

Sustainable investments: women's contributions to natural resource management projects in Africa¹

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The problem

The growing linkages between poverty, resource decline, and ecological degradation constitute a formidable challenge to development policy and practice. In many African countries, the natural resource base on which significant populations depend for their livelihood is deteriorating markedly. Gender is one of the key variables defining access to and control over natural resources. Women—as well as men—use and manage resources and have different roles, responsibilities, opportunities, and constraints in doing so, both within the household and in the community. Gender is a determining factor in the division of labour, rights, and responsibilities, and, therefore, affects sustainability of livelihoods and the equitability of development (see, for example, Berry 1989; Braidotti et al. 1994; Collins 1991; Gianotten et al. 1994; Mehra 1993; Rocheleau et al. 1996).

Can prospects for improving livelihood security and building sustainable environments in Africa be increased if women have greater influence over decisions about how resources are managed? For development scholars and practitioners who are convinced of the importance of gender considerations and women's contributions in donor-driven environmental planning in Africa, an affirmative answer is self-evident. But the question was recently posed by the Office of Technical Resources in the Africa Bureau of USAID, which suggests doubt on the part of the donors and inadequate reports on the part of implementers. If bilateral and multilateral agencies lack substantive, comparative data that demonstrate measurable social and environmental improvements from women-focused natural resource management projects, then such a lack could jeopardise future donor support for such work.

From our perspective, the development ‘project’ approach is often narrowly and inappropriately conceived. We hope that new forms of international assistance will eventually help to avert failed plans and tragedies linked to or aggravated by development. Indeed, the project approach to development, as illuminated by Uvin (1998) in his analysis of Rwanda, can lead to a myopia which may foster negative forces of exclusion, oppression, and structural violence. We do believe, however, that the international community has a moral obligation to share its wealth and technical knowledge with poor nations. Our intention is that the views and suggestions presented here contribute to a shift in prevalent institutional approaches to development by emphasising process rather than aggregate results, the integration of social and environmental indicators, and a commitment to assessing accomplishments, as well as failures, with the stakeholders themselves. We hope that this paper will contribute to ongoing efforts to rethink the strategic use of projects as an approach to development.

Anecdotal evidence from Africa and other regions in the South attests to the advantages of giving women greater managerial control over donor-driven natural resource management projects which have traditionally vested authority in men. However, anecdotal evidence alone does not do justice to the knowledge and labours of African women involved in such efforts. It is clear that few development agencies perform systematic evaluations with gender-disaggregated data, despite nearly two decades of development literature describing the pitfalls of failing to do so. We were motivated to find case studies that contain qualitative and quantitative information on project process and effect, the kind of ‘hard evidence’ that we believe is necessary to institutionalise donor support firmly for African women’s contributions to creating sustainable environments and economies. After an extensive literature search, we selected five case studies from an array of donor-sponsored natural resource management projects across sub-Saharan Africa.² Our paper seeks to assess:

- the effects of women’s involvement in project-related resource management decisions;
- those conditions which foster their involvement; and
- indicators of impact, process, and sustainability which denote changes in equity and effectiveness in natural resource management projects.

We elucidate data that irrefutably show ‘success’ in local and foreign organisational terms, and we emphasise the common denominators that form the basis of their positive outcomes. Finally, to remedy the gap in the institutional records and to ensure equitable and beneficial natural resource management projects, we offer a methodology that allows stakeholders to evaluate the project process with attention to social, economic, and ecological effects.

Analytical approach

This paper analyses the findings of five case studies culled from an extensive literature search across Africa. The cases selected are from The Gambia, Kenya, Malawi, Nigeria, and Rwanda, and are based on extensive documentation and fieldwork. Each case offers specific insights for understanding the complexities, issues, outcomes, and explanatory variables in regard to the roles of women in decisions related to resource management projects. They highlight in very different ways the primary data, analysis, and synthesis needed to build indicators which assess effective and gender-inclusive resource management. Informed by our broad literature search and extensive experience in Eastern and Southern Africa, we find that the case studies are characterised by recurrent themes, despite the fact that they differ in scale and magnitude. From them, we identify five enabling conditions, develop indicators, and suggest several hypotheses for future exploration.

Experience leads us to affirm Kabeer’s conceptualisation of poverty as both *state* and *process*. Defining poverty as a situation in which resources are insufficient to meet basic needs, the *state* of poverty focuses on shortfalls in needs satisfaction, while the *process* of poverty is concerned with the causes and mechanisms of the generation and transmission of poverty (Kabeer 1991:243). Resources are distributed in a society through a complex system of entitlements which are in turn shaped by the social relations and practices governing possession, distribution, and use in that society. Impoverishment occurs because of a deterioration in the value of the two main parameters—endowments and exchange entitlements—which constitute the basis of household or individual claims to the social product (Sen 1990; Kabeer 1992). Like Kabeer and many others, we are concerned about the social relations established around resource tenure, access and control, and emphasise what has perhaps become common knowledge that ‘in general women’s rights to property and natural resources in

many regions are much more restricted than men's' (Lastarria-Cornhiel 1994:3; Rocheleau et al. 1996).

