

Sustainable Agriculture in Africa: Towards A New Paradigm – The Embeddedness Approach.

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Introduction

This paper argues that the conventional paradigm of sustainable agriculture¹{SA} in Africa has disenfranchised smallholder farmers as researchers and principal actors in the pursuit of answers to this question. Many scientists, agricultural research institutions and policymakers in Africa have conceptualised and treated SA as a technical or scientific issue – the pursuit of agricultural productivity and environmental conservation through ‘modern’ agricultural practices and techniques - new or improved crop varieties, cropping patterns/methods, use of modern equipment, chemicals, pesticides, et cetera {Barrett, et al, 2000 and Pretty, 1995, for a good review of the literature on this view}. Underlying this conception are two worn out but popular assumptions: a) traditional African agriculture is inefficient, unproductive and backward, and b) the government, the donor and the scientist know what is best for the African farmer. Nobel Laureate Theodore Schultz {1964} had long demolished the first view by demonstrating that peasant farmers may be poor but are not necessarily inefficient. Participatory development literature equally ought to have laid the second view to rest, however, for reasons underscored elsewhere in this paper, both views persist.

One result of this technologically biased conceptualisation has been a misguided top-down policy approach oriented towards the creation of ‘modern agriculture’, which has, among other things, engendered exploitative and irrelevant institutional structures, undermined and marginalized local knowledge and preferences, and proven expensive and unsustainable, {Brokensha, et al, 1980, Forsyth et al, 1998, Kuyek, 2002,}. The other has been a proliferation of technologically biased studies which not only replicate erroneous assumptions about both the nature of, and how SA in Africa might be achieved, but also ignore or obscure broader historical, social, economic, political and institutional factors that impact on the prospects of SA {Astone, 1998, Barrett et al, 2000}.

Contrary to this technologically biased conceptualisation, it is argued here that SA is a systemic process that is embedded in historical, biophysical, socio-economic and politico-institutional structures and relationships that obtain in particular localities. What is often presented as ‘technical’ in the technologically biased conception is essentially ‘ideological’ or ‘political’, {Mackenzie, 1998}. For instance, the ‘modern’ agricultural practices orientation of much of SA efforts in Africa is partially determined by bureaucratic and political choices or preferences, {under the influence of various interest groups – agribusiness, geo-political and economic forces and institutions, farmers, etc} and partially by predominant Western notions of scientific knowledge that exclude indigenous knowledge systems from the realm of ‘technical scientific’ knowledge, coupled with etic {outsider bias} analyses that view African agriculture from the biophysical and socio-economic contexts of the Western world or Southeast Asia under the green revolution {Barrett et al, 2000, 4}.

¹ Sustainable agriculture is here defined as agricultural practices that are economically viable, socially acceptable, environmental friendly and technically appropriate.

Thus, while mistakenly regarded as 'technical' and therefore 'objective', this ideologically biased conceptualisation reinforces the common misconception of traditional agricultural practices as inefficient and backward, and wittingly or unwittingly acts as a rationale for transplanting external conceptions of, and policy responses to, the problem of SA without due consideration to African biophysical, historical, socio-economic and politico-institutional complexities.

This conventional paradigm has constrained the prospects of SA in Africa by:

- I. Failing to recognise that many of the problems of agricultural productivity and natural resource degradation in Africa derive from the broader historical, economic, social and political environment and not simply from either lack of 'technical innovation' and 'modernisation' or dynamics of the biophysical environment. As Barrett and others {Barrett et al, 2000, Mackenzie, 1998} have shown, throughout the 20th century, colonial and postcolonial governments in Africa used combinations of socio-economic and political policies such as land use and marketing restrictions, price and trade regulations and other urban biased policies to prey on smallholder agriculture, with tragic consequences for SA. Structural adjustment policies of the 1980s –90s while redressing some of these problems, have added others, through policies such as liberalisation and privatisation whose impacts remain relatively unknown.
- II. Omitting many pressing agricultural and environmental problems currently affecting smallholder farmers due to the prevalence of 'expert bias' occasioned by the preponderance of western concepts of knowledge which have created knowledge-based asymmetrical power relationships between 'experts' and policy makers on the one hand, and smallholder farmers on the other, in which the 'expert opinion' reigns supreme.
- III. Failing to capture the full factors, actors, structures and relationships that interact to impact on the prospects of SA in Africa, thus limiting the analytical understanding of studies carried out even under the terms set out by this paradigm.

