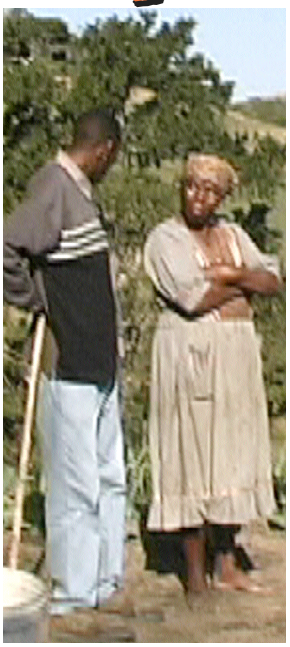
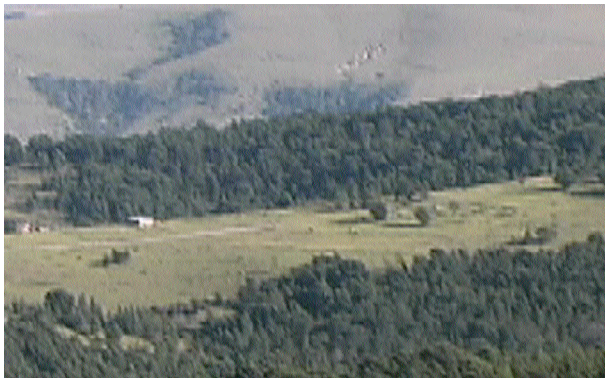
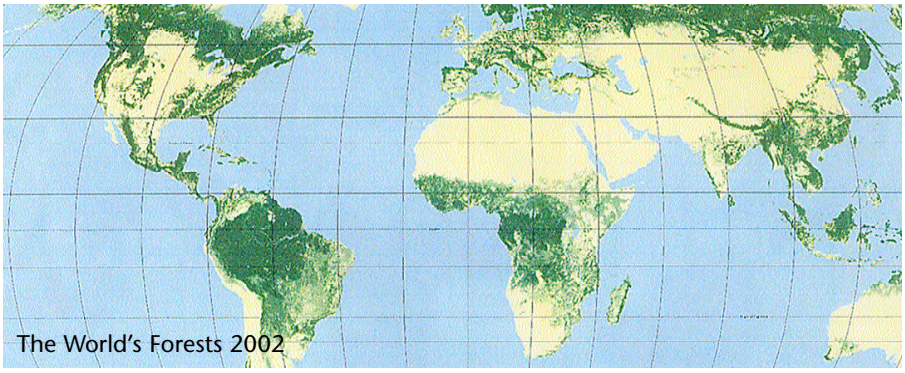
Strengthening Academic Infrastructure in Forestry in South Africa







The World's Forests 2002

Final Report
November
2003

USAID

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Dedication

We dedicate this report to our dear friend and colleague, the late Dr. Bart Thielges, who was the Associate Dean for Research and International Programs, College of Forestry, and Interim Dean of International Programs, OSU. He was also the Principal Investigator and Co-Director of this project.

Bart Thielges

June 16, 1938 - June 29, 2003

Strengthening Academic Infrastructure in Forestry in South Africa

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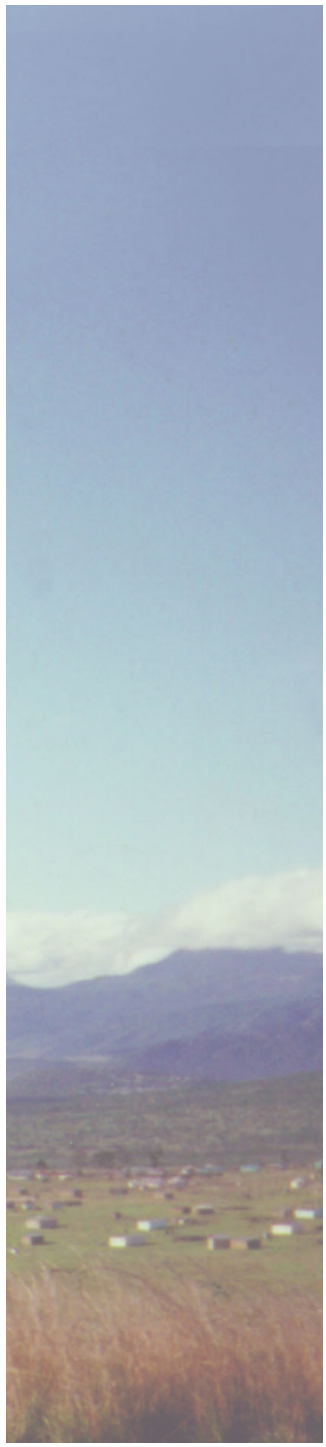

PART II

Preface

This report is a compilation of work accomplished by the Higher Education Partnership between Oregon State University (OSU), the University of Fort Hare (UFH), the Fort Cox College of Agriculture and Forestry (FCC) and the University of Natal in Pietermaritzburg (UNP) South Africa. This partnership was funded by the USAID Association Liaison Office (ALO) for University Cooperation for Development ($199,120). By working together the partners later secured additional support from the USAID Education for Development Democracy Initiative (EDDI) in the amount of $450,000. OSU and the South African partners made contributions ($270,117) to meet the cost share requirements.

The original project "Strengthening Academic Infrastructure in Forestry in South Africa" was awarded on July 1998. A Sustainability Grant to continue the existing work with expanded objectives in affordable housing and technology enhancement was awarded on November 2000. This report covers the partnership activities and achievements during the last five years ending September 2003.

The first part of this report addresses the achievements made in academic program, curriculum, and facilities development. It deals with strengthening the capacities of UFH, FCC and UNP to design and implement educational, research and outreach programs in agroforestry and community forestry. The second part of the report deals with the affordable housing preliminary studies. It is a feasibility study that could lead to the development of a viable local industry providing affordable alternative housing to Eastern Cape residents and poor urban communities throughout South Africa. That activity could also enhance improved forest management and utilization in the Province, and would provide a significant number of new jobs in resource management, transportation, manufacturing, and construction.

The report is organized in several sections: (a) summary report; (b) introduction to the study location and the partnership; (c) agroforestry as a new academic discipline at UFH addressing agroforestry curriculum development, establishing research and demonstrations plots, agroforestry modeling; (d) establishing Plant Propagation Center and improving nursery facilities; (e) technology enhancement to improve teaching and learning; (f) working with rural villages to promote tree planting and rural development; and (g) preliminary studies on affordable housing investigating the availability of resources and assessing the social acceptability of alternative housing.

Thanks are extended to the USAID - ALO and EDDI for providing funding to work on this project, and the College of Forestry and the Office of International Research and Development at OSU, and the South African partner institutions - the University of Fort Hare, Fort Cox College of Agriculture and Forestry and the University of Natal in Pietermaritzburg for providing assistance and continued cooperation to make this project successful. We believe the experience gained from this study can be used to promote sustainable economic development in southern Africa and elsewhere in Africa.

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Research Associate, and Project Co-Director
Department of Forest Science
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Oregon State University
University of Fort Hare
Fort Cox College
University of Natal

Part I

Strengthening Agroforestry Education and Development in South Africa

Left to right:
Mr. David Dauncey,FCC;
Dr Abenet Belete, UFH;
Mr. Michael Underwood, UNP;
Mr. Awonke Sonandi, FCC;
Mr. Grey De Villiers, UFH;
Dr. Bart Thielges, OSU;
Dr. Frits Rijkenberg, UNP; and,
Dr. Badege Bishaw, OSU

Strengthening Agroforestry Education and Development in South Africa[1]

Badege Bishaw[2], Robin Rose[2], Bart Thielges[2], Marion McNamara[2], Jeff Hino[2] and Takalani Masutha[3], Awonke Sonandi[4] and Frits Rijkenberg[5]

Summary

Excellent universities and technical colleges are essential to produce the educated leaders and skilled professionals necessary for the development of politically and economically sustainable societies. Strong partnerships between higher education, government, business, and the people are critical to meeting South Africa's post-apartheid challenges.

In 1994, South Africa entered a new stage of non-racial democracy with the election of Nelson Mandela as president. Currently, South Africa is undergoing a reconstruction and development program. The overall goal of the reconstruction program is "sustainable transformation" that helps South Africa consolidate democracy and support basic economic and social services. Forestry and other sectors of the economy are also undergoing policy changes to address the current state of political transformation and development (Department of Water Affairs and Forestry, 1996).

In 1998, a new project entitled "Strengthening Academic Infrastructure in Forestry in South Africa" was initiated by forging a partnership among three educational institutions: University of Fort Hare (UFH), Fort Cox College of Agriculture and Forestry (FCC), and Oregon State University (OSU). Later, the OSU partners proposed to include the University of Natal at Pietermaritzburg (UN-P) as a new partner in the project to strengthen institutional capacity both at the UFH and FCC. This project was funded by the USAID - Association Liaison Office (ALO) for University Cooperation, and the USAID "Education for Development and Democracy Initiative (EDDI).

The objectives of our partnership are to (1) Strengthen the capacities of the UFH and FCC to design and implement educational, research, and outreach programs in agroforestry and community forestry; (2) contribute to the internationalization of students, faculty, and curricula at the four partner institutions; (3) identify opportunities for

Excellent universities and technical colleges are essential to produce the educated leaders and skilled professionals necessary for the development of politically and economically sustainable societies.

1) A collaborative project between OSU and South African college and universities, and funded by the USAID-ALO & -EDDI. 2) Project Director and Project Coordinators, OSU; 3) Agroforestry Coordinator, UFH; 4) Project Co-Director, FCC; and 5) Project Co-Director UN-P.

student and faculty exchanges and for collaborative research and education among partners, and (4) explore needs and possibilities for additional education at OSU for FCC, UFH and the UNP faculty.

Through this collaboration, (1) exchange visits were made to the Eastern Cape and KwaZulu Natal in South Africa, and OSU for orientation and planning by project co-directors of the four institutions; (2) collaboration among participants and institutions was strengthened by developing agroforestry curricula for undergraduate, honors, and graduate programs at UFH; (3) at FCC the Plant Propagation Center has been established and significant improvements have been made to the water storage and distribution systems; (4) staff instructional skills has been improved through training and providing media equipment; (5) established an agroforestry demonstration plots at FCC and UNP, and work is in progress to develop a small farm modeling at UNP, and (6) Participatory Rural Appraisal is underway to promote tree planting and rural development in Eastern Cape South Africa.

We think that these collaborative projects have achieved and exceeded our intended goals to both strengthen institutional capacity in agroforestry and related programs of the RSA partner institutions, and to improve the internationalization of such programs at both OSU and the South African institutions.

