as much as possible to maximize personal gain - a phenomenon which leads to the **eventual** degradation of the resource and **reduced** gain for **everyone** involved (**Moorehead 1991**). Furthermore, no one has the **incentive** to "save something for tomorrow" because they know this saving **will** simply be exploited by the next person to come along. Organization of such **resource** user groups allows common ground rules to be defined **regarding** individual use. More rational use of **the resource** should **lead** to regeneration and more for **all** concerned. Other NGOS in the region have had some success in organizing several villages to sustainably manage common forests. This approach has yet to be tried for a **common** fishery.

The second approach involves a training **programme** in regenerative agriculture techniques. Regenerative agriculture **involves** a variety of techniques that: increase soil humidity and fertility (often by increasing soil organic matter), **cut** down on wind erosion and **evapotranspiration**, and increase water **infiltration** while decreasing **run-off**². These techniques allow for more sustainable and intensive agriculture as **well** as a **healthier**³ production or **agro-ecosystem**. It is finally of note that investments in production systems **often** invoke little to no injection of cash at the **local level**. They do, however, generally require a degree of skill transfer as well as a **certain level** of **organizational/management** capacity (see 'local capacity-building investment' below) **at the village level**. These investments also **often take** (time before they show) **significant** results. All of these factors mean that villagers may sometimes find these types of investments less attractive than the cash-laden variety. For these reasons, the project has sequenced these activities after credit action that act as a "*porte d'entrée*" into the community.

Diversification Investments

The third type of project investments are those that encourage the diversification of income or production sources. Such investments render a livelihood system more complex. Generally **speaking**, the more complex a livelihood system, the less sensitive

² These techniques also fall under the banner of soil conservation (rock lines, composting, crop rotation, crop association) and **agro-forestry** (wind breaks, hedge rows, parkland agro-forestry, etc.).

³ Sensitivity and resiliency are **two key parameters** of ecosystem health. **The healthier an ecosystem** is, the less sensitive it is to exogenous **perturbations** (eg. a drought) and more able to bounce back after such shocks (ie. higher resiliency). For more discussion of these concepts, see Vandermeer 1989. Perhaps not so coincidentally, some food security experts have used these concepts, sensitivity and resiliency, to describe the health of livelihood systems (eg. Davies 1993).

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it is to environmental perturbations. Livelihood systems under stress sometimes naturally progress in this direction via the use of coping strategies. The SADS has advocated reinforcing sound (sustainable) indigenous coping strategies as one way of strengthening livelihood systems. An example of this type of SADS intervention is the Grameen Bank, a credit scheme designed to promote small commerce among women. This intervention is based on the premise that one way women meet household needs is via petty commerce'. The project has also begun to promote fish farming, a practice that has been traditionally done on a very small scale in the region. The idea is to gradually improve traditional systems so that this once minimal source of income may become a more reliable and significant revenue generator.

Local Capacity Building Investments

Since the beginning of its village-level actions, the project quickly realized that communities often did not have the skills necessary to effectively manage collective action and/or money. This has led to a fourth group of interventions which the project calls "local capacity building investments". To date, this work has involved working with traditional village structures to create management and surveillance committees. Members of these committees receive training from SCF and its government partner, the rural cooperative service, on their responsibilities vis à vis village activities and funds. More importantly, SCF provides literacy, numeracy and accountancy training to the aforementioned committee members and other villagers, so that they can better manage their money and keep written records.

More recently, the project has realized that it must think about organizing at the supra-village level. In some instances, the project has given loans to a traditional grouping of villages or "collectivité" for a common activity (eg. cereal bank). It is eventually hoped that profits from these activities will be used to subsidize the functioning of collective health centres. It is also hoped that these collectivité could eventually be organized to tackle some common natural resource problems (as described earlier). The second type of supra-village organizational effort involves "federating" a huge number of villages in a specific geographic region. The "federation" has its own elected management committee and funds in a commercial bank account given to it by SCF. It is then up to the federation's management committee to evaluate loan requests from individual villages, disperse funds and collect repayments. This process is initially under the supervision of SCF with the idea that the project's involvement will significantly decrease over time. What is important is that one of the tasks that was previously the domain of the project (ie. deciding who will receive a loan) is being transferred to a locally managed institution. As these federations develop a solid track

⁴A review of the SADS sponsored Grameen Bank in Attara revealed that with a 50% increase in revenue, poor women's (35% of the group) expenditures on food for the family tripled (SADS 1994).

record, they are also likely to gain access to commercial banking credit. In some instances they may also be able to speak as a common voice to the government on certain policy issues that are important to them.