This paper seeks to suggest ways of addressing these deficiencies by conceiving of SA in Africa as a process that is embedded in historical, biophysical, socio-economic and politico-institutional factors, structures and relationships. In so doing, the paper also suggests ways through which both the natural and social sciences can work together across disciplines in order to meet the needs of local users of research results. It also identifies high priority research areas that merit further research under a new paradigm.

Towards a New Conceptual Framework: The Embeddedness Approach

At a broader disciplinary level, the theoretical precepts for this framework come from the evolving interdisciplinary sub-discipline of socio-economics, which essentially consists of four characteristic assumptions:

- I. Economics is an open system embedded in society, polity, culture and nature {Lutz, 2000}. In other words, economic variables are complex social phenomena: there are sociological relationships in economic actions such as production, consumption, distribution and exchange {Zafirovski, 1999}.
- II. Socio-economic thought is interdisciplinary, including anthropology, philosophy, law, history, psychology and other disciplines. Socio-economics is not committed to any one paradigm or ideology, but treats behaviour as involving the whole person and society within a continually evolving context.
- III. Competitive behaviour is only a sub-set of human behaviour, socio-economic thought includes cooperation
- IV. It does not make automatic assumptions of self-interest and optimal resource allocation but allows for the possibility of operational social norms. Socio-economic thought is positive and normative, inductive and deductive and sees questions of value as being inextricably linked to individual and collective choices, it is not limited to instrumental rationality {Lutz, 2000}.

At a narrower more specific level, this study draws from the theory of embeddedness {Granovetter, 1985,1993, Jessop, 1999, Sornn-Friese, 1998}. Mark Granovetter {1985} and other students of socio-economics/economic sociology {Jessop, 1999, Sorne-Friese, 1998} have shown that all economic action is embedded in social relationships and institutions. The embeddedness approach is a relational concept that links actions of economic actors to economic relationships and social structures at both the micro and the macro level and enables one to focus on the inter-linkage and interpenetration between these relationships, thereby eliminating the problem inherent in conventional economic analysis that either ignores the impact of noneconomic factors on economic action, or treats them as exogenous {Ibid.}.

The embeddedness approach can also be seen as an interdisciplinary concept linking the social with the natural sciences, sociological with economic, political with cultural analyses, et cetera. For instance, the biophysical environment which is normally the preserve of natural science research is affected by, and in turn affects, the socio-cultural as well as the politico-economic environment, typically the domain of most social science research.

In adopting this approach, we accept Granovetter's argument that economic activities are conducted in ways that are specific to and dependent on social relations and structures. An embeddedness perspective would depict individual actors involved in SA as entities engaged in multiple activities: having multiple goals, different resource and competence endowments, making decisions embedded in ongoing economic relationships and social structures that affect and are affected by the decisions of other individual actors or groups. 'Actors do not make action or take decisions as atoms outside a social context, but neither do they mechanically or automatically adhere to social context...' {Sorne-Friese, 1998, 8}.

Recent studies that challenge the technologically biased conception of SA support the embeddedness approach by identifying, historical, socio-economic and politico-institutional factors that impact on the prospects of SA, but which are usually ignored or treated in isolation in the conventional literature. These factors include markets, politics, globalisation, gender, property rights regimes, poverty and indigenous knowledge systems. {Barrett et al 2000, Brokensha et al, 1980, Forsyth et al, 1998, Kuyek, 2002, Mugabe, 1998, Pretty, 1995, Warren et al, 1989}.