When we discuss the enabling conditions of successful natural resource management projects, we are addressing both an enabling state (such as a secure livelihood) and a desired condition, an outcome linked to a process. Certain enabling conditions are thus both fundamental starting points of equitable social relations and viability, as well as continuing features of 'sustainable' development. For example, the involvement of stakeholders in decision making can be perceived as both an enabling condition and also, if successfully maintained or enhanced, as an outcome. Here our perspective reflects, in a positive sense, Kabeer's conceptualisation of poverty as both state and process.

Analysis in this study relies on an ecological approach which emphasises the interaction of the environment and human beings in a diversity of complex land-use systems. An ecological approach allows us to see land-use and technology change as a dynamic, interactive process rather than one of incremental and unilinear movement. We are interested in both household and community levels of activity and the ways these relate to broad policy analysis and implementation. In addition, local organisation and grassroots movements are critical to progressive social change (however that may be locally defined) and more equitable and effective management of resources.

Summaries of cases selected

The five cases offer insights into the conditions that enable women's effective management of resources and benefit the community at large. Kenya's Chanderema Women's Group in Vihiga District exemplifies competent group organisation for management of high, milk-yielding dairy cattle, soil erosion control, and fodder cultivation activities. Further, the collaboration of the group with Farming Systems of Kenya, Africa 2000, and the government of Kenya, demonstrates the value of local to global partnerships.

The Women in Agriculture Development Project in Malawi (WIADP) highlights the importance of women's production in smallholder agriculture. It also shows how two very important institutional changes have led to policy changes that have benefited both agriculture and women: collecting gender-disaggregated data and introducing gender concerns at different levels of government.

A study of Nigeria and the adoption of soybean technology among men and women farmers documents the rate and effectiveness with

which women and men make land-use decisions regarding the adoption of a new technology. This research testifies to the value of gender-disaggregated statistics to disclose data and clarify misinformation and misinterpretations concerning men's and women's respective roles in agriculture.

The fourth case, Rwanda's aquaculture sector, explores wetland land-use systems where women are the key workers. Data were collected in 1992 and 1993 before the genocide of 1994. Aquaculture is based on recycling and refurbishing land with organic manure and using local plant and crop waste for fish production. The case illustrates the importance of local cooperatives in the community which collaborate with Rwandan and international researchers and extension workers. More importantly, the case also illustrates a fundamental critique of the development community, as revealed by Uvin (1998) in his examination of Rwanda and events leading up to the genocide. The project evaluations—exploring aquaculture, community, and gender roles—judged the effort a success. Yet the project was functioning within a broad context of ethnic politics, human rights abuses, and violence; analysts ignored the relationship between the project itself and the big picture of state policy and social structure. By ignoring the context, the development community contributed to the destructive processes underway.

The Gambia case relates the complexity of gender politics with regard to competing crop production systems. Into the thicket of gendered competition over the low-lying land and groundwater sources come the development/donor agencies, promoting their own conflicting agendas. The donors encourage, on the one hand, women's commercial vegetable gardens to enhance food production and incomes, and, on the other hand, men's orchards to stabilise land resources. Tree planting on garden beds became a mechanism for land-holders to alienate surplus female labour and subsidies that were embodied in concrete-lined wells and permanent wire fences. At the same time, shade effects from tree planting threaten to undermine the productivity of gardeners, who play a key role in providing for the subsistence needs of their families. Gender is clearly a critical aspect of the political ecology of The Gambia and is little understood by the donor community, something which has jeopardised productivity, sustainability, and community welfare.

In total, these cases are complementary in that they emphasise different sectors, highlight diverse enabling conditions, and provide

data across a variety of activities. Moreover, they offer evidence to support the claim that opportunities for environmental sustainability and economic productivity are increased when women are vested with authority to make land-use management decisions. All cases also reveal some of the ambiguities and complexities of the development process. Two in particular, Rwanda and The Gambia, reflect the short-sightedness and conflicting objectives of the donor community, as well as the myriad ways in which development efforts can become entangled in domestic policies and social issues.

Deriving enabling conditions from the cases

There are common themes emerging in these case studies which we have called ‘enabling conditions’, signifying attributes favourable to fostering sustainable economic activity and equitable social relations. Findings from the case studies permit us to cluster enabling conditions in five categories:

- gender-disaggregated data;
- extension and training;
- local participation and organisation;
- livelihood security;
- local to global linkages and partnerships.

We discuss each of these enabling conditions in turn, drawing on evidence from at least two cases for each.

Gender-disaggregated data

The case has been made persuasively for nearly 15 years (see Overholt et al. 1985) that knowledge of gender-based activities, access and control over resources, involvement in decision making, and responsibility for productive activities is essential in order to formulate effective projects and programmes. We can readily demonstrate the relevance of gender-disaggregated data to establishing programmes and policies to improve livelihoods, increase food security, and lead to an enriched and sustainable natural environment.

The Malawi case illustrates this point emphatically. WIADP conducted research on gender roles in the diverse farming systems in Malawi, disaggregated by gender a number of data sets, and presented these data to policy makers. According to Spring (1995), WIADP made a major national breakthrough in statistical data gathering by studying two of Malawi’s largest surveys—the National Survey of Agriculture

(NSSA) and the Agro-Economic Surveys (AES)—and determining a way to distinguish the sex of the household head in both of them.

