
A Select Annotated Bibliography: Indigenous Technical Knowledge in Development

Liz O'Keefe and Michael Howes

Barker, D., J. Oguntoyinbo and P. Richards, *The Utility of the Nigerian Peasant Farmer's Knowledge in the Monitoring of Agricultural Resources: A General Report*. Monitoring and Assessment Research Centre of the Scientific Committee on Problems of the Environment, International Council of Scientific Unions, MARC Report no 4, 1977.

This report seeks to determine whether the ordinary farmer's knowledge of soils, vegetation, pests and climate can be successfully incorporated within the framework of an environmental monitoring system, and whether the peasant farmer might be trained and encouraged to make systematic observations of ecological data on a continuing basis. The nature and quality of the peasant farmer's environmental knowledge is assessed through two case studies. The first is an analysis of peasant response to a general set of questions relating to farming problems, farm management practices and agricultural innovations in the Ikale area of Ondo State, Nigeria. The second study looks in detail at a particular problem identified in the first survey, the crop damage caused by the grasshopper *Zonocerus variegatus*. The studies demonstrate that farmers are able to provide lucid and concise information on environmental difficulties and that, when related to objective circumstances of agricultural production in the area, the data appear to represent rational assessments of real difficulties. The peasant farmer is a good empiricist and can be used to provide early warning information that would otherwise require an expensive and therefore sparse network of observation posts. By participating in a monitoring programme, the farmer would be able to express his own views, needs and requirements and should, therefore, become much more closely identified with the overall conservation and environmental management strategies that African governments are working towards.

Belshaw, D. G. R. and M. Hall, 'The Analysis and Use of Agricultural Experimental Data in Tropical Africa', *Eastern African Journal of Rural Development*, vol 5, nos 1-2, 1972.

The paper's thesis is that resources in tropical African agriculture are used far less productively than ought to be the case. The authors review the factors hindering the development of effective programmes of problem-solving agricultural research, and the characteristics of small-scale peasant agriculture which are insufficiently recognised in the design of much current experimental research. They discuss the objectives and design of agricultural experimental research and give examples of the divergencies between research-derived advice and peasant farm realities. They conclude that there is frequently a divergence between the design of agricultural experiments, or the interpretation of their results, and the realities facing the peasant farm family; that there is little interest by the research scientist in applying research-derived recommendations to the farm and that lack of success in this area is not objectively investigated. As a result, progress in agricultural development is less rapid than it ought to be, and this in turn results in a smaller allocation of public expenditure to agricultural research and extension. Potentialities for rapid agricultural development are thereby passed over in favour of investment either in capital-intensive agricultural projects or in other sectors having both a lower rate of return and a narrower spread of welfare effects.

Biggs, S. D., 'Appropriate Agricultural Technology in Bangladesh', *Institute of Development Studies, University of Sussex, Discussion Paper*, no 90, January, 1976.

Two papers are reproduced here:

a. *Appropriate Agricultural Technology in Bangladesh: Issues, Needs and Suggestions*. This paper argues that too little attention has been given to the best mix of different types of old and new techniques and institutions in the implementation of agricultural development plans. Some possible criteria for the selection of appropriate technology are outlined and suggestions made as to how institutions can be encouraged or adapted to promote a more appropriate technology.

b. *Interaction between technological and institutional development: what is appropriate, where, when and for whom?* This paper examines the

interdependence between technologies and institutions. It uses the experience of the Kosi area in Bihar, India, to illustrate the ways in which technologies and institutions are inextricably interwoven in a stratified rural society. A framework for policy analysis, planning and implementation is developed, suitable for achieving the socialist goals of the Bangladesh government.

Brokensha, D. and B. Riley, 'Vegetation Changes in Mbere Division, Embu', *Institute for Development Studies, University of Nairobi, Working Paper* no 319, 1977.

