An analysis of indigenous knowledge systems: implications for agricultural extension education with particular reference to natural resource management in Zimbabwe

Olivia Nyembezi Muchena
Iowa State University

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Iowa State University, 1990
An analysis of indigenous knowledge systems:
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in Zimbabwe

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Olivia Nyembezi Muchena

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Ames, Iowa
1990

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LIST OF ABBREVIATIONS

CAMPFIRE - Communal Areas Management Programme for Indigenous Resources

CES - Cooperative Extension Service

IKS - Indigenous Knowledge Systems

IK - indigenous knowledge

NRM - natural resources management
INTRODUCTION

Background

Problems such as food shortages, environmental degradation and declining economies during the past three decades in developing countries have led to the search for alternative development models (The World Bank, 1989; Chambers, 1983). In agriculture, sustainable agriculture is being examined as a response to the risks of losing biodiversity through uniform high yielding varieties, the soaring cost of external based inputs and the negative effects of agrochemicals (Lappe and Collins, 1986; Sardar, 1988). Indigenous Knowledge Systems (IKS or IK) show potential for environmentally-sound alternatives to food production (Richards, 1985; Brokensha et al., 1980; Atte, 1989). Recurrent themes in IKS related literature are local innovation and experimentation, conservation practices and ethics and the tenacity of IKS under difficult conditions. However IKS's contribution remains largely potential due to ignorance, negative professional attitudes and institutional barriers (Thrupp, 1988).

Statement of the Problem

Ethnobotany, ethnoecology, indigenous agricultural practices and development anthropology feature in current IKS literature (Brokensha et al., 1980; Posey, 1983; Posey et al., 1984; Rambo and Sajise, 1984). Except for Roling (1988) and Compton (1989), there is virtually no input from the discipline of agricultural education and extension.
Technically, knowledge for agribusiness is readily available as part of the 20th century knowledge mainstream. IKS, on the other hand, is peripheral and often overlooked by commercial indexing and abstract services (McKiernan 1989). One reason for this marginal position is that IKS is localized, unpublished, and much of it belongs to oral literature. It is, thus, overlooked by those who service commercial knowledge systems. Efforts to document IKS are just beginning, for example, in the Center for Indigenous Knowledge in Agricultural and Rural Development (CIKARD).

Purpose

The purpose of this research was to contribute to the body of knowledge to delineate and conceptualize agricultural IKS from an educational and extension perspective. The study analyzed the nature of IKS and how it is perceived, assessed its viability in agricultural education and extension programs, and drew some implications for extension education. The study answered the following questions:

1. What is the cognitive and value basis of IKS?
2. In what form is IKS encoded and transmitted?
3. What are the implications of the findings in 1 and 2 to agricultural education and agricultural extension?

Objectives

The objectives of the study were:

• To define and explain the meaning of IKS.
• To develop sensitizing concepts to IKS.
• To identify and analyze proverbs as a source of IK in Shona culture.
• To determine values undergirding natural resource management (NRM) among the Shona.

Theses

The theses of the study were:

1. Understanding (cognitive) and appreciation (affective) of IKS are essential for promoting sustainable agricultural development.
2. IKS provide a cultural basis for extension and training that is absent or glossed over in technology transfer approaches.
3. The curriculum implications of IKS need to be addressed in a systematic curriculum approach for enduring results.

A philosophical and technical approach was used to develop a framework for analyzing IKS in agricultural education and extension curriculum.

The results of the study may be used in agricultural education and extension curriculum development and for in-service training programs.
LITERATURE REVIEW

The critical review of literature identifies information gaps in relating IKS to agricultural education and extension, indicates the contribution of the present study and is useful in constructing an overall theoretical framework for the three subsequent articles. The discussion on methodology focuses on qualitative research paradigm as the model applied in the three papers.

Definitions and Conceptualizations

As an emergent field of study, IK is characterized by a variety of definitions, fragmented theoretical conceptions and a marginalized position vis-a-vis the current mainstream knowledge system. This has given rise to a plethora of terminologies referring to the same phenomena: indigenous knowledge systems, indigenous technical knowledge, ethnoscience, local, traditional, people's science, village science (Atte, 1989). The differences in terminology tend to arise from a mixing of semantic and conceptual perceptions of the words used. Freire (1973) indicates that words operate in a field of association, i.e., the mental image evoked by or associated with the word. The images may be positive or negative. The term extension, for example, can have meanings ranging from extending a thing to extension as mission bringing agricultural salvation.

Similarly, the terms indigenous, traditional, folk, village or local tend to have negative connotations like static, conservative or backward. It is, therefore, necessary to distinguish the IKS field of
association and the conceptualization of the phenomenon as represented in Figure 1.

<table>
<thead>
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<th>semantic definitions</th>
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<tr>
<td>• &quot;having originated and being produced, growing, living or occurring naturally in a particular region or environment.&quot;</td>
<td>• integrated system of cognition, beliefs/values and practices</td>
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<tr>
<td>• &quot;native&quot; (Webster's Ninth Collegiate Dictionary)</td>
<td>• contextual information system</td>
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<tr>
<td>associative meanings</td>
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<tr>
<td>simple</td>
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<tr>
<td>tribal</td>
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<td>backward</td>
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<tr>
<td>traditional</td>
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<td>static</td>
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<tr>
<td>exotic</td>
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<td>inferior</td>
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<td>(adapted from IKS literature)</td>
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Figure 1. Definitions of IKS

The semantic and conceptual aspects are both relevant to this study because of the concern with knowledge systems that are native or originating in particular places under particular conditions. Although the environments of IKS differ, there are commonalities that warrant an abstraction or generalization to the phenomena of IKS as elaborated in the definitions below.
According to Atte (1989, p. 3),

Whatever the implications of using these different terms, there is significant unity in the recognition that rural communities in Africa and other parts of the Third World have profound and detailed knowledge of the ecosystem and species (the natural environment) which they are in contact with and cultural settings within their respective environments. They have also developed effective ways of ensuring that this knowledge and the physical resources of the environment are used sustainably. Ethnoscience or folk science or ILK [indigenous local knowledge] is therefore the form of shared environmental knowledge, beliefs and rules and techniques for productive activities.

This definition is pertinent for this study as it raises the important issues of recognition of IK as a knowledge system, the nature of that knowledge (profound and detailed), and points to a dimension of IK most relevant to agricultural and extension education, i.e., sustainability. The one weakness of Atte's definition is that it is limited to agriculture and the environment, though his paper includes several dimensions of IKS.

McClure (1989, p. 1) defines IKS as

... learned ways of knowing and looking at the world. They have evolved from years of experience and trial-and-error problem solving by groups of people working in their environments drawing upon resources they have at hand.

McClure's definition is broader and important because it includes a people's world view which is a philosophical/ideological element of any knowledge system. However, it misses some important aspects of IK, i.e., dynamic, influenced by internal creativity and experimentation as well as contact with external systems (Warren, 1989).
IK is unique in that it is generated in response to the natural and human conditions of a particular environment and context. It is dynamic and creative due to continuous experimentation and evaluation stimulated by adaptation requirements and external influences. Richards (1985) observed the detailed development of indigenous rice varieties through selection and experiment as well as trials of the improved varieties from the research centers among Sierra Leonean farmers.

The above definitions emphasize indigenous knowledge systems and not indigenous people. The United Nations' definition of indigenous peoples include all or some of the elements listed:

1. descendants of the original inhabitants of a territory
2. nomadic or seminomadic peoples
3. people without centralized political institutions
4. a national minority
5. different world-view
6. people who subjectively consider themselves to be indigenous and are accepted as such (adapted from Burger, 1987, p. 9).

These elements are important as various combinations of them permit a wider definition of indigenous people. The more common reference of indigenous people as minorities in isolated communities of the Amazon forest, for example, is misleading. Such a view of indigenous peoples excludes those countries which were once colonized, like Zimbabwe, where the indigenous people are the majority.
Dimensions of IKS

Atte (1989) observes that rural people's knowledge covers the whole range of human experiences. A partial selection of the scope of IK is presented below using a framework of academic disciplines.

Figure 2. Dimensions of IKS

Several points are worth noting about the dimensions of IKS. First, the above listing represents a tiny fraction of the scope of IK and is given as an illustration. Second, though listed here under disciplines to facilitate the understanding for those used to western academic framework, IK is not so compartmentalized, but very integrated in its cognitive, skills and affective domains and integrated across disciplines.

Third, Atte (1989, p. 7) notes that

In all those fields, each rural group has developed knowledge encompassing theory, concepts, interrelations, factual data and attributive information, of a high degree of accuracy. Such knowledge is so good that such societies
have been able to exploit them both for social organizations and productive endeavors to maintain the group.

However, due to historical and political processes such as colonization and international interactions, these knowledge systems have been put at risk (Ngugi wa Thiongo, 1987).

Philosophy of IKS

Sardar (1988) refers to Goonatilake's use of the metaphor of knowledge hills to describe the historical and current status of IKS. Hills of knowledge reflecting different civilizations (China, India, Islam, Europe [Africa]) existed before the dominance of modern science. The latter levelled other hills. But according to Sardar (1988, p. 13) "... this is not a world hill; it is only a regional hill masquerading as a universal phenomenon."

Warren (1989) shows how 19th century social sciences contributed to negative values and attitudes towards IKS through ethnic stereotypes and prejudices. In Africa, colonization and the alienating effects of western education systems contributed much to this process. The main intellectual tool used in the levelling of other knowledge hills is the western scientific method rooted in reason as the only way of knowing. Sardar (1988) describes the exclusive nature of western science thus,

... it is a tool of reduction with an essentially exclusionist methodology, and its use is limited strictly within an ontological and epistemological framework. Reason is exclusive in the sense that there is no place in science for issues of morality and values for it is pure, clinical and neutral; only those aspects of a phenomenon which are amenable to pure reason are really worthy of investigation. It is exclusive as only those who have been specially
trained in the use of scientific reasoning have the right access to knowledge and are the true judges of what constitutes scientific knowledge... it is exclusive in that reason constitutes the only legitimate way of knowing and is the only arbitrator of truth. (Emphasis added.)

Sardar's critical characterization of western scientific epistemology has been voiced in the past and is increasingly being echoed not just by IKS promoters but by writers like Levi-Strauss (1977), Kuhn (1962), and Rosnow (1981). The common criticisms in these and other studies are the mechanical, reductionist worldview, and a questioning of the neutrality of positivism.

IK as either an alternative paradigm or another way of knowing is characterized in almost polar opposite terms. IK is seen as holistic and inclusive in its epistemological framework and approach to reality. Agriculture, for example, in many IKS is both technical and social in that it has strong cognitive and affective dimensions. The affective dimension such as values related to land may have a metaphysical basis. Thus for the precolonial Shona people of Zimbabwe no human being could own land as it was given by Mwari (God). The chief, as political head assisted by spirit mediums (religious leaders), administered land on behalf of the dead and the living. Land management would include technical knowledge such as terracing as well as religious taboos and sanctions. According to Njoroge and Bennars (1986, p. 146) "the cognitive dimension was thus linked directly with the normative dimension given the social character of traditional knowledge."
Perceptions of IKS

The changing perceptions towards the acceptance of IKS is largely based on utilitarian values. Evidence of this is how current IKS literature dwells on the stock of IKS, i.e., documenting what indigenous knowledge is available in various fields that can be put to immediate use. Little attention has been paid to the generation, accumulation, storage and dissemination of IK.

Njoroge and Bennars (1986), for example, argue that there was nothing like knowledge for its own sake in precolonial African society. Knowledge enabled people to cope with life at a practical and theoretical level. However, Levi-Strauss cited by Howes (1985, p. 3) argues that the so called primitive peoples demonstrate that "... the universe is an object of thought, at least, as much as it is a means of satisfying needs." According to Richards (1985), Sierra Leonean farmers when asked why they plant a type of rice give the response "For experiment." The interest in experimenting goes beyond the utilitarian value for as Richards indicates,

Playing with rice [i.e., experimenting] is the national sport of rural Sierra Leone. (Richards, 1985, p. 145)

Howes and Chambers (1985) conclude that indigenous technical knowledge can be seen as stock and process, and suggest that the process aspect should be analyzed to determine how IK is generated and hybridized.

Atte (1989) provides some useful information in the understanding of the process aspects of IKS.
First, indigenous knowledge systems

comprise of a shared cognitive model of the empirical world, plus a set of rules and techniques for converting this model into meaningful activity which sustains growth and development of the society. . . . The use of linguistic symbols, (terminologies), classification (taxonomies) and propositions (theories) to encode this information is the predominant method employed by all groups. (Atte, 1989, p. 7)

Second, the process of cognitive mapping, acquiring, coding and decoding information results in locational and attributive information (Downs and Stea, 1973, cited in Atte, 1989). These information aspects are illustrated in Figure 3.

<table>
<thead>
<tr>
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<th>Attributive information</th>
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<td>location</td>
<td>of phenomena</td>
</tr>
<tr>
<td>direction</td>
<td>in the environment</td>
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<tr>
<td>distance</td>
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(i) descriptive - quasi objective or denoted facts of phenomena

(ii) evaluative or connotive - assignment of meaning, value, attitudes to phenomena physical and cultural

Figure 3. Typology of information (adapted from Atte, 1989)

Knowledge and understanding of indigenous cognitive models and mapping processes can provide a basis for genuine dialogue between farmers on the one hand and researchers, extension workers and agricultural educators on the other (Freire, 1973; Howes, 1985). It is important to realize that as long as IK is seen from a utilitarian view, it will remain marginal and limited in application. The analysis of proverbs in Section 1 is an attempt to understand the cognitive mapping process
of the Shona people vis-a-vis natural resources. Section II on values in natural resource management focuses on the evaluative aspect of indigenous natural resource management.

It is apparent from the discussion above that IK is holistic in perspective and an integrated system of beliefs, values, practices, and cognition pervasive in all its dimensions.

It can be concluded that Goonatilake’s knowledge hills metaphor is useful but somewhat limited as a theoretical construct. The recent flourish of IKS literature suggests that other knowledge hills have been buried, not levelled. IKS studies are attempts to excavate and recreate new knowledge hills for contemporary conditions. In the words of Sardar (1988, p. 13) paraphrasing Goonatilake,

The project of our time is to recreate the topography of several new hills, 'in our own backyard.' Each great civilization must create a knowledge structure based on its own unique world-view, on its own way of knowing. "The search for a truly universal hill and of a truly 'universal' global science can begin only after this reemergence."

The attainment of a truly universal global science on the conditions prescribed above sounds utopian. In the meantime, this study makes a contribution towards the recognition and acceptance of the existence of the other knowledge systems. The aim is not to reconstruct and maintain a romantic static past, but to examine ways that the contribution of IKS in sustainable agriculture through agricultural education and extension training can be effected. An emic-etic approach to agricultural education and extension is a possible route.
Emic-etic Perspective for Agricultural Education and Extension

Knowledge and understanding of IKS cognitive models and mapping synthesized with western agricultural education would result in an emic-etic approach to agricultural extension education. According to Goodenough (1981, p. 16)

... when we describe any socially meaningful behavioral system, the description is an emic one to the extent that it is based on elements that are already components of that system, and the description is an etic one to the extent that it is based on conceptual elements that are not components of that system.