WIADP subsequently convinced analysts at the National Statistical Office (NSO) to disaggregate its data. As a result, the NSO had its first publication containing the percentages of female-headed households by area and development project for the entire country. To the amazement of all, female-headed households constituted nearly 30 per cent of all rural households, with a range from 15 to 45 per cent. These data became the rationale to assist women in several programmes and to shift policy towards women farmers (Spring 1995:6)

Subsequently the WIADP approach for disaggregating data became a model for most data sets in the country. WIADP used the data on extension to show gender differences in the delivery of extension services. Only with accurate gender-disaggregated data were the members of the WIADP project able to develop convincing arguments and interventions for policy and programme changes. The data collected on women farmers, and specifically on female-headed households, were sufficient to 'allow' women access to some portion of development resources. Analysis of the data sets confirmed that women not only contributed a large percentage of the labour to Malawi's smallholder agriculture but also made agricultural decisions in many rural households. The data also showed the variable nature of the division of labour by gender in terms of crop, task, location, and family composition. These data were invaluable in making the case for policy change to policy makers (Spring 1995:8).

The data collected by WIADP thus provided the foundation for launching gender-specific training such as on-farm maize and soybean trials, new technologies, and credit programmes among smallholders in two resource-poor, drought-prone areas. The programmes greatly improved the productivity and levels of food self-sufficiency within the participating households.

The Nigeria case also points to the importance of obtaining gender-disaggregated data. As in many other African countries, women in Nigeria take increasing responsibility for family farms, while men migrate to cities and sometimes abroad to seek employment. Kehinde explores the differences in the degree of soybean technology adoption between men and women farmers. The population for the study included all resource-poor farmers involved in soybean production in Oyo State, with a sample of 200 stratified according to gender and age taken from three different ecological zones. Twenty-two per cent of

those selected for the sample were women. Using analysis of variance to test the effect of gender on soybean technology adoption, Kehinde found that the only statistically significant differences between men and women pertained to the acreage of soybeans planted and the unit price per measure of soybeans. Men had a higher total acreage planted (yet a slightly lower proportion of land planted to soybeans compared with women), and women received higher unit prices from soybeans than men. The study demonstrated beyond a doubt that women farmers are just as capable as men in adapting to new crops and innovations. Logically, the next step is to link this study (and others of its type) to policy change. If the trend of male out-migration continues, it will be increasingly important for Nigerian policy makers to address research and extension to women farmers to ensure the food supply for the country.

Thus, we have in these two cases hard evidence of women's key roles in managing land, and in making agricultural and resource-use decisions. The Nigeria case provides data which now need to be integrated into policies and programmes. The Malawi case demonstrates the potential when data analysis is effectively linked to policy and programme design through political and administrative processes.

Extension and training

Effectiveness of extension services and training emerges from all the cases as central to their success. For the Kenya project with the Chanderema Women's Group, training constituted an integral part of project management. The local NGO, Farming Systems Kenya Ltd (FSK), in charge of administering the project, organised preliminary sessions to teach proper upkeep of exotic Jersey cows, and how to establish napier grass plots for fodder and construct zero grazing units. Moreover, FSK organised ongoing field days—two per month—on calf-rearing and cow maintenance as well as fodder management and use. In addition, an extension agent visited farms of group members every two months. Thus, at the local level, there was a close integration of group members, NGO programme staff, and extension agents involved in the Chanderema project. FSK specifies that the programme seeks to (1) train farmers in crop and livestock production techniques; (2) train farmers in record keeping and credit management; (3) provide in-kind credit for seed, fertiliser, and heifers; and (4) advise farmers on market conditions and provide some marketing and supply services. The training was largely carried out by the NGO (Njoroge 1995).

Working at a higher scale within the Malawian government, the WIADP worked with the Ministry of Agriculture in refocusing and reorganising its extension services. First, they encouraged a client-centred approach, drawing on the data on women farmers to facilitate a reorientation in this regard. This meant targeting agricultural services to women as well as men. It meant that gender awareness became integrated into the agricultural service and delivery system. Second, WIADP engaged in retraining female extension agents in certain agricultural topics, as opposed to home economics, which had been their traditional emphasis.

Third, WIADP was able to generate a climate which permitted male extension staff to work with women clients and managed to legitimise this approach at the policy level. Fourth, they gained assurance that seats would be set aside for women in agricultural training classes, and they secured these seats through national policy directives. Fifth, they fostered interdisciplinary work within the Ministry of Agriculture, encouraging both social and agricultural scientists to work together in an interdisciplinary fashion.

Local participation and organisation

All five cases reflect high levels of local participation and organisation. What does this mean? Passive participation is one-way communication of information from a sponsoring agency to members of the community. This kind of participation is easily manipulated by local leaders to build patronage, and it tends to promote dependence rather than self-reliance. Reactive participation is usually controlled by the external development agent. There may be donations of labour, money, or other resources, but the initiative lies with the outside party and there are rarely ongoing forms of community organisation. Over time the activity dissipates. Active or full participation arises within a community. Community members themselves are the agents of change, though they may act in concert with outside sources of funds, technical expertise, or other resources. The advantages of this form of participation are that leadership and initiative are based within local communities and that grassroots organisations often arise through general community mobilisation.

