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Indigenous Knowledge for Sustainable Agriculture and Rural Development

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This Gatekeeper Series is produced by the International Institute for Environment and Development to highlight key topics in the field of sustainable agriculture. Each paper reviews a selected issue of contemporary importance and draws preliminary conclusions of relevance to development activities. References are provided to important sources and background material.

The Swedish International Development Authority (SIDA) funds the series, which is aimed especially at the field staff, researchers and decision makers of such agencies.

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INDIGENOUS KNOWLEDGE FOR SUSTAINABLE AGRICULTURE AND RURAL DEVELOPMENT

D. Michael Warren and Kristin Cashman

Indigenous knowledge can play a key role in the design of sustainable agricultural systems, increasing the likelihood that rural populations will accept, develop, and maintain innovations and interventions. It can be defined as the sum of experience and knowledge of a given ethnic group that forms the basis for decision-making in the face of familiar and unfamiliar problems and challenges. Farmers of agrarian, as well as industrialised, societies have sophisticated ways of looking at the world. They have names for many different kinds of plants, ways to diagnose and treat human and animal diseases, and methods to crop fertile and infertile soils. This knowledge has accrued over many centuries, and is a critical and substantial aspect of the culture and technology of any society. Yet it has often been overlooked by Western scientific research and development.

Indigenous knowledge functions within the given socio-economic and spatial boundaries of the society and plays an active part in the culture of the population concerned, being preserved, communicated, and used by its members to serve some purpose in relation to productive activity within the society (Bell, 1979). It can be transferred by quite elaborate systems, often involving oral transmission using stories and myths. Yet few examples have been methodically recorded, and fewer still have been studied with the purpose of developing an integrated approach to solving agricultural and rural problems (Brokensha et al., 1980).

Why Investigate Indigenous Knowledge?

Many technological solutions that have been proposed to address problems in rural communities have failed in the field because they do not take into account the local culture, particularly society's preferences, skills, and knowledge. Success in development is more likely to be achieved when local people are involved in the planning and implementation of development projects; and project officials who are familiar with indigenous knowledge are better equipped to facilitate participation by the local populations.

Development Scenarios and Indigenous Knowledge

The following scenarios outline some problems encountered by international development specialists, illustrating in particular how development strategies incorporating indigenous skills and wisdom are more likely to lead to appropriate processes for effecting technical change. Some of these focus on the way that external knowledge can be incorporated into

indigenous knowledge systems, thus helping to augment and reinforce indigenous capabilities for the acquisition, absorption and use of imported technology.

Scenario 1 – Overcoming Biases in Extension Communication

Indigenous knowledge can be used to facilitate communication in rural development programmes. Communication between project personnel and farmers is often very poor, particularly in projects with a structure that favours literacy, top-down message flows and innovations developed elsewhere (Warren, 1976; 1988). This often results in a serious comprehension gap. Often incompatibility of an innovation with local cultural values results in no adoption. In one agroforestry project in western Nigeria farmers perceived planting trees on their farm fields as incompatible with their sociocultural values and beliefs. Nigerian farmers, like industrialised country farmers, also strongly favour increasing production, but soil conservation innovations are perceived as conflicting with this desire. In consequence both these technologies were adopted very slowly (Cashman, 1987).

But ethnoscience, which records indigenous knowledge and decision-making systems, can facilitate communication by providing a better understanding of how people perceive their environment and organise their perceptions. The aim is to overcome the tendency to impose an outsider's structure upon a local situation by explaining why things are being done from the perspective of the local people.

Scenario 2 – Improving Existing Production Systems

Integrating the art and knowledge developed by farmers over the centuries with the advances of modern science is a tremendous challenge. One successful example is the agroforestry system 'alley cropping', which is characterised by crop production between alleys formed by hedgerows of leguminous trees or shrubs. This farming system can be an economically more profitable and ecologically more stable alternative to the practice of shifting cultivation. By incorporating the regenerative features of the traditional bush fallow system it allows farmers to realise an extended cropping period without returning the farmland to fallow. With this approach, cropping and fallow phases take place concurrently. It has great potential for dramatically increasing food production, and stabilising or even reversing environmental stress in Africa (Rang et al., 1984).