The Shona perception of and values on land and its management is an example of an emic view because it is based on the internal, functional and structural elements of a particular cultural system. On the other hand, the western view of freehold, private property as basis or motivation for land development when applied to the Shona cultural situation is an etic perspective.

Ruttan (1988) indicates how in development literature cultural endowments (the emic perspectives) are often viewed as obstacles to technical or institutional change. One reason for this view is that cultural endowments are analyzed from an etic perspective using predetermined general concepts. A large component of the emic perspective comprises of religion, taboos, myths and related ethnic ideologies and values. These elements of indigenous cultural systems appear irrational from an etic perspective. Howes (1985) summarizes the perceptions of the essence of IK in current literature as mystical/irrational, utilitarian or intrinsic. Reactions to IKS by researchers, educators, development professionals and institutions
<table>
<thead>
<tr>
<th>Level of Perception</th>
<th>Response Evoked</th>
<th>Potential Contribution</th>
</tr>
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</table>
| 1. Mystical/irrational | • obstacle to development  
• inferiority complex/embarrassment  
• dismiss/ignore  
• useless | • beliefs, myths as encodement of knowledge |
| 2. Utilitarian | • acknowledge and accept validity partially  
• romanticism/idolization  
• skepticism | • substitute compliment knowledge hybridize system |
| 3. Intrinsic | • curiosity  
• desire to learn more, i.e., R & D | • joint ventures/dialogue/participation  
• analysis for knowledge generation |

Figure 4. Responses to IKS: Levels of perceptions, responses and potential contribution (adapted from Howes, 1985, and IKS literature)
depends on which of these perceptions is held. Figure 4 illustrates these perceptions, responses and potential contribution of IKS.

An emic-etic framework for analyzing the potential contribution of IKS across all levels would reveal what is genuinely useless, what had comparative advantage over western knowledge system and what has intrinsic value for unique knowledge generation. This study attempts to identify those elements of IKS cognitive or affective educational domain that provide the basis for genuine participation and collaboration in agriculture extension education and natural resource management from a people’s own cultural basis. A curriculum for training agricultural educators and extentionists to operate in this emic-etic perspective has an ideological basis of learning with and from a people.

Thrupp (1988) warns against the danger of "scientizing" IKS through its appropriation, processing, packaging and reexport to developing countries by western scientists. This is an important concern. The challenge is how to relate IK to current educational efforts without losing its essence. What curriculum orientations, functions and designs are appropriate?

Curriculum Orientations of IKS

The holistic nature of IKS appears to have elements of several curriculum orientations in philosophical terms. Its humanistic and academic/liberal orientations are apparent in the affective and cognitive dimensions. Its behaviorist and technological orientations are found in the technical orientations of the physical, biological
and social dimensions as noted in the section on dimensions of IKS above (see also Atte, 1989, pp. 7-19). In addition, IK as prescribed in current literature is reconstructionist to some extent. According to McNeil (1985, p. 26)

- the primary purpose of the social reconstructionist curriculum is to confront the learner with many severe problems that humankind faces.

The problems span across the reality of life, i.e., from economics, science and technology, politics and others. "Learning opportunities must be real, action oriented and must teach values" (McNeil, 1985, p. 28). It has already been noted that IKS and related values in agriculture and natural resource management are gaining in importance as a response to problems of hunger, economic decline and ecological problems and even political stability (World Bank, 1989).

In addition reconstructionists such as Freire (1970, 1973) and Jimmerson (1989) assert that there is no value-free or neutral education. Jimmerson discusses how current extension practice in the U.S. serves the priorities of the dominant paradigm by focusing only on means. Jimmerson's (1989) characterization of the alternative paradigm of extension in the future is relevant for this study because it includes elements central to IKS, i.e., natural environment intrinsically valued, participative structures, nature delicately balanced, limits to science, integration of fact/value, thought/feeling.

A mere integration of few elements of IKS in existing agricultural education and extension curriculum is a band aid approach
which will continue to serve the interests of the dominant paradigm. A confluent curriculum approach with an emic-etic perspective is suggested (Berman and Roderick, 1977; Phenix, 1977; McNeil, 1985) to produce professionals with an emic-etic perspective to agricultural development. An emic-etic perspective (Figure 5) includes the recognition of other epistemologies, the holistic and integrated nature of indigenous knowledge systems. The emic perspective provides the internal conceptions and perceptions of agriculture while the etic perceptions provide the framework for determining the effects and/or significance of beliefs on human ecological behavior (Lovelace, 1984).

Figure 5. An emic-etic perspective for a confluent curriculum approach to IKS
The literature reviewed shows that there is enough material available to construct a conceptual framework (Figure 5) which can effect and facilitate the recognition, acceptance, and utilization of IK in agricultural education and extension. An emic-etic perspective provides the underlying philosophy of knowledge generation and exchange within and between all subsystems of agricultural education and extension.

The Process of Confluent Curriculum Development

The situation described above requires a systematic, well-structured process of synthesizing elements of current agricultural education and extension with the holistic, integrated nature of IKS. An initial emphasis on the affective domain of an emic-etic based curriculum (Figure 5) would be aimed at countering professional and personal negative attitudes and institutional barriers to IKS. Emphasis on cognitive and psychomotor domains of agricultural education and extension curriculum at the expense of the affective domains have contributed to these negative attitudes and barriers to IKS. A curriculum that combines the cognitive psychological aspects of IKS with emic-etic perspectives is likely to produce extension personnel who can effectively manage knowledge and information systems from the farmers (IKS) and research stations. This is not just a technical process, but as Bruner (1971) and Freire (1973) indicate pedagogical theory is not neutral, but takes into account the political, social and economic aspects of a given country. Bobbitt’s experience in the Philippines confirms the need for such a curriculum.
We needed principles of curriculum making. We did not know that we should first determine objectives from a study of social needs. We supposed education consisted only of teaching the familiar subjects. We had not come to see that it is essentially a process of unfolding the potential abilities of a population and in particularized relation to the social conditions. We had not learned that studies are means, not ends. (Bobbitt, cited in McNeil, 1987, p. 33b. Emphasis added.)

In developing countries the result of negating particularized conditions is that extension efforts have been geared to training for increased productivity primarily for external markets and the replacement of indigenous farming systems. The situation requires different training models for extension personnel. According to McNeil (1985, p. 11):

The essence of confluent education is the integration of an affective domain (emotions, attitudes, values) with the cognitive domain (intellectual knowledge and abilities). It is an added-on curriculum, whereby emotional dimensions are added to conventional subject matter so that there is personal meaning to what is learned. (Emphasis added.)

McNeil's description of the essence of confluent education is relevant for this study in all but one aspect, i.e., the add-on curriculum. In the U.S., the need for a confluent curriculum has arisen because of "current curricular patterns which frequently ignore, repress, deny or negate those aspects of the person that add richness, color and texture to human life" (Berman and Roderick, 1977, p. 3). This situation can be addressed by an "add-on curriculum" approach. With a history of total displacement of indigenous knowledge systems, a more radical approach is essential.

A further justification for a radical confluent curriculum approach is the emphasis on the integration of the affective domain.
Current IK literature validates the technical aspects (cognitive and psychomotor domains) of the subject matter. The barriers to its recognition and appropriation by professionals, institutions and alienated farmers themselves are negative attitudes and value judgments (Thrupp, 1988; Marsden, 1989). Hence the need to emphasize the affective domain in the initial phase of curriculum adaptation to IKS.

Figure 6 is a diagramatic representation of the hierarchy of the affective domain's educational objectives ranging from the receiving level at the bottom to the characterization by value complex at the top. According to Krathwohl et al. (1958, p. 176), previous experience "may facilitate or hinder recognition of the phenomena to which the teacher is trying to sensitize him [the learner]." This is the situation at the receiving level. The objectives at this bottom level should be geared to raising awareness, engender a willingness to respond, and controlled or selected attention to what is being learned.

The position of many agricultural educators and extensionists (professionals and trainees) on the hierarchy of the affective domain as represented in Figure 6 is at the receiving or responding levels. Farmers are likely to be at levels 2 and 3 where the need is to restore confidence of the viability of their own knowledge systems. A curriculum of affect would include objectives that address the affective domain at all levels.
Figure 6. Hierarchy of the affective domain of educational objectives applied attitudes towards IK in agricultural education and extension.
Ignoring the affective variables in learning tends to lead to failure in cognitive and psychomotor domains as the learner may fail to conceptualize or appropriate a value set. Whether agriculture is viewed as business or as a way of life, there are values and attitudes that go with each respective view. The majority of small scale farmers in Zimbabwe, for example, view agriculture as a way of life even though it is also regarded as a source of income. Failure to recognize some of the fundamental values that go with these cultural endowments are obstacles to development.

One possible reason for the neglect of the affective domain in agricultural education and extension is that affective variables are seen as difficult to identify, promote and measure. An emic-etic framework of analysis and a confluent curriculum could provide some solutions to these problems. The elements of a confluent curriculum essential in the process of designing an emic-etic training approach are highlighted below on the basis of McNeil (1985).

Participation Marsden (1989) argues that people's participation should not be limited to decision making roles or some consultative process. The position of farmers as cogenerators of knowledge should have its basis in their indigenous knowledge based expertise. Freire (1970), Chambers (1983), and Richards (1985) have noted how researchers' and extension professionals' assumed ignorance of the farmer act as obstacles to genuine dialogue and exchange of information. A curriculum approach that promotes participatory values through teaching and learning methodology, and content (teaching
students how to identify and record IKS, for example) is likely to have lasting effect.

Integration This principle involves interaction, interpenetration and integration of thinking, feelings and action (McNeil, 1985, p. 12). Western trained extension workers have learned to compartmentalize the domains of their knowledge. This is contrary to the African world view, for example, where knowledge is not just a matter of cognition but of feelings, values, morals, and ethics as well. These issues need to be addressed in a curriculum context and not side stepped or ignored under the guise of objectivity or neutrality. Section II on Shona values in natural resources shows how values influence decisions and solutions related to ecological issues.

Relevance Relevance of what is learned to the learner is important especially in adult extension programs. Universal prescriptive solutions (agroforestry, for example) typical of the dominant knowledge system may fail because of factors in the context that were not planned for. Richards (1986) illustrates this point by showing how high yielding rice varieties that succeeded in India had to be abandoned in Sierra Leone because of situational factors. Knowledge that is situation and locality specific is a characteristic of IKS that need to be appreciated for its relevance.

Self This principle of confluent theory espouses self as a legitimate object of learning. The alienating effects of Western education need to be counterbalanced by what the people can contribute to the process of experimenting, generating, synthesizing and
hybridizing knowledge in agriculture and natural resource management. Participation in knowledge generation leads to appropriation and ownership of what is learned.

**Goal** The social goal of confluent curriculum is to develop the whole person within a given society. There is a need for making African extension programs holistic rather than just looking at the farmer as a recipient of technology to increase productivity for national and international markets. The social, political and economic factors impinging on agriculture have to be taken into account.

In addition, the elements of a confluent curriculum and the nature of IKS as defined above lend themselves to the principles of sequencing in curriculum development. Thus, starting with the farmers' indigenous knowledge, extension educators can move from the simple to the complex, from the familiar to the unfamiliar, from the concrete to the abstract. Such an approach will ensure a genuine two way information exchange system.
This study belongs to the qualitative research methods paradigm. Cook and Reichardt (1979, p. 34) define a paradigm as

a set of interrelated assumptions about the social world which provides a philosophical and conceptual framework for the organized study of the world.

This definition is based on Kuhn's (1962) idea of a disciplinary matrix. According to Kuhn a matrix is used among other things to identify problems and issues in a discipline, develop a framework for models and theories, determine the criteria for appropriate data collecting instruments and for presenting knowledge as organized principles for a discipline.

A paradigm is best understood by knowing its origin (Cook and Reichardt, 1979). Borg and Gall (1989) support this view and indicate research in physical sciences as the basis of the quantitative research paradigm, i.e., positivism. The qualitative paradigm is of social science origin because it is better suited for behavioral sciences (Borg and Gall, 1989).

The adequacy of both paradigms as complimentary or alternative methods of inquiry are determined by specific situations. Agricultural education and extension as an academic discipline belongs to both the physical and social sciences. Rhoades (1984, p. 46) supports this view and makes a case for agricultural anthropology because it is

the comparative, holistic and temporal study of the human element in agricultural activity, focusing on the
interaction of ecology, technology, social structure and ideology within local and broader farming environments, and with the practical goal of responsibility applying this knowledge to improve efficiency of food production.

It is, therefore, possible to use the quantitative and the qualitative paradigms together or separately. McNeely and Pitt (1985) indicates that the importance of qualitative methods of measurement is that though relative, it more readily reflects reality and cultural context.

There seems to be an overemphasis of quantitative research methods in the training and research by agricultural educators and extension professionals. Cook and Reichardt (1979) confirm this view for other social science disciplines. This study contributes to the reversal of this imbalance through the use of qualitative research methods of data collection and analysis.

Characteristics of Qualitative Research Paradigm

Characteristics of the qualitative research paradigm relevant for this study are inductive data analysis, holistic, naturalistic approach, reality from a subjective, humanistic perspective, and ethnographic methods of data collection (Bodgan and Bilken, 1982; Borg and Gall, 1989; Kniker, in press). The applicability of these characteristics to the study is briefly explained.

Inductive data analysis

Bodgan and Bilken (1982) give two goals of qualitative research methods which are best addressed by inductive data analysis: description of multiple realities and development of sensitizing
concepts. The multiple realities of IKS are reflected in its character of an integrated system of cognition, values and practices. Research in IKS is at the initial stage where those not familiar with these systems need to be sensitized to their existence, nature and potential.

Inductive data analysis provides the framework for starting with data which reveal unanticipated outcomes, leading to generalizations (Borg and Gall, 1989; Glaser and Strauss, 1967). The process of concept and theory building are grounded in data illustrated by characteristic examples and not on the basis of an hypothesis (Cook and Reichardt, 1979; Strauss, 1987; Miles and Huberman, 1984). The analysis of Shona proverbs uses the inductive approach to arrive at cultural based natural resource management.

Holistic and naturalistic inquiry

The elements of a naturalistic inquiry include a holistic approach, in a natural setting (Borg and Gall, 1989). Data are considered within the context or natural setting, not in an experimental or laboratory setting. The whole picture, not an element or abstraction of the phenomenon under study is considered. Reference has already been made to the holistic approach to land issues within Shona traditional natural resource management context. One characteristic of indigenous agricultural systems is that they are very contextualized (Richards, 1986).
Subjective humanistic perspective

Qualitative research methods are subjective because of the subjective meaning given by participants in the interpretation of data, and emphasis on social process and meaning attributed by the subjects (Bogdan and Bilken, 1982). This process is imbued with feelings making it humanistic. The subjective perspective is obvious in the discussion of religious and other cultural values as a basis for conservation discussed in Section II.

Ethnographic methods

Ethnographic methods such as participant observation over long periods of time characterize the qualitative research paradigm. These methods make possible what Borg and Gall (1989, p. 387) describe as "indepth analytical description of an intact cultural scene."