This paper examines the nature of vegetation in Mbere Division, Embu, Kenya, the way it has changed, and the manner in which it is perceived and utilised by the indigenous population. Vegetation is by far the most important element in the local resource base, and largely for this reason, the Mbere have accumulated a highly detailed knowledge of plant life. It is argued that the utilitarian system of classification which the Mbere employ is far more appropriate than the inventorial principles governing Western taxonomy, and that far greater account should be taken of such knowledge in the formulation of development plans than is presently the case.

Chapman, G. P., 'The Folklore of the Perceived Environment in Bihar', Dept. of Geography, University of Cambridge (mimeo), 1977.

The peasant farmers of Bihar have a collective store of traditional information relating to farming practices and to the behaviour of the physical environment, which is expressed in the form of proverbs. The paper reports on a project undertaken to discover the kind of information they hold, the way in which it is stored, and the way in which it relates to the environment. Four different cultural groups—Biharis, Bengalis, Hos and Santhals—are investigated, and substantial differences found in the nature and extent of the technical knowledge possessed by each. Particular attention is paid to indigenous calendars, which are shown to be superior to their Western counterparts; and local knowledge of disease, animals, soils, weather and climate is also considered. The author concludes that in order to be effective and non-disruptive, extension activity must work on a thorough understanding of this knowledge and its organising frameworks.

Conklin, H. C., *Hanunoo Agriculture: A Report on an Integral System of Shifting Cultivation in the Philippines*, FAO Forestry Development Paper no 12, Rome, 1957.

The report is a very detailed case study on the shifting cultivation practices of a small upland group on the island of Mindoro in the Philippines, conducted from the combined perspectives of anthropology and ecology. It makes no suggestions for improvements in the standard of living, on the grounds that this is a case of almost perfect equilibrium between man and the environment, and that any deterioration on either side would be an extremely slow process. Improvements in the standard of living should develop naturally among the people themselves so that their present equilibrium would not be disturbed.

Development Alternatives Inc., *Strategies for Small Farmer Development: An Empirical Study of Rural Development Projects*. Report to US/AID in three volumes: Final Report, Case Studies and Executive Summary, DAI, Washington DC, May 1975.

The purpose of rural projects is assumed to be the promotion of self-sustained growth in the small farmer's income, the acquisition of agricultural knowledge and an increase in self-help capabilities. Using the information gained from a detailed examination and evaluation of 36 rural development projects in Africa and Latin America, the report concludes that project success depends largely on whether farmers are involved in decision-making during the implementation of the project and commit their own labour and/or cash to the activity. To design projects responsive to these criteria takes more time and knowledge of local conditions than aid agencies normally deem necessary. Such agencies need either to adopt a more locally based 'organic' development approach or to support smaller institutions able to operate on this basis.

Dommen, A. J., 'The Bamboo Tube Well: A Note on an Example of Indigenous Technology', *Economic Development and Cultural Change*, vol 23, no 3, 1975.

A case study of the development of a bamboo tube well by a medium-sized farmer in the Saharsa district of Bihar, India, where, despite a massive investment in infrastructure projects such as canal systems, the critically important input of irrigation water had remained beyond the reach of the majority of farmers. The well is made from split bamboo lengths, iron rings and coir string. Its construction is simple and economical. Besides being cheap enough to be expendable if the well dries up, it can also be made from indigenous or easily available materials. The success and publicity of the

prototype resulted in small village workshops being set up all over the district to construct the wells.

Duff, B., *Design, Development and Extension of Small-Scale Agricultural Equipment*, Agricultural Development Council Inc., 1971.

A range of problems impede the mechanisation of agriculture in the less developed countries. Machines developed in the West may prove unsuitable for use under tropical conditions, and even where this is not the case, they are unlikely to meet the economic or institutional requirements of small farmers. The International Rice Research Institute in the Philippines adapts and invents new machines which are complementary with on-farm resources, and can be produced, utilised and maintained using local resources and skills. The decision about which types of machinery are relevant is made by a 'combination of intuition and experienced judgment, supported by a limited number of economic surveys and some field tests and evaluation work'. This provides machine designers with more complete information on potential markets, existing technologies, and the economic environment in which machines would be produced and operated.