Introduction

Study Location and Problem Statements

The Eastern Cape Province of South Africa is vitally important to the development and utilization of land resources in South Africa. This region is one of the few places in that country where there is enough annual precipitation to support "high forest" growth and to also grow many agronomic and horticultural crops. Thus it is not coincidental that the national government has located a forestry initiative in this province, where both the University of Fort Hare and Fort Cox College of Agriculture and Forestry are also located. Historically, this province also encompasses much of the areas previously designated as "Homelands" under the apartheid government.

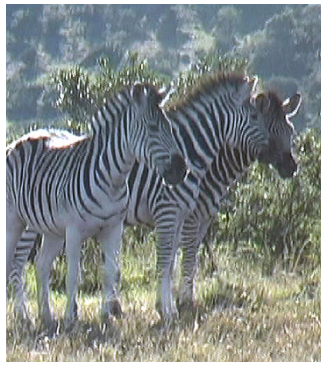
The University of Fort Hare and Fort Cox College are designated as 'Historically Disadvantaged Institutions' (HDIs) located northwest of King William's Town in Eastern Cape Province. Agricultural and community development in the bush areas adjacent to their campuses presents a unique set of challenges to land-use planning and to creating sustainable economic activity. The area suffers from extensive deforestation and attendant erosion, brought about by the demands of an expanding population for fuel wood, wood for housing and other construction, medicinal and ceremonial uses of wood and other forest products, and by the overgrazing of free-ranging goats and cattle. Rural area unemployment rates currently run about 40 to 45 percent with pockets exceeding 70%.

Agroforestry, which integrates trees, crops, and livestock into farming and community systems, is a promising land-use technique for Eastern Cape Province that will alleviate problems of soil erosion and land degradation while also providing food, fuel wood, and fodder for families and communities on a sustainable basis. There are also economic niches in wholesale vegetable, ornamental plant, and forest tree seedling markets that could be addressed by Eastern Cape residents and communities. Both the University of Fort Hare (UFH) and Fort Cox College (FCC) could provide valuable educational and development assistance to help local communities address these issues. But to achieve success in implementing such sustainable farming and marketing systems in this area, major improvements in the education, training, research, and technology transfer capabilities of both UFH and FCC are initially needed.

The problems faced by UFH and FCC and their surrounding villages are serious but not insurmountable. The situation can be significantly improved by putting in place well-organized and -executed programs that integrate academic education and professional training at both institutions with an extension or outreach program that is tightly focused on the agroforestry and social forestry needs in the villages. The following five interventions were proposed to address problems of deforestation and land degradation in the Eastern Cape, South Africa:

1) Develop an Agroforestry and Social Forestry curricula, develop more effective teaching materials and methods, upgrade information technology equipment and systems, and improve instructional skills of faculty at both UFH and FCC.
2) Improve the tree nursery facilities at FCC and UFH to the point where they can be used to provide the levels of education and training in the technical and managerial skills that graduates of these programs could employ to create their own businesses
3) Establish a school forest at the FCC Campus to support the teaching, training, and demonstration programs and to generate income for these programs.
4) Establish agroforestry demonstration plots at UFH and FCC to provide an outdoor laboratory for students and faculty.
5) Promote rural tree planting in six villages through farmer's participation, i.e., using a participatory approach.

Because of its climate, soils, central location in the country, and the existing agriculture and forestry education and research programs at FCC and UFH, the Eastern Cape region is ideally suited for an enterprise center focused upon growing and processing trees and horticultural crops. If these enterprises are properly planned and implemented, the region could also provide food, fuel wood, construction lumber, employment, and income to local communities on a sustainable basis. This is extremely important in this part of the country where tribal governments and other local community organizations manage many of the resources and where the natural environment itself, in terms of aesthetics and wildlife habitat, is not only a national resource but also a national treasure.



To support these development efforts, it is highly appropriate for effective educational, research, and extension activities in agroforestry and social forestry to be located at UFH and FCC. The graduates of these academic programs will form the leadership for sustainable development of forest and agricultural resources in this province and elsewhere in South Africa, as well as in other nations of southern Africa. In this report we will present a brief summary of the partnership and give overall activities of the project during the last five years. The report will address the development of an agroforestry curriculum, the establishment of agroforestry demonstration plots, establishment of nurseries and greenhouses, technology enhancement to improve teaching and development of teaching materials, and the promotion of rural tree planting through the participation of farmers.

The Partnership

This project has established a unique partnership among our four institutions---Oregon State University, the University of Fort Hare, and Fort Cox College of Agriculture and Forestry, University of Natal---for driving the implementation of this sustainable development effort. A U.S. partnership with both major South African Universities and a small rural Technical College will provide a means to strengthen the higher education and research capacities of all four institutions. Furthermore, it will provide an exceptional opportunity to improve the local and regional lines of communication and dissemination of information and technology by developing at UFH and FCC improved capacities for extended education (i.e., extension or outreach) programs for rural populations throughout South Africa. This idea of incorporating a "grassroots element" is central to this project---which eventually aims to involve our partnership in working with rural villages in horticultural crop production, tree planting, and erosion control through community participation.

A time-tested and proven characteristic of the U.S. Land Grant university system is that of conducting excellent traditional educational and research programs, while at the same time operating an effective means of delivering information and technology to farmers, industries, and other citizens. South Africa is definitely interested in developing its public institutions of higher education---especially those with missions in agriculture/natural resources, business, engineering, and other technologies---along the lines of the Land Grant model. For example, several of their major comprehensive universities, including UFH and UNP, are currently engaged in studying the Cooperative Extension Service structure in the United States. Each of the four institutions brings unique strengths to our partnership:

- The University of Fort Hare has well-established and internationally recognized academic and research programs in Agriculture, supported by the resources of a comprehensive university currently enrolling 7,500 students.
- The University of Natal is a highly regarded academic institution with eight academic programs in Science & Agriculture, Education, Engineering, Human

Sciences, Human & Management Science, Law, Community Development, Management Studies, and Health Science with 27,000 students. The primary role of both UFH and UNP in this project will be graduate education, basic research, and extension education.

- Fort Cox College of Agriculture and Forestry has existing, strong "hands-on" technical programs in Social Forestry and in Agriculture located in a natural setting amidst the communities that will be served by the programs developed by this partnership. These programs will play a critical role in undergraduate technical education, applied research and demonstration, and technology transfer.
- Because it has major strengths in Forestry and in Agricultural Sciences, including agroforestry, Oregon State University is ideally suited to provide assistance in developing new academic programs in agroforestry, refining existing Social Forestry academic programs, and initiating research in those areas. And, most important, as a major Land Grant university, OSU is capable of assisting with the planning and implementation of effective technology transfer and extension programs in both forestry and agriculture.

On the whole, strengthening our existing partnership through this project has contributed significantly toward establishing effective permanent programs that lead to sustainable development of Eastern Cape natural resources while also protecting the environment. The logistics are favorable; both South African partners are located amidst the resources and communities to be served, and they are near enough to each other for efficient and effective cooperative efforts. Oregon State University has the capacity to contribute considerable support in terms of knowledgeable and experienced teaching and research faculty and modern technical resources, and it has an excellent track record in the area of international development in Africa and elsewhere.

Agroforestry as a New Academic Discipline

Badege Bishaw, Grey De Villiers, Frits Rijkenberg, and John Sessions

Agroforestry Curriculum Development at UFH

There is a great concern today in South Africa and worldwide about the general decline of vegetation and the subsequent effects on the environment, particularly on the components that make up the basic source of subsistence for all nations, namely soil, water, and agriculture. Agroforestry, which integrates trees, crops, and livestock into farming systems, is a promising means of alleviating problems of soil erosion and land degradation. Agroforestry systems increase diversity, help sustain production, and have great social, economic, and environmental benefits. Various systems and combinations of systems are possible, with trees being used to provide human food, animal feed, fuel, and fiber. The trees may also provide protection, shade or shelter for crops or animals, and serve in the conservation of soil.

The practice of agroforestry has not been championed by any governmental department or non-governmental organization in South Africa to date (as has been the case in neighboring countries of the North), and therefore is not a common practice amongst small-scale farmers (Isla Grundy 2002). This also holds true regarding agroforestry education and training institutions in South Africa. There is no institution of higher learning that provides formal undergraduate and graduate education in agroforestry in South Africa. The main objective of this project was to identify the potential for agroforestry education in South Africa, and provide the needed education and training by developing an agroforestry curriculum, establishing research and demonstration plots, and developing teaching materials at the University of Fort Hare and Fort Cox College.

The Faculty of Agriculture at the University of Fort Hare, being the only agricultural faculty in the Eastern Cape, understands the need for and importance of multidisciplinary natural resource management, such as agroforestry. Through its efforts to train high-level personnel in agriculture and natural resource management, the Faculty of Agriculture is ready to meet the challenges facing South Africa. At this juncture, the faculty believes that it is timely to include an agroforestry education, research and outreach program as one of its training components. To help with this effort, the Faculty of Agriculture at the University of Fort Hare initiated a collaborative agreement between Oregon State University in the USA and Fort Cox College of Agriculture and Forestry in South Africa.

Through this linkage project, Dr. Badege Bishaw from the College of Forestry, Oregon State University, was assigned to the University of Fort Hare to assist in the development of the Agroforestry education, research, and outreach program (Annex 1). The Faculty of

Agroforestry, which integrates trees, crops, and livestock into farming systems, is a promising means of alleviating problems of soil erosion and land degradation. Agroforestry systems increase diversity, help sustain production, and have great social, economic, and environmental benefits.

Agriculture hosted Dr. Bishaw while he was in South Africa and a Faculty Task Force (Annex 2) set to work with him on the Agroforestry curriculum, research, and outreach program. Dr. Bishaw had a number of meetings with the Dean, Faculty of Agriculture, and members of the Faculty Task Force. The following are extracts of agreements reached and steps taken by the Task Force to develop the Agroforestry curriculum at UFH (Annex 2).