Modified ethnographic indepth interviews and observations were used for this study. The data collected on current knowledge levels of indigenous natural resource management among the elderly people in Zimbabwe was collected intermittently over a period of three years (1985-88). While the researcher and assistants did not reside with the participants for the duration of three years, the data are considered ethnographic because informal oral interviews were detailed, conversational in the emic question framework of the participants. Secondly, the interviewers were members of the same culture and language and sometimes belonged to the villages and families as the participants and were already familiar with the cultural context.
In the pilot study, a structured interview schedule organized by subject matter (trees, soil, animals) was used. This had to be abandoned as it emerged that a holistic emic framework for discussing natural resources was more appropriate than our etic question framework (Appendix A). Unstructured interview questions allowed for a natural, free following thematic dialogue. The data from this ethnographic interviews approach were used to either validate or compliment the oral literature data in the case of the proverbs analysis or in the case of values in natural resource management.

Detailed discussion of each type of qualitative research method used is given in the relevant sections, i.e., literary and content analysis for Section I and intellectual history for Sections II and III. In conclusion, the qualitative research paradigm is applicable to this study because

When new ideas, theoretical constructs or behavioral syndromes emerge, they are often poorly defined and not well understood (Borg and Gall, 1989, p. 408).

Such is the case concerning IKS in agricultural education and extension.

Explanation of the Dissertation Format

An overall introduction contains a statement of the problem, a critical review of literature on indigenous knowledge systems. The subsection on methodology presents relevant aspects of the qualitative research paradigm. Indigenous knowledge systems (IKS) in relation to agricultural extension education form the unifying thread of the three separate sections. Section I analyses Shona proverbs as a source of
indigenous knowledge that can be used in natural resource extension education programs. Section II examines Shona values on natural resources and their impact on conservation. Section III is an intellectual historical analysis of the origins of agricultural extension and explains the effect of the origins on technology transfer and IKS.

The overall summary of the study presents the curriculum and other implications of IKS on agricultural extension education. Suggestions and recommendations for further study are also given.

Operational Definitions
Agricultural education - teaching and learning about crop production, livestock and natural resources management.
Agricultural extension - nonformal education programs in agriculture.
Emic - analysis of behavior or phenomenon in terms of the internal structural or functional elements of a particular cultural system.
Etic - analysis of behavior or phenomenon in relation to predetermined general concepts external to a particular cultural system.
Indigenous knowledge system - learned ways of knowing and looking at the world unique to a geographic or ethnic context.
Natural resource management - skills, knowledge and attitudes related to using and conserving natural environment.
SECTION I. AN ANALYSIS OF SHONA PROVERBS AS A SOURCE OF INDIGENOUS KNOWLEDGE IN NATURAL RESOURCES

Introduction

Proverbs belong to the genre of oral literature. Proverbs as a tool for communication are used for emphasizing ideas, warning, correction or summarizing an argument. These social functions of proverbs make their metaphorical meaning more important than their literal meaning. Evidence of this is the number of studies carried out to analyze the sociolinguistic or the social functions of proverbs (Arewa and Dundes, 1964; Bascom, 1965; Abrahams, 1976; Ben-Amos, 1976). Penfield and Duru (1988) make a unique contribution by analyzing the role of Igbo proverbs in the mental development of children.

This study is a departure from the socio-linguistic and social function studies because it concentrates on the literal text of proverbs as a source of indigenous knowledge on natural resources.

Statement of the Problem

The study aimed at analyzing the literal text of a selected sample of proverbs to determine what knowledge about natural resource phenomena is conveyed. Hamutyinei and Plangger (1987) compiled 1876 Shona proverbs and described their work as a source book for further analysis and interpretation of proverbs from linguistic and cultural points of view. The purpose of this study was to analyze some of
these proverbs from a cultural based environmental information perspective.

What knowledge do Shona proverbs reveal about natural resources? Can the inferences from proverbs provide data which can be verified by behavioral practices or checked against other evidence? How can the findings be applied to current natural resource management (NRM) or environmental education programs? An analysis of some Shona proverbs and data from previous studies was used to address these questions.

Objectives

The specific objectives of the study were:

1. To identify information on natural resources phenomena in the literal text of proverbs.
2. To identify values about natural resource phenomena implied or explicitly stated in proverb text.
3. To determine human behavior vis-a-vis the environment based on the knowledge of natural resources.
4. To determine the relevance and applicability of the findings to environmental education and natural resource management.

The working hypothesis of the study is that Shona proverbs with natural resource referents are an encapsulation of indigenous knowledge reflecting human behavior vis-a-vis the natural environment.

Rationale for the Study

This study makes four important contributions to NRM in Zimbabwe. First, the National Conservation Strategy, The Zimbabwe Road to
Survival (1987) is a policy document compiled by the Ministry of Natural Resources and Tourism. The document gives prominence to the role of formal and nonformal education (NFE) in environmental education. Current efforts include environmental education components in the syllabi for agriculture, geography, science and education for living. This study makes a contribution to the achievement of the national Conservation Strategy through the provision of cultural based materials for environmental education.

Second, the National Strategy document rightly indicates that the success of the strategy is dependent on the popular support and cooperation of the Zimbabwe people. The task of making environmental education interesting, meaningful and integral to the life of the young Zimbabweans is a challenge. Humor is a pervasive aspect of Shona and other African proverbs. This can be used to capture the attention and interest of children in environmental education. A discussion on wild animals that are considered as pests and how they can be managed could be based on the humorous text of the following proverb:

Zvaita sei kuti chembere yorasika/bere rorutsa imvi?  
(How come an old woman is missing/and the hyena vomits grey hair?)

Third, the analytical framework used in this study (see discussion below) shows the pedagogical role of proverbs. This framework combined with the metaphorical, and abstract reasoning in the imagery and structure of Shona proverbs, can be used in the teaching and learning of concepts like analogy, inferences, causality
and generalizations (Penfield and Duru, 1988). These concepts apply to many academic disciplines, some of them such as inferential statistics, deemed to be hard. The learning principle of starting with the known to the unknown applies here based on the nature of the concrete imagery of proverb text.

Fourth, the mobilization of indigenous knowledge in forms relevant and appropriate for the contemporary situations is a frequent challenging call in IKS literature (Brokensha et al., 1980; McNeely et al., 1990). This study is a response to that call in at least three ways. Tree-related proverbs are analyzed in relation to current conservation concerns. The discussion on sacred trees and forests and totem taboos indicate the possibilities of modern equivalents that can be worked out from these. Lastly the analytical framework used can be seen as a tool for assessment and presentation of IK in a form relevant and appropriate for environmental educational planners and teachers.

Literature Review

The purpose of this literature review is to assess proverbs as a source of IK, to define environmental education and develop a conceptual framework.

Herskovits and Tagbwe (1930, p. 22) state that proverbs give a cultural background that "affords a vivid picture of life of these [Kru] people. We see them on land, in their canoes, farming, trading, and fishing." Posselt (1927, p. 35), writing on Mashona Folklore, confirms Herskovits' view thus,
Folk-lore may be accepted as a form of record of the mental development of the people: it contains the gems of culture. Although Posselt’s focus is on folk stories, his description fits the character of proverbs. He affirms that the stories have "creditable amount of wisdom, are rich in philosophic reflections, and an unfailing source of humor" (1927, p. 36).

Penfield and Duni (1988) cite Taylor who makes two important points about proverbs as sources of knowledge: proverbs originate from generalizations of "a simple scene in nature or in the culture and carry the weight of human experience in a condensed form" (Taylor in Penfield and Duru, 1988, p. 120). According to Hamutyinei and Plangger (1987), Chimhundu (1980) makes a case for the wisdom in Shona proverbs by stating that the other meaning of Shumo (proverb) is sense or wisdom and

Shumo should be allowed to retain the 'other meaning' [besides proverbs] where reference is to relative importance or praise worthiness of an idea object or act . . . this other meaning of Shumo implies approval by the generalized other in the community at large (Chimhundu, 1980, p. 38, in Hamutyinei and Plangger, 1987. Emphasis added.)

Thus, these and the other writers agree on the importance of proverbs as a source of knowledge based on a particular culture.

Environmental education: Indigenous and western perspectives

Makina (1981) identifies four approaches to conservation education in traditional society viz: oral, apprenticeship, social pressure and ceremonies. Parents, relatives and community elders were responsible for educating the young. It is very likely that the use of relevant proverbs would be included in such oral presentation. The
apprenticeship approach occurred within the context of training for particular ages and responsibilities such as hunting or collecting forest products or herding cattle. Training for the young and adults was under the guidance of a qualified and experienced person. Conservation was also learned through regulation and normative behavior. Ceremonies such as work parties (Whimbe) and initiation ceremonies provided further opportunities for learning. Makina (1981, p. 35) rightly concludes that,

Compared with the present day efforts in adult conservation education, there was more done in traditional society. I content that today's adult is less informed, less knowledgeable about wildlife conservation than the same adult a hundred years ago.

This traditional heritage provides a base for contemporary conservation education programs.

Environmental education today

The Zimbabwe government has demonstrated its commitment to environmental education by including elements of it in the syllabi for agriculture, geography, science and education for living at Secondary School levels. It is not clear how much input is specifically designated environmental education [nor how environmental education is defined]. What is available is support material prepared by the Curriculum Development Unit of the Ministry of Education (DMM/7/87, p. 31).

Roth (1987) identifies the biophysical, sociocultural and environmental management as the three constellations that environmental management should be concerned with. According to Roth,
Environmental management education is concerned with an individual's self-understanding, an understanding of the co-inhabitants of the earth and inter-relationships within and among each of these constellation of concerns (p. 30).

The Zimbabwe Conservation Strategy seems to be based on the biophysical and environmental management aspects. The approach appears to be technocratic with little attention to the socio-cultural elements. The possible contribution of indigenous environmental knowledge seems to have been overlooked. The objective of the strategy to make conservation "an integral part of the consciousness of every member of society" cannot afford to neglect the cultural element. As Roth (1987) suggests, education, communication, and interpretations through formal and nonformal education in environmental management contribute to a desirable quality of life. This study seeks to highlight indigenous environmental information and values as a basis for raising awareness of environmental problems and solutions.

Conceptual framework for proverb analysis

A combination of cognitive psychology and literary analysis is used to analyze the text of proverbs for natural resource information. Penfield and Duru (1988) adopted a cognitive psychological approach to analyze the role of language (Igbo proverbs) in child development. On the basis of related literature, the authors use a three stage analysis of Igbo proverbs. According to Penfield and Duru (1988), there are three levels of meaning in a proverb: i) the text or literal meaning, ii) the generalized or philosophical meaning, and
iii) the contextual meaning. The relationship between i) and ii) is analogic based on the concrete elements in the literal meaning associated with cultural truth, conveyed by the generalization in iii). This relationship is applied to a particular social context. While levels i) and iii) remain constant, the contextual use of a given proverb changes. This change is due to the various functions a proverb can perform, for example, warning, correction, or advise.

Penfield and Duru further modified Seitel’s (1976) analytical model from a two level, literal and contextual referents to a three level model as produced and illustrated below. An Igbo proverb: One hand cannot tie a parcel, applied to a big brother asked to help a young child with a chore, is used for illustration.

Figure 7. Model for proverb interpretation (Penfield and Duru, 1988, p. 123)

This study is concerned with the meaning of literal referents in level i and to a lesser extent level iii, the philosophical meaning.
What is of relevance is the concept of literalization involved in the interpretation of a proverb from Penfield and Duru’s (1988) model above. The authors indicated that the degree of interpretation depends on the degree of literalization. This concept refers to the complexity and difficulty of interpreting the proverb.

Literalization is defined thus,

- **Partial literalization** is where a referent in layer (i) is identical to another in layer (ii) and complete literalization is where $A = C + B + D$ (p. 23).

Complete literalization is usually used in adult conversation because of its complexity and deeper meanings involved.

Partial and complete literalization is in a way similar to the manifest and latent characteristic of a message in content analysis. Holsti (1969, p. 14) defines content analysis as a "... technique for making inferences by objectively and systematically identifying specified characteristics of messages." By objectively analyzing the natural and physical phenomena in the literal text of proverbs, one can glean material pertinent to Shona people’s knowledge, perception and values of natural resources.

**Literature as source of data**

The use of literature sources to validate historical reconstruction of trends, changes in societal attitudes and opinions is acknowledged by Hall (1969) and Beringer (1978). Alagoa (1966) indicates that reactions towards use of oral literature for similar purposes range from acceptance to rejection. Alagoa uses Nembe (Niger Delta) proverbs whose literal referents are political figures or
events to analyze traditional ideas on political institutions and leadership styles. The Nembe proverb, "The King has thirty ears," is interpreted in terms of divine and autocratic leadership/styles (Alagoa, 1968, p. 240).

Hall (1969) used literature as a source of data in his cross-cultural study of space perception. He identified "crucial components of messages that the author provided for the reader to build up his own sensations of space" (Hall, 1969, p. 94). An important consideration according to Hall in using literature as a source of data is that there are many levels of communication: what might be relevant on one level may not be on another level. Thus a proverb at the literary level has more metaphorical and symbolic meaning than when considered at the literal or manifest level, or partial literalization. For the purposes of studying proverbs as encapsulation of environmental information, a proverb's literal level is considered more relevant than the metaphorical meaning.

Categorization

Using literature as a source of data involves content analysis. Data are organized and placed into units and categories which represent processes or situations (Berelson, 1952; Holsti, 1969). Each proverb is treated as a unit permitting "precise description of relevant content characteristics" (Holsti, 1969, p. 94). The relevant content characteristic is the information about the natural resource phenomena conveyed by the proverb referent (tree, forest, fruit) in the text. This information was interpreted on the basis of whether
the cognitive, affective or psychomotor domain of educational objective was the thrust of the literal text. Thus the purposive nature of the sample of proverbs and consideration of the proverb as a unit led to categorization by domains of educational objectives.

The criteria for placing the units in relevant categories was based on Krathwohl's et al. (1958) elaboration of the taxonomy of educational objectives for the cognitive and affective domains. The characterization of locational and attributive information in IKS by Atte (1989) was also brought to bear in the criteria for the cognitive and affective domains. For the psychomotor domain, Harrow's (1972) material was used. Figure 8 shows each category, the criteria for admission and the operational definitions for the criteria.

Illustration

Proverb:

(1) Kuyevedza kwe maruwa/kunobva mumidzi
The beauty of flowers come from the roots.

Category: Cognitive

Criteria: Understanding and comprehension of the location of flowers in relation to the physiology of plants and nutritive process.

In addition to categorization by educational objective domains, the proverb was also placed in a values column. Common values related to natural resources as held by indigenous peoples and revealed in IKS literature determined the value dimension of the categorization framework. The criteria for admission into a value category were
<table>
<thead>
<tr>
<th>Category</th>
<th>Definition</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive locational information</td>
<td>location, direction, distance of phenomena in the environment</td>
<td>Recall, understanding, comprehension, application</td>
</tr>
<tr>
<td>Affective or Attributive information</td>
<td>descriptive information - quasi objective, evaluative or connotive</td>
<td>Assign meaning, values or attitude to natural phenomena</td>
</tr>
<tr>
<td>Psychomotor</td>
<td>Manipulative or kinesthetic discrimination</td>
<td>Abilities, interpretation of stimuli for various senses providing data for adjustment to environment through visual, auditory, olfactory, tactile, discrimination, and coordinated abilities.</td>
</tr>
</tbody>
</table>

Figure 8. Scheme for categorizing proverbs by domains of educational objectives (adapted from Krathwohl et al., 1958; Atte, 1989; Harrow, 1972)
derived from the philosophical generalization of the proverb. This is equivalent to Penfield and Duru's level iii meaning of the proverb as given in Hamutyinei and Plangger (1987) for each proverb. In the case of (1) illustrated above, the value dimension is ecological knowledge. In Shona society, the value of ecological information was put into conservation use. Makina (1981) describes rules and rituals for the collection of roots and bark for medicinal purposes that ensured plant survival. It was an offense to destroy the whole plant. This ethical practice was based on plant physiology. Figure 9 is a presentation of the data for study using the analytical framework described above and summarized in the steps listed below.