But alley cropping has been adopted and sustained by few limited-resource farmers in Africa. Despite it being an adaptation of indigenous knowledge, the necessary elements summarised in Scenario 1 had not been considered in several efforts to promote the new system in Nigeria.

To overcome these constraints, alley cropping had to be presented in a way that assured the farmer it would satisfy some currently desired production need. A play entitled "The Fertiliser Bush" was used by Cashman (1987) as the primary means of introducing the new

concept of alley cropping. The use of the phrase 'the fertiliser bush' downplayed the use of trees, whilst emphasising the primary benefit of the new technology, that is fertiliser, to the farming system. Nonetheless scripting a presentation to be acted out by members of the community was by no means a novel idea. Important information, particularly historical facts, has long been transmitted in this manner in many cultures, especially in those with a low level of literacy.

Scenario 3 – Incorporating New Technology into Existing Knowledge

The consumption of protein is essential for human growth and development, yet protein intake is currently declining among sub-Saharan populations. Soybeans, a legume with a source of high-quality protein, are a recent import to some African farming systems. Although they are being actively promoted to replenish protein poor diets in Africa, production is still not extensive, even though the plant is adaptable to most tropical and subtropical regions.

In southern Kaduna state in Nigeria, soybean is well established as a substitute for locustbean in the mass production of *dadawa*, a traditional food flavour used extensively through West and Central Africa. Historically the locustbean, a leguminous tree (*Parkia clappertonia*), has played the major role as raw material for the production of *dadawa*, as well as a primary source of protein for humans. But the tree is slow to mature and is susceptible to considerable fluctuations in yield. These limitations have been further exacerbated by increasing deforestation brought on by expanding population and the accompanying demand for food flavouring (Mahbratu and Hahn, 1986). In northern Nigeria, women farmers have also shifted from locustbean to soybean cultivation, though here it was an indigenous response, not instigated by outside intervention.

The circumstances of *dadawa* production thus provide an excellent opportunity for comparative research on women's indigenous response to ecological and economic constraints. Perhaps lessons can be learnt for adopting successful techniques of transfer and processing in other regions of Africa where the introduction of soybean has not been well received.

Scenario 4 – The Design Activities of Research and Development Programmes

Despite profound social change and advances in scientific knowledge the benefits of development have not reached the vast majority of the rural poor. The scope of social development generally has been biased by formally educated, urban-based people, and has usually operated in their favour. In those cases where improving the quality of rural life has been the aim of development projects, rural people have been virtually uninvolved in the design. Too often the ecological and socio-economic conditions of the target area have not

been compatible with the project plan assumptions, and the desired results could not be achieved on a sustained basis.

By dismissing indigenous knowledge as irrelevant, rural people may be encouraged to adopt practices that lead to undesirable effects through the inappropriate use of local resources. The new techniques adopted may also undermine the delicate balance of the local cultural or natural environment, causing declines in social welfare. Or the technologies may have little consequence, apart from the wasted expense of time and money involved in developing and extending them.

Increasingly, attempts are being made to increase the participation of rural people in development activities. The techniques of Farming Systems Research and Extension and Integrated Rural Development together with Farmer Participatory Research, are representative of this new trend. All seek to achieve a closer fit between intended technical solutions and existing social frameworks.

Scenario 5 – Change from within Societies

Not only is there increasing awareness of the feasibility of using indigenous knowledge to enhance and facilitate development, but there is a growing recognition that many indigenous technologies are environmentally benign. This indigenous knowledge comprises an extensive array of responses to changes in the cultural, physical, or economic environment and can provide useful insights for modern research and extension.