These cases all demonstrate the utility of well-organised groups in effective resource management. The Rwanda case is illustrative. Fish ponds in Rwanda are developed in the publicly owned *marais* lands or wetlands. Government law institutionalised the traditional rules of

collective use of wetlands (Balakrishnan et al. 1993:14). Rwandan women and men share responsibilities in the aquaculture production system. A primary advantage of organising in farmer groups is the access to land for production. Farmers cultivate the *marais* land as a production group, and this collective production allows access to the rich farmland for a large number of farmers (Hishamunda and Moehl 1989).

In the integrated aquaculture system, the pond bunds are used for garden crops, which are cultivated by women. Most women state that they have taken up fish culture to provide for family food needs, since fish from ponds are regarded as a ready and relatively cheap source of protein. In addition, some women's groups have benefited financially by selling the fish and saving the cash returns, which have been used later to purchase inputs for agricultural production.

Yet the project analyses were not sensitive to issues of ethnicity, poverty, and collective behaviour, nor were there assessments of the interplay of social structures and project outcomes. Since this project, like others, was considered in isolation from its surroundings, the development community was inadvertently contributing to the build-up of frustrations and animosities leading to genocide (Carnegie Commission 1997; Uvin 1998).

Local women's market garden groups have been spectacularly successful on the North Bank of the Gambia River, the region investigated by Schroeder. Over the past two decades, this area has developed into one of the most intensive vegetable-producing enclaves in the country. The pool of women gardeners grew from 30, selected to take part in a pilot onion project in the mid-1970s, to more than 400, registered during an expansion project in 1984, to 540 in 1991 (Schroeder 1995). At least a dozen separate projects have been funded by international NGOs and voluntary agencies, bringing the total invested in this Mandinka-speaking community to at least US\$40,000 between 1978 and 1995. The funds have been used for fences, wells, seed, fertiliser, and other inputs for the gardens which send truckloads of fresh produce to market outlets up and down the border between The Gambia and Senegal.

Women's groups supervise day-to-day operations of the gardens, including maintenance of perimeters, seasonal land clearing, and administering fines to those who do not cooperate. In general, fences are managed by the group, but women work their own land allocation individually or as a family group. Water management and marketing

are collective operations. Schroeder's observations of 1991 sales suggest that aggregate annual returns to the 540 growers in the village he studied were in the order of US\$80,000, clearly an important addition to household income. It was group organisation that facilitated the strategies and inputs that made the market gardening so successful.

In both of the above cases, the groups were engaged in productive activities leading to greater food availability, increased income, and improved management of the resource base. Groups may focus on productive activities and specific resource-management problems. They may also build capacities and collective strength, enabling them to take a more active part in political processes determining access to and allocation of resources. The Gambia case demonstrates the complexities of gendered politics, development objectives, and resource/land-tenure issues. The women's groups and their gardens on the North Bank of the Gambia River clearly became part of a larger set of questions embedded in local political economy and ecology.

Levels of livelihood security

The programmes or projects described in these five cases have contributed substantially to improving levels of livelihood security. Recall that we identify the relevance of livelihood security as both enabling condition and outcome, in the manner in which Kabeer has defined the state of poverty as shortfalls in needs satisfaction, and the process of poverty as the causes and mechanisms which generate and transmit it. In both Malawi and The Gambia, the initial benefits to livelihood security from credit and extension programmes focused on women (Malawi) and group-managed vegetable gardens (The Gambia) led to the rapid growth of the programmes. Women could assess the benefits to livelihood security and became engaged, in increasing numbers, in the programmes.

The Malawi programme (WIADP) has had the most far-reaching consequences for smallholder farming households. This success is related largely to the fact that WIADP mainstreamed women into farm clubs and enabled them to participate in a seasonal credit programme. Seasonal credit, as dispensed in Malawi, provides inputs (seeds, fertilisers, and chemicals) in crop-specific packages through farm clubs. Individual farmers can choose the particular packages they want, and the club as a whole is responsible for seeing that the loans are repaid (Spring 1995:29). Defaults by members might result in the

entire club being disbanded and denied future loans. The Ministry of Agriculture's policy specifies that both women and men must be members of farm clubs in order to receive agricultural credit.

Clubs are organised by farmers themselves, and it has been difficult for women to become club members. (For an in-depth discussion of this issue, see Spring 1995.) In fact, male extensionists were not supposed to register women into farm clubs. With WIADP working on behalf of women farmers, smallholder women overcame obstacles to club membership. Of all farm-club members obtaining credit in 1990–1991, 35 per cent were women and 65 per cent were men. Within another three years, the numbers of women in clubs who were receiving credit had jumped to 40 per cent.