Faniran, A. and O. Areola, 'The Concept of Resources and Resource Utilisation Among Local Communities in Western State, Nigeria', *African Environment*, vol 2, no 3, 1976.

In the field of crop production and the management of the soil, the knowledge and experience of local farmers are unrivalled and no alternative system of food crop production has been found that is as well adjusted to the prevailing environmental conditions as that which has long been practised by the people. They should be able to provide planners with information on natural resources based on their knowledge and experience. A survey was carried out to determine whether this was the case. Local people, local government officials and employees were surveyed about their general awareness of their environment and its resources; the value and possible uses of each resource element; interaction with the natural environment and present use of resources; and the capability of local government institutions adequately to evaluate and make recommendations about development alternatives and rational utilisation of resources. The authors conclude that in considering the environment and its resources the local people tend to overlook those components which they make use of often and with which they are very familiar. Most local

inhabitants judge the value of a resource element by the amount of ready cash it brings in or by its importance as a source of food or in providing social amenities. Any resource development project must be directly relevant to the needs and aspirations of the local inhabitants and must bring tangible benefits to them in terms of improving the employment situation and general welfare and socio-economic well-being of the community. The local government councils as presently constituted in the states concerned are poorly equipped to study, evaluate and plan for the systematic development of the natural resources in each district. Finally, there is a need to educate people in rural districts to develop a positive attitude towards the natural environment and to see ways of developing, managing and utilising its resources.

Gordon, J., 'Intermediate Technology in West African Agriculture', *World Crops*, vol 19, no 3, June, 1969.

The paper argues that there is a clear-cut case in agriculture for developing a cluster of small-scale enterprises linked to agriculture and centring on a small farm and multi-purpose tractor. The necessary matched equipment could be gradually acquired by a contractor-farmer with the aid of a loan scheme if necessary. The equipment introduced should take account of the level of local mechanical skills, and training in the operation of the equipment and in maintenance and simple repairs would be necessary.

Guggenheim, H. and R. Fanale, 'Shared Technology: A Project for Water Storage and Irrigation in Dogon Villages', *African Environment Occasional Paper* no 76-1, March, 1976.

This project aims to strengthen the ability of Dogon villagers to help themselves. The chief concern is not modernisation but rather the organic development of a traditional society. In constructing 'water granaries' and small reservoirs, the authors worked closely with the villagers, consulting them on all points, sharing with them their calculations of costs and benefits, asking their advice, and incorporating as much as possible of traditional Dogon technology into their work. In some instances, the existence of an opportunity in the environment to create a water storage system had been perceived by the Dogon prior to the authors' arrival, but what they lacked were the specific technical and material aids needed to implement a solution.

Hammond, P., *Yatenga: Technology in the Culture of a West African Kingdom*, Collier-Macmillan, London, 1966.

Notes that anthropologists in Africa have concentrated on social organisation and religion to the almost total exclusion of technology. The book provides a detailed description of the technology of the Mossi of Yatenga, and argues that an awareness of the interaction of technology with environment is a necessary precondition for an understanding of contemporary economic, social, political, and religious organisation and of culture history. Such an understanding is equally essential to successful prediction of the ways in which Mossi culture is likely to change in the future.

Hatch, J. K., *The Corn Farmers of Motupe: A Study of Traditional Farming Practices in Northern Coastal Peru*, Monograph no 1, Land Tenure Centre, University of Wisconsin, 1976.

A study written from the perspective of allowing the small farmer to teach the researcher what he knows. The study is the farmers' view of what they do and why, as taught to the author. The bulk of the study is devoted to a detailed description of how the small farmer earns his livelihood, and to a manual of farming practices. The author aims to demonstrate the 'utter complexity of the small farmer's production processes'; to up-date Western images of labour-intensive agriculture and the family farm; and to show the inadequacies of contemporary survey research efforts to acquire information about the farmer's production process. The author argues that 'if we expect small farmers to modify or replace their traditional technology with more productive methods, it is urgent that we completely understand the nature and rationale of the practices these producers currently employ'.