While these studies are important in directing attention to key elements of SA that have been ignored or obscured by the technologically biased studies, they too fail to recognise the embeddedness of agricultural sustainability thus failing to show how the various actors, factors and structures interact and relate to affect the prospects of SA. Identifying these actors, factors and structures is a necessary first step towards addressing the problem of SA, however, this alone is not sufficient - one needs to show the interlinkages and relationships between them, and how these interlinkages and relationships impact on SA.

A brief illustration of how these interactions and interrelationships impact on the prospects of SA in Africa² is provided below.

Modern science, Indigenous Knowledge Systems, Gender and Property Rights Regimes

Chambers and Howes {1980}, Knight {1980}, McClure {1980} and Richards {1989} argue that despite the scientific, technical nature of indigenous knowledge systems {IKS} and its proven ability to secure sustainable agriculture for African communities prior to colonial and postcolonial disruption and neglect, efforts aimed at SA in Africa by colonial and postcolonial governments, scientists, and research institutes have marginalized and ignored IKS. This has occurred despite increasing recognition that {a} IKS is an evolutionary product of farmer-led experimentation, typically well adapted to the particular ecological, social and economic contexts under which it is developed, {b} offers a low cost approach with potentially higher benefits than 'modern' knowledge-based approaches that are not only expensive but also inaccessible to many poor farmers {Brokensha et al, 1980, Warren & Titilula, 1989, Warren et al, 1995}. Kuyek {2002} shows for instance, that smallholder farmers {using traditional

² This paper does not seek to make the case for or against any of the variables identified, it only attempts to show how they might impact on SA, and how they affect and are affected by other factors.

practices} are Africa's most significant innovators, accounting for as much as 90% of the seeds needs {breeders} in certain communities, with formal sector {modern agriculture} innovation remaining largely insignificant in most countries despite attracting the largest share of funding, research and political attention.

This is not to argue, however, that IKS or traditional agricultural practices are the panacea to the problem of SA in Africa, or that modern agriculture is incompatible with this process. On the contrary, both IKS and modern agricultural practices are critical components in this quest. The point here is that the insubordination of IKS and the unequal knowledge relations between farmers and 'experts' constrain the prospects of SA by obscuring means, priorities, preferences, relevance and relative efficiencies. Modern science is predicated on an ideology of knowledge production as a specialised profession, in which only 'professionals' or 'experts' can legitimately produce knowledge, {Berman, 1981}. This gives modern 'experts' power over smallholder farmers, hence the ability to determine, what is sustainable agriculture, what constitutes knowledge, who has access to what type of information, et cetera.

Invariably, 'experts' have used this power to insubordinate the knowledge of smallholder farmers and yet evidence shows that 'modern knowledge' is not necessarily superior to IKS {Belshaw, 1980, Chambers & Howes, 1980, Knight, 1980, Richards, 1980} nor are the two mutually exclusive. Depending on prevailing local circumstances, for example, the use of both may hasten rather than impede efforts aimed at SA. This unequal knowledge relationship has resulted in disproportionate allocation of material and political resources into the pursuit of 'modern agriculture', with few results to show for it in many parts of Africa. Whether or not IKS can achieve SA on its own, or the degree to which it can supplement modern agricultural efforts aimed at sustainability remains an empirical question.