Steps in proverb analysis

The following steps in proverb analysis are adapted from Hall (1969), Holsti (1969), and Penfield and Duru (1988).

1. Identify the relevant level of communication -- literal text, or manifest content or partial literalization.

2. Identify the crucial component of the message as the criterion for categorization -- the domain of educational objective under which the attribute of the natural resource referent falls (cognitive, affective, psychomotor).

3. Check information in (2) above against other data -- behavioral data in other studies.
Sample of proverbs

The publication *Tsumo/Shumo* by Hamutyinei and Plangger (1987) is the compilation of Shona proverbs from which the purposive sample of 30 proverbs was drawn. The sample was purposive for several reasons.

First, the study was designed to show the presence of cognitive, affective, and psychomotor domains of educational objectives of the proverb texts. Thus, only those tree related proverbs belonging to one of these domains were selected.

Second, the study included illustrations of environmental education materials based on proverbs. This influenced the choice of proverbs which could be used for this purpose.

Third, trees and forests are high risk natural resources in Zimbabwe compared to other wildlife species. The selection of tree related proverbs provides a channel for highlighting the need for tree/forest conservation education.

Most of the proverbs were selected from the Hamutyinei and Plangger (1987) collection. This is indicated in Figure 9 by a number in brackets which refers to the proverb number in the book. Absence of a bracketed number means the proverb might have been contributed through a conversation or interview.

Validity

The validity of using proverbs as a source of data is largely based on their being widely recognized and accepted mode of expression as noted earlier. In Shona a proverbial expression is usually prefixed by "... ndosaka vakuru vakati + proverb" translated "...
that is why the elders said + proverb." Hamutyinei and Plangger (1987) point out the "vakuru vakati/the elders said" is indicative of both the power of sanction by elders and approval by the generalized other. Elders in Shona and African culture in general were (and to a great extent are still) regarded as custodians of much knowledge and wisdom (Njoroge and Bennars, 1986). The elder's role as a resource person is expressed in an African proverb, "When a knowledgeable old person dies, a whole library disappears." It follows then that the knowledge of the natural and physical world as expressed in Shona proverbs is rooted in the cultural and technical knowledge of a given people.

Presentation and Discussion of Findings

Figure 9 is a presentation of the proverbs by categories and value dimensions as explained earlier. The data are presented under two headings: educational objective domains and value dimensions.

Educational objective domain

The process of knowledge acquisition in IKS involves various modes and levels of observation as is the case in any scientific knowledge generation process. Kenyatta (1938) indicates that Africans paid much attention to the role of observation in the learning process of the African child. The Gikuyu child learned to distinguish a great variety of birds, animals, insects, trees, grasses, fruits and flowers. The ability to observe was considered very important because counting was a taboo in Gikuyu society. Therefore, a young boy as a
herder needed to keenly observe and know animals by color, size, type of horns and naming. It has been said that the Ndebele people of Zimbabwe had 30 cattle color categories. Although there was no counting taboo among the Shona, the ability to observe was also a very important aspect of their farming, pastoral and hunting life. This is illustrated in the proverbs in the cognitive and psychomotor domains categories.

Range of cognition

Knowledge about plants conveyed in the proverbs text include plant physiology (1,8); production pattern of fruit trees (6,16); entomology and pests related information (15,22,25).

According to Atte (1989), locational information is for encoding, storing, and decoding information about the location, direction and distance of phenomena in the environment. Proverb 12 indicates the presence or absence of the loquat fruit tree in a particular ecological setting. Proverbs 15, 22 and 25 describe the locations of insects inside fruits and dead wood.

Plant-animal dependence relationships in the ecosystem are conveyed in proverbs 3, 4, 7, 10 and 14.

Behavioral application of information

The psychomotor related domain proverb referents show human behavior to, or reactions based on knowledge of the environment. The knowledge acquired through the senses is conveyed in 8 where the poisonous aspects of the bitter apple makes it a tabooed fruit. The
sparse vegetation of the vlei (plain) in 11 makes it an unlikely place
to hide in case of trouble compared to the forest. However, under
different circumstances, even the forest is no place to hide because
(implied) it is common property 17. The danger of big fires whose
origins are small and unnoticed is recognized in 23. The ridiculous
and stupid waste of effort in collecting wild spinach through a trap
(used for animals) is implied in 28.

Knowledge based values

In the affective domain, evaluative or connotive remarks are
given in relation to attributes of a natural resource referent in the
proverb. In 1 the beauty of the flower is appreciated only in as far
as it depends on the roots in the plant physiology process. The value
of the flower to the bee is in terms of pollen contribution. Thus a
wilted flower does not attract the bee 13. Similarly, the usefulness
of the forest or vlei 11 is relative to the circumstances requiring a
particular density of vegetation. Eating of hute fruits as a main
evening meal by an expert farmer in 30 is a sign of desperate hunger
circumstances. The hute tree will produce fruits even in adverse
climatic conditions.

It can be seen from the proverbs in each category that proverbs
are indeed an encapsulation of ecological information born out of
close observation and interaction with the natural environment.
Use-value dimensions

A survey of literature on Shona environmental indigenous practices and data from interviews with elderly people in Table 1. Natural resource management value bases

<table>
<thead>
<tr>
<th>Base</th>
<th>Practices</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ecological basis</td>
<td>- methods of herb collection</td>
</tr>
<tr>
<td></td>
<td>- methods of firewood collection</td>
</tr>
<tr>
<td>2. Economic basis</td>
<td>- fruit and food collection regulations</td>
</tr>
<tr>
<td>3. Ideational (values, attitudes) basis</td>
<td>- taboos and totemic practices</td>
</tr>
<tr>
<td>4. Religious basis</td>
<td>- respect for nature</td>
</tr>
<tr>
<td>5. Social basis</td>
<td>- corporate ownership and responsibilities</td>
</tr>
<tr>
<td>6. Aesthetic basis</td>
<td>- appreciation of nature's beauty</td>
</tr>
</tbody>
</table>

Manicaland Province and other parts of Zimbabwe show that ecological knowledge was applied to natural resource management (Makina, 1981; Tobayiwa and Jackson, 1985; Wilson, 1989). There are several value bases of NRM practices that arose from the people's knowledge as shown in Table 1.

Ecological basis

Knowledge of plant properties was applied in the NRM system through such practices as designated methods of collection of medicinal herbs (methods of debarking for fibre) and firewood
collection in order to preserve the shrub or tree. The herbalist needing the bark of a particular tree would always debark in a manner that ensured the tree or plant would not suffer from excessive sap loss (Makina, 1981). Similarly only dead wood on the ground was to be collected as firewood contrary to the present practice of tree cutting for firewood. Relevant proverbs for ecological knowledge are based NRM 1, 4, 11, 12, 14, 15, 23, 26, 27.

**Economical basis**

The purposive sample used did not give many economic related proverbs. The reason is that the main economic activities were agriculture and hunting. Relevant proverbs for these two activities have domesticated animals like cattle, wild animals, land/soil and crops referents. These were not included here. However, there were rules and regulations protecting food/fruits (18, 19, 29) or consumptive resources like firewood, for example, implied in 25 is the practice of collecting only deadwood for firewood. There is a taboo against cutting fruit trees or obtaining ripe fruit from a tree by throwing an object. This is the import of the "trick" aspect in proverb 29. The individual feels tricked (enticed) to break a regulation to obtain the ripened fruit through prohibited means.

**Social basis**

There were at least two social bases for NRM among the Shona: common property rights and responsibilities and rules and regulations prescribed for utilization of natural resources. Cheater (1986) uses
### PROVERBS AND THEIR EDUCATIONAL OBJECTIVE DOMAIN CATEGORIES

#### VALUE DIMENSION

<table>
<thead>
<tr>
<th>Cognitive</th>
<th>Ecological</th>
<th>Economic</th>
<th>Social</th>
<th>Religious</th>
<th>Aesthetic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Kuyevedza kwemaruwa kunobva mumidzi.</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The beauty of flowers come from the roots.</td>
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<tr>
<td>2. Tendai/muchero ugowisa. (1274)</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Be grateful (to the tree) so that it may yield more fruits.</td>
<td></td>
<td></td>
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<td>3. Ruva rasvava harikwedzi uchi. (1197)</td>
<td></td>
<td>X</td>
<td></td>
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<tr>
<td>A wilting flower does not attract bees.</td>
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<td></td>
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<tr>
<td>4. Kure kwegava ndokusina mutsubvu. (284)</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
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</tr>
<tr>
<td>Far for a jackal is where there is no mutsubvu fruit tree.</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Mwoyo muti unomera paunoda. (1154)</td>
<td>X</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>The heart [of love] is like a tree, it germinates where it likes.</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>6. Mukuwasha mukuyu hauperi kudyiwa. (921)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>A son-in-law is a fig tree; he never stops being consumed.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Gunguo rinodya mbamba/rino, muchero waro. (175 &amp; 6)</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>If there were no (bambara) groundnuts, what [fruit] would the crows eat?</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Iringa nameso muchero wenhundurwa. (244)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>It's a thing to be looked at only (like) a bitter apple.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>It is mysterious if a baboon falls from a tree.</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Mbudzi kudy a mufenje/kufana nyina. (962)</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(If) a goat eats cabbage-tree leaves, it imitates its mother.</td>
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</tr>
</tbody>
</table>

Figure 9. Proverbs by categories and value dimensions
11. Zvandiwanira pabani/dai manga muri musango ndaihwanda mumuti.
   It has found me in the vlei/if it was in the forest, I would have hidden in the tree.

12. Mazhanje ari musango/asi handi masango ese ane mazhanje.
   The mazhanje fruits are in the forest, but not all forests have mazhanje fruit trees.

Affective

13. Chakupa sango hachishorwe.
   What the forest gives you should not be despised.

14. Maunga marema kudyadumi waagere. (97)
   Hairy caterpillars are stupid, they feed on the tree which they live.

15. Ngezmweo zvimbutu zvamaonde.
   It is typical (like) insects inside a fig.

16. Totenda maruva/tadya chakata. (791)
   We believe in the blossoms after eating the chakata (parinari) fruit.

17. Dondo harina mbikira. (1551)
   A forest provides no place for hiding (something).

18. Muchero wakurumbira wakuwa. (691)
   A fruit that is plentiful [and popular] is already out of season.

19. Muchero wesango hauvimbe navo. (788)
   The fruit of the forest cannot be relied on.

20. Mukadzi isango rehuni/rino tsvakwa naani naani. (1187)
   A woman is like a forest in which anyone can look for firewood.

Figure 9. Continued
<table>
<thead>
<tr>
<th>Number</th>
<th>Proverb/Expression</th>
<th>Translation/Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>21.</td>
<td>Kufira guyu kuuya/hazvienzani nekuflra shamba. (31)</td>
<td>To die for a fig is better; it cannot be compared to dying for a cattle melon.</td>
</tr>
<tr>
<td>22.</td>
<td>Kuona onde kutsvuka/imo mukati mune honye. (823)</td>
<td>A fig can be red [brown and ripe] outside/yet there are maggots.</td>
</tr>
<tr>
<td>23.</td>
<td>Kamoto kamberevere/kakano pisa sango mberi. (1632)</td>
<td>A small and sneaking fire burns logs far ahead [can cause a big fire].</td>
</tr>
<tr>
<td>25.</td>
<td>Matanda masairirwa/unosiya nerino muchenje. (1443)</td>
<td>(Standing) logs are [to be] tested; you may leave the one eaten by ants.</td>
</tr>
<tr>
<td>27.</td>
<td>Hombarume haiiti shura ne sango. (1772)</td>
<td>A hunter has no mysterious notions about the forest.</td>
</tr>
<tr>
<td>28.</td>
<td>Kuvaraidza zuva/kuteya moa neriwa. (variant of 1236)</td>
<td>It is just killing time if one sets a stone-trap for wild spinach.</td>
</tr>
<tr>
<td>29.</td>
<td>Mashanje echakata/kutsvukira mumuti kuti ndiposherwe. (816)</td>
<td>It's the trick of a chakata fruit to redden [ripen] on the tree and so to become a target.</td>
</tr>
<tr>
<td>30.</td>
<td>Yaruma sei nzara/hurudza kuratira hute. (836)</td>
<td>How biting the hunger must be that (even) an expert farmer eats wild plums in the evening.</td>
</tr>
</tbody>
</table>

Psychomotor

<table>
<thead>
<tr>
<th>Psychological Category</th>
<th>Example</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ecological</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Economic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Religious</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aesthetic</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

Figure 9. Continued
the concept of usufructuary rights (which usually refers to land use rights for cultivation) to include use of other natural resources and indicates that

In Shona society, . . . everyone had the right to use public pathways, springs and wild fruit trees, whether or not they were located on land to which individuals had cultivation rights (p. 55).

Proverbs (14, 15, 16, 17)

14 a forest is no place to hide
15 The plentiful (popular also) fruit is short lived
16 Fruits of the forests cannot be relied on
17 A woman is like firewood, anyone is entitled to look for

indicate the right of any member of the community to forest products like fruits and firewood. In fact, the literal texts of these proverbs sound like Hardin's (1968) notion of the tragedy of commons. According to Hardin, resources held in common will inevitably be overexploited and degraded. While these proverbs' literal meaning give this impression, in actual practice the Shona situation was not one of open access. Open access, according to Bruce and Fortmann (1989), is a situation where no group has user rights and no potential user is excluded.

Common property as applied by the Shona had specific behavioral rules for resource utilization. Some of these rules are revealed in the texts of proverbs 23 and 27.

23 (Standing) logs are [to be] tested; you [may] leave the one eaten by white ants
27 It is the trick of a chakaa fruit (parinari) to redder [ripen] on the tree and so become a target

Only dead wood was to be collected as firewood from the forests. Tree cutting, partial or totally, was only allowed for building or
furniture making purposes as stated by elderly people in interviews. This is in direct contrast to wholesale forest destruction due to population and land pressure that is so prevalent in many areas of Zimbabwe. Hamutyienei and Plangger (1987) in their explanation of proverb 11, (Hairy caterpillars are stupid, they feed on the tree on which they live [no. 97 in the book]) say that, "This proverb may be used to dissuade boys from cutting a tree in order to get its fruits which they cannot reach from the ground" (p. 24).

This explanation is similar to the rule indirectly stated in proverb 27. The use of the word trick implies someone being led to do something that they would not otherwise do. To collect a ripe (redden) fruit from the tree by throwing a stick or stone was prohibited. Similar regulations existed for the amounts of fruit or other food products one could collect at a time. These common property rules ensured equitable distribution of resources between members of the community, and between them and the wild animals. These rules and regulations more often than not were backed by religious sanctions in the form of taboos.