In The Gambia, the 20-year development of market gardens along the North Bank of the Gambia River reveals that women are engaged in successful vegetable production for sale. As Schroeder (1993) emphasises, the economic and ecological pressures of the 1970s and early 1980s, including declining rice production, poor terms of trade for groundnuts, and drought, meant that families were having difficulty meeting household needs. Women began to intensify efforts to reclaim marginal land for gardening purposes; and, as seen above, the area under cultivation grew from five hectares in the mid-1970s to more than 30 hectares, with an increase to 540 growers in the village and returns measuring approximately US\$80,000 (Schroeder 1995:7). This contribution to livelihood security is well understood by both the men and the women in the village, who are now engaged in a controversy over how that land should be used and how labour should be allocated among rice, vegetable, and tree crops. The controversy arose when an agroforestry project was funded by USAID in tandem with the women's garden project. The agroforestry project provided a vehicle for men to expropriate the land that women were using to cultivate vegetables, thereby undermining women's efforts. There is no doubt that women have been effective managers of the natural-resource base. The issue, however, is gender-based control over the land and who gets to benefit from its cultivation. Livelihood security—even generous livelihoods—is at the heart of this issue.

Local to global linkages and partnerships

One way to strengthen equitable and effective resource management is to develop linkages among actors and groups at different scales through coalitions, alliance building, and networking. Such linkages

and partnerships constitute a bridge between external opportunities and local initiatives. They have a number of advantages. We identify two.

First, they draw on the experience, knowledge, and skills of local, diverse groups, endeavouring to translate that experience in ways that can inform the decisions of development policy makers. WIADP in Malawi illustrates this advantage. WIADP carried out surveys and trials selectively within all three regions of the country, experimenting at the micro-level with new approaches to data gathering and providing extension services. When a new approach proved useful and suitable, WIADP then moved to influence the policy level through working with (1) women's units, national machineries, and professional women; (2) planning units responsible for writing national policy, five year plans, and country strategies; and (3) donors who could influence policy through funding. 'It was', says Spring (1995:14), 'departmental, then ministerial, and finally national policy that legitimated gender concerns in development endeavors'. But it was groundwork at the local level, linking evidence from farming households and communities to policy makers, which permitted these changes.

Second, planned linkages and partnerships can overcome a variety of problems reflecting suspicion, even contestation, that have plagued the development efforts of NGOs in Africa (Thomas-Slayer 1992:136). Kenya's Chanderema project illustrates the ways in which national or indigenous NGOs, an international NGO, the government, and the local community can build an effective partnership to meet a set of development objectives. To begin with, there is a locally organised group which identified its own concerns and needs. Second, the UNDP's Africa 2000 Network is an international donor agency specifically designed to provide small-scale assistance to local groups endeavouring to improve livelihoods in the context of building a sustainable environment. Africa 2000's Kenya office is managed by Kenyans who are knowledgeable about environmental and resource issues, and dedicated to addressing development problems at the local level.

Third, the Kenyan NGO, FSK, was established in 1981 as an independent affiliate of the African Inland Church in Nakuru District. Its overall goal is to increase the productivity and profitability of Kenyan agriculture and to enhance food security. Its specific objective is to strengthen the capabilities of smallholder farmers and their incomes through programmes of training and credit. FSK conducted a baseline

study for the Chandereima project, carried out training in livestock management as well as business management and fodder production, and provided various follow-up support services.

Fourth, the Ministry of Agriculture, Livestock Development and Marketing was involved in the partnership by providing veterinary and artificial insemination services. While there were problems with these services, there was clear recognition of the division of responsibilities and the design of the partnership.

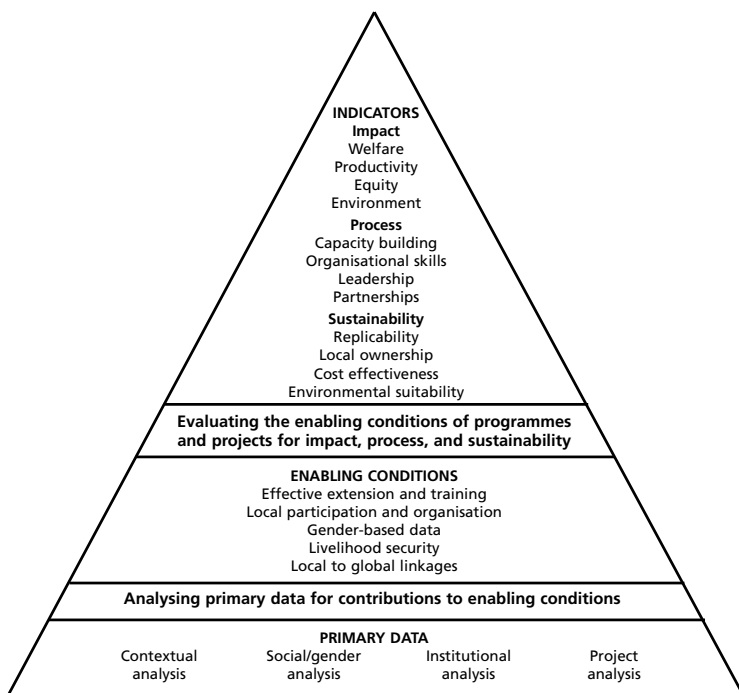
All participating entities recognised the need for collaboration and for each individual organisation to carry out its obligations if the project was to succeed. This recognition seemed to be at the heart of establishing supportive partnerships. This partnership included the community (the Chandereima group), the public sector (government), international donors (the UN's Africa 2000), local NGOs (FSK), and individual farming households. The process of building partnerships among local groups and external agencies links micro activities and macro structures, as well as transcending individual agendas, turf struggles, and entrenched roles. The dialogue enables groups to identify effective approaches to local development and resource management, and broadens their capacity for flexible, innovative action.