1. The Task Force believes that there is an urgent need to begin Agroforestry education, research, and extension in the Faculty of Agriculture in order to address natural resource management issues facing South Africa from a multidisciplinary perspective. They also believe it is timely to begin Agroforestry education at UFH to help the process of internationalization of the university's curriculum.
2. Looking into the advantages and disadvantages of having a stand-alone program or a subset of existing programs, the Task Force has agreed to have a stand-alone Agroforestry program, which will be housed in the Department of Agronomy. The program will have undergraduate, honors, and graduate programs.
3. The Task Force has developed an undergraduate Agroforestry curriculum with an Agroforestry emphasis (Annex 3). The Task Force began with the Agriculture Production Science curriculum, added Agroforestry and related courses, and modified some of the existing courses to meet the agroforestry specialization requirements.
4. After reviewing the Agroforestry course description and outline prepared by Dr. Bishaw (Annex 4), the Task Force accepted as presented. However, they have made the following decisions regarding the Introduction to Agroforestry course: (a) the course should be divided into two semester courses and should be offered in the 3rd year, 1st and 2nd semesters; (b) the course should consist of a three-credit lecture and a one-credit practical in each semester.
5. It was also agreed to have an Honors program in Agroforestry, since this is one of the training components of the Faculty of Agriculture. Admission and graduation requirements will be the same as for other Honors programs. Currently students are registered to take courses in Agroforestry in the Honors program at UFH.
6. With regards to the graduate program, it was agreed to have a graduate curriculum for Agroforestry with three areas of specialization (Annex 5). These are Agronomy, Livestock and Pasture; and Agricultural Economics, Extension and Rural Development. The admission requirements to these programs will be the same as for the other Masters programs in the Faculty of Agriculture.

Agroforestry Research and Demonstrations

The University of Fort Hare took a leading role in the development of Agroforestry by conducting a project, funded by the Anglo American Corporation, between 1978 and 1988. The University decided to discontinue the research in 1988; however, some of the findings remain valid today and have never been implemented elsewhere (De Villers 1988).

The Task Force reviewed past agroforestry and related research in the Eastern Cape and found some baseline information which could be used to delineate the different land-use systems in the agro-ecological zones. There are also some preliminary species screening trials for agroforestry practices in the Eastern Cape. These were begun by the Department of Agronomy and the Agricultural and Rural Development Research Institute (ARDRI) in the early 1980s. Additionally, there are a number of research projects conducted by the Livestock and Pasture Department in range management and different grazing techniques. This research represents one important agroforestry practice, the silvopasture subsystem. To strengthen the agroforestry education at UFH, it is recommended that the Faculty of Agriculture initiate research and demonstration plots in Agroforestry. These research and demonstration plots will be used by the students for the practical component of their coursework and will also serve as a demonstration for training farmers.

To identify appropriate agroforestry technologies and small farm modeling that will serve as research and demonstrations plots in the Eastern Cape and KwaZulu Natal province; task forces were established at Fort Cox College and the University of Natal in Pietermaritzburg. Using a participatory approach, the Task Forces have identified and prioritized the following problems with farming systems in the Eastern Cape and KwaZulu Natal. These are food security, water shortages, soil fertility, soil erosion on marginal lands, fodder shortages and over grazing, and fuelwood shortages. Based on the assessment of the farming systems, appropriate agroforestry technologies are proposed to address the problems thus identified. These are establishing fruit orchards, water harvesting schemes, alley cropping, compost production, establishing fodder banks and growing grass, woodlots, and living fences.

Based on the recommendations, a 1-hectare agroforestry demonstration plot has been established at Fort Cox College to date. The area is well fenced with four-strand barbed wire and reinforced with a living fence of Casuarinas. An alley cropping demonstration using Leucaena leucocephala with grass was also established. A demonstration of fruit farming using citrus trees and an indigenous tree-planting trial were established (Annex 6). Similar work is underway at Ukulinga Farm, University of Natal in Pietermaritzburg. Information and data on tree survival and growth of the different species of crops, fruits, and indigenous trees will be collected. Based on the analysis of the data and observations, a manual on individual species' growth and performance will be prepared. This will serve as part of teaching and learning materials for students and farmers for future training.

The University Farm and its facilities at Fort Hare are very useful for future agroforestry education, research, and demonstration. The Fort Hare Research Farm measures 1,364 hectares and is used for students' training, research, and production purposes. The training component aims at providing practical facilities for students from the Faculty of Agriculture. Some of the facilities are also used for research projects conducted by the staff and graduate students. The aim of the production component is to

maintain the farm as an economically productive unit within the framework of the policies decided upon by the Farm Committee, which is the governing body. The Research Farm also provides educational facilities and materials for visiting individuals, school groups, farmers' associations and other interest groups.

The livestock section caters to the training and research needs of the Department of Livestock and Pasture. It has eight major different types/breeds of livestock, e.g., dairy (Friesland) and beef (Bosmara and Nuguni) cattle, sheep (Dohne Merino), goats (Boergoat and Indigenous Nugni), poultry, and heavy horses (Percheron). The bush and grass components of the natural veld are used extensively for students' training and research, which covers such topics as veld management systems, bush encroachment control, and utilization of irrigated pastures. A recent development is the creation of the Animal Traction Unit, which endeavors to demonstrate and promote the use of animals for tillage and general haulage.

The crop section provides materials and facilities for the agronomic requisites of the Faculty. The bulk of the livestock fodder requirements, such as maize grain and silage, and Lucerne hay are grown on this section. Demonstration orchards covering a range of fruits and nuts, including deciduous fruits, citrus, pecan nuts, and prickly pear, have also been established for teaching and research purposes.

The University Farm has a small nursery to raise vegetables and fruit seedlings. This nursery has been tremendously improved and increased in size through funding from this project to meet the future needs for raising seedlings for the agroforestry education, research, and extension program. This nursery site is now used for students' practical courses, farmers' training, and demonstration purposes.

The Research Farm also serves as community outreach and provides an important demonstration model for a wide range of activities peculiar to the climatic and vegetation zone of the Eastern Cape. The Farm is able to demonstrate management practices for a wide range of crops, veld management, and livestock management practices for both large and small stock. Thus, the Research Farm at UFH can be regarded as an important arm of the Faculty of Agriculture.

Thus, the presence of the various educational departments and the availability of the various teaching and research facilities in the Faculty of Agriculture and the surrounding areas create an ideal situation for beginning an agroforestry education program at UFH. However, to be successful in this effort and to develop an agroforestry education research and outreach program, the active participation of all concerned departments in the Faculty of Agriculture is very critical. This cooperation will serve to strengthen the agroforestry program and will also help to save limited resources, such as personnel and materials, and avoid duplication of efforts.

Agroforestry Modeling at UNP

Another major agroforestry activity at UNP is a program to identify promising Farming Systems for small-scale farmers in KwaZulu-Natal. A proposal concept paper has

already developed by experts from OSU and UNP. The aim of this work is to provide the small-scale farmer, or his/her extension agent, a means to identify his/her specific area in KwaZulu-Natal, promising and feasible integrated crop, livestock and agro-forestry and value added alternatives.

The KwaZulu-Natal Department of Agriculture and Environmental Affairs at Cedara has a superb Bioresource Database with which it provides detailed information on each of 500+ bioresource units in the province at a scale resolution of 1:50,000. The Geographic Positioning System (GPS) location provides the interrogator of database with a printout giving the details inter alia of its grassland type, its soils, its climatic constraints and the more common crops that might be successfully cultivated in the area.

For the purpose of the present concept it is proposed that this Cedara database provides the framework onto which much more agricultural information is grafted. Examples of data to be included could be: growth parameters of all vegetables, agronomic, indigenous and medicinal plants as well as fruit/nut/fodder/conservation/timber/fuelwood trees that can be cultivated in the province with their relative values in the provision of human/animal nutrition etc. Similarly all livestock types will be entered with their growth parameters, nutritional needs, manure yields, and their potential contribution to income generation and animal/human nutrition. Also data on the value-added potential of any of the products of such farming components will be added.

OSU faculty members with forest and crop modeling have been involved in this task and made the first site visit to the Cedara Bioresources Center in summer of 2002. The next step in the modeling project will be to develop a prototype using either known technical relationships between plant growth and environmental conditions (weekly temperature, sunlight, precipitation, shade requirements, soil conditions, and plant-soil exchanges) or assumed ones for a trail number of plants in order to understand the structural requirements of the model. This prototype will be developed with the assistance of local crop scientists at the University of Natal and perhaps some consulting assistance from OSU College of Agriculture. Graduate students and faculty members from UNP and OSU will be involved to complete this task. The OSU lead scientist is preparing the detail program to implement this project and will make continuous visit to UNP and Cedara Bioresource Center. This project work will continue using additional funding provided by the USAID EDDI.


FORT COX
PLANT
PROPAGATION
CENTRE

Plant Propagation Center and Nursery Facility

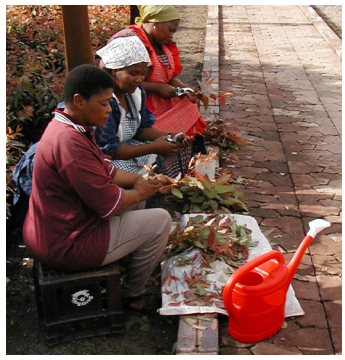
Robin Rose, Awonke Sonandi, David Dauncey, Henry Fredericks

Although there are excellent forestry and horticultural opportunities elsewhere in South Africa, FCC and UFH---as a result of being Historically Disadvantaged Institutions during the apartheid era---currently have little or no capability to provide training opportunities for students in nursery management. There is a strong horticultural industry in South Africa run mainly by white South Africans, also a holdover from apartheid days. An improvement in the capacities of FCC and UFH to train students in the science and business of plant culture for forestry and horticulture will create the necessary intellectual capital needed to establish local private businesses and to take advantage of local, regional, and international markets for forestry and horticultural nursery stock.

There have been numerous outcomes from this part of the overall project that have greatly exceeded the original goals and expected outcomes. First, no one ever expected that the FCC Plant Propagation Center concept would lead to so many additional now-successful projects. Second, the FCC Plant Propagation Center led directly to carrying the concept to Fort Hare. Third, no one ever expected in the beginning that the center would lead to such usefulness by both the forestry programs and the agricultural programs at Fort Cox and Fort Hare. At Fort Cox there has been competition among faculty for space – space that was not there only a couple of years ago. Fourth, the Center at Fort Cox is not only capable of training students, but it now serves an extension role with villages miles away. Fifth, it has become a staging platform for the setting up of demonstration plots throughout the local area. The facility continues to grow in ways never thought probable only two years ago.

The addition of a strong nursery program would allow FCC and UFH to provide the many surrounding villages with the kind of "land grant" extension support — including access to productive resources and technical information — that began in the USA more than a century ago. There is strong evidence that local people want the opportunity to be engaged in productive and economically beneficial work, and a nursery facility at FCC and UFH would provide them with the tools they need to improve their quality of life.

One of the primary products of this project was the building of the FCC Plant Propagation Center at Fort Cox College. The old nursery was run down and completely defunct. The nearby pond was completely rebuilt and now supplies water to an array of projects. Steady improvements have been made to the FCC Plant Propagation Center ever since, including the building of a new greenhouse. The FCC Plant Propagation Center was so successful that the nursery facility at the University of Fort Hare was also completely refurbished and upgraded. Both nurseries are now able to supply seedlings to the village cooperatives.