Heinz, H. J. and B. Maguire, *The Ethno-Biology of the !Kō Bushmen. Their Botanical Knowledge and Plant Lore*, Occasional Paper No. 1. Government Printer, Gaborone, Botswana (undated).

The authors bring the combined perspective of ethnology, plant taxonomy and ecology to bear on the problem of determining the way in which bushmen conceptualise the botanical phenomena of which they are aware, and upon which their continued survival depends. Detailed work carried out with an individual informant suggested that the !Kō have an extensive knowledge of vegetation, and a keen ability to discriminate between different species, but only a rudimentary under-

standing of plant physiology and physiological processes. This reflects the necessarily utilitarian relationship of the people with a harsh environment.

Herrera, A. O., *Scientific and Traditional Technologies in Developing Countries*, Science Policy Research Unit, University of Sussex, 1977 (mimeo).

This article postulates a new approach to development from the point of view of technological requirements. Its basic characteristics would be: an objective of satisfying basic needs such as food, shelter, health and education; development based on indigenous natural and human resources; new technologies which are not socially disruptive, allowing a smooth continuous transition from traditional societies to better forms of social organisation; and the objective of the rational management of the environment as a guideline of economic and social development. The minimum necessary pre-condition of this new approach is the existence of the political will to improve, as fast as materially possible, the situation of the submerged part of societies.

Horton, R., 'African Traditional Thought and Western Science', *Africa*, vol 37, nos 1 and 2, 1967.

This article is divided into two sections. The first takes as its point of departure the proposition that anthropologists' ignorance of the true nature of the scientific enterprise has led them to postulate a series of false dichotomies between scientific and traditional African thought; and then proceeds to identify a series of underlying similarities between the two systems. This then provides a basis for the exploration, in the second section, of outstanding differences. The most important of these is that science incorporates into itself an awareness of the possibility of alternatives to its established body of theoretical tenets, which finds no counterpart in traditional African thought. This, in turn, is associated with the device of the controlled experiment—through which theory can be bombarded with artificial events—and the underlying driving force of the belief in 'progress'.

Hunter, G., 'Indigenous Development and the Developing World', *ODI Review*, no 2, 1974.

Although it is now widely accepted that Western models of development are unsuitable in the case of many developing countries, certain assumptions and elements drawn from such models continue to be advocated. These include the

concepts of 'efficient bureaucracy' and 'co-ordination' as necessary approaches to rural development, and a misdefinition of 'mobilising the people' to include only the poorest section of society. The result is that choices of possible local action are repeatedly pre-empted by an insistence upon a single set of actions, prescribed by planners and executed inefficiently by the bureaucracy in various forms. There can be no answer to the question of whether indigenous effort could produce modest but assured and rewarding progress, because indigenous effort is not allowed to find its own way or make its own choices.

Igbozurike, M. U., 'Ecological Balance in Tropical Agriculture', *Geographical Review*, vol 61, no 4, 1971.

Food shortage is a recurrent problem in the developing countries of the tropics. Most agricultural systems in this region are based on mixed cropping, which has many socio-economic merits and such significant ecological implications that it is surprising researchers and development planners have hitherto condemned it as an impediment to progress. There should be more extensive research into mixed cropping, since it is man's best approximation of natural ecosystems and can become both the short-term and the permanent solution to agricultural problems of the tropics.

Intermediate Technology Development Group Ltd., Rural Africa Development Project, NCAE Silsoe/Project Report No. 3, *The Complexity of Problem Identification Amongst Smallholder Farmers in Africa: An Example of a Farm-Level Survey Technique Using Local Resources* by Robert Mann, April, 1974.

A necessary condition for the success of any rural development programme is a prior understanding of farming calendars and cropping sequences, traditional communal customs and obligations, and the essential economic pattern and the ecological conditions upon which any farming system is based. This paper reproduces the questionnaire and methodology used in collecting such information in Zambia. Although variations in farming systems in Africa make it impractical to derive a single questionnaire format or analytical method suitable for all circumstances, the paper provides a guide to the information content necessary to cover all major assets and activities, ranging from the semi-nomadic or subsistence level to intensive, monetised production.