Building indicators

After examining the five enabling conditions specified above—effective extension and training, local participation and organisation, gender-based data, livelihood security, and local to global linkages—we can identify indicators associated with each which clarify effectiveness and equity in resource management. Indicators communicate information about progress towards particular goals, provide clues about matters of larger significance, or make perceptible a trend or phenomenon that is not immediately detectable (Hammond et al. 1995:1). While indicators often quantify information as well as simplifying information about complex phenomena, those emerging in our analysis do not quantify data across the cases under consideration. Rather, they elicit from these cases the central elements of gender-inclusive project effectiveness leading to improved livelihoods and sustainable environments. Individually, each case provides quantitative data revealing problems and successes. The indicators are based on a qualitative, not quantitative, aggregation of the findings.

Indicators can be used for many purposes, such as providing a framework for collecting and reporting information, providing guidance to various organisations on needs, priorities, and policy effectiveness, and facilitating local community efforts to undertake and strengthen development plans. The choice of indicators depends on the purpose for which they are required and on the audience. For an audience focused on development practice and research, we have chosen to be explicit about the ways in which we are developing the indicators, and to suggest tools which are useful for primary data collection, as well as processes for analysing the data. Figure 1 presents our conceptualisation of the information needed for building indicators.

Figure 1: Information pyramid for achieving gender-inclusive, equitable programmes and projects for resource management



(Source: adapted from Hammond et al., *Environmental Indicators: A Systematic Approach to Measuring and Reporting on Environmental Policy Performance in the Context of Sustainable Development*, p. 1)

Three categories of indicators determine whether progress is being made towards the objectives of improved livelihoods and sustainable environments: impact indicators; process indicators; and sustainability indicators. For each category, we suggest four sub-topics. These indicators, of course, require baseline data to determine the nature and rate of progress towards the objectives. We discuss each in turn.

Impact indicators

Impacts have both quantitative and qualitative dimensions:

- *Productivity* can be measured in terms of increased output per given unit of land, inputs, labour, or period of time. Improved productivity may also be a matter of decreased labour time for the same output, and it can be determined by measuring income.
- *Welfare* has many dimensions. It should be possible to select those most relevant to the type of project, e.g. health, educational opportunity, nutrition, improved housing, better sanitation.
- *Equity* as a measure will suggest how broadly based are the improvements in welfare and productivity. It requires consideration of social groups and suggests that the contextual analysis (as part of the primary data-gathering exercises) is an important component of building indicators.
- *Environment* requires measures of the ways in which a project is affecting soil fertility, water quality and retention, erosion, natural vegetation, and biodiversity.

Process indicators

There are a great many 'process' issues which might be measured in connection with projects, all leading to increased capacities and self-reliance. We identify four:

- *Capacity building* on the part of individuals or a local group in a community. What new skills have been acquired; what local knowledge has been identified and used; what institutions have been strengthened?
- *Organisational skills* suggest the development of group capabilities in identifying problems, prioritising solutions, implementing programme, dealing with conflict, consensus building, negotiation, and problem solving.
- *Leadership* is an essential element in strengthening local communities. The emergence of local leadership committed to

these goals and able to mobilise and organise local groups is an important part of this process.

- *Partnerships* can strengthen development efforts through linking the various stakeholders in a common effort. Partnerships which build relationships between local communities and external agents, regional, national, and even international, can help bring a project to fruition and can serve as an indicator that the project is not likely to wither in isolation and neglect.

Sustainability indicators

These are essential for determining not only the viability of the project at the moment the evaluation is being prepared, but also its longevity and influence. We identify four:

- *Replicability* suggests that others can readily undertake a similar project. If there is spontaneous replication, so much the better. The project is spreading on the basis of its own merits without an outside organiser or initiator.
- *Local ownership* is an important indicator of the project's lifetime. If local people find it useful, want it to continue, and are prepared to assume responsibility for assuring its continuation, local ownership has been achieved and so has a new level of local empowerment.
- *Cost-effectiveness* is an essential part of sustainability, although it may be difficult to separate it from the impact indicators. If the project is not cost-effective—in the broadest sense of the term, including all levels of effort required of local people to sustain it—then it is unlikely to be supported by local residents. Three types of cost-effectiveness, each designed to meet the needs of different kinds of projects, include: (1) measures of costs in comparison with community resources; (2) the ratio of net benefits to costs; and (3) the ratio of per-unit costs.
- *Environmental suitability* is an essential element of sustainability. If the project or programme has, on balance, a negative impact on the environment, it may bring short-term benefits (such as some types of mining) but is not sustainable in the long term. Many projects have both positive and negative effects on the environment, and these must be weighed in each situation.