The FCC Plant Propagation Center exceeded everyone's most optimistic expectations. The shade house system is now complete much to everyone's amazement. What was a mess of rotting green shade cloth, wires, and poles is now a gleaming white shade house. The white shade cloth is now stretched tight over a buttressed wood structure such that the wind can no longer do damage. The old, unusable irrigation system has been replaced with a modern fixed overhead system of pipes and spray heads. Unlike the old system, this irrigation system has a proportioning valve to allow the application of liquid fertilizers. The pump is powerful enough to water several beds at a time. The best improvement is the fact that the entire irrigation system has been partitioned into six beds that can be watered individually or in combination.

The pond was completed about two years ago, and it is one of the largest water containing structure on Fort Cox campus. It holds two to three times as much water as it used to hold. A bulldozer was used to deepen and widen it. A rough estimate has the pond set at around 2400 cubic meters of water — which is a lot of water! This pond can easily handle a new greenhouse, extended shade houses, and drip irrigation system for various Agroforestry / seed tree plots next to the nursery.

A modern greenhouse was purchased and built (September 2003) to increase the capacity of the Fort Cox Plant Propagation Center. The clearing of the area to build the greenhouse was completed long ago. The PPC now has the large capacity to raise over one hundred thousand horticultural and tree seedlings. One of the wonderful outcomes has been the ability to create jobs at Fort Cox and to have the facility sell plants. No one at the school ever dreamed they could sell seedlings and use the money to support the educational program!

The physical improvements to the spillway and the construction of a head house to secure equipment, a pump house, fencing for the center, and general refurbishing of the nursery at UFH for training and use by participating villages has been completed. There are no private sector nurseries operating in this area, despite its climatic suitability and access to transportation, both of which would help make such a business successful. One goal of this project is to help create local demand for nursery stock while building the human capital for operating and managing nurseries, so that in the future many small businesses may spin off from this effort. This will be achieved through training in extension and technology transfer techniques that the PPC and Nursery employees will need to work effectively with villagers and farmers.

This extension element is an integral and important part of the larger curriculum described in section 3.1. Faculty from FCC and UFH, as well as some students, were engaged in an intensive period of "training the trainers" regarding forestry and horticultural nursery stock production. Faculty members from OSU, some of whom are already working with FCC and UFH, have developed an extensive production and reforestation curriculum that would be implemented as part of this project. And, in addition to implementing the longer-term academic curriculum, appropriate short courses have been developed to train appropriate faculty, students, and greenhouse

and nursery workers on production and regeneration techniques. Some of these short courses would be conducted on the FCC and UFH campuses, while others would take the form of short-term (3 months) training at Oregon State University. The latter programs would allow FCC and UFH participants to take formal, advanced courses and also to work with OSU faculty and staff on activities appropriate to this project.

Another spin off from the PPC has been the starting of a school forest at Fort Cox. Right near the PPC the very first school forest will be planted in September 2004 all as a result of the presence of the center. The future should bring additional additions to the forest until at least 100 ha have been planted on out in time. At present the land around Fort Cox is over grazed Acacia karoo range land.

Future support for the PPC needs to be sustained for several more years. One of the miracles of this project has been the accomplishment of significant outcomes even in the face of threats and violence to the participants. Even under highly strained conditions the nursery got built and exceeded everyone's expectations. This never could have happened without the support of local participants who saw that something "good" was happening. The PPC now serves as an anchor for forestry, agroforestry, and agricultural programs yet to come. Disadvantages still exist at Fort Cox and Fort Hare that will take years to improve. Any and all visitors to the PPC have been amazed at the quality of the operation so far from any city. It is literally the only teaching facility of its kind in a remote area of the Eastern Cape that serves villagers and students. The work needs to go forward and the program sustained.

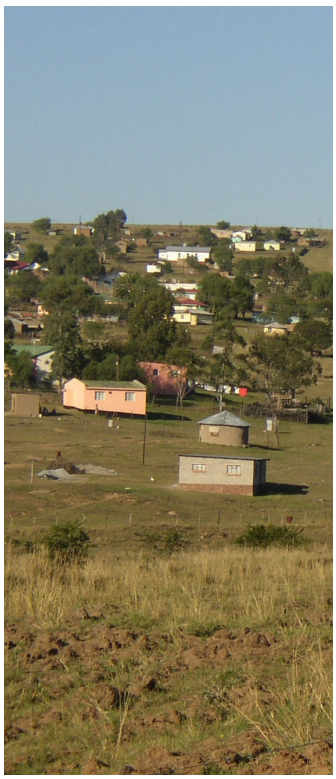
Working with Rural Villages

Marion McNamara, Takalanie Masutha, Badege Bishaw, Robin Rose

Improving the quality of life in rural communities in the Eastern Cape is a primary goal of this project. While interventions such as the introduction of improved seeds, fertilizers, and irrigation systems have been effective in some areas of southern Africa, effort has been lacking in the reforestation work needed to mitigate environmental degradation and depletion of the forest resource base in Eastern Cape Province, South Africa. In fragile and semi-arid ecosystems such as this, land pressures have been rising, land-use changes accelerating, demand for water increasing, and consumption of fuel wood escalating. Given these and other demands on the natural resource base, the overall development efforts to sustain the basic support systems in Africa have been falling short of desired goals in much of the continent, including South Africa's temperate provinces.

Part of the dilemma lies in the fundamental approach to development. For much of Africa, the colonial era---and for South Africa, the apartheid era---brought centralized decision-making and, frequently, poor implementation policies. Rural communities played no role in making decisions that affected important aspects of the political, socioeconomic, and ecological systems that sustained them. Following independence, forces external to Africa's poor villages became critical factors in mounting rural development efforts. Governments, non-governmental organizations, and international development agencies often used "top-down" approaches to design policies and programs without consulting intended beneficiaries. Local, national, and international decision-makers often used funds to import technologies from the North, rather than to utilize and enhance locally conceived, and thus more sustainable, "appropriate technology" approaches. The failure rate of such projects was high and as one result, disinterest of rural citizenry in development project activities was widespread.

One alternative to conventional top-down approaches to rural development is the Participatory Rural Appraisal (PRA). It is based on village experiences in those situations where communities are working effectively to manage natural resources. This methodology assumes that popular participation is a fundamental ingredient in project planning. It is a systematic, semi-structured activity carried out in the field by a multidisciplinary team and is designed to acquire quickly new information for rural development. PRA assumes that the rural communities form the active foundation for reversing current natural resource degradation and increasing food production. PRA assumes that communities need committed local leadership and effective rural institutions to do the job. PRA also helps communities mobilize their human resources to define problems, consider previous successes, evaluate local institutional capacities, prioritize opportunities, and prepare a systematic and site specific plan of action — in this case a village tree-planting and resource management plan.



As a result of previous collaborative work, FCC and UFH have identified three villages in the vicinity of each institution that are excellent candidates for participation in agroforestry and social forestry programs. Some of the villages are within walking distance of the campus, which presents an excellent opportunity for the institutions to begin extension activities by working with its nearest neighbors. One village outside of Middledrift has a fenced-in school ground that would be superb for the planting of a wood lot for teaching basic agroforestry. At present, the ground is grazed bare and the nearby gully is highly eroded. The village near the entrance to the road leading to the FCC campus has no trees at all. The village north of FCC on McDonald Mountain is starting to suffer from overgrazing and too much harvesting of trees for hut construction.

These sites will serve as demonstration and outreach projects in tree planting and natural resource management. To undertake the outreach and development effort we used PRA methodology. We had meetings with tribal and community leaders to make sure that the local people would be actively involved in the decision making and planning process. From this process we also learned that local people have lots of knowledge about their own problems and potentials, and that development activities will be effective only if they are fully involved. Fifteen faculty, staff and students from UFH and FCC were trained to lead the PRA process in the six villages. Staffs involved in the project are able to offer expertise to the community in both agroforestry techniques, as well as in related fields, such as Social Forestry and Parks and Gardens management in towns.

The following PRA steps were used in collecting information from the selected six villages:

1) preparations, which includes (a) identifying area to be covered and people to be involved; (b) making practical arrangements with people involved and organizing community meetings; (c) insuring sufficient knowledge and skills in the group and creating positive attitude among participants.
2) knowledge development through survey and discussion with farmers and community leaders.
3) analysis through continued discussion with farmers, and the identification of problems and potentials of land use.
4) planning development technologies by prioritizing selected issues of research and extension.
5) implementation of development programs.
6) monitoring and evaluation of the proposed technologies in two to three years. This will include testing (a) the adaptability of the technologies to the area; (b) whether they are economically viable and socially acceptable; and (c) the sustainability of the system.

Using the PRA process, information on the biophysical resources, land-use practices and socioeconomic conditions of the communities is being collected, because both natural resources and socioeconomic conditions determine how farmers make their decisions on the type of enterprise they are willing to undertake. This, in turn, has helped researchers and development workers from UFH, FCC, and OSU formulate alter-

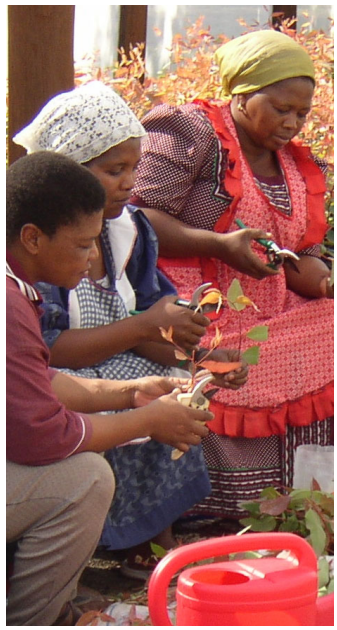
native technologies and research programs that will alleviate the problems and constants thus identified. The information gathered with the participation of the communities was used to identify problems in tree planting and potentials in rural development. Farmers have already decided to grow fruit and shade trees around their homes.

As part of the development strategy, these villages will later be invited to form a village cooperative to produce, plant, and nurture trees that will create economic and environmental benefits for the village. Working with UFH and FCC faculty, the village groups will be trained in democratic decision-making at the local level, including the decisions about roles, responsibilities, and shares of the benefit stream emerging from the project. In addition to getting assistance with the technical aspects of tree planting from the staff of the Fort Cox Plant Propagation Center and the Fort Hare Nursery, working with these village groups will also present an excellent opportunity for introducing literacy training and community organizing skills.

Women will also be especially recruited to join the cooperatives, and meeting times will be planned to fit into women's schedules. To encourage women's participation, there may be additional incentives that will reduce the competing demands on their time. Each cooperative will be eligible for a small loan to get their reforestation project off the ground, for purchasing nursery stock, fencing, etc. The focus will be on improving the cooperative's capital investment in the tools for reforestation. Some of the income generating ideas for tree planting will include planting fruit or nut trees, fuel wood, and fodder trees. These plantings will create an income stream to the cooperative members, and their loan amount would be paid from this benefit stream.