Closely related to IKS are two interrelated factors: gender and property rights systems. Thanks to the women in development {WID} literature, there was an early recognition that sustainable agriculture could be a gendered process, although little effort has been made to factor this knowledge into policy making {Astone, 1998, Njoku, 1989}. By contrast, little is known about the relationship between gender and IKS, or rather the impact of the empowerment of women on IKS, although women constitute the largest percentage of smallholder farmers in Africa {FAO, 1998}, and are by extension, Africa's most important agricultural innovators. Based on a study of five African extension systems, Ewa Njoku {1989} argues that male stereotypes of women {as unprogressive in dealing with innovations etc} constrain IKS and SA by reinforcing attitudes that underplay the value of women's knowledge, and excludes women from participating in sustainable agriculture. She demonstrates that the real problem is unequal power relationships - male attitudinal resistance to the empowerment of women, not lack of awareness of the importance of women's knowledge. This unequal power relationship at the household level and in the broader society also impacts on SA through gendered property rights regimes, which determine for instance, access to land, markets, credit, et cetera. By excluding or otherwise discriminating against the principal farmers {women, gender biased property rights systems in some parts of Africa {Mwagiru, 1998} constrain the prospects of SA.

But social and economic exclusion is not the only shortcoming of many property rights regimes in Africa. Many of these regimes are not only irrelevant; they are also exploitative and tend to work against the broader economic interests of the continent. As with Western concepts of knowledge, both colonial and postcolonial governments transplanted Western legal institutions into Africa without giving due consideration to the continent's cultural, socio-economic, and political complexities. One such institution is the concept of private property rights to land. Led by the World Bank and other donors, many African countries embarked on land reform programmes based on individual rights in the 1960s through the 1980s on the understanding that this would, among other things, promote sustainable agriculture. Recent studies suggest however that the much criticised communal land tenure system may encourage SA by enhancing equity and efficiency under the prevailing socio-economic and political conditions in Africa {Espan & Bromley, 1997, Platteau, 1992}, and that the private property rights to land regime may constrain SA by encouraging, amongst other things, economically unviable land fragmentation. Despite claims by proponents that private property rights to land enhance agricultural efficiency and productivity, numerous studies have observed no positive

relationship between private property rights to land and agricultural efficiency, sustainability or environmental conservation {Bassett, 1993, Besley, 1995, Platteau, 1992, Sellers & Sellers, 1999}.

Another legal instrument that is increasingly being transplanted into Africa without thoughtful reflection and adaptation is the concept of Intellectual property rights {IPRs}. International institutions such as the World Bank and the World Trade Organisation {WTO} aided by transnational agribusiness companies and African governments are spearheading the importation of this legal institution. Kenya and South Africa, for instance, have hurriedly signed on to this property rights regime without seriously considering its implications for smallholder farmers, and its potential impact on SA. To begin, with IPRs are based on a culture where the right to deny access to innovation is accepted practice – capitalist notion of economic monopoly. 'It carves out exclusive rights to an individual (either a natural person or a legal one) to exploit particular creations of human ingenuity. For example, a patent vests exclusive right in an inventor to develop, control, use and market an innovative industrial process or product for a specified period of time. Trademarks extend protection to brand names that have a particular identity in the marketplace while trade secrets protect confidential information often of commercial value to an industrial firm or person. Copyright (perhaps the most common and established form of intellectual protection) covers literal and artistic works such as computer software, writings and drawings', {Mugabe, 1998}. This is inconsistent with African cultural practices where innovation in agriculture, for instance, has proceeded through collective community processes based on sharing, through verbal farmer-to-farmer, and/or intergenerational transmission mechanisms {Kuyek, 2002}.

Proponents of IPRs argue that it will promote SA by encouraging private technology transfer and investments in research and development. However, as Kuyek persuasively argues, IPRs do not automatically encourage or reward innovation. In other words, IPRs is neither a necessary nor a sufficient condition for innovation. Farmers will not necessarily innovate so as to benefit from IPRs, and even if they could, they would not necessarily benefit from IPRs as it is currently conceived and implemented in some parts of Africa. Generally, the Western forms of intellectual property rights do not provide the necessary protection for IKS, innovations and rights of indigenous and local peoples. Even where they do, like with copyright laws, for instance, it is expensive for holders of traditional knowledge to enforce their intellectual rights enshrined in copyright {Mugabe, 1998}.