Table 1 clarifies how the indicators connect to the enabling conditions, revealing the latter's relevance to meeting environmental and economic objectives in the five cases.

Table 1: Indicators, enabling conditions, and illustrative changes in the five cases

Enabling conditions	Impact	Process	Sustainability
Extension and training	<i>Environment</i> Improved, intensive farming on farmland resulting from new information (Nigeria)	<i>Partnerships</i> Household and community adoption of aquaculture over time (Rwanda)	<i>Local ownership</i> Group organisation of AI services (Kenya)
Local participation and organisation	<i>Productivity</i> Increased productivity /sales through communal efforts (The Gambia)	<i>Capacity building</i> Organised farmer production groups (Rwanda)	<i>Cost-effectiveness</i> Spontaneous replication of communal vegetable gardens (The Gambia)
Gender-disaggregated data	<i>Equity</i> Extension services targeted to women-headed households (Malawi)	<i>Leadership</i> Household income earnings by men and women (The Gambia)	<i>Local ownership</i> (i.e. national instead of donor ownership) Integration of data into national planning process (Malawi)
Livelihood security	<i>Welfare</i> Improved nutrition/sales from aquaculture (Rwanda)	<i>Organisational skills</i> Farmers keep records showing increased milk yield from high breed cows (Kenya)	<i>Environmental suitability</i> Group members rehabilitate soil with compost (Rwanda)
Partnerships and linkages	<i>Productivity</i> New technologies and higher yields resulting from international and national research linkages (Nigeria)	<i>Capacity building</i> Long-term collaboration of extension services, farmer organisations, and researchers (Malawi)	<i>Replicability</i> New groups undertaking partnerships/projects (Kenya)

Using the indicators to monitor the Chandereima dairy project

To demonstrate how a research project or organisation can monitor its progress and adapt to a changing situation, based on our discussion of relevant indicators and enabling conditions, we have structured the experience of the Chandereima Women's Group dairy project in a way which highlights our points. The primary objective of the Chandereima Women's Group involved generating income for the group. The group and FSK decided to launch a dairy project for the purpose of selling milk, and since the milk output of the exotic Jersey breed is superior to

that of the indigenous breed, project personnel and participants opted to introduce Jerseys into the community.

Treating this project with the benefit of hindsight allows us to demonstrate how data-gathering tools can best be employed. Hypothetically, then, primary data are collected to inform project development. Various tools are used to gather data which permit the community to see the opportunities and constraints facing the proposed dairy project idea. Some of the constraints include, first, that the indigenous cattle are kept for dowry purposes. However, the indigenous breed consumes a large amount of fodder and competes with the Jersey cows, thereby jeopardising the health and milk-producing capacity of the new cattle. Second, the land and the cash crops are controlled by men, and one-quarter of household farmland is devoted to cash crops instead of staple crops; therefore a limited amount of land is available to women to plant fodder cultivars for the cows. Third, success of the project depends on a reliable artificial insemination service, but the government service is inefficient and cannot be relied upon. On the plus side, the government encourages the raising of exogenous cattle, notwithstanding the problem of its inadequate support services. If well organised, the Chanderema group may be able to mobilise to get government extension services to assist their enterprise.

Based on analysis of these primary data, the strategic details of the women's group's objective—to generate income for members' households—can be reformulated by the women's group and FSK. Strategies must negotiate the cultural, political, and institutional constraints confronted by the participants, as well as tapping into the opportunities. Perhaps cultural traditions, such as the passing on of indigenous cattle for dowries, can adapt to a changing situation, and men might choose to accept exogenous, milk-producing cattle instead. In this way, households could increase their Jersey herds and enjoy greater milk yields. Working on strategies may generate new objectives, therefore, which reach beyond pragmatic issues such as earning income. The new objectives may include lobbying to change the government policy that obliges households to keep cash crops on land, when they would rather replace cash crops with subsistence and fodder crops. They may also include training community members in artificial insemination techniques, so that they may at least get the necessary materials (if not the personnel) from the government to carry out artificial insemination services.

Once the objectives are reformulated, the participants and development agency can look ahead to a regular monitoring of the activity. This necessitates selecting well-defined indicators which pay attention to impact, process, and sustainability. When, for example, group members receive the new cows, does the higher milk production result in a noticeable increase in income, or is all money sinking back into veterinary or insemination services (impact)? What is the increase in income (impact)? If members succeed in reducing the number of indigenous cattle owned by their households, is fodder adequate for the new breeds (impact)? How did members accomplish the reduction of indigenous cattle, i.e. did they consult with the whole household (process)? Will men continue to accept the new arrangement (sustainability)? Does the increase in milk improve the nutritional level of the household (impact, sustainability)? Are more residents interested in joining the Chanderema group after seeing its success (sustainability)? Are group members motivated to address the relevant government agency concerning the problem of inadequate insemination services (process)? Regular evaluations should incorporate issues that span the range of indicators. It is largely due to the lack of regular, thorough evaluation that documented evidence concerning successful women-controlled resource management activities is scarce.