Johnson, A. W., 'Individuality and Experimentation in Traditional Agriculture', *Human Ecology*, vol 1, no 2, September, 1972.

Anthropologists and agricultural economists have promulgated a view of 'traditional agriculture' where innovation is eschewed because it is either too risky or unnecessary in view of the fact that techniques are so well adapted to environmental conditions. This view, however, fails to take account of the readily demonstrated existence both of individual differences in agricultural practices and of systematic experimentation within traditional agricultural communities. Such individuality and experimentation are probably pervasive in traditional societies and must be seen as an essential component of their adaptive processes, as important as the more familiar processes of traditional transmission.

Knight, C. G., *Ecology and Change*, Academic Press Inc., New York, 1974.

A geographical study of agricultural practices and agricultural change focused on the Nhiha society of the Mzobi area of south-western Tanzania. It explains the traditional agricultural system and the process and results of agricultural change within it. Most of the change that has taken place has resulted from a voluntary learning experience and may suggest strategies for development when funds for personnel and massive development programmes are not available.

Langley, P., 'The Ethnolinguistic Approach to the Rural Environment: Its Usefulness in Rural Planning in Africa', *African Environment Special Report No. 1: Problems and Perspectives*, International African Institute, London, 1975.

The paper argues that a social group's perception of its environment, as it may appear through semantic study, can become one of the main tools of understanding the relationships between social structure and the organisation of space. It concludes that these perceptions might form one basis for planning to transform the environment by means of the people who actually live in it.

The paper presents one strategy for overcoming the breakdown in communications between Western advisers and the social groups for whom they are supposed to be working. It argues the existence of a 'people's science' not just in the admitted fields of construction techniques and spatial organisation of the habitat, but also in the sphere of concepts, the explanation of social and natural phenomena and economic reasoning,

and argues that these help rural people to structure their understanding of their environment and interaction with it. In contrast to the West, where the mode of production has led to an ideological split into different disciplines, the languages of rural Africa make no distinction between social and physical environments. The scientific/technical approach which advocates 'rational use of natural resources' tends to limit the environment to its physical elements and structure, excluding consideration of social, economic and political structures. The paper concludes that the conceptualisations of rural people could be the base for formulating environmental planning strategies, given that the people themselves should have control over the changes in their environment.

Longacre, D. J., *Nutrition and Development*, Mennonite Central Committee, Development Monograph Series No. 4, Akron, Pa. (undated)

The monograph provides an overview of the causes and effects of poor nutrition, with special emphasis on the ways in which nutrition relates to problems of agriculture, health and justice. A main section deals with indigenising and humanising nutritional education, as part of a development process based on 'returning the focus of decision-making to the people themselves'. The author discusses nutrition experiments in rural areas, particularly one nutrition education experiment in Brazil which applied the method of Paulo Freire. She notes that small agencies have an advantage in determining needs and priorities in accord with the people's own agenda of needs and priorities in each area.

Macpherson, G. and D. Jackson., 'Village Technology for Rural Development: Agricultural Innovation in Tanzania', *International Labour Review*, vol III no 2, 1975.

Despite the attention that has been given to such aspects of rural development as improved seeds, fertilisers, irrigation and land reform, the farmer's tools have been relatively neglected. The authors describe and analyse an ILO/UNDP project in Tanzania aimed at improving the implements most appropriate to the needs and the environmental and economic constraints of small-scale subsistence farmers. The project's base has been called 'village technology' to distinguish it from 'mechanised' and 'intermediate' technologies, both of which can be too expensive for most farmers. Relative costs are compared and detailed data on suitable implements are given. The economic soundness of village technology is

demonstrated by a case study of the cost of supplying water to a village in Northern Tanzania. The article concludes with a theoretical consideration of the need for a 'hierarchy' of technologies on which to base projects for rural development.