Whether or not IPRs can promote SA therefore depends on the nature or type of the IPRs regime, the type of innovations African Agriculture needs, and who Africa's agricultural innovators are. African agricultural innovators, as we have seen, are mainly smallholder farmers, who engage in collective innovation processes through sharing {community rights of use}. The IPRs regime, however, is based on concepts of knowledge, and individual rights to property that are both inconsistent with Africa's cultural values and socio-economic needs and does not address particular needs and means of this particular class of innovators. For instance, by patenting seeds, IPRs would restrict the right of farmers to use, share and save seed from their harvests, as seed patents extend breeders' monopoly to the harvest of the farmer's crop. This would have a number of unpleasant consequences, including: fostering dependence on foreign companies, allowing piracy of farmer innovations, threatening food security and agro-biodiversity, et cetera. The Industrial Property Act, passed in Kenya in 2001, for instance, allows for patenting, 'at a minimum, of plant parts, biotechnological products and a wide range of micro-organisms', {Kuyek, 2002, 8}, items some of which, would normally be shared under traditional African agriculture and customary laws.

This Act demonstrates two things:

1. The lack of seriousness with which Kenya and other African countries approach IKS, IPRs and SA, seemingly unaware of the renewed interest in IKS occasioned by the increasing commercialisation of genetic resources and the growth of biodiversity prospecting enterprises {such as Shaman Pharmaceuticals which rely extensively on IKS in their screening activities}, the increasing loss of plant and animal species, the neglect and insubordination of indigenous peoples' rights and knowledge by national and international legal systems et cetera {Kuyek, 2002, Mugabe, 1998}

2. The dominant influence of the western-oriented strand of the IPRs debate which argues that IPRs can be employed successfully to protect intellectual, economic, environmental, social, and cultural rights of indigenous and local peoples, over the opposing view which holds that an alternative property rights regime consistent with local customary practices and economic conditions is needed. Opponents of IPRs argue that, as Africa neither has the technology, the capital, nor even the taste for modern bio-tech products, the push for IPRs, as it is currently conceived, is an attempt by agribusiness firms to privatise Africa's innovative practices and biological resources and to reorganise its seed markets for the benefits of foreign corporations {op.cit.}.

This is not to argue, however, that IPRs and other property rights regimes in general are detrimental to SA in Africa, as a case can be made for their adaptation to suit Africa's economic and socio-cultural needs and demands³. Rather, the paper seeks to make the case that legal frameworks are important determinants of SA as they can not only be used to encourage or discourage particular types of innovations, farming practices and technologies, but they can also be used to grant or deny market access, address or redress unequal power or knowledge relationships, enhance or restrict political participation, et cetera.

Markets, Poverty, Globalisation and Localisation

Other broader socio-economic and politico-institutional factors whose impacts on SA have not been sufficiently studied or have been studied in isolation include, markets, poverty, globalisation and localisation. The World Bank {2002}, Whiteside {1998}, Pretty {1998}, Forsyth and others {1998} have shown how markets impact on sustainable agriculture. Access to factor and product markets determines the costs and benefits to farmers of engaging in agriculture and therefore, rewards and 'punishment' for making particular choices regarding agricultural practices, techniques and implements. Yet markets themselves are socially embedded institutions, more so in Africa where access to markets sometimes depends on extra-economic relations/factors/structures such as patron-client politics, ethnicity, legal restrictions, state intervention, et cetera {Gore, 1994, Whiteside, 1998}. A clearer illustration of how the market impacts on SA is provided by the rapidly expanding 'ethical market', fuelled by ethical trading⁴ standards. Some elements of ethical trade such as sustainable producer livelihoods and conservation of the environment and biodiversity, contain aspects of sustainable agriculture, while others such as agribusiness driven grades, standards, and codes of practice meant to curve out 'premium markets' may constrain sustainable agriculture prospects in Africa, particularly by excluding poorer smallholder farmers from lucrative agricultural sectors, as is evidenced by emerging trends in Kenya's horticultural sector {USAID, 2001}.