HOW SUSTAINABLE IS THIS STRATEGY?

The inevitable question is how sustainable is the rural investment strategy adopted by the SADS project? On the ground, the project has already taken a number of steps to ensure this eventuality: providing villagers with the skills to take over after SCF, working closely with government partners who could provide future technical advice if needed, the creation of locally sustainable revolving funds, gradually transferring responsibility to village and sup-village organizations, providing assistance in a fashion (ie. loans) that does not create dependence, training of trainers at the village level, introducing villagers to the formal banking system (and vice versa) so they will have future access to credit, and sharing information with other agencies on the lessons we have learned through our work. However, it must be realized that this is only part of the puzzle to ensuring Sustainability. At the policy level there is another series of obstacles and opportunities to be addressed if the strategy is to have a "sustainability safety net."

Obstacles

The SADS is attacking food insecurity by leveraging four different angles. Terms of exchange, production, diversification and local-level capacity. In most cases, SCF inputs come in the form of training, credit or information. The question then is what obstacles lie in the way of villagers having long-term access to any of these inputs.

Bureaucratic Disorientation

In the domain of training, it should first be recognized that the need for outside input can be diminished if people are given the necessary problem-solving skills to tackle future problems. The training of village-level trainers also decreases reliance on outside "experts". However, one can also accept that rural producers, like professionals everywhere else in the world, can probably always use additional technical training. The problem is that many technical extension services in Mali are not very adept at providing such training. This is not so much a question of technical competence but of attitude. Civil servants often think they are superior to rural producers, treating them like children when explanations are given. Training of this nature is not empowering to the learner and may even be detrimental. Unfortunately, the solution to this problem is not easily at hand, for it not only involves re-training large numbers of civil servants but changing the ethos of large organizations (see the concept of bureaucratic reorientation in Uphoff 1991) or even that of an entire civil servant class. This said, contact of civil servants with NGOs, who often have a more

sound pedagogical approach to training villagers, does slowly lead to changing attitudes. The other obvious problem that state extension agencies often encounter is a lack of funding. In many cases this problem is linked to the urban bias of many governments. At one point in the mid '80s, it was calculated that nearly 75% of the tax revenue raised in the Mopti region was going to other parts of the country (RIM 1987: 27). At the very least, taxes raised locally should be re-invested locally (sound technical extension being one outlet for these funds).

Land Tenure

Another policy problem related to food insecurity in Mali is that of resource tenure. As mentioned earlier, during the colonial regime (and later in post-colonial times) resource tenure was taken away from traditional managers and given to the state. Many of these resources have been decimated (fisheries, forests and pastures) because the state simply does not have the power or the will (agents often being susceptible to corruption) to police them. Given that even trees are the property of the state, farmers are both reluctant to plant new trees and are known to remove saplings from fields so that they will not be fined for cutting a tree down at a later date. SADS initiatives to organize focal producers for the rational use of common property resources are hampered by the fact that Malian law does not really allow local organizations to police the use of their resources (i.e. this is the state's responsibility). What this means, for example, is that an outside fisherman with a government permit could take a village organization to court for impeding him from fishing in local waters.

Opportunities

There are also numerous opportunities for SCF to positively influence the policy environment in Mali.

Decentralization

Serious discussions to decentralize the Mali government have already begun. This represents a tremendous opportunity to return legal control of resources to the local level. In returning power to the local level, the state should try to work with traditional structures to the extent possible (while recognizing that many of these traditional management systems have atrophied over the years). As mentioned in the introduction of this paper, no one has a better understanding of local ecology than the villagers themselves. The most difficult task will be to work out locally enforceable access rules for common resources. Rational resource use means that exploitation in the short run will have to decrease (which means there will be losers). The challenge is to make sure everyone loses out as equally as possible. Once a policy framework has been set for this process to begin, NGOs (with their good faith connections to local communities) could greatly facilitate the process of working out such arrangements. Such organizational work will also make the government more willing to hand over the control of resources to local populations.