McDowell, J., 'The Concept of Village Technology in Eastern Africa', *Appropriate Technology*, vol 2, no 2, August 1975.

The author argues that the initial steps in rural development must be within the capability of the small farmer and his family, both in terms of cost and of their available knowledge and skills. Village technology introduces small initial changes which, when taken together, have the potential to bring about significant improvements in the overall quality of rural life, thereby providing a basis for more advanced development. The author calls for the development and extension of village technology in the areas of food conservation, conservation of economic crops, water supplies, the saving of fuel, and wind and water power.

Mikesell, M. W., 'Cultural Ecology' in National Council for Social Studies, *Focus on Geography*, P. Bacon ed, Washington DC, 1970.

Cultural ecology differs from the earlier environmentalist traditional in geography in that nature and culture are not seen as opposing forces or separate entities, but rather as interlocking components of a complex ecosystem. The most common strategy in analysing cultural ecology is to examine a particular link in a particular ecosystem, e.g. the connection between climate and agriculture. Establishing a link's functional character permits expansion into other components of a system, e.g. technology, social organisation, landform and soils. This process is illustrated by a series of case studies.

Norman, D. W., 'Rationalising Mixed Cropping Under Indigenous Conditions: The Example of Northern Nigeria', *Samaru Research Bulletin*, 232, Institute for Agricultural Research, Samaru, Ahmadu Bello University, Zaria, Nigeria.

In spite of the prevalence of mixed cropping throughout the developing world, little effort has been expended on its investigation, particularly under indigenous conditions. The paper attempts partially to rectify this with empirical data collected at the farmer's level in Northern Nigeria. Mixed cropping is shown in this area of limited rainfall to be, under indigenous technological conditions, a rational strategy in terms

both of profit maximisation and of risk minimisation.

O'Keefe, P. and B. Wisner, 'African Drought—The State of the Game', *African Environment Special Report No. 1: Problems and Perspectives*, International African Institute, London, 1975.

The authors start from the premise that peasant landuse systems in existing drought areas were once successful and consider the recent history of these areas in order to understand why they should be so vulnerable in the current crisis. They argue that changes in the farmer's objective conditions through the colonial and neo-colonial periods—especially the rise of the capitalist mode of production—have worked to constrain peasant decision-making. As these constraints increase, stress which might previously have been contained becomes too much for the peasant livelihood system to bear, and produces a highly simplified decision-pathology on the part of peasants which is less sensitive to successive states of nature. The authors conclude that the problem of drought is basically a problem of poverty, of continual regional economic maldistribution and underdevelopment within countries, leading to increasing vulnerability of the poor within these regions; that any initiative for large-scale reconstruction carries with it the danger of displacing or proletarianising the poor into increased vulnerability to drought; and that peasant perception and utilisation of local resources can be very sensitive to states of nature. The emergence of hybrid technology which would draw from both traditional and modern sources, thus enlarging the peasant's range of choice, would thus seem to be a strong foundation for development in the dry zones.

O'Keefe, P. and B. Wisner, 'Development or underdevelopment: a Kenyan case study', *African Environment*, vol 2, nos 1–2, 1976.

From studies of the complex organisation of small communities it is possible to monitor the effects of development (and underdevelopment) and, more importantly, to make policy recommendations that encourage integrated, 'grass roots' development. Detailed micro-empirical studies are essentially practical, for they allow the disparate strands of the physical and human environments to be drawn together. The ecological detail presented is the necessary complement to those broader studies of political economy which reveal the interdependence of communities, regions and nations in global patterns. Micro-level community studies and

political economic studies together yield a composite picture of underdevelopment as a process, not a state. The authors present a case study of a village in Kikuyuland based on this approach.

Rappaport, R. A., 'The Flow of Energy in an Agricultural Society', *Scientific American*, vol 225, no 3, 1971.