Conventional views regarding the relationship between poverty and sustainable agriculture draw heavily from the view established by the Brundtland Commission of 1987 concerning the relationship between poverty and environmental degradation in which the two are seen as being inextricably linked and self reinforcing - the so-called Environmental Kuznets Curve⁵. As Forsyth and others {Forsyth, et al, 1998} have shown however, this orthodox view has disturbing assumptions and implications that may not augur well for the prospects of SA in Africa. In particular, this conception is based on misinformed linkages of human activity and the environment. It implies for instance that poor people degrade landscapes in response to population growth, economic marginalisation, and existing environmental degradation, yet considerable evidence shows that many poor people have adopted protective mechanisms through collective action which reduce the impacts of demographic, economic and environmental changes {ibid.} It also implies that the only way to reduce environmental

³ The OAU Model Law for the protection of the rights of local communities, farmers, breeders and regulation of access to biological resources which places more emphasis on community rights while seeking to help African countries fulfil their obligations to TRIPs and CBD while protecting the collective social process of knowledge generation in Africa is an excellent example.

⁴ Ethical trade refers to the trade in goods produced under conditions that are socially, environmentally, and economically responsible – sustainable producer livelihoods, prohibition of forced or child labour, fair wages for workers, fair trade, promotion of biodiversity, environmental conservation etc {Blowfield, 1999}

⁵ Environmental Kuznets Curve states that environmental degradation initially increases with income and productivity before a wealthy population starts to invest in environmental conservation.

degradation is to eradicate poverty first, a concept that may encourage policy responses that may increase both poverty and environmental degradation. As Forsyth and others argue, by assuming a universal experience of poverty and environmental degradation, this conception also runs the risk of ignoring local experiences of poverty and environmental degradation thereby not only failing to address pressing agricultural productivity and environmental problems currently affecting poor people, but also failing to provide enabling circumstances for local people to create their own institutional responses to problems of sustainable agriculture. There is need therefore for further research, under a different conceptual framework, to determine the relationship between poverty and sustainable agriculture.

Poverty is, of course, not just a function of environmental degradation. It is also embedded in historical, biophysical, socio-economic and politico-institutional factors such as natural resource endowments, IKS, markets, the nature of the state, gender relations, property rights regimes, globalisation, localisation, et cetera. Take globalisation and localisation for instance. As we have seen through consumer driven ethical trading, or agribusiness-led IPRs, globalisation can have a positive or a negative impact on the prospects of SA. The same can be said of localisation. As Jules Pretty {1998} and Elspeth Huxley {1960} have shown, local groups and institutions can both constrain and facilitate efforts aimed at sustainable agriculture. Invariably, agriculture has always been a partially collective business in many societies around the world, with farmers and farming households working together on resource management through such practices as users' association rules and the pooling together of labour and other resources in activities that would be too costly for individual farmers to undertake. However, local groups and organisations can also constrain SA by institutionalising unequal power relationships which determine access to natural resources, markets, et cetera, particularly in highly stratified societies {Pretty, 1998}. Despite the potential impacts of globalisation and localisation on SA however, efforts aimed at SA in Africa have largely targeted individual farmers rather than local and external groups and institutions that may influence individual farmer choices in the first place.

In sum therefore, the technical conceptualisation of sustainable agriculture has ignored or under-emphasised investigations into the broader historical, socio-economic, and politico-institutional factors, structures and relationships that impact on the prospects of SA in Africa. Studies that address these issues treat them in isolation, as if they were independent of each other. The result is that not only do we know little about the factors that constrain the prospects of SA in Africa we equally know little about its dynamics.

It is for this reason that this paper proposes further research on the relationships below, under an embeddedness approach. Areas that merit further research include:

1. Law and sustainable agriculture
2. Gender and sustainable agriculture
3. Markets, Politics and sustainable agriculture
4. Poverty and sustainable
5. Science, indigenous knowledge systems and sustainable agriculture
6. Globalisation, localisation and sustainable agriculture.