**Religious basis**

Taboos, sacred phenomena and respect for nature were common NRM techniques (J.E.S.T., 1936; Mitchell, 1961; Tobayiwa and Jackson, 1985).

**Taboos** Religious taboos relating to trees are exemplified by proverb 8 (It's a thing to be looked at only like a bitter apple). The taboo on the bitter apple seems to have been a protective device
against a dangerous/poisonous plant. Similarly, some trees were tabooed as firewood because of their offensive smoke (to the eyes) or smell. On the other hand, some trees were for specified uses and nothing else, for example for making tools (hoe or spear handles), or for ceremonial occasions like burials or graveside trees. Wilson (1989, p. 387) observed that "... nearly all southern Shona will add that it is a taboo to cut down fruit trees in the fields."

Ayisi (1979) compares the breaking of a taboo to a sociological virus which could spread like an epidemic. In other words, taboos had individual and social implications. A violation of some taboos was supposed to affect the whole community (for example, induce drought situation). The social implications led to social control. Restitution rituals would involve the whole community.

Sacred forests Sacred trees/forest phenomenon in Zimbabwe has been observed by McCallum (1976), Mitchell (1961), Makina (1981), and Wilson (1989). McCallum (1976, p. 299) makes an important point related to *mupangara* *albizia gummifera* when he says, "Another name indicating observation of wildlife is 'the tree that daisies find difficult to climb.'" This tree, according to McCullum, produces a gum used in pharmacy, calico-printing and for other purposes. The taboo is apparently for the protection of a tree with economic value. Sacred forest taboos operated through limited access or stipulations of desirable behavior in those forests (Makina, 1981).

Respect for nature Proverbs 2 and 10 sum up the general respectful attitude of the Shona towards natural environment. This
attitude was based on the belief of the pervasive God-Mwari of the cosmos (Mbiti, 1970).

2 What the forest gives you should not be despised
10 Be grateful to the tree so that it may yield more fruits

Respect of what Musiki (the creator) had given was incorporated in what could or could not be said about a given aspect of the natural and physical world. To say this fruit is tasteless, or this mushroom is rotten, or that baboon is ugly was considered a serious spiritual offense. Punishment included loss of sense of direction while in the forest.

To keep the forest clean there were rules for using the forest as a toilet. If these rules were not followed (not covering up excreta) consequences as bizarre as being followed by one's excreta wherever you went acted as control mechanisms.

Kenyatta (1938) indicates that some taboos were used as methods of instruction for health, hygiene and, in this case, for NRM notwithstanding their logic, validity, or lack of it.

The above discussion of a few proverbs has shown information in cognitive, affective and skills domains related to natural resource utilization and values. How can proverbs be used in environmental management education?

Application to Extension Education Programs

Although the circumstances in which the proverbs were derived and the NRM practiced as described have changed, this indigenous knowledge can be used as a cultural basis in designing and implementing present day NRM programs as illustrated below.
**Generation of new values and proverbs**

The culture based indigenous knowledge and values can provide the framework for working out programs that are applicable to contemporary demands. Taboos and sacred phenomena, for example, have been affected by secularization, Christianity and western scientific

<table>
<thead>
<tr>
<th>Program Type</th>
<th>IKS Basis &amp; NRM Today</th>
</tr>
</thead>
</table>
| 1. Preventive | - build on common property rights and responsibilities in place of destructive individualistic consumerism  
- substitute taboos with meaningful and rewarding social sanctions relevant to the situation |
| 2. Promotive  | - produce development-oriented, NRM materials for adults and schools based on proverbs' literal and metaphoric meaning |
| 3. Rehabilitative | - research and improve on indigenous tree species to combat deforestation  
- build on fruit tree taboos to promote fruit tree growing for nutrition, shade, windbreaks, and other agroforestry programs |
| 4. Communication training | - build into extension curriculum language aspects of communication, i.e., ability to understand and use people's idiom of expression |

Figure 10. Application of proverbs to extension education in NRM

Influences. Fear of the bizarre or religious sanctions are no longer the basis of environmental related behavior. Appell (1987) observed
that conversion to Christianity led to forest degradation among the Rungus Dulsum of Sabah, Malaysia because there was no need for protection by rogon (spirits of the natural and social world). One elderly man in Manicaland echoed this type of value-behavior change when he said,

Chirungu chakauya, hapana chichayera.  
Nothing is sacred anymore, since the coming of the white man’s civilization.

The situation requires generation of new values based on what is familiar. Tree and forest protection and afforestation programs could use the concepts of taboos and stewardship to explain the negative long term effects of forest clearing. Government regulations and other similar measures could be translated as the taboos of the day. The proverb 10 ([If] a goat eats cabbage-tree leaves, it imitates its mother) can be used to explain that things can no longer be done according to tradition without modification or change.

Secondly, knowledge is generated in response to prevailing conditions and demands. Chimhundu (in Hamutyinei and Plangger, 1987) gives proverbs based on modern imagery. Three of these are listed below:

1. Saga reshunga/rakapera netisipunu  
The bag of sugar/was finished by teaspoon.

2. Chabhenda chabhenda/njanji haiswatudzwi  
What is crooked is crooked/a railway line cannot be straightened.

To tremble before a policeman/it is because you have dagga [drug] in your pocket.
These proverbs clearly depict prevailing conditions. Unlike Chimhundu, who does not encourage conscious coinage of proverbs, we suggest that such a conscious effort should be tried. The young people, for example, could be challenged to come up with proverbs or stories that convey environmental concerns from their perspective. Such a project could provide a vehicle for enjoyable learning in response to matters of serious national concern like conservation.

**Proverb based development material**

Proverb text is rich with material that can be used in developmental literature for formal and nonformal education. Proverb 5 (The heart is like a tree, it germinates where it likes) compares the free spirit of love with the ubiquitous tree or forest. This proverb has been used by the author to write a page long teenage love story located in Mabvuku residential area of Harare, once surrounded by thick forest. Today the Mabvuku area is like a desert. Trees no longer germinate where they like. The simple story is used as a basis for discussion and raising awareness on deforestation, causes of soil erosion, and the need to see economic demands of agriculture and fuelwood within a long term context of environmental impact. Culture based teaching-learning materials can contribute to reducing developmental conflicts of technical packages that are not based on emic perspectives.
Communication

Extension is almost synonymous with communication (Lionberger and Gwin, 1982; van den Ban and Hawkins, 1988; and Freire, 1970, 1973). Except for Freire, the language aspect of communication is usually given minimal attention. Freire (1973, p. 137) says,

Efficient communication requires the subjects in dialogue to direct their "entering into" towards the same object. It requires that they express it by means of linguistic signs belonging to a linguistic universe common to both so that they can have a similar comprehension of the object of communication. In this communication, which operates through words, the relation of thought-language-context or reality cannot be broken.

Freire's words are very applicable to the Zimbabwe situation. It is common knowledge that young extension workers communicate in a mixture of Shona and English (colloquially known as Shonglish). The author listened to an extension worker give instruction on poultry and how small creatures called bacteria, which cannot be seen by the naked eye, can cause diseases. In Shona beliefs, disease can be caused by invisible people called witches. The equating of bacteria with witches can cause some "noise" in communication (Rogers, 1983). However, if the concept of witches is used as a familiar frame of reference to explain bacteria or germ theory as witches causing diseases in poultry, there is likely to be "similar comprehension of the object of communication." Unfortunately communication in extension seems to be based on the premise that farmers must understand phenomena in western scientific framework. This hinders the learning process. The objective should be finding aspects within
the culture that can be used as teaching and learning vehicles. Proverb text or other indigenous communication media can be used in this manner effectively.

A second important aspect of communication is the contextual use of proverbs. Proverbs in speech can be used to reinforce ideas or to correct behavior. Both aspects can be applied in extension. The corrective use of proverbs is extolled for the indirect, diplomatic but terse way of pointing to negative behavior without putting down the addressee (Penfield & Duru, 1988). The judicious use of proverbs can be very important in a society which, according to Samkange and Samkange (1980, p. 34), "sets a premium on human relations." An extension worker could use proverb 30, for example, in a humorous way to indicate that if soil conservation practices are not followed we might get to such low yields that it can be said of us,

How biting the hunger must be that (even) an expert farmer eats wild plums in the evening.

Proverbs for reinforcing ideas was illustrated by the spokesperson of a village farmers' group at the end of Guruve Field Day in Kachuta village in northeastern border of Zimbabwe on May 15, 1987. In thanking the extension personnel and university staff and students for their visit and important information, the spokesperson used the proverb,

Njere moto unogokwa Knowledge is like live coals [in the traditional cooking fireplace] it can be borrowed [by a neighbor to start their own fire in the absence of lighters or matches].
The idea of knowledge exchange conveyed in this proverb is fundamental to the central concern of this study, i.e., indigenous knowledge as a basis of knowledge exchange and generation in which farmers participate as equals. Fortunately, there is some evidence of appreciation of people's knowledge as conveyed by Pito Shiri, a Zimbabwe extension worker, who said,

The most important thing is to get to know people's traditions and humble yourself before them. Don't try to be different or act as a "professional" from outside. If you can get farmers to understand that they know things you don't know, then you have got them on your side (Sofo et al., 1980, p. 30).

In summary, this study has demonstrated the application of Posey's (1987, p. 197) observation that

Myths encode important ecological information, as well as social rules of behavior. Thus what superficially may seem to be nonsense or superstition may be structurally codified to transmit a variety of fundamental ideas at different semantic levels.
SECTION II. SHONA CULTURAL VALUES IN NATURAL RESOURCE MANAGEMENT: IMPLICATIONS FOR EXTENSION EDUCATION

Introduction

A survey of literature on ecology and environmental concerns shows a shift in emphasis from matters purely ecological to increasing concern with the human and cultural dimensions of natural resource management (Muchena and Vanek, in press). Cultural values of natural resources are often embedded in religious and social phenomena in indigenous societies (Posey, 1983; Pitt, 1985; Makina, 1981; Hansen and Erbaugh, 1987; Altieri and Merrick, 1987).

Purpose and Objectives

The purpose of this study was to analyze cultural values that formed the basis of indigenous natural resource management (NRM) of the precolonial Shona people of Zimbabwe. The specific questions the study addressed were:

1. What values did the Shona people have for natural resources?
2. How were the values reflected in natural resource management?
3. What relevance do these values have in contemporary environmental education?

Methodology

The study used a historical (and anthropological analysis) research technique within an anthropological framework to critically examine data from secondary sources of IKS literature.
Leach (1976, cited in Pitt, 1985) distinguished empirical anthropology based on direct observation of behavior from rationalist anthropology which emphasizes categories of thought and ideology. Empirical anthropology provides information on human behavior. Pitt (1985) acknowledges Evans-Pritchard's studies in the 1940s as rationalist anthropology which showed the importance of ideas and social values in ecological behavior. This study belongs to the rationalist anthropology paradigm as it explores the social values of Shona people's ecological behavior.

Posey (1983, p. 879) defines ethnoecology as "indigenous perceptions of 'natural' divisions in the biological worlds and plants-animals-human relationships within each division." (Emphasis added.) This integrated system of beliefs (perceptions), cognition and practices (relationships) that Posey observed among the Kaypo of the Amazonian is present among indigenous peoples across the world: the Native Americans in North America (Hill and Mohawk, 1989); the Chinese in southwest China (Pei, 1985); in Kenya (Barrow, 1988); in Indian (Guha, 1985); and the Shona of Zimbabwe (Alvord, 1929; Murphree, 1969; Makina, 1981).

Lovelace (1984) in Cultural Beliefs and Management of Agroecosystems in South East Asia delineates the subsystems that make up the human ecosystem. The natural world subsystem is made up of the biophysical and the context of human existence. The socio-cultural context is made up of the social, political, economic and arts.
Figure 11 is a diagramatic presentation of the two main subsystems and their respective subdivisions.

According to Lovelace (1984), the subsystems are internally dynamic, while interaction between the subsystem also exist. Those subsystems are important in the emic and etic analyses of ecological behavior. The emic perspective provides the internal conceptions and perceptions of the natural environment while the etic perception provides the framework for determining the effects and/or significance of beliefs on human ecological behavior (Lovelace, 1984).

Lovelace's view is similar to Wamalwa's (forthcoming) description of the African's two pronged approach to resource utilization shown in Figure 12.
Figure 12. An African approach to resource utilization (adapted from Wamalwa, forthcoming, pp. 46-50)

The physical approach is comparable to Lovelace's natural world subsystem. The psychological approach is comparable to Lovelace's sociocultural subsystem. The latter as cognitive and psychological elements provide the cultural basis in natural resources management that is the subject of this study.

Bennett (1980) argues that human components are to be seen as analytically equal to environmental components in the socionatural system. One reason for the analytical neglect of cultural values in ecological matters is that these values are often encoded in religious beliefs, rituals, ceremonies, and myths (Posey, 1983; Brokensha et al., 1980; Hill and Mohawk, 1989). Those accustomed to seeing reality in rational scientific or economic terms tend to ignore or dismiss such values in their analyses. This study is a confirmation of Bennett's (1980) view that the human components have to be analytically equal to environmental components.
Religious Values in NRM


Nature in the broadest sense of the word is not an empty impersonal object or phenomenon: it is filled with religious significance--God is seen in and behind these objects and phenomena: they are his creation, they manifest him, they symbolize his being and presence.

Metuh (1981, p. 48) supports this view and adds that "beliefs fit together in the logic of those who believe."

Several writers on ethnoecology endorse Metuh's observation and argue that it is necessary to understand this view to avoid labelling or dismissing such beliefs and values as illogical or superstitious (Posey et al., 1984; Cohn, 1988). The rest of the paper presents and discusses some of the cultural values undergirding precolonial Shona NRM and assess their applicability to current extension education programs.

Shona Cultural Values as Basis for Natural Resource Management

The data for the discussion are from the secondary sources and unstructured interviews/discussions with elderly people in selected parts of Zimbabwe between 1985 and 1988. The data are grouped under two broad value categories: religious and socio-economic. Figure 13 is a summary of the data.
<table>
<thead>
<tr>
<th>Value Category</th>
<th>Manifestation</th>
<th>Practice</th>
<th>Indicators of Success</th>
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<tbody>
<tr>
<td>Religious</td>
<td>Land views</td>
<td>• Ownership and administration</td>
<td>• Security, ecological stability and sustainability</td>
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<td>• Land management</td>
<td>• equitable distribution</td>
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<td>Stewardship</td>
<td>Sacred Phenomena</td>
<td>• Social and political significance</td>
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<td>• Taboos</td>
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<td></td>
<td>• Totems</td>
<td>• Conservation</td>
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<td>• Rituals</td>
<td>• Biodiversity</td>
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<td>• Myths</td>
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<tr>
<td>Economic</td>
<td>Agriculture as a way of life</td>
<td>• Agriculture and hunting techniques</td>
<td>• Tenacity under difficult conditions</td>
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<td></td>
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<td>• Attitude to land</td>
<td>• Ecostability</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Security</td>
</tr>
</tbody>
</table>

Figure 13. Cultural values as basis for natural resource management in IKS
Land

According to Burger (1987), land has religious, political, social and economic significance to indigenous peoples. Among the Shona land was a God-given resource not owned by any human being. Murphree (1969, pp. 48-49), in his study of Christianity and the Shona, shows that Mwari - God of the cosmos, etymologically means the "begetter or bearer" who "emerges as the creator, the source of nature, life and rain."