Banking Sector

Guaranteeing longer term access to credit is also a problem. Mali is fortunate in that it already has a formal banking structure in place that has begun extending loans to rural producers. This said, these banking institutions are still only found in the larger urban centres, making them generally inaccessible to rural inhabitants. The amount of bureaucratic paperwork required to obtain a loan is also a considerable obstacle. Finally, women (often due to the size of their loan requests) are much less likely to gain access to this credit. Ultimately, banking institutions need to be created that are much more adapted to the milieu (e.g. mobile rural banks). NGOs and donors should continue to encourage these banking institutions in their overtures to the rural population. Time will demonstrate that the rural producers (particularly women) are a much better risk than their urban counterpart. [It is noteworthy that access to credit has become more important in an increasingly monetized economy. Monetization of trade has generally led to more volatile terms of exchange than were present in a barter dominated system⁵. While NGOs probably cannot roll back the tide of increasing monetization, they can work to improve timely access to credit so that rural producers will have the means to take advantage of seasonable price fluctuations

information

There are also certain types of information that the government could provide to rural producers which would greatly improve production levels. While villagers often have a very refined understanding of the local situation, their knowledge of outside influences on their production systems is much more limited. As mentioned earlier, the Malian Sahel is characterized by highly variable rainfall and flood levels in riparian environments. Through the use of satellite imagery, or even simple up-stream calculations, the government could provide Mopti rural producers with vital information on flood levels 1-2 months in advance. Such information would be extremely useful when planting decisions are made. As is already done for cereal prices via the national radio, flood level information could be broadcast in a variety of local languages. As radios are now a common possession of even the poorest in Mali, this conduit would ensure wide transmission.

LARGER QUESTIONS

Since much of the work of NGOs striving to enhance long-term food security at the local level involves income generation, an important question for Save the Children is whether or not wealth gains translate to improved child welfare. As indicated

⁵This is aggravated by the fact that a small number of powerful merchants control most of the cereal, fish and cattle trade in the region. This concentration of power was facilitated by policies under the previous regime that only gave export and commercial trading permits to a select clientele

earlier, small-scale studies in Mali have shown that revenue gains among the poorest women of a project group resulted in a significant rise in household food expenditure.' As one might expect, this positive correlation, between revenue gains and food expenditure, declines with wealthier portions of the population. In other words, child welfare (nutritional status) is most immediately impacted when wealth gains are experienced by the very poor. This of course is a rather static analysis, and does not account for the fact that while the child of a less poor family may not see an immediate change in welfare from income gains, he/she may now be less vulnerable to future hunger because his/her family has invested in assets that could support them through hard times. It is likely that this increasing food security with income gains also levels off among increasingly wealthier portions of the population. Once again, one has to understand the relationships between rich and poor in a community to know if wealth gains to the rich might ultimately be passed on to the poor in a crisis period. All of this points to the necessity of understanding the dynamics of the rural economy if one is to effectively decrease vulnerability and improve child welfare.

CONCLUSION

Despite popular perception, marginal lands are often not as unproductive as perceived. More often than not, local people possess the knowledge to sustainably manage these lands. By working to help villagers exploit terms of exchange, make sustainable improvements to production systems, diversify sources of revenue and improve local capacity, NGOs ease deer-case long-term vulnerability. At the same time, NGOs must be ever conscious of the policy environment in which they are functioning. It has been noted that increased access to credit by the poor can greatly facilitate the fair exchange of foodstuffs in a region. While an NGO like SCF can promote the creation of villager run savings and credit schemes, wider impact is dependent on the private sector developing more appropriate banking institutions. Similarly, NGOs may work directly at the local level to facilitate better resource use, while government policies distort incentives and drive unsustainable exploitation. Finally, sometimes governments can provide vital information to rural producers that could greatly improve their production decisions.

In sum, the ways in which governments, donors and NGOs can decrease the vulnerability of rural people in marginal lands is not excessively expensive or complicated. Trust, advice based on solid understanding of a zone's economy/ecology and a willingness to learn from each other are the most important components.

References

- Daly, H. 1991. *Slcxdy-State Economics* Washington DC. Island Press
- Davies, S. 1993. *versatile livelihoods: Strategic Adaptation to Food Insecurity in the Malian Sahel* (draft). IDS. University of Sussex, Brighton.
- Moorhead, R. 1991. *Structural Chaos: Community and State Management of Common Property in Mali*. IDS, University of Sussex. Brighton.
- Moseley, W. 1994. *Investing in Sustainable Access to Food: Reflections on SADS Project Interventions*. Mop(i, Mimco.
- RIM 1987. *Refuge in the Sahel*. Jersey, U.K
- SADS 1989. *Que Faire? Recommendations d'Action du Suivi Alimentaire Delta Seno Mopti*, Mimco.
- SADS 1994. *Rapport d'Evaluation sur La Banque 'Grameen' de L'Association des Femmes d'Attara. Mopti, Mimco.*
- Uphoff, N. 1991. *Fitting People to Projects to People In: Putting People First: Sociological Variables in Rural Development*. Cerna M., (cd.) New York: Oxford University Press; pp 467-511
- Vandermeer, J. 1989. *The Ecology of Intercropping*. New York: Cambridge University Press.