The role of trees in providing shade and beautification for the villages cannot be overlooked, nor can the contribution that trees makes to the hydrological cycle. Water availability in the area is becoming critical, and reforestation can help recharge the watersheds. These “common” benefits create no identifiable income stream, of course. However, the project will encourage the establishment of such non-income producing tree stands by providing partial forgiveness of the loans for the income generating projects in exchange for the establishment of these additional “conservation forests”.

In addition, UFH and FCC faculty members will be trained in modern techniques of delivering the extension and technology transfer programs that will form the basis of the partnership’s outreach work. Again, some of this training will be done in South Africa and some at Oregon State University in the USA.

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Media Technology and Staff Training

Jeff Hino and Mark Reed

The Need for Technology Enhancement and Strengthening

The traditionally black University of Fort Hare (UFH) and Fort Cox College (FCC) in the Eastern Cape Province in the Republic of South Africa suffered through the apartheid era, only to find their educational facilities, infrastructure, and faculty/staff development programs poorly prepared to meet the challenges and opportunities of 21st Century South Africa. Improving the educational and outreach capacity of UFH and FCC is crucial if these institutions are to survive and compete successfully with other more modern and technologically developed campuses in South Africa.

As part of the USAID-ALO project Strengthening Academic Infrastructure in Forestry in Southern Africa, Oregon State University's College of Forestry took steps to improve the educational and outreach capacities at UFH and FCC through instructional and communication technology enhancement through a USAID Technology Enhancement Grant. Educational specialists from OSU shared their expertise and experiences in teaching and educational technology with its partner institutions in South Africa. This effort included development of communication curriculum, workshops in teaching improvement, the delivery of state-of-the-art digital technology and training, providing infrastructure support, and media documentation.

Goals and Priorities

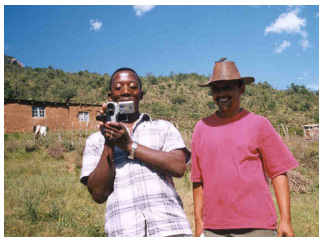
At the core of the effort was the desire to improve teaching and outreach capabilities at the partner institutions through the integration of technology. Technology needs at UFH and FCC were assessed and improvements were based on the needs of the partner institutions, with emphasis on developing the required communication and technology skills as well as providing state-of-the-art equipment and systems. The goals of the project were to:

1. Improve the capacity of both institutions with the delivery and installation of multimedia hardware and software technology;
2. Train faculty at both institutions in the organization and delivery of course materials and outreach activities using instructional technology;
3. Explore the development of distance learning opportunities between OSU and each of the RSA partner campuses.

To reach these goals, the project set the following priorities:

1. Provide tools, training, and production expertise necessary to integrate media technology, including digital photography and video into teaching and outreach programs at each partner institution.

2. Improve skills of faculty in delivery of instructional materials and information over the World Wide Web, use of visuals in teaching, and applying interactive learning techniques and technologies.
3. Increase the capacity of both UFH and FCC to originate distance learning programs through training and materials development.



Assumptions

The grant operated under the principle that classroom teaching and learning can be improved by the use of real-world, highly visual examples. Effective visuals can broaden the impact of instruction to accommodate diverse learning styles, and motivate learning by creating a highly engaging and interesting teaching/learning environment. Increased use of visuals would be particularly relevant in the Eastern Cape where learning environments are challenged by language barriers, yet faculty rely heavily on the traditional delivery method of verbal lecture and student note-taking in English

This effort was driven by the belief that with proper training, instructors could use tools such as digital still cameras, digital video cameras, non-linear video editing systems, and the World Wide Web to develop and present effective, locally produced visual-based learning materials. Technologies such as digital photography and digital video can provide documentation of difficult to reconstruct techniques and processes. Faculty could create "virtual tours" of industry and field sites relevant to local curricula (i.e., social forestry, agronomy, and livestock science). Where individual student access to computers is limited or non-existent, a data/video projection system would provide large group presentations of World Wide Web pages, PowerPoint lectures, and video programs. The inclusion of a CD burner would provide an effective and economical delivery and archiving of digital media, images, and presentations.

Activities and Results

May 2000

Mark Reed, a Media Specialist from OSU's Forestry Media Center worked with existing resources at UFH and FCC to build a framework on which to build capacity in teaching and outreach using instructional technology. Activities included:

1. Surveying the College's media center, making suggestions for improvement of audiovisual services, and training library staff;
2. Developing a new course on Communication Skills;
3. Conducting teaching improvement seminars;
4. Conducting workshops on accessing information on the Internet and making presentations with PowerPoint.
5. Providing informal consultations with individual staff members, and photographic documentation of both FCC and UFH.

This initial visit confirmed that teaching in these institutions was predominated by "chalk-talk", with the instructor lecturing and the students taking notes. All lectures were

in English, which further compromised the learning environment, as English is not the native language for the majority of the students in the Eastern Cape. Often, the only technology used was an overhead projector.

May 2001

With groundwork in place, a subsequent visit by Jeff Hino of the Forestry Media Center focused on providing technology and relevant training for faculty and staff to improve resident instruction and outreach activities. This phase of the project injected new teaching technology into the classroom to encourage a greater use of visuals in teaching to assist in overcoming the language barrier, and accommodate the diversity of student learning styles found in any classroom

The project delivered two "digital teaching packages" of hardware and software ---one for UFH and one for FCC. Each set included a data projector, a digital still camera, a digital video camera, a multimedia computer, a portable hard drive, flatbed scanner, and the assorted multimedia software packages and miscellaneous supplies.

During this visit, the media specialist from OSU conducted a number of activities to provide a foundation for the integration of this new teaching and outreach media, including:

1. Procuring, delivering, and setting up an array of state-of-the-art digital technology to UFH and FCC.
2. Consulting with administrators to provide goals, objectives, and systems for managing the technology and related training,
3. Consulting one-on-one with individual faculty and media personnel to provide individualized instruction on use of media equipment and methods;
4. Conducting hands-on workshops with faculty and staff to develop skills in integrating media into their teaching and outreach efforts.

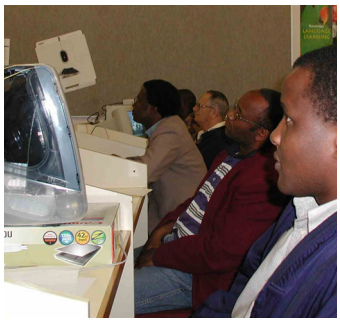
The workshops included: "Using Multimedia to Improve Teaching and Learning…an Introduction" and "Integrating New Media into Teaching & Learning."

Participating faculty and staff from Fort Cox and Fort Hare were trained in the fundamentals of:

- Digital Photography
- Digital video camera operation and technique
- Editing digital video on a computer
- Reaching the visual learner, with emphasis on techniques for the classroom
- Using data/video projection in the classroom for PowerPoint, WWW, and video presentations
- Storing and distributing video and still images on CD-ROM and the Web.

The workshops targeted several outcomes:

- To provide an overview on the use of visuals in teaching and learning, and to prepare faculty for the new media technology.
- To demonstrate new multimedia technology for use in teaching, learning and extension.



- To provide background information on how and when to use different presentation media

The capstone workshop "Integrating new Media into Teaching and Learning" combined all three new technologies (digital photography, digital video, CD-Writing and data/video projection) into a comprehensive daylong, hands-on experience. The workshop consisted of lecture/demonstrations and small group hands-on media "laboratories". In these mini-labs, participants created a small group project using each of the demonstrated technologies. The workshop was videotaped for development of a video-based instructional package on new media integration for use by faculty of UFH and FCC. In addition, a three-minute documentary video was produced highlighting the activities and excitement generated by this workshop. This video clip was shown at the 2001 ALO "Synergy in Development" conference in Washington, D.C.

May 2003

This third visit by Jeff Hino concentrated on video documentation of the "Strengthening Academic Infrastructure in Forestry in Southern Africa" and associated EDDI grants for agroforestry. The resulting 19-minute documentary video highlights the projects, people, and successes of the partnership in South Africa. The intended audience includes USAID personnel, South African institutional personnel, other participating ALO partnership institutions, OSU College of Forestry faculty and students, OSU International Program staff, and the interested general public

Purposes of the video included:

- To build a positive image in viewers of the success of the various projects associated with the partnership.
- To identify key elements of the partnership and their respective component activities, resources, outcomes, and challenges.
- To illustrate the linkages between elements of the OSU partnership and broader ALO/USAID goals.

The completed video was shown at the August 2003 "Synergy in Development" conference held in Washington, D.C., Subsequent distribution of the video and DVD will include partner institutions, and other governmental agencies, NGOs, and institutions of higher education.

Impacts and Successes

Development of Communication Skills Course at Fort Cox College

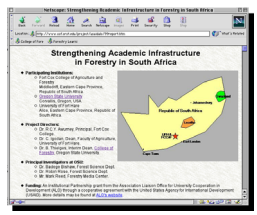
Many students arrive at Fort Cox College with insufficient skills in written and spoken English to undertake diploma coursework, and were required to take a one-semester pre-diploma course focusing primarily on written skills. In May of 2000, Mark Reed of the Forestry Media Center worked on-site with a committee of FCC faculty and administrators to strengthen and expand this into a more comprehensive two-semester

course teaching a broad range of communication skills. The resulting course design better prepared diploma students in Social Forestry and other programs to successfully compete for jobs, conduct extension work with clients (village farmers), and communicate with other audiences such as employers, government agencies, and donors

In a 2-day workshop, faculty and administrators developed and sequenced a series of outcomes for this new course. Skill areas addressed included training students to use a variety of media (posters, overhead transparencies, and slides) in presentations, the ability to write reports and other documents in good English, and being able to locate reference material in the library and on the Internet.

Recognizing that lecture alone would not enable students to learn complex tasks, or to think critically and independently in a course of this kind, the design team delineated appropriate teaching methods for the course that expand beyond traditional lectures. Methods identified included the use of practicals, providing immediate feedback, incorporating discussion, and use of individualized instruction.

The committee also realized that communication skills couldn't be adequately mastered in one course; they must be practiced throughout the Diploma program. A commitment was made to incorporate practical assignments, which exercise and refine the basic skills developed in the new Communications Skills course in other courses in Fort Cox's programs of study.



Digital Media Labs

The equipment delivered through this grant has been housed in dedicated "Digital Teaching & Learning Laboratories" at both the University of Fort Hare, and Fort Cox College. Administrative infrastructure was put into place to provide local management of these facilities by trained IT systems managers at each institution to schedule, maintain, and offer additional training for faculty, students, and staff.