After the evaluation is complete, it is time to assess the current context. Have social changes in the community occurred as a result of the activity? Interviews and other tools can be administered, and the data can be re-analysed. Depending on whether the situation has changed, with objectives met or prevented, the participants can reformulate objectives and strategies once again, always with an eye to monitoring and evaluating indicators of impact, process, and sustainability. This cycle can continue until the donor or facilitating agency eventually pulls out of the project and the group is able to manage or redirect the activity independently, the true sign of sustainability. Table 2 reveals the usefulness of the indicators for a specific project.

Concluding observations

The analysis of these five cases clarifies ways in which gender shapes the opportunities and constraints that African men and women face in securing viable livelihoods and strong community institutions

Table 2: Using the indicators to monitor the Chandereema dairy project

Impact	Process	Sustainability
<i>Productivity</i> The change in levels of milk sales and income since the introduction of the Chandereema women's project	<i>Capacity building</i> Effectiveness of group members working together to solve problems	<i>Replicability</i> Other groups interested in undertaking similar projects
<i>Welfare</i> Improvement in nutrition with the increase in milk production among Chandereema Group members' households	<i>Organisational skills</i> New skills introduced to the Chandereema Women's Group	<i>Local ownership</i> Actions taken by group when a cow dies or a critical element in a project malfunctions
<i>Equity</i> Opportunities generated by the Chandereema Group which are equitably distributed among group members	<i>Leadership</i> Emergent leaders from group who have mobilising capabilities and commitment to project	<i>Cost-effectiveness</i> The ratio of per unit benefits to costs, including units of land and labour
<i>Environment</i> The use of land for fodder competing with other land users' claims	<i>Partnerships</i> Partner organisations working effectively towards mutually understood and agreed upon objectives	<i>Environmental suitability</i> Long-term prospect of land supporting dairy projects, accounting for smallholder farming, fodder management, and zero-based grazing

across cultural, political, economic, and ecological settings. It further identifies both the conditions under which women can more effectively manage land and other resources and the ways in which women are crucial contributors to community livelihoods and adept resource managers. The case analysis suggests that if policy, programmes, and projects are to foster sustainable, effective, and equitable management of resources, they must address the concerns of men and women and the ways in which they, individually and collectively, relate to the State, the economy, and the resource base.

Researchers can help this process by sensitive awareness of the issues and careful contextual, social, institutional, and project analysis. Development professionals can assist by a sustained effort to build gender-inclusive programmes and to attend to capacity-building processes. Donor agencies must recognise the impacts their changing agendas may have on the larger context in which struggles over land, resources, and livelihoods occur. In fact, the development aid system itself can become part of the ongoing struggles within any community and can potentially bring harm or benefit.

These case studies have provided ample evidence to support the assertion that prospects for achieving livelihood security and sustainable environments in Africa will be improved if women have a more central role in resource-management decisions. These five cases highlight enabling conditions which facilitate effective involvement of both men and women in natural-resource management, including:

- pertinent *gender-disaggregated data* routinely collected for baseline, monitoring, and evaluation purposes;
- effective and gender-aware *extension and training*, to ensure that new technologies and new procedures are fully integrated into natural-resource management project efforts;
- local *participation and organisation*, central to capacity building at the local level, which, in turn, helps to strengthen projects and leads to their sustainability;
- positive impact on *livelihood security*, which can occur in a variety of ways, from dune-stabilisation or water-control measures, to access to new seedlings, new credit opportunities, or new technologies;
- *linkages and partnerships* across issues of infrastructure, research, policy, training, and institution building, which can build project success.

A variety of indicators can help to measure progress in terms of impact, process, and sustainability. They are useful both for researchers seeking careful analysis and presentation of their findings on matters of environmental and economic change and for development professionals who can build gender-inclusive programmes, thereby increasing women's involvement—and both equity and effectiveness—in resource management.

Notes

1 This paper is based on data gathered in 1995 and 1996 through Clark University's Ecology, Community Organisation and Gender (ECOGEN) project. It resulted in a report by Barbara Thomas-Slayter, Genese Sodikoff and Eileen Reynolds entitled *Gender, Equity, and Effective Resource Management in Africa* (1996), which was funded through the Office of Technical Resources in the Africa

Bureau of USAID. In-depth case materials were provided for this report by Dr Revathi Balakrishnan (Rwanda), Dr Lucy Kehinde (Nigeria), Dr Richard Schroeder (The Gambia), Dr Anita Spring (Malawi), and Ms Betty Wamalwa-Muragori (Kenya), who carried out the fieldwork in their respective sites. The works of these researchers are included in the references.

2 The projects were gleaned from a literature search from bilateral and multilateral development institutions that had implemented natural resource projects with a focus on gender issues. More than 50 cases from over 20 countries were reviewed. They included projects in a variety of natural resource management sectors including reforestation, improved agricultural technologies, land use, environmentally friendly technologies (e.g. solar or biogas energy or improved cooking stoves), extension and training, sustainable harvesting of plant products, water supply development, and soil erosion control. While the materials reviewed were largely in English, projects were reviewed from a range of non-anglophone countries, including Sudan, Madagascar, Senegal, Cameroon, Burkina Faso, Mali, Mauritania, Niger, and Cape Verde. Of the case studies, only five met the criteria of containing substantive data which demonstrated success.

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