Towards Turning the Tide: Participatory Research

The overriding argument in this paper is that the conventional paradigm of sustainable agriculture in Africa has disenfranchised smallholder farmers as researchers and actors in the pursuit of answers to the question of sustainable agriculture, which happens to be *the* question of their daily lives and survival. This, as this paper has attempted to show, can impact negatively SA.

Any effort aimed at redressing this failure therefore has to start from the premise that there is an urgent need to

- a) Question the idealistic view of science as 'objective' as this is not only increasingly becoming difficult to maintain in the light of historical methodological, and philosophical arguments that have brought against it in recent years {Kuhn, 1962, Richards, 1980, Sohng, 1995, Warren et al, 1989,} but also

disenfranchises local people as researchers in problems that directly affect their daily lives.

- b) Transfer power from an elite group, national and international, that has exclusively determined the interests of smallholder farmers, back to the farmers who are engaged in agricultural production and innovation.

Participatory research provides a model starting point as it is ' a means of putting research capabilities in the hands of the deprived and the disenfranchised people so that they can identify themselves as knowing actors; defining their reality, shaping their new identity, naming their history and transforming their lives for themselves', {Sohng, 1995, 4}. It addresses three things that conventional research methodologies tend to obscure: people, power and praxis. It is people-centred because the process of critical inquiry is informed by and responds to the experiences and needs of the people, it promotes the empowerment of local people by encouraging the development of indigenous/common knowledge which is suppressed by the dominant knowledge system, and, it recognises the inseparability of theory and practice and critical awareness of the personal-political dialectic {Ibid.} In other words, participatory research is grounded in an explicit political stance and value base that emphasises social change - the transformation of socio-economic and politico-institutional structures and relationships that institutionalise social injustice, inequality, disempowerment or political oppression. It therefore does not separate the researcher from the researched, but rather sees both as actors in the research process – from problem identification through to and including research design, data collection, interpretation, and options for action.

As a dialogic approach, this method also provides an avenue for communication between natural and social scientists on the one hand, and between scientists and smallholder farmers on the other hand. It therefore offers a mechanism through which all three can come together to not only conduct participatory collaborative research but also to communicate the results of their findings to users of the results, namely, the wider farming community and the policy making establishment.

While the social sciences have embraced some aspects of participatory research for some time now, the natural sciences remain sceptical of the concept, although it is noteworthy that many members of the Consultative Group on International Agricultural Research {CGIAR} that have long been inclined towards 'modern agriculture', are beginning to employ and appreciate the values of this method {Ashby, et al, 2000, Hobbs, et al, 1999, Wuyts-Fivaro, 1996, for excellent examples}.

Still, it would appear that many social and natural scientists, as well as agricultural research institutions, remain shy of participatory research and only embrace 'token' elements of this method for 'development correctness' reasons. As Jennifer Astone {1998} has shown, they only employ participatory methodologies to gather background information, after which, local people have little or no role in influencing the flow or interpreting the content of the research. Seldom are they even informed of the outcomes of the research or its conclusions.

This is the problem that participatory research seeks to avoid. Taken seriously, participatory research can be a socially and intellectually empowering tool as the women's, environmental, and indigenous peoples' movements' have shown {for a good review, Sohng, 1995}. In fact, participatory research initially developed as a reaction to the Western intellectual colonialism of Third World social research into development. It thus views research as a collective action in the struggle over power and resources, a struggle in which knowledge empowerment is critical to the final outcome.

Despite the enormous possibilities it offers however, participatory research presents a number of challenges, and should not be romanticised. To begin with, it is expensive in terms of both time and money. The validity of participatory research has also been frequently questioned, but once we accept the view that the 'objectivity' of science is relative and ideological, we should have few problems with the validity of this method as limitations

imposed by its explicit political stance are no greater than those imposed by conventional scientific methods which are no less ideological, even when they refuse to concede the fact.

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