Impacts on Teaching and Outreach

Immediate impacts on the instructional program included increased teaching effectiveness, with plans now developing for delivery of distance education programming to off-campus audiences.

Fort Cox College of Agriculture and Forestry

In the two years since the equipment and training was delivered, faculty members at FCC have put the equipment to good use, incorporating digital images into their PowerPoint lectures, and integrating video into their teaching. There is a consistent demand for the digital cameras and data projector. The latter has proven extremely valuable to teaching in the college, and also resulted in traveling multimedia recruiting efforts.

Other Outcomes

This "injection" of technology into the teaching culture at FCC and UFH has begun a groundswell of interest in using new forms of media for both instruction and outreach.

Several key faculty at FCC have since gone on to develop and integrate video into their Social Forestry courses. The use of PowerPoint is no longer a unique occurrence in either institution. In an interview, the principal of Fort Cox College indicated that the faculty has also put the video and data projection equipment to use in FCC recruiting efforts as well.

Over the course of the project, a number of activities involved combined faculties of Fort Hare and Fort Cox working side-by-side to improve teaching and integrate technology into their teaching and outreach activities. The camaraderie exhibited at workshops and meetings demonstrated increased cooperation and communication between faculty and administration of FCC and UFH.

Challenges

Both Fort Cox College and the University of Fort Hare are in a somewhat precarious situation due to the rapidly changing social and economic climate within South Africa. Black South Africans have a greater choice in where they can attend school. Historically black institutions like Fort Cox and Fort Hare now have greater difficulty attracting students, and are redefining their role in the post-apartheid era.

Another challenge faced by both institutions is their rural location. Many South Africans feel their best opportunities for advancement lie in the major metropolitan areas and are reluctant to live in relatively isolated areas. This impacts recruitment not only of students but also of staff

Shipping equipment from the USA to the RSA proved difficult, and took valuable time away from the training effort. The trainer was left with insufficient time to work closely with a core of highly motivated faculty to develop specific classroom applications. Training on the equipment was limited to large group workshops in which attendees created simple, demonstration products. Other challenges included:

- Access to Equipment. The equipment delivered through this grant was to be housed in dedicated "Digital Teaching & Learning Laboratories" at both institutions, with administrative infrastructure in place to provide local management of the equipment. This was done at UFH; however, security efforts made it difficult for faculty to access the equipment easily, and use was impaired.

  Meanwhile, at FCC, the demands on the equipment were high; however, control of access became somewhat lax. The Apple Macintosh multimedia computer was damaged, and eventually could not be used to edit video. Servicing of Apple computers is difficult to find in the Eastern Cape, and the computer was not repaired. Several FCC faculty are now exploring PC-based video editing options.
- Faculty Turnover. Several key FCC faculty who attended the workshops have since left the college for other positions. (Interestingly, one of them has since applied all the multimedia training we gave him in a new position with RSA National Parks!)
- Computer Network Issues. Fort Cox has had to rely on academic staff members who have full teaching loads to take on network operations. This, together with

the remote rural location of FCC creates challenges in maintaining reliable access to the Internet and the off-campus web server.

Visions for the Future

Discussions with faculty at both institutions show a high degree of interest in continuing to expand on the "technology seed" that was planted. Like most plants, just where the leaves and flowers bloom is often unpredictable. Specifically, both institutions — but particularly FCC — would greatly benefit from an extended training effort to build on the foundations now in place.

Mentor development of course materials

Both FCC and UFH would benefit from targeted training and mentoring of key faculty. In this scenario, an OSU trainer would work closely with a highly motivated small group of faculty to create learning materials that could be put to direct use in their teaching and outreach efforts.

Increase effective use of the WWW

Both computer networking hardware and operational expertise could be greatly augmented at both FCC and UFH. Neither institution currently has a functioning web site. Provide additional workshops on developing web pages for teaching. This could be a series of workshops:

- Introduction: putting basic class information on the web (syllabus)
- Intermediate: providing course learning materials
- Advanced: Using educational portal software, web-based teaching techniques (Web CT, Blackboard.)

Develop a college web site

- Work with a web-skilled faculty member form each institution to produce a viable, structured website into which content can be added by faculty and departments.
- Explore the use of educational web portal software, working with local infrastructure and products. The University of Fort Hare has adopted WebCT as their preferred software package. There may be interest by FCC in Blackboard (the OSU choice). Faculty will need training in either of these packages.

Assist in developing a series of short videos for the partner institutions

Development of stronger and more positive relations with surrounding communities should be a top priority. A public awareness campaign could be initiated using broadcast television spots and short video programs which highlight how FCC and UFH are working vigorously to improve conditions in the Eastern Cape through research and outreach in agriculture and forestry. OSU video producers could play a mentoring role working with faculty and administration to produce such materials, including informational programs, recruiting videos, and PSAs (Pubic Service Announcements).

Distance Education

- Throughout the technology enhancement project, there was great interest in the potential for the development of distance education materials using the newly acquired media capabilities. To realize this potential, however, is no small task. It will require major investments in administrative visioning, planning, faculty training, and installation of technology and infrastructure. OSU could work with partner institutions in all of the following activities:
- Train faculty in the administration, design and delivery of distance education courses and materials to administration and faculty at UFH and FCC. Discussions should address the following questions:
  a. Who is the audience? How will they take advantage of distance delivery technologies? Will they have access to an internet-connected computer? To a VCR?
  b. Which delivery technologies are most appropriate?
  c. How will faculty be brought on board?
  d. Can the movement toward performance-based learning provide an opportunity for building distance learning into the curriculum?
- Provide key personnel in the partnering institutions with opportunities attend distance education conferences in both the U.S. and RSA
- Work with the administration and faculty to develop a distance education plan.
- Increase capacities for delivering distance education via audio/video-based packages, and web.
- Provide necessary additional equipment and training to faculty and staff.
- Renovate a facility at each institution to include distance education product capabilities (video-taping, audio taping, videoconferencing.)
- Produce a pilot course for distance delivery. Encourage a distance learning link between UFH and FCC, with courses being shared between institutions

Summary

At the heart of any effort for building capacity lies the issue of effective communication: whether in the classroom or in the community. With the new tools and methods provided through this project, faculty at the University of fort Hare and Fort Cox College are in a better position to communicate ideas to their students in a more effective and compelling manner; and to reach local villagers to move the Eastern Cape toward a more sustainable future.

Quantitative Summary Data

Deliverables

- One (1) Communication Skills Course developed
- Two (2) Digital media labs installed
- Two (2) documentary videos produced
- Nine (9) workshops conducted
- 20+ hours of digital video footage collected

Attendance

Workshop Title	UFH	FCC
Using Internet Explorer		25
Introduction to PowerPoint (session I)		10
Introduction to PowerPoint (session II)		16
Opportunities for Course Improvement	30	25
Introduction to New Technology	12	12
Media Integration in Teaching and Learning	24	11
Course Design		5
Total	66	104

Conclusions and Recommendations

Based on the recommendations of the Agroforestry Task Force undergraduate, honors, and graduate curricula for Agroforestry have been developed at UFH. There will be also three areas of specialization in the graduate program. These are as follows: Agronomy; Livestock and Pasture; and Agricultural Economics, Extension and Rural Development. As part of the curriculum development process, both the undergraduate, honors, and graduate curricula has undergone a review process by the Academic Commission of the Faculty of Agriculture at UFH. It has also gone through the University Senate and has been approved. It has now been submitted to the South African Higher Education Standardization for final approval. Once this process is complete, students will be admitted to the program.

To undertake the agroforestry education, research, and extension programs at UFH requires a team approach from the different disciplines in the Faculty of Agriculture and Social Science. At present there is expertise in Crop and Animal science, and Agricultural Economics, Extension and Rural Development. We have hired a Project Coordinator and Agroforestry lecturer at UFH from funding available through this project. The responsibility of this individual is to coordinate the project activities in Eastern Cape in promoting tree planting and rural development. He will also teach students the agroforestry course at UFH developed by the project, and give training to farmers. In addition, he will serve as liaison between UFH and FCC to build a strong educational partnership between the two institutions by working together with different components of the project.

The OSU faculty involved in the Agroforestry curriculum development will assist the new faculty in establishing an agroforestry research and demonstration plots, in developing library collections, developing teaching materials, and helping to establish a network with national and international organizations.

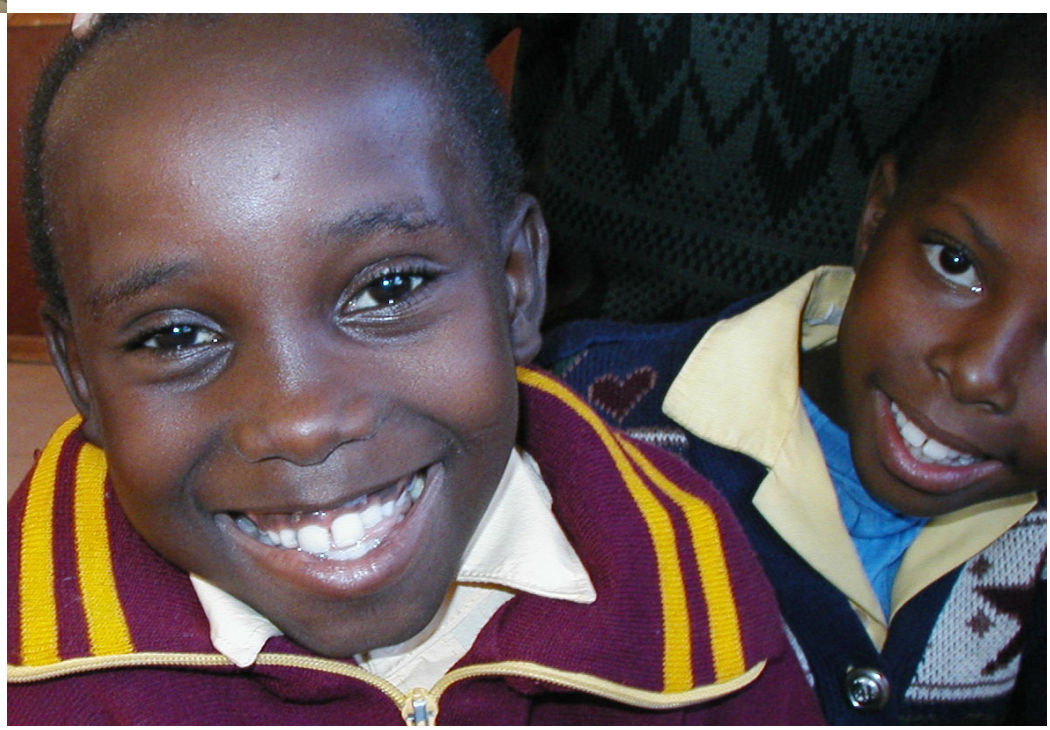
With regards to Agroforestry research and extension at the UFH, some work is already under way by the faculty. However, it is very important for the UFH to take a systematic approach to agroforestry research and extension. Using the PRA approach will help researchers at the University identify the different land-use and agroforestry problems and constraints in the region. This process will also create the opportunity to identify the agroforestry potentials and research needs in the Eastern Cape. Based on this information researchers could easily prioritize agroforestry research and extension needs from the farmers' perspectives. This could be achieved by a multidisciplinary team of scientists from the University of Fort Hare, Fort Cox College, and Oregon State University with the active participation of farmers in the Eastern Cape.