Indigenous technological innovations often represent the most appropriate adaptations to the environmental and cultural conditions of the societies which create them. For example, in Iran the *qanats*, horizontal wells, are still considered one of the most appropriate ways of transporting and bringing water to the surface. They are said to last indefinitely, and the materials they need are all readily available locally.

Moreover some innovations can be borrowed, almost intact, from indigenous knowledge based in other cultures. Centuries-old techniques used by farmers in Mali are being investigated to find ways of stopping the devastating erosion of Africa's soils by tropical rainfall. Oxfam has developed a method based on a traditional technique of conserving the soil. This technique centres around building terraces which conserve the soil, boost crop yields, and restore barren lands to production. The terraces greatly increase crop yields by enhancing water retention in the soil (Harrison, 1987).

Farmers in Kenya are now requesting that terraces are laid out on their land by government agricultural extension agents. The key to the programme's popularity is that it is based on working with small farmers to improve traditional techniques, using cheap hand tools and simple labour-saving devices.

Scenario 6 – Creation of an Indigenous Technological Foundation

The lack of recognition of indigenous knowledge in the development process is mirrored in the training, and the resultant transfer of technology, extended to international students attending Western institutions. It is well documented that international students often become uncritical and imitative consumers of knowledge that is a product of another cultural system (Lee, 1983; Cashman and Plihal, 1987; Cashman and Persons, 1988; Goonatilake, 1984).

A major structural problem in the approach of Western institutions of higher learning is the dismissal of indigenous knowledge and capabilities because the demand for new techniques are met by outside knowledge and capabilities. The result is the potential loss of relevant and applicable stocks of knowledge and capabilities that have existed for generations (Goonatilake, 1984; Bell, 1979; Richards, 1985). This structural defect and its consequences justify a major effort to identify ways to record and use indigenous knowledge in effecting technical change.

A Prototype Repository for Indigenous Knowledge

The Center for Indigenous Knowledge for Agriculture and Rural Development (CIKARD) was established at Iowa State University in October 1987. CIKARD has 3 main functions: it collects published and unpublished materials and makes them available to development practitioners; it develops and pursues approaches that foster integration of indigenous knowledge into agricultural research and extension; and it conducts training courses on techniques for documenting and using indigenous knowledge. It is hoped that CIKARD will serve as a prototype for other regional and national centres interested in documenting and applying indigenous knowledge for the improvement of small scale production systems in developing countries. In this way it can assist in the development of regional and national repositories of indigenous knowledge, and support collaborative research ventures with overseas institutions.

Cashman describes the CIKARD objectives as comparable to those of the Soviet geneticist and botanist N.I. Vavilov. During the 1920s Vavilov established repositories of genetic diversity ("gene banks") in various parts of the world because of the worldwide trend towards conformity that reduced genetic diversity. These genetic pools then represented nature's storehouse of biological responses to the environment.

A process similar to plant genetic obliteration occurs with the world's store of knowledge whenever local systems of knowledge and technology are suppressed or lost. The CIKARD repository of indigenous knowledge and decision-making systems is one way to enhance understanding and communication between development practitioners and clientele groups. From a combined knowledge of the past and the present, the indigenous and the scientific, it is hoped that development may enter a wiser phase.

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The Sustainable Agriculture and Rural Livelihoods Programme of IIED promotes and supports the development of socially and environmentally aware agriculture through policy research, training and capacity strengthening, networking and information dissemination, and advisory services.

The Programme emphasises close collaboration and consultation with a wide range of institutions in the South. Collaborative research projects are aimed at identifying the constraints and potentials of the livelihood strategies of the Third World poor who are affected by ecological, economic and social change. These initiatives focus on the development and application of participatory approaches to research and development; resource conserving technologies and practices; collective approaches to resource management; the value of wild foods and resources; rural-urban interactions; and policies and institutions that work for sustainable agriculture.

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