Traditional religion for the Shona, according to Murphree (1969, p. 148), has "the advantage of close connection with tribal leadership, and with ideas of land ownership and land fertility."

Land was invested in the ancestral spirits (who represented the dead and the living). It was administered by the chief as political leader who was accountable to spiritual leaders, spirit mediums (Bullock, 1927; Carbutt, 1927; Holleman, 1952). Alvord (1929, p. 9), the founder of agricultural extension for the Africans in Zimbabwe (Rhodesia then) and the architect of the Land Husbandry Act, observed that,

Every native farming practice, . . . , has back of it a definite (and to the native a sensible) reason. These reasons are based on tradition, superstition, worship of the departed dead and fear of the unknown.

According to Garbett (1963) every adult member of a village was entitled to land use, and forfeited that right on leaving the village or being accused of witchcraft. Land was never regarded as an individually-owned or inheritable property. Robinson (1969, p. 18)
states that "Individual ownership of land is an alien concept to him [the African in Rhodesia then], the land "belongs" to the chief and is for the free use of all members of the tribe according to their needs."

The close relationship between the indigenous people is acknowledged by early colonial administrators (Alvord, 1929; Robinson, 1960; Robertson, 1969). Alvord (1929, p. 9) described the natives as, "They are of the earth earthy."

The epitome of this relationship was expressed in one of the liberation struggle's slogans - "mwana wevu" (the child of the soil) - a political endearing term used to refer to the black people. The land issue was at the core of the liberation struggle as freedom from white domination was to be largely manifested by recovering of the colonially-expropriated land.

Land expropriation from 1893 throughout the colonial history was effected through violent (war), political and legal (Acts of Parliament) means. Samkange and Samkange (1980) indicate that the Mashona rebellion of 1896 was largely because the Europeans were seen to take the "untakeable," i.e., the land. According to Phimister (1986), by 1904, so much land had been expropriated by the whites that Sikombo, a native, complained that "It appears that all the country is occupied by (white) farmers. There is nobody but farmers." Expropriation meant the eviction of blacks from the best land to marginal and poor areas. In 1909, blacks on unalienated land had to pay rent to the British South Africa Company and in 1912, grazing
fees. Through successive measures, such as the Land Apportionment Act of 1931, Land Husbandry Act of 1951, and the Land Tenure Act of 1969, the country was divided into almost two equal halves between the minority colonial settlers and the majority indigenous peoples. The settler farmers were buying land cheaply from the company, not even from the chiefs.

The precolonial Shona land tenure system and the colonial land expropriation system reveal the contrasting views toward land.

Why was land so important to these two groups of people? To the Shona, land was a resource for survival, part of their natural resource heritage. To the colonial settlers, on the other hand, land was a commodity, a source of wealth, to be exploited for maximum profit. The maximum profit objective was achieved through ownership of thousands of acres by individual farmers, and the growing of cash crops. The differences in land tenure values led to etic perspectives aptly summarized by Robertson (1969, p. 18):

The experts in African development, the agriculturalists, the pastoralists, the ecologists, the economists, etc., etc., saw this tenurial system of the African as the sole cause of the deteriorating land position. They argued that a man could not be expected to care for and conserve his parcel of land unless his right of occupation was inalienable and that under the existing system he could be dispossessed by any of a number of agencies. (Emphasis added.)

What the experts seem to have overlooked was that the African regarded his right to land use as inalienable because it had divine sanction which the new order was threatening or did not recognize.

The Shona farming system had inbuilt land management practices through shifting cultivation, slash and burn operations, land rotation...
and ample grazing with no congestion and overstocking (Robertson, 1969; Myers and Ames, 1984). For cultivation, a short-handled hoe was used. Dried wood from the clearing process was burned and applied to the soil as fertilizer. These practices were adequate and appropriate, given the small scattered population and availability of land.

Land as a natural resource imbued with religious values also provided security through the tenure system, social and political significance. Land management practices ensured its sustainability and ecological stability.

**Stewardship of creation**

The African view that nature is filled with religious significance (Mbiti, 1970) engendered attitudes of almost reverential fear manifested through sacred phenomena like taboos, totems, rituals and myths. The role of the sacred phenomena in natural resource conservation observed by Makina (1981) was confirmed through primary data from interviews with the elderly in rural Zimbabwe. Sacred mountains (Nyangani Range, especially Binga, Mukotso, Popwe and Chapungu), sacred forests (Sango re Va Nyemba), sacred trees (Muchakata, Farinari, Mutuwa-Kirkia), lions (lions, leopards), Mutarazi Falls in Samanga area (said to have many medicinal plants), sacred animals and birds were often quoted as examples. Protection of these sacred forests, animals and birds was regulated through taboos. Breaking of a taboo was considered a serious spiritual offence to the creator of the phenomena. The offense had individual and social
dimensions. The social dimension implied social sanction against the individual, family and/or community.

The Shona have a totemic clan name system based on wildlife. According to Tobayiwa and Jackson (1985, p. 229), "Each person has a totem animal or part of an animal, whose name is received through the father." Totems contributed to conservation through taboos against killing and eating one's totemic animal or part of it, encouraging aesthetic and inspirational values of wildlife. Tobayiwa and Jackson (1985, p. 229) observe that totemic praise poetry "show close observation and attachment to nature." The authors further explain that,

The reverence afforded to one's "mutupo" [totemic clan name] animal takes many forms. . . . a special effort was made to highlight those qualities of the totem animal in which it excels . . . elegance, gaiety, dignity, strength . . ." (Tobayiwa and Jackson, 1985, p. 232).

This brief account of the sacred phenomena illustrate Posey's (1983, p. 890) observation that "Cycles of ritual and ceremonies have been shown to function as regulators of natural resources." The outcome of these natural resource management practices was ecological stability and biodiversity.

**Economic values**

Agriculture was the main economic activity of the indigenous Shona, even though they regarded it a way of life, not an occupation (Alvord, 1929).

The agricultural prosperity of the Shona was quite evident at the turn of the 19th century when the colonialists first made contact
(Myers and Ames, 1984). This was evident through the agricultural skills practiced, the great variety of crops grown, and the volume of local and long-distance trade. Planting took place at the beginning of the rainy season and involved intercropping. The crops grown included several varieties of millet and sorghum for the drier areas; maize and rice for the wetter areas. Vegetables included peas, beans, sweet potatoes, pumpkins, marrows, melons, cucumbers, and tomatoes. Other crops grown were tobacco, groundnuts, yams, cassava, and cotton. Cattle, sheep, goats, and fowls were also raised as part of the farming system.

With the establishment of mining communities by the colonialists, new markets were opened for the Shona. Phimister (1986) notes that in 1903, the blacks sold agricultural products valued at £600,000. That the Shona were not simple-minded, small peasant/backward farmers is illustrated by the fact that in 1903, they were responding favorably to the new markets. However, when the colonial governments introduced various measures to curb their agricultural performance and the threat to white farmers, the producers refused to sell and stopped growing maize in 1934 (Stoneman, 1981).

Initially white farmers performed poorly in agricultural production, compared to the black population. Myers and Ames (1984) give some insight to the situation:

Although the Europeans (white) deplored the African system (of farming), their own system of deep ploughing with emphasis on rotation rather than leaving the land to fallow produced yields inferior to those of the African peasants until after World War II, when inputs of fertilizer and farm mechanization resulted in higher yields and larger cropping areas. . . . By
early 20th century, Shona farmers were marketing surplus crops to European settlers who were less proficient (p. 88).

Wilken (1987) gives three measures of return in traditional resource management: ecological stability, security, and effectiveness under difficult conditions. From the brief descriptive analysis of Shona land tenure and agricultural system, success was achieved. Ecological stability was achieved through shifting cultivation and religious based conservation practices. Security of tenure was ensured through the religious and politically based land tenure system. Effectiveness under difficult conditions was demonstrated by the refusal to sell and the stopping of maize growing under adverse conditions.

Implications

The introduction of commercial farming, different forms of land tenure and other economic, political and social developments have resulted in modifications of values towards religion, land and nature. The National Conservation Strategy: Zimbabwe's Road to Survival (1987), the official policy statement on conservation, states that land clearing for cultivation, increased demands for fuelwood and building materials, destruction of woodlands, population pressure are all contributing to the depletion of natural resources. What can be the relevance of cultural values to these current NRM problems in Zimbabwe?

According to Lovelace (1984) belief systems have four adaptive functions: provide interpretations and explanations of reality or
phenomena, a basis of understanding, provide security and a basis for 
solidarity and action. These adaptive functions become critical for 
complex and rapidly changing situation like Zimbabwe. McNeely and 
Pitt (1985) point to the need for balancing the alteration of negative 
traditional values with the promotion of positive ones. The challenge 
lies in translating or transforming these values to apply to 
contemporary situations.

The value of agriculture as a way of life provides an example of 
an indigenous value that can be used as a basis for promoting 
contemporary agricultural development and natural resource management. 
Agriculture in IKS is a way of life encompassing economic (food 
supply), social (land as common property implying common values and 
responsibility), religious (land as a God-given resource), political 
(land administration a responsibility of the chief or government). 
This holistic approach could be used as the basis of an agricultural 
extension program on land management and conservation. The economic 
importance of agriculture could be highlighted by food security and 
foreign exchange earning, two issues critical to national survival in 
Zimbabwe and other developing countries.

Politically, governments (the modern chiefs) still administer or 
control land distribution in a national framework. Land is still a 
serious issue after independence even though the religious sanctions 
of its ownership have practically disappeared. However, 
secularization and westernization has not weakened the promotion of 
religious values even in the formal education system. A comparison of
land views or nature views across world religions could be some basis for discussing land conservation within the formal and nonformal systems of education.

Although the land tenure system and values have changed to a certain extent, there are social responsibilities for all land holders that could be used as motivating factors for good land management. Children among the Shona, their present and future well being are central social values for parents and communities to conserve resources for them.

This point was demonstrated to the author by a group of women from rural areas at a workshop on natural resource management held in Harare in November 1987. After a group discussion session on indigenous natural resource management, the women were asked to make a summary presentation as a way of assessing the value of what they had discussed. During the two hour lunch break before the presentation, the women composed a song which was their form of communicating their environmental concerns vis-a-vis the future of their children. The lyrics are given below, and were sung to a familiar religious tune of "What a Friend We Have in Jesus":

<table>
<thead>
<tr>
<th>Shona Text</th>
<th>English Translation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Makoronga oti fungisa</td>
<td>Gulleys (due to soil erosion) remind us</td>
</tr>
<tr>
<td>Kuti tigadziro minda</td>
<td>To conserve land/soil</td>
</tr>
<tr>
<td>Kana tazosiya nyika</td>
<td>so that when we depart from earth</td>
</tr>
<tr>
<td>Nyika isakukurwa</td>
<td>The land will not be washed away.</td>
</tr>
</tbody>
</table>
Chorus:

Kana minda yatorwa nevana
Pane nyika tagara
Hapazowe nemibvunzo
kuti uyu munda ivu
riripi.

Mombe ne hwai zwati
vunza
Tine vana toisepi
Tsuro ne mbeva zvinodaro
Huswa nemiti zviripi?

When the children take over
The land we have been living on
There will not be such questions as
"Where is the soil of this land?"

The cattle and sheep will also ask
"Where do we raise our children?"
The rabbit and the mouse
Will say, "Where is the grass and
trees?"

The lyrics portray the social responsibility of adults for ensuring the conservation of natural resources to pass on to future generations and to wildlife.

This adaptation of the holistic land perspective is an illustration of the use of cultural data for the adaptive functions of belief systems as explained by Lovelace (1984) above.

Secondly, the application of modified land views to current problems shows that values, like society, are dynamic. Jimmerson (1989) challenges U.S. extension professionals not to assume a scientific neutral position, but to be engaged with their clientele in the generation of alternative value systems. Jimmerson's views are very relevant to the Zimbabwe NRM situation. The displacement of indigenous NRM has led to the identification with implementation of western and technocratic approaches. Wilson's (1989, p. 380) observation in southern Zimbabwe confirms this point, and he states,

It is clear that local theories [on trees in the fields] are highly sophisticated and combine well with recent advantages in scientific ecology, largely in opposition to the technocratic approach adopted by the state.
The situation could be redressed through the generation of new values or modification of existing ones. McNeely et al. (1990) suggest a classification of natural resource values that could be applied in generating or modifying cultural values to meet contemporary demands. Figure 14 is a presentation of this classification adapted to include the Shona cultural equivalents of what the authors suggest. A brief descriptive comment on each value category is in order.

Direct value of the consumptive use value is equivalent to the Shona communal social rights and responsibility associated with common property. Traditionally there were rules of conduct for ensuring ecological stability and equitable distribution of fuel wood resources. Only dead wood was collected for firewood. The depletion of forests today due to land pressure does not preclude the generation of new and appropriate mechanisms.

The economic equivalent of the productive value is already in place through the CAMPFIRE project which ensures economic benefits for local population from income generated in local area game parks. The economic returns act as incentive for conservation and cooperation with local government. The indirect nonconsumptive values have an economic and aesthetic value. Research in indigenous species, their value of biodiversity vis-a-vis in situ and ex situ conservation imply financial gains and control which could also act as incentive apart from the aesthetic value (see Altieri and Merrick, 1987). The option value though listed as indirect has impacted economic survival value.
for future resource needs. The existence value in terms of ethics has its social equivalent to Shona values of integrity of creation based on religious values. These brief illustrations show the potential of generating and promoting relevant NRM practices through adaption of cultural values and their synthesis with western scientific ecology. Agricultural education and extension research and development conducted in an interdisciplinary framework with farmers engaged as equal partners could contribute to such an exercise.
<table>
<thead>
<tr>
<th>Value Category</th>
<th>Example</th>
<th>Level of Relevance</th>
<th>Shona Value Equivalents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Value</td>
<td>Consumptive Use Value</td>
<td>Local</td>
<td>Common property social responsibilities and rights</td>
</tr>
<tr>
<td></td>
<td>• firewood</td>
<td></td>
<td>• social regulations for collecting forest products</td>
</tr>
<tr>
<td></td>
<td>Productive Use Value</td>
<td>National</td>
<td>Economic value of natural resources</td>
</tr>
<tr>
<td></td>
<td>• economic use of natural resources</td>
<td></td>
<td>• land and agriculture</td>
</tr>
<tr>
<td>Indirect Value</td>
<td>Nonconsumptive Value</td>
<td>International and national</td>
<td>Aesthetic Values</td>
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<tr>
<td></td>
<td>• research</td>
<td></td>
<td>• totemic based attitudes to</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>• bird watching conservation of wild life</td>
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<td></td>
<td>Option Value</td>
<td>National government</td>
<td>Economic priorities and adult social responsibilities to future generations</td>
</tr>
<tr>
<td></td>
<td>• maintaining options for future</td>
<td>local people</td>
<td>• conservation</td>
</tr>
<tr>
<td></td>
<td>Existence Values</td>
<td>International</td>
<td>Religious/spiritual natural resource</td>
</tr>
<tr>
<td></td>
<td>national life existence</td>
<td>local</td>
<td>• ethics about wild</td>
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<td></td>
<td></td>
<td></td>
<td>• land views</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>• sacred phenomena conservation</td>
</tr>
</tbody>
</table>

Figure 14. Classification and relevance of values of biological resources and Shona value equivalents (adapted from McNeely et al., 1990, pp. 28-35)
SECTION III. ORIGINS OF AGRICULTURAL EXTENSION:
IMPLICATIONS OF TECHNOLOGY TRANSFER IN ZIMBABWE

Introduction

According to Koht (1964), intellectual history should be approached in a way that brings ideas into connection with real conditions—economic, social, or political. The purpose of this paper is to examine the intellectual and social origins of agricultural extension and to draw some implications for agricultural extension and indigenous knowledge in Zimbabwe.