For agroforestry and community forestry to be successful in Eastern Cape, South Africa, the active participation of the rural communities is essential in the planning, implementation, and management of the program. Participation in this program will build communities' confidence and acceptance of the program. To be successful, these

agroforestry and community forestry programs also should be considered as part of the rural development package, and foresters and agroforestry experts and extension workers who participate in these programs should consider themselves part of the rural development team. Thus, a thorough understanding of farmers' circumstances is necessary to enable more effective problem identification for planning the reforestation work and improved technology.

UFH and FCC should be encouraged to continue strengthening their collaborative work and share their experiences and knowledge in nursery management, establishing an agroforestry and community forestry research and demonstration plots to support future education in Agroforestry and Social Forestry. Efforts must also be made to coordinate the collaborative work between OSU, UFH, FCC and UNP in order to avoid duplication of efforts with other donors and for better use of resources.

Finally the collaborative project between OSU and the South African higher learning institutions has made great success in building educational partnership and improving human capacity to promote economic development in rural communities of the Eastern Cape and KwaZulu-Natal provinces in South Africa. The sustainability of this project is very critical in order not to lose the tremendous gains of the partnership achieved through many challenges and should continue through external and internal funding. We believe that the experience gained from this project during the last five years can be used in other parts of southern Africa and elsewhere in Africa to promote sustainable development.



APPENDICES

ANNEX 1

January 21, 1999

WORK PLAN

Badege Bishaw, Ph.D.
College of Forestry
Oregon State University

Agroforestry Curriculum Development at the University of Fort Hare East Cape Province, South Africa

The following information is needed to start work on agroforestry curriculum development.

From University of Fort Hare

1. The organization of the College of Agriculture and the University. How does Agroforestry and Community forestry fit into this system?
2. How should the new Agroforestry program be organized?
3. Courses offerings at the College of Agriculture, in Plant science, Animal Science, and Agricultural Economics Sociology etc.
4. What are the admission requirements for students to join the College of Agriculture?
    a) Are there prerequisites?
    b) What are the qualifications for admission?
5. What is the curriculum content of the College of Agriculture?
6. What are the requirements for graduation from the College of Agriculture?
    a) Major and elective courses,
    b) total credit hours, and
    c) Resident training requirements.
7. Did the College of Agriculture and the University follow the quarter or semester system?
8. When does this new program start? How this program does operate?
    a) Curriculum content
    b) Budget
    c) Faculty to teach the course and support staff

d) Nursery and trial plots
e) Library facilities
f) Computer access, Internet etc.

9. Relationship of this program with other higher education institutions in South Africa.

From Regional and National Level

1. What are the institutions that administer forestry and agroforestry research and development programs?
2. How are they organized?
3. What kind of graduates do these institutions expect from this program?
4. What are the employment opportunities for the graduates from this program?
5. What are the different types of Agroforestry systems at the regional and national levels?
6. What are the issues of land-use and natural resource management at the region and national levels?
7. What is the outreach role of the College? How does this program enrich this effort?

From International Connections

1. What are the international connections for information and technical exchange?
   1.1 Bilateral countries:
      - Colleges and universities.
   2.2 Multi-national
      - FAO, UNEP, UNESCO, ICRAF and CIFOR etc.
   3.3 Non-governmental
      - IUCN, IUFRO, African Academy of Science etc.
2. Are there donors interested in this program?
   1.1 USAID, ODI etc.

ANNEX 2

February 18, 1999

Meeting of the Agroforestry Task Force on Curriculum Development University of Fort Hare, South Africa.

Agenda

1 Approval of minutes from the meeting of February 15, 1999.
2 Curriculum development.
2.1 Agroforestry curriculum for undergraduate program.
2.2 Agroforestry curriculum for graduate program.
2.3 Introduction to agroforestry course.

The meeting started at 8:30 am in the Board Room of the Faculty of Agriculture.

Present

Dr. Puffy Soundy, Head, Dept. of Agronomy
Dr. Badege Bishaw, OSU, College of Forestry
Mr. Ian Trollip, Dept. of Agr. Economics, Extension & Rural Development
Mr. Grey de Villiers, Dept of Agronomy
Mr. Sivelile Nompozolo, Dept. of Agr. Economics, Extension & Rural Development.

The meeting started by approving the minutes of February 15, 1999. The minutes were approved without additional comments and suggestions.

The next agenda for the day's meeting was to work on agroforestry curriculum development. It was suggested by Dr. Soundy, Head, Dept. of Agronomy, to take the existing Agricultural Production Science Curriculum and work on it to develop an undergraduate curriculum with Agroforestry emphasis. The group, after looking into the listing of courses in the curriculum for the Agricultural Production Science, has found appropriate to start its work on it. Almost all courses in the 1st and 2nd year in both 1st and 2nd semesters were accepted as they existed. Starting 3rd year, some additional courses were suggested by the Task Force to be included in the curriculum.

The following were some of the suggestions made to develop an undergraduate curriculum with emphasis in agroforestry:

1. The Task Force discussed and agreed that graduates from this program should have a strong background in agroforestry with more practical orientation. This is with the understanding that current employers will demand students who graduate from this program to do more practical work in the field.
2. The Task Force also proposed the following additional agroforestry and related courses to be included in the curriculum.

1.1 Introduction to Agroforestry
1.2 Introduction to Nursery Technology
1.3 Introduction to Plant Breeding
1.4 Social Forestry and Community Forestry
1.5 Seminar in Agroforestry
1.6 Project in Agroforestry
1.7 Agricultural Extension and Human Development (AGX 321)
1.8 Natural Resource Economics and Policy.

3. Some statistics courses were proposed to be included into the curriculum such as STA 117, STA 127, AGB 311 and AGB 321. However, the group after looking into the course load that students are required to take in a semester (i.e. Maximum of 12-15 Credit hours), it was felt to leave out these courses at the moment.
4. After adding the above agroforestry and related courses, the Task Force also agreed to change the area of specialization to be called "Agricultural Production Science I Agroforestry". The group also suggested the above listed agroforestry courses be given the course code APF followed by a course number. For example, Introduction to Agroforestry course can have APF 301 if it is offered in the 3rd year first semester.
5. The Task Force also made suggestions to modify some of the Land Use Planning courses in the curriculum. That is, to give more emphasis in agroforestry to the content of the courses and label them as follows. Existing Land Use Planning courses such as, ALP 412 will be named as ALP 412 Land Use Planning (Agroforestry), and ALP 422 will be named as Project in Land Use Planning (Agroforestry).

The meeting was adjourned at 10:00 am setting the next meeting date for Thursday, February 25, 1999, at 8:30 am.

Undergraduate Agroforestry Curriculum

Year	Semester	Course	Credit
I	1	BIO 111 Plant Biology	3
		CHE 115 Basic Chemistry Concepts	2
		CHE 114 Physical Chemistry 1	1
		PHY 115 Elementary Mechanics & Heat Transfer	1-1/2
		PHY 116 Elementary Electro-magnetic & Optics	1-1/2
		AGC 111Elements of Agro-Meteorology	1-1/2
		AGE 111 Introduction to Agricultural Economics	2-1/2
I	2	BIO 121 Animal Biology	3
		CHE 121 Inorganic Chemistry	1
		CHE 123 Organic Chemistry	2
		PHY 125 Mechanics, Waves & Sound	1-1/2
		PHY 126 Electromagnetism & Modern Physics	1-1/2
II	1	AGA 211 Introduction to Animal Science	3
		BCH 111 General Biochemistry	3
		AGW 211 Introductions to Seminar Writing	1/2
		MIC 211 Introduction to Microbiology	2
		AGS 211 Introduction to Soil Science	3
II	2	AGC 121 Introduction to Crop Science	3
		AGE 221 Farm Management	2
		AGW 221 Introductory Seminar	1/2
		AGP 22 Pasture Ecology	2-1/2
		AGS 221 Pedology	2
		AGE 121 Marketing of Agricultural Products	2
		AGV 221 Anatomy and Physiology	3
III	1	APF 301 Introduction to Agroforestry I	3
		AGC 311 Water Regulations	1-1/2
		AGC 211 Elements of Crop Production	3
		AGH 311 Elements of horticultural Science	2
		AGH 312 Elements of Fruit and Vegetation Production	2
		AGE 211 Agricultural Production Economics	2-1/2
III	2	APF 302 Introduction to Agroforestry II	3
		AGA 321 Animal Nutrition	3
		AGC 221 Elementary Irrigation	1-1/2
		AGG 221 Introduction to Agricultural Engineering	3
		AGV 321 Elementary Animal Health	1-1/2
		AGX 221 Introduction to Agricultural Extension	1-1/2
		AGC 312 Introduction to Genetics and Plant Breeding	4

Year	Semester	Course	Credit
IV	1	ALP 411 Land Use Planning (General)	1-1/2
		ALP 412 Land Use Planning Agroforestry	3
		AGP 311Pasture Management	2-1/2
		APF 411 Introduction to Nursery Technology	3
		APF 311Project in Agroforestry	3
IV	2	ALP 422 Project in Land Use Planning Agroforestry	
		AGP 321 Fodder Production and Conservation	2
		AGX 312 Agricultural Extension and Human Development	3
		AGE Natural Resource Economics and Policy	3
		APF 412 Social Forestry and Community Forestry	3
		APF 413 Seminar in Agroforestry	1

Agroforestry Curriculum Development, University of Fort Hare

Agroforestry Course Description.
Course Description (4 credits hr.).
3 credits lecture, 1 credit practical.

Introduction to the concepts of agroforestry. Agroforestry and its role in rural development in South Africa. Ecological benefits of agroforestry and the environment. Agroforestry as a source of raw materials for rural households and small industries, food, fodder, and construction materials. Agroforestry systems: agrisilviculture, alley cropping or taungya permanent tree and crop combinations; agrosilvopasture, forest / veld grazing, and potential in rural development. Components of agroforestry systems. Characteristics of selected food crops and multipurpose tree species (MPT's); characteristics of livestock and pasture; fish farming and bee keeping in agroforestry. Technology transfer and monitoring in agroforestry systems. Land and tree tenure policy and agroforestry. Agroforestry as a sustainable land-use system..