Examines the energetics of swiddening (gardening and swine husbandry in tropical rain forests) in New Guinea. The general strategy of swiddening is to establish temporary associations of plants directly useful to man on sites from which forest is removed, and to encourage the return of forests to those sites after harvesting. The return of the forest makes it easier to re-establish an association of cultivated plants in the future. Swiddening makes relatively light demands on farmers in terms of energy inputs, provides for almost all their dietary needs and, if properly practised, alters ecosystems less than other modes of agriculture of comparable productivity. This kind of farming is compared favourably with more ecologically disruptive methods of modern agriculture.

Richards, P., 'Alternative Strategies for the African Environment: 'folk ecologies' as a basis for community-oriented agricultural development', *African Environment Special Report No. 1: Problems and Perspectives*, International African Institute, London, 1975.

This paper argues that the culture of the ordinary people, together with the experience they have gained in coping with the day-to-day problems of contemporary economic and social change, contain ideas and techniques which could be of immediate value in the struggle to improve agricultural yields and farm income. The full benefit of using the best of these ideas and techniques is only likely to be felt where a scaled-down grassroots approach to development planning has been adopted, as in the case of Tanzania. The author gives an overview of types of useful research on traditional knowledge and folk ecology, including studies by anthropologists and ethnographers of traditional cosmological and religious ideas; studies by ethnolinguists; and the micro-level spadework of ethnobotanists, agricultural economists, and others, which shows that the basic agronomic practices of African farmers are sound.

Ruddle, K. and R. Chesterfield, 'Change Perceived as Man-made Hazard in a Rural Development Environment', *Development and Change*, vol 7, no 3, 1976.

The authors consider a development situation involving wholesale alteration of the biophysical system in which a given subsistence system operates, together with major infrastructural change within the system. In the absence of a thorough understanding of the pre-existing ecosystem on the part of the change agent, this will probably elicit perceptions and responses from a local population other than those intended by the developer. It is essential for the success of any rural development planning model that local rural people have a major role in making the decisions and formulating the plans which will affect their lives. The environmental perceptions of client populations can serve as a useful basis for developing indicators about local natural resources, the potential of traditional systems for modernisation, and the likely 'human' success of any planned changes implemented.

Sansom, R. L., 'The Motor Pump: A Case Study of Innovation and Development', *Oxford Economic Papers*, vol 21, no 1, March 1969.

A motor pump developed by local farmers contributed to the development of a major portion of the upper delta region of the Mekong Delta in South Vietnam. It was adopted rapidly by farmers, despite the lack of government support, having proved itself extremely profitable by allowing extra land to be double cropped.

Semiti, G. A., 'Cash Crops Versus Food Crops and their Comparative Effects on the Human Environment', in Benneh, G. and G. A. Semiti, 'Nutrition and the Human Environment', *African Environment Occasional Paper No 76-8*, July, 1976.

This paper argues that development programmes promoting cash crop economies tend to work against the establishment of an adequate food and nutrition policy for the people of developing countries. A cash crop economy is a serious pollution factor, which tends to deny the producers adequate food supplies by claiming the major share of available natural resources; it also denies indigenous populations employment in agricultural industries.

Stoez, E., *Thoughts on Development*, Mennonite Central Committee, Development Monograph Series No. 1, Akron, Pa., 1977.

Since underdevelopment reflects more a poverty of spirit than a lack of wealth, true progress will only begin with transformations in basic attitudes. Changes should have a strong community base, expressed through locally-owned development institutions. Generally local capabilities for management, financing and technical action should determine the scale of new activities. Outside assistance is helpful only if viewed as subordinate to a primarily indigenous process.

IDS RESEARCH REPORTS

The Prevention of Farm-Level Food Grain Storage Losses in India: a Social Cost-Benefit Analysis

R. A. Boxall, M. Greeley, D. S. Tyagi, with M. Lipton and J. Neelakanta
An investigation in Andhra Pradesh, India, of the extent of food grain loss during storage at the farm-level, and of the savings achieved by various improved storage methods.

October 1978 239 pages £3.50

Available on request from IDS Communications, Institute of Development Studies at the University of Sussex, Brighton BN1 9RE, UK.