The thesis of this paper is that the origins of cooperative extension service (CES) are specific to and determined by the culture. Attempts to adapt the U.S. model to developing countries often ignore the social aspects of the origins of extension. An intellectual historical research technique provides the conceptual framework for analyzing both the U.S. and Zimbabwe experience. The Training and Visit System (T&V) of extension is highlighted in the historical development of extension in Zimbabwe to show how this technology negates indigenous knowledge systems.

Intellectual history as a research technique

Beringer (1978) suggests that there are two basic approaches to intellectual history: the internal humanist and the external social science related. The internal approach involves the study of an idea through time, without regard to the social context. The external approach involves studying the development of an idea in relation to
the social context. For the purposes of this paper, the external approach is adopted as it is considered more applicable to the issues under consideration.

Baumer (1978) identifies four main concerns of intellectual history as:

- discovering the climate of opinion or the Zeitgeist (the spirit of an age);
- determining the causes of change in the climate of opinion giving rise to new ideas;
- how much the ideas affect the majority of nonintellectual peoples;
- how to use the work of the intellectual historian.

A brief examination of the development of CES might more clearly explain how this has been done.

Seaman Knapp is acknowledged, either explicitly or implicitly, as the father of the extension movement (Brunner and Yang, 1949; Bailey, 1949; Scott, 1970; True, 1928). Bailey (1945, p. 279) says of Knapp, He was the originator of the idea, organizer of the details of structure and operation, and principal engineer of opinion and political energy which secured its (the Smith-Lever Act) passage.

Knapp, as a special agent, had transformed the southern rural life by demonstrating proper farming practices to the people (Boone, 1988, p. 26).

What were the conditions and climate of opinion that led to the work of Knapp and the Smith-Lever Act in 1914? According to Nelson (1985), the U.S. was an agrarian economy with the majority of people living in rural areas. There were a variety of extension activities
ranging from nonformal education programs, such as the Chautauqua movement, to agricultural farm demonstrations of Seaman Knapp. The chaotic situation was reflected by the fact that the legislation to systematize and create the CES developed over a long period between 1860 and 1914. At least 32 bills were proposed, and the history of the eventual Smith-Lever Act sounds like a "... movie of a boat slipping through a storm guided by two remarkable politicians."

The storm partly reflected the differences of perceptions and opinions on what extension was supposed to be and how it was to operate. The two main camps in the tortuous, complex, and often controversial debate were the politicians, bankers, lawyers, and others in support of Knapp, on the one hand, and intellectuals/academics on the other, represented by the Association of Agricultural Colleges. Despite these differences, the spirit of the time was the need for diffusing useful and practical agriculture and home economics information to the rural people of the U.S.

The Smith-Lever Act (1914) was a legislative foundation of extension, and an establishment of a third major component to the Land Grant College-Experiment Station and CES tradition of U.S. agricultural development. Although the political process leading to the act involved mainly the intellectual and political elites, the majority of nonintellectual members of society benefited and continued to benefit from the CES. Thus, the development of an idea (extension) into legislation and into a viable institution has had continuous
social impact. One reason for this positive outcome, according to Nelson (1985, p. 20), is that

The level of education and sophistication of the American farmer has consistently been above the rest of the agricultural world. When extension and vocational agriculture were introduced, most farmers were literate enough to utilize bulletins, farm magazines and newspapers. . . . thus, extension and vocational agriculture had the opportunity to reach rural clientele through many of the same methods still used today.

Flora and Flora (1989) confirm Nelson's view by pointing to the unity of goals between researchers and farmers who had a common background and,

at least in the early days, the researchers and extension agents themselves continued to farm; Seaman Knapp is an example. The farmer's goals had never to be established since they were implicit in the frame of reference and upbringing of the researchers, the extension agents, and the users of research. All shared the same social background and the same experience in practical agriculture.

It can be concluded that a strong legislative foundation, a sophisticated clientele, and a long history of synergism between the subsystems of land grant colleges, experiment stations, and CES are culturally specific factors making the U.S. extension model very unique.

Second and closely related to the factor of synergism is the organism character of the CES. Because the different components of the macrosystem of agricultural development were put together within the same era, they meshed, grew, and changed together, as it were. Thus, the combination of a land grant college, providing information on the basis of its mission of teaching, research and extension and experimentation funded by the federal government and sharing
administrative/political structures with the client subsystem result in a synthesis of ideas and ideals born of intellectual historical development.

Third, the CES has managed to offer its clientele various program types, i.e., technology transfer, body of knowledge and problem solving (typology after Boyle, 1981). The emphasis might shift according to time and situation, but at least a variety is there to choose from.

Developing countries, by comparison, are attempting to adapt or adopt agricultural extension in a piecemeal fashion, without much political, legislative, and intellectual grounding processes. The philosophy of the CES, working with people, helping people to help themselves has persisted over the years. The need for firmly grounded institutions and programs appears to be overshadowed by the desire for a rapid technological development. Technology transfer seems to be the Zeitgeist of the 1980s and the modus operandi of agricultural extension in developing countries. The remainder of the paper illustrates how this technology transfer approach and a top-down philosophy negate the historical development and the cultural grounding that make the U.S. CES model unique.

The Changing Approaches in Agricultural Extension: The Zimbabwean Experience

Extension definitions and relation to IKS

In its classical usage, agricultural extension refers to the system of disseminating information from university or research...
institutions to rural people as in the case of the U.S. model. However, there are variants of agricultural extension as a concept and practice depending on a country context and ideological orientations. Roling (1988) suggests four types of extension on the criteria of purposes of extension. Informative extension is educational in purpose as in the case of the U.S. model. Emancipatory extension is geared to uplifting the poor and oppressed as promoted by Freire (1973). Formative extension emphasizes human resource development through enhancing the capacities to learn, analyze and decide. Persuasive extension is a policy instrument for meeting specific objectives such as increasing cash crop production for export.

Agricultural extension in Zimbabwe as in many developing countries is based on the U.S. model in origin. However, in practice it is best characterized as a combination of informative and persuasive extension because it is a policy instrument for increased market oriented production. This extension approach has completely ignored possible contribution of or cooperation with the people’s indigenous knowledge and experience. The reasons are largely historical and political.

Swanson and Claar (1984, p. 5) describe agricultural extension programs in Third World countries as a "post-independence phenomenon" starting in the late 1940s in Latin America and the Caribbean to the 1960s and 1970s for African nations. Zimbabwe, however, has a relatively longer history of agricultural extension. In October 1926, Emory Delmont Alvord, an American Mormon church missionary, was
appointed to the post of "Agriculturalist for Natives" by the Southern Rhodesia government (Reid, 1977). A Bachelor of Science with honors in Agriculture, a Master of Science and seven years of "spreading the gospel of the plough" at Mount Selinda near Chipinga in Zimbabwe qualified him for this post. According to Reid (1977, p. 432):

He founded the agricultural extension service for African areas, was architect of the agricultural and conservation aspects of the Native Land Husbandry Act, established training courses and programmes for technicians, started the first irrigation schemes in Tribal Land, initiated soil conservation and grazing programmes, community development activities and inspired generations of farmers and extension workers. His work continues today, 17 years after his death, to influence agricultural extension, education and research.

It is important to note that until 1981 after independence, there existed two extension services in Zimbabwe, one for white commercial farmers (Europeans) and one for African areas (the indigenous blacks). Alvord was the founder of agricultural extension for the African areas.

Alvord, like many of his contemporary white settlers, recognized that the indigenous people were essentially agriculturalist but regarded them to be of an inferior type to what the Europeans knew or practiced. In 1929 Alvord wrote,

They [the Africans] have a clearly defined practice spoken of by Europeans as "Kaffir [Kaffir is a derogatory term for blacks.] farming." Their methods are wasteful, slovenly and unnecessarily ineffective, and if continued, will be ruinous to the future interests of Rhodesia (Alvord, 1929, p. 9).

In an almost self-contradicting manner Alvord admits that the natives had a great more varieties of foods than do Europeans and proceed to give a detailed classification of foods under grass family
crops, legume family crops, other crops as well as wild plants and fruits. Myers and Ames (1984, p. 88) confirmed this variety of crops and remarked that:

Although the Europeans (white) deplored the African system (of farming), their own system of deep ploughing with emphasis on rotation rather than leaving their land to fallow produced yields inferior to those of African peasants until after World War II, when inputs of fertilizer and farm mechanization resulted in higher yields and larger cropping areas. By early 20th century, Shona farmers were marketing surplus crops to European settlers who were less proficient.

Alvord, in spite of deploring African farming methods, believed that with guidance and direction, the native would become "an excellent agriculturalist." His agricultural work was therefore geared to educating the Africans to achieve "the well-being of the native and the conservation of the land on which he lives" (p. 16). To achieve these objectives 26 native agricultural demonstrators were posted in native reserves by 1929. In 1980 Zimbabwe had 2,000 extension workers, 120 of them being women (Sofo et al., 1980).

Since the paternalistic days of Alvord, agricultural extension has shifted emphasis and approach depending on the political situation. In the 1950s and 1960s the emphasis was on conservation. According to Beinart (1989, p. 146):

Ideas about how land and natural resources were to be controlled and used, and who should control and use them, must be located in the context of broader political, religious and economic contestations.

The political efforts of the white settler governments to contain blacks in designated reserves largely determined the focus of agriculture extension in African areas. The Land Husbandry Act was
the policy instrument for these efforts. Resistance to the Act by blacks was a rallying point of nationalist politics. From this period until after independence in 1980, extension workers were often seen as implementors of and supporters of oppressive legislation related to land conservation (Drinkwater, 1989; Mutwira, 1989).

Technology transfer approach is another prominent extension approach of the Zimbabwean agricultural extension scene. Before independence, technology transfer took the form of what Pickering (1989) calls the commodity-based approach designed to facilitate the production of a single crop. Using the master-farmer training scheme, extension focused on the production of high yielding maize varieties. The master-farmer approach has been characterized as elitist and exclusive since it only worked with the progressive male innovators and early adopters (Lionberger and Gwin, 1982; Rogers, 1983).

After independence and in line with the egalitarian ethos of the new government, technology transfer was increasingly effected through group approach to extension. A prominent feature of post independence extension in Zimbabwe is the World Bank-sponsored Training and Visit System (T & V).

The T & V system

The T & V system of extension is a management system designed to improve extension services in developing countries. Its main features are: a unified extension service, regular contact maintained between research and extension, and extension and farmers, and dedication of extension personnel (Benor and Harrison, 1984). A specific schedule
of training of Village Extension Workers (VEW) and visits to contact farmers is set weekly and fortnightly, and rigidly followed.

The designers of the T & V worked out the system in great detail of when an activity should take place, and at what level within the straight line of command. A maximum ratio of one village extension worker to 800 farm families is recommended. Roling (1988) indicates that the T & V system is geared towards a high-value commodity monocrop, with the crop specialist as central to the extension service.

The application of the T & V system in India has been evaluated as highly successful. In Turkey, the implementation of the system required a complete reorganization of the research and extension system for effective linkages (Rolings, 1988). In Zimbabwe, the system was slightly modified to meet the practice of a group approach, rather than on individual progressive farmer approach to extension services. However, the rest of the prescribed detailed top-down approach and tightly managed T & V system remained intact.

The T & V system as technology transfer

According to Frame (1983, p. 73):

Technology transfer is the conveyance of either a man-made tangible good/process or intangible know-how from those who possess it to those who do not.

Frame's definition suggests a linear communication process, which in agricultural extension Roling (1988, p. 53) refers to as "the sock-it-to-them" model. Given the very detailed and prescriptive design of
the T & V system, Frame's and Roling's definitions are very appropriate descriptions of the T & V system.

These definitions—and by extrapolation, the T & V system—are antithetical to what agricultural extension is supposed to be, i.e., working with people, helping people to help themselves. Roling (1988) rightly views extension as an information system whose subsystems are research, extension, education, and utilizers. The linkage model (Havelock, cited by Roling, 1988) of the extension system is illustrated in the diagram below.

```
Research ——— Extension ——— Utilizer

Subsystem ←—— Subsystem ←—— Subsystem
```

Figure 15. The agricultural information system (Source: Roling, 1988, p. 32)

Synergism and the educational process are the two characteristics that make this linkage model much more than a mechanical unilinear transfer of technology. It is much easier to envisage a two-way learning process in the environment of the linkage model than in the T & V system. This point is more apparent when one considers the cultural implications of the T & V system in the context of Zimbabwe.

The environment of technology transfer

It is vital to take into account two important aspects of technological development and transfer. First, no technological
development or transfer takes place in a vacuum. The context of technology includes the political, the economic, and the social set-up of a given country or region. Bandyopadhyay and Shiva (1988, p. 55) have observed that

Science and technology are central components of contemporary political economy even while they are characterized as objective and interest-independent.

Thus, although the T & V system has been promoted as a management tool or mechanism, it is not without certain Western cultural values, such as being overly concerned with efficiency and maximization of production. Moreover, this system is promoted and sponsored by the World Bank, a major capitalist financial institution. The ideological and cultural implications of these two aspects are elaborated later.

Second, while it is relatively easy to transfer tangible (hardware) goods to any environment with little or no adaptation or modification, the same cannot be said of intangible know-how, such as a way of managing or conducting business. The designers and promoters of the T & V system appear to have ignored the political, the economic, and the cultural context, as well as the technological absorptive capacity in technology transfer.

The political context

The war of liberation in Zimbabwe was mostly fought in the rural areas of the country. The liberation struggle entailed a process of consciousness raising that left the rural masses not only aware of their rights, but also articulate and confident in their demand for democratic participation in matters affecting their lives. A common
post-independence phenomenon was bureaucratic officials, expatriates, and expert consultants being brought to line by peasants at public meetings, or during interviews. The author experienced and observed such phenomena during research or consultancy activities.

It was within this political context that the T & V system pilot project was introduced in Chiwundura and Chirumanzi areas in the southwest part of Zimbabwe. The T & V system is so pre-packaged that there is very little room for alterations or modifications. However, for the system to be operative in Zimbabwe, it had to be adopted to the group approach to agricultural extension. Roling (1988) has described the T & V system as a modified version of the progressive (early adopter) farmer approach. This approach is not only associated with the former elitist and divisive colonial extension system, but also would be difficult to practice in the context of the egalitarian village ethos born of Shona and Ndebele communal life and the liberation struggle.

Thus, instead of the village extension worker communicating through handpicked contact farmers and hoping for a multiplier effect, T & V system training sessions had to be targeted at village farmers' groups. Alternatively, in any special training activity or meeting requiring representation of the group by one or few farmers, the latter had to be chosen by the group on the basis of the group's agreed criteria. This is true of other community development projects or family planning promotions in rural Zimbabwe. At the village
level, the villagers do the selecting. On this aspect, the T & V practice was incongruent with the prevailing political practice.

Another factor related to the political context of the operation of T & V system in Zimbabwe is the top-down approach. Information was to pass from the AEO (agricultural extension officer) or subject matter specialist to extension worker to farmer contact leaders to other farmers. That this approach was not to be taken for granted in Zimbabwe is best expressed in the words of a provincial agricultural extension officer,

... whilst we are pumping information one way down this pipeline, we want to be receptive to the fact that there is a hell of a lot of innovation going on in those groups, and in some instances, like that ploughing (demonstration), we would be spectators learning how tractor-ploughing or ox-ploughing is done from the farmers. So it [Agritex - the agency carrying the extension services on in Zimbabwe] is not an agency which sees itself as the master of all knowledge, but rather as ... true dialogue in which the progression is shared as much between ideas up from the field as it is with ideas down. (Interview with Vaughan-Evans, PAEO, Midlands 21 March 1985 in Drinkwater 1987 p. 4)

Despite such positive expressions and attempts at modifications, Drinkwater (1987) found in his evaluative study a disenchantment with the T & V system at officer and farmer levels. After three and a half years of the T & V experiment, there was decline in attendance at farmer training sessions. One reason for the decline was that the training lessons prepared by the AEOs were on the basis of technical literature and sources, not from the prevalent conditions on the ground.

Because of the tightly-managed schedule of the T & V, it was also not always possible to time the feedback of the village extension
worker to the AEO to make a relevant input in terms of the agricultural calendar. Other reasons for the disenchantment are implied in the words of one extension worker in an interview, "If the discussion was given to everyone, including farmers, to say how T & V could be improved, the decision would be pouring..." i.e., there would be an overwhelming response (Drinkwater, 1987, p. 8).

**Technological absorptive capacity**

According to Frame (1983), the technological absorptive capacity of the recipients is determined by how capable they are in adopting the technology effectively. The T & V system is basically an organizational management mechanism designed to deliver information from the specialist to the farmer in an efficient manner. The prominent feature of this system is tight management of time. The goal is to achieve efficient production of training on the part of the extension worker, and crop production on the part of the farmers. Webster's dictionary defines efficient as productive without waste; it also implies a comparison of production with cost as in energy, time, and money. The concern of the designers of the T & V system with efficiency is related to a World Bank corporate culture characterized by economic determinism. In a recent reassessment of the failure of the Bank's policies in Africa, Landell-Mills et al. (1989, p. 28) still predicated success of raising agricultural production on,

... strengthening agricultural research and disseminating improved technologies through tightly managed national extension services, based on a training and visit system that reaches both men and women. (Emphasis added.)
Why the concern with tightly managed extension services, and why present detailed, worked out, daily, weekly/fortnightly schedules for countries, and countries with the diversity of the Third World? Perhaps, the answer lies in the perceived inefficient operation of Third World extension services and farmers. While it is undeniable that food crises and natural disasters are bases for calling for efficient agricultural operations, it is possible that the notion of efficiency has an ethnic and etic bias. According to Hall (1969, p. 131), Europeans (Germans and German Swiss) have observed that Americans "... structure time very tightly and are sticklers for schedules." This perception of time leads to the economic adage that time is money. Thus, if Africa is to develop (in economic terms), its agricultural systems must be so highly programmed and must adhere to strict schedules of operation to become productively efficient.

Do Africans have the capacity to adopt a technology (the T & V system) whose success depends on tight management of time and schedules? Tight management of schedules is not just a function of attitude towards time. A very high ratio of extension worker to farmers is a rule rather than an exception in many developing countries. Inadequate communication infrastructure as well as scarce human and financial resources all contribute to the perceived inefficiency of LDC's agricultural systems. For designers and promoters of the T & V system to rely on a tightly-managed organization system for increased production is reductionism par excellence.
Cultural Implications of the T & V Systems

Ruttan (1988), drawing on various anthropological and economic studies, shows how cultural endowments can have positive or negative effects on development. Myrdal, cited in Ruttan (1988, p. 254) and writing in the Asian context, states that

Popular religion sanctifies a whole system of life and work, attitudes, and institutions that contribute to the resistance of that system to planned changes along the lines of the modernization ideal.

Ackermann (1981), while acknowledging the existence of cultural values common to a society, indicates the importance of group interests and values in relation to given innovations. In Zimbabwe, for example, the professional extension worker may have acquired Western-oriented (modern) attitudes towards time management through formal education and other avenues. This would make it relatively easier for extension workers to adopt the schedules of the T & V extension system, other things being equal. The opposite is likely to be the case for the farmers in the village.

Drinkwater (1987) observed how two consecutive training sessions (over a total period of one month) could not take place because of two deaths in the village. There is no privatization of grief among the Shona and Ndebele people of Zimbabwe. Death and funerals are whole village affairs. The duration at funeral watches can be as long as a week or more, depending on the circumstances. All but essential activities are suspended at such time. Working in one’s field may not be considered a priority over a funeral watch. For the village people, human relations are more important than schedules. This is in
direct contrast with the observation of Hall's (1969) informants that schedules appear to be more important than human relationships in the American perception of time.

Conclusions and Implications

What are the implications of the above scenario for agricultural extension? First, the political, technological and cultural elements constitute the environment of technological transfer. These elements have to be planned for, not ignored, discarded or imposed.

Second, culture is created by societal beings and is dynamic. Therefore, it is possible to plan for cultural changes. However, this does not mean outsiders planning and handing down for implementation, but planning with the people concerned in genuine dialogue. The former is called cultural imperialism, even if it is couched in seemingly technological neutrality. The latter is development leading to self-reliance. The U.S. CES provides a good example of a culturally grounded system that is self-reliant in all aspects.

Watanabe (1981) provides good examples of how research and development is used by multi-national corporations for adaptations of utility vehicles to suit the conditions of a developing country. If such a process is necessary for nonhuman machines, the need is greater where human beings with values and attitudes are concerned. There is a need for R & D in the agricultural extension delivery systems to modify and adapt them to prevailing conditions of individual countries.
Third, for those developing countries with at least five years of extension service experience, an intellectual historical analysis might help clarify the origins, social impact, and present direction. Intellectual history of extension can thus be a useful formative evaluative technique.
SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

Indigenous knowledge systems (IKS) are being examined by academicians and development planners for contribution to alternative development approaches. Sustainable agriculture and environmental management are topical issues and feature in IKS literature. However, there is not much contribution from the discipline of agricultural education and extension. The reasons range from lack of awareness of materials in IKS, personal and professional negative attitudes and institutional barriers.

Qualitative research methods of literary and content analysis, and intellectual history technique were used to assess the viability of IKS in agricultural education and extension with particular reference to natural resource management in Zimbabwe. In Section I literary and content analyses were used to analyze the literal texts of tree-related Shona proverbs to determine what knowledge about natural resource phenomena is conveyed. The study showed that Shona proverbs are an encapsulation of knowledge reflecting human behavior vis-a-vis the natural environment. The analysis of proverbs showed a wide range of cognition about plant physiology, production patterns and the interdependence of species in the ecosystem. Knowledge about trees/plants and the ecosystem was applied to human activities like hunting and collection of forest products. Rules and regulations pertaining to these activities operated mostly through taboos and
other prohibitions. The proverbs also showed attitudes and values towards natural resources based on knowledge of attributes of natural resources. This knowledge provided ecological, economic, religious and aesthetic bases for appreciating and conserving natural resources.

In Section III Shona people's cultural values towards natural resources were analyzed to determine their relevance for contemporary environmental education and concerns. The historical and rationalist anthropological methods were used to critically examine data from secondary sources. Rationalist anthropology shows the importance of ideas and social values in ecological behavior. Religious and socio-economic value categories emerged as bases for NRM behavior related to land, stewardship of creation, and agriculture.

These findings led to the conclusion that there is potential of generating and promoting relevant NRM values and practices through the adaptation of cultural values, and their synthesis with western scientific ecological knowledge. Agricultural education and extension research and development in an interdisciplinary framework, with farmers engaged as equal partners, could make a significant contribution.

The intellectual history technique was used in Section III to examine the origins of agricultural extension and its implication for technology transfer to Zimbabwe. The study showed that the creation of the cooperative extension service (CES) in the U.S. was the result of a historical process and cultural specific conditions. Export models of agricultural extension often ignore these specificities.
The implications of the findings are that the political and technological development as well as cultural elements of a society constitute the environment of technology transfer. These factors have to be planned for, and are not to be ignored nor to be viewed as obstacles to agricultural development.

Four major findings emerged from the study. First, IKS are integrated systems of cognition, beliefs and practices.

Second, vital information on NRM in IKS is often encoded in unique forms such as proverbs, myths, rituals and ceremonies. This information is not readily apparent to an outsider or someone operating from an etic perspective.

Third, current agricultural education and extension training programs in developing countries like Zimbabwe lack an emic-etic approach to prepare professionals for a society whose majority population is indigenous.

Fourth, the prevalence of cognitive psychological aspects in IKS indicate a need for a curriculum which integrates and highlights affective domain of educational objectives. A confluent curriculum with its elements of participation, integration and relevance is suitable for synthesizing IKS with current training programs.

Conclusions

These findings lead to several conclusions. First, there is need for taking IKS seriously in agricultural education and extension within the formal and nonformal education systems. Second, an eclectic adoption of elements of IKS is likely to be ineffective in
addressing some of the serious agricultural environmental and attitudinal problems. Lastly, negative professional attitudes and institutional barriers to IKS need to be recognized and addressed and addressed systematically.

Recommendations

In view of these conclusions, the following recommendations are made:

1. The need to raise awareness about the existence and contribution of IKS should be addressed systematically through curriculum changes, especially in developing country training institutions. However, the need for internationalizing agricultural education and extension, and the dependence of developing countries on western training institutions and expertise, makes IKS training in western institutions necessary, too.

2. There is a need for synthesizing vast material in the fugitive IKS literature into forms useable for teaching and learning purposes in agricultural education and extension.

3. More training emphasis in qualitative research methods is needed for more agricultural professionals to be involved in collecting, assessing and preparing useable IKS materials.

4. Inservice training of extension personnel in methods of collecting, organizing and utilizing IK is an immediate and feasible objective. A joint venture between the university, Agritex and farmers could provide the institutional structure required for such a venture.
5. There is a need for including the history and sociology or anthropology of agriculture in agricultural education and extension training curricula in Zimbabwe. These subjects would address philosophical and historical issues related to the context of the development of the discipline. Inputs on the history of agricultural education and extension would include trends, changing opinions and influences on the operation of agricultural education and extension over different historical periods.

6. Farmers with expertise in a particular IK area could be involved as resource persons in inservice and formal education training.

7. Direct interaction between researchers and scientists mediated by extensionist is another practical step that could be taken to facilitate the process of utilizing IK.

These recommendations have implications for structural changes, not only in the training curriculum, but also in the philosophy and practice of extension. Bown (1975, p. 1) aptly remarks that

They [African policy makers] may criticize foreign educational content, but do not criticize the structure or methodology of imported western systems of education, whether of formal schooling or of adult and continuing education.

This study and the proposed recommendations are a response to Bown's challenge and to the content and structure of agricultural extension in Zimbabwe. Knowledge and values creation on the basis of indigenous knowledge is a form of mental and economic decolonization given the colonial and racially dehumanizing past.
This study is but a small contribution to the process of legitimizing IKS in agricultural education and extension, and to expanding the frontiers of knowledge.
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APPENDIX A:

QUESTION GUIDE FOR UNSTRUCTURED INTERVIEWS
WITH THE ELDERLY IN MANICALAND PROVINCE AND SELECTED
DISTRICTS OF MASHONALAND EAST, CENTRAL, WEST AND MASVINGO PROVINCE
Nzira dzamadzitateguru dze Kuchenge tedza miti, masango, mhuka ne ivhu kana minda. (Traditional methods of managing trees, forests, animals, the soil and fields)

1. Titaurireyiwo zvaiyera pazvinhu izvi nekuti zvai fambiswa seyi. (miti, masango, mhuka, ivhu kana minda) Could you please tell us about natural resources related taboos and how they operated (especially taboos related to trees, forests, animals, soil and fields)?

<table>
<thead>
<tr>
<th>Zvaiyera</th>
<th>Chikonzero</th>
<th>ZvaIitika</th>
<th>nzira dzoku</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taboo</td>
<td>Chekuzviyeresa</td>
<td>Kana</td>
<td>gadzirisa</td>
</tr>
<tr>
<td>Reasons for taboo</td>
<td>Usina Kutevedza</td>
<td>Results of breach</td>
<td>zvakanganiswa</td>
</tr>
</tbody>
</table>

2. Ndiani aiudza munhu kuti chekuti chinoyera? Who was responsible for making people knowledgeable about taboos?

3. Pazvinhu zvese zvaiyera, zvichiri kuyera ne zvisisayere ndezvipi? Which of the above are still regarded as taboos?

<table>
<thead>
<tr>
<th>Zvichiri kuyera</th>
<th>Zvisisa</th>
<th>Zvikonzero</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taboo still</td>
<td>yere</td>
<td>Reasons</td>
</tr>
<tr>
<td></td>
<td>No longer taboo</td>
<td></td>
</tr>
</tbody>
</table>
4. Mitemo yaitevedzwa paku vhima, kutsvaga huni kana michero ndeyipi? Zvaifamba seiyi?
What were the rules and regulations regarding the collection of hunting, firewood and fruit collection, and managing the land/fields? How did they operate?

<table>
<thead>
<tr>
<th>Mitemo</th>
<th>Zvikonzero</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rules</td>
<td>Reasons</td>
</tr>
</tbody>
</table>

Michero (Fruits)

Huni (Firewood)

Kuvhima (Hunting)

Ivhu (Soil/land)

5. Mazita emiti ane zvanoreva here? Tsanangurayi
What do tree names mean? Please explain.

<table>
<thead>
<tr>
<th>Zita re muti</th>
<th>Zvarinoreva</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of tree</td>
<td>Meaning/explanation</td>
</tr>
</tbody>
</table>

6. Tiudzeyiwo mabasa emiti yaka siyana siyana, uye kuti pane zvaishandiswa here pamutí iwoyo. (Uses of trees and prohibitions related to particular trees)

<table>
<thead>
<tr>
<th>Mutí</th>
<th>basarawo</th>
<th>Zvawaisa shandiswa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tree</td>
<td>Use</td>
<td>nachikonzero</td>
</tr>
</tbody>
</table>

Prohibition and reasons
7. Tikurukureyiwo nekuti kurima kwai famba sei chinyakare.
Please describe the agricultural process of the past.

8. Tipyiwo mhando dzevu ne basa radzo nezuikonzero zvekurishandisa.
Soil types, uses and reasons for particular uses.

<table>
<thead>
<tr>
<th>Mhando ye vhu</th>
<th>Zvaraisevenzeswa</th>
<th>Zvikonzero</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil type</td>
<td>Uses</td>
<td>Reasons</td>
</tr>
</tbody>
</table>

9. Ndiani vaidzidzisa nezvekurima?
Who was responsible for teaching agriculture in the past?

10. Pane zvimwewo zvamungada kukurukura here kupamhidzira zvamataura?
Additional comments.