Agroforestry Course Outline

1.0 Introduction to Agroforestry.
1.1. Definition and concepts of agroforestry.
1.2. Benefits of agroforestry in the land use Systems.
1.2.1. Ecological benefits of agroforestry
1.2.2. Economic benefits of agroforestry.
1.3. Classifications of agroforestry systems.
1.3. 1. Trees grown in association with corps (agrisilviculture)
1.3.2. Trees grown in association with livestock (silvopasture)
1.3.3. Trees grown in association both with crops and livestock (Agri-silvopasture).
1.4. Agroforestry practices in the sub humid and semi-arid regions of Southern Africa.
1.4.1. Structural analysis of the systems
1.4.2. Functional analysis of the systems
2.0 Participatory Rural Appraisal for planning Agroforestry.
2.1. Concepts of Participatory Rural Appraisal
2.2. Steps in Rural Appraisal and Planning.
2.2.1. Preparations: Identifying the area and the people to be involved
2.2.2. Combining local knowledge and expert knowledge

2.2.3. Conducting the survey and collecting useful information
2.2.4. Problem Analysis of land-use and socio-economic conditions
2.2.5. Agroforestry planning for farm, watershed or landscape level.
3.0 Establishment and Management of Multipurpose Trees and Shrubs Species.
3.1. Objectives and purpose of agroforestry planting.
3.2 Identify and characterize important MPT's in the region or South Mrica (e.g. important trees, shrubs and horticultural crops).
3.3. Nursery establishment and management to raise the MPT's.
3.3.1. Preparation of seedbeds
3.3.2. Seed source and quality
3.3.3. Care of seedlings (watering, shading, weed control etc.).
3.4. Preparation and field planting of MPT's.
3.4.1. Site identification and preparation for planting
3.4.2. Planting a.direct sawing, b. planting seedlings.
3.5. Care and management of MPT's.
3.5.1. Cultivation and weeding
3.5.2. Pruning and thinning
3.5.3. Coppicing and pollarding
3.5.4. Pest and disease control.
4.0 Livestock and Pasture Subsystems.
4.1. Objectives of livestock production
4.2. Types of livestock in the region
4.3. Source of pasture and forage
4.4. Open / free grazing
4.5. Management of livestock and pasture
4.6. Animal disease and pest control.
5.0 Agroforestry Technology Transfer and Demonstration.
5.1. Selecting successful agroforestry farms for demonstration
5.2. Monitoring and evaluation of the agroforestry practices
5.3. Preparation of training materials based on the field experience
5.4. Training of farmers in class room and field visit
5.5. Establish "Newsletter" to exchange information between farmers and researchers
5.6. Agroforestry field visit to the UFH and Fort Cox farm.
6.0 Economics and Policy Aspects of Agroforestry.
6.1. Principles of production as it relates to agroforestry (land, labor and capital)
6.2. Principles of demand and supply
6.3. Agroforestry farm planning and budgeting.
6.3.1. Inputs: land, labor and capital

6.3.2. Outputs: a. for house consumption (food, fuelwood, fodder), b. market.
6.4. Agroforestry "Farm Model" with examples from South Africa
6.5. Government incentives to encourage farmers to grow more trees.
6.5.1. Material incentives, (providing farmers with seedling and farm tools)
6.5.2. Market incentives (provide market to agroforestry outputs)
6.5.3. Security of land and tree tenure and agroforestry.
7.0 Agroforestry for Sustainable Development.
7.1. What is sustainable development?
7.2. Ecological and Economic benefits of agroforestry
7.3. Role of agroforestry to combat deforestation and land degradation
7.4. Land carrying capacity, population growth and agroforestry
7.5. Macro-economic policy and agroforestry.

Agroforestry Graduate Curriculum at UFH

Based on a similar curriculum devised for Kenyatta University in consultation with ICRAF (Kenyatta University, 1999). The Course numbers given below are either those for existing courses at the University of Fort Hare or suggested new ones for specifically Agroforestry subjects.

COURSE STRUCTURE

CORE UNITS

AFR 600 Agroforestry Systems
AFR 601 Multipurpose Trees, Shrubs and Nursery Technology
AFR 602 Research Methods for Agroforestry and Rural Development
AFR 603 Statistical Methods in Agroforestry
AFR 604 Rural Development.
AGE 608 Agricultural Resource Economics (for students with an Agricultural Economics bias)

OR

AFR 605 Social participation in Community Development (for other students).
AFR 606 Seminars:a.Comprehensive literature review, andb. Project Seminar.

ELECTIVE UNITS

AFR 607 Introduction to Forestry
AFR 608 Forest Ecology
AFR 609 Economics of Land and Water Resource Management
AFR 610 Principles and Management of Watershed Resources
AFR 611 Soil Conservation
AFR 612 Soil Management and Productivity in Agroforestry
AFR 613 Climatic and Edaphic Resources of Agricultural Systems
AGC 609 Special Topics in Crop Science (Equivalent to: Management of Cropping Systems)
AGC 602 Advanced Topics in Crop Physiology (Equivalent to: Environmental Stress and Crop Production)
AFR 614 Basis of Agricultural Systems
AGC 603 Selected Courses in Biometry and/or Computer Science (Equivalent to: Statistical Methods in Agroforestry and Rural Development)
AFR 615 Economic Development and Gender Issues in Rural Development
AGC 604 Advanced Topics in Crop Ecology (Equivalent to Ecology o Agronomic

Crops)
AFR 616 Modeling and Simulation of Agroforestry Systems
AFR 617 Urban Forestry
AGE 610 Project Planning and Management
AGE 611 Benefit Cost Analysis
AGE 612 Introduction to Agribusiness.
AGP 602 Advanced Topics in Pasture Science
AGP 606 Seminar in Advanced Pasture Science
AGO 607 Seminar in Advanced Pasture Science.

Students with an Animal Science Bias will be required to take a selection of Courses from those listed below, in consultation with the Head of Department:

Module 1: Evolution of ruminants and their present environment
Module 2: The Rumen: ecology and fermentation patterns
Module 3: End products of fermentation
Module 4: Energy: metabolism, requirements and standards for feeding
Module 5: Protein: metabolism, requirements and standards for feeding
Module 6: Voluntary feed intake and control
Module 7: Minerals and Vitamins: functions in metabolism and requirements
Module 8: Free Ranging Animals: quantity and quality of feed intake, supplementation
Module 9: Animal nutrition in rural and communal farming areas
Module 10: Research methodology and techniques
Module 11: Mono-gastric: poultry nutrition
Module 12: Mono-gastric: pig nutrition
Module 13: Feeding systems and ration formulation in dairy, beef and small-stock production systems

December 16, 2002

Agroforestry Research and Demonstration and Small Farm modeling Fort Cox College of Agriculture and Forestry

Meeting of the FCC and OSU Team

Agenda

To identify appropriate agroforestry technologies and small farm modeling this will serve as research and demonstration for training students, farmers and the public.

Present

Mr. Leutle Mamogoto Frans, Head, Department of Social Forestry, FCC
Dr. Badege Bishaw, Project Coordinator, OSU
Mr. Henry Fredricks, Lecturer, Social Forestry, FCC
Mr. David Dauncy, Maintenance Manager, FCC
Mrs. Thembisa Gcaza, Nursery Technician, Social Forestry, FCC.

To identify the appropriate agroforestry technologies for the R & D, it was necessary for the team to discuss, identify and prioritize problems of the farming systems in the Eastern Cape. Based on our discussion the following problems were identified.

- Food security
- Water shortage
- Soil fertility / marginal soils
- Fodder shortage / over-grazing
- Fuelwood shortage
- Soil erosion
- Organizational capacity

Once the problems of the Farming Systems in the E. Cape have been identified, appropriate agroforestry technologies were proposed as solution to address the problems. These are:

- Fruit orchards
- Water harvesting
- Alley Cropping / Compost production
- Fodder banks / growing grass
- Woodlots / living fences
- Natural regeneration
- Small Farm modeling

For each agroforestry technology, the team also identified different fruit types, tree species and design of agroforestry practices that will be used to establishing the R & D at FCC campus.

A. Fruit Orchards

The following fruit trees were identified to address the food security and cash income in the Farming System of the E. Cape. These are: Prickly pears (Cactus family), Kei Apple (Dovyalis caffra); Orange, Peaches and Peaca nuts. There are also other fruit trees that will be included in the R & D. as species screening trails.

B. Water Harvesting

Different ways of water harvesting was discussed. 1) Drinking water can be harvested and recycled from the roofs of the houses during the rainy season. 2) Building small catchments around fruit trees and individual plants to conserve water for growing trees. 3) Mulching grass or crop residues is also suggested as one of the soil moisture conservation methods.

C. Alley Cropping

The alley cropping / Farming research and demonstration will address the soil fertility problems and fodder issues in the E. Cape. Planting nitrogen fixing trees such as tree Lucerne and Leucaena intercropped with maize and beans will help address the soil fertility issue. Also planting Pigeon Pea with maize and beans in an alley cropping system will address the food security issue. In addition production of compost from animal waste and organic farming was suggested as one of the soil improvement techniques.

D. Fodder Banks

To address the fodder shortage in E. Cape planting tree Lucerne and Napier grass as a supplement to traditional grazing was suggested. Also, improving the traditional grazing through rotational grazing and fodder supplements is another area which needs further investigation.

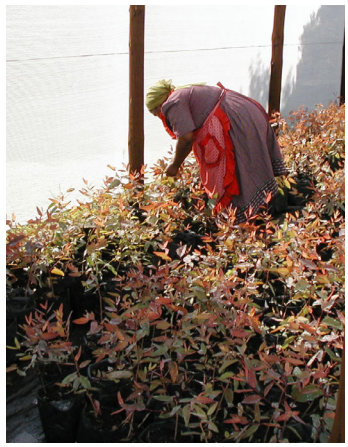
E. Woodlots and Living Fences

Fast growing tree species such as Eucalyptus for woodlot planting, and Casuarina as living fence and wind break will be planted. The Eucalyptus and Casuarina species will be planted as an upper story trees, while other species such as Dovyalis caffra will be planted as an under story trees to serve as living fence.

F. Natural regeneration

Natural regeneration of the existing bush veld is equally important to maintain and conserve the biodiversity of plant and animal species in E. Cape. Inventory of natural vegetation and regeneration study has already been started by a team of scientists

from FCC and OSU on the Amathola mountains. More research is needed to study natural regeneration in the bushveld in E. Cape.



Small Farming Modeling

In this meeting the idea of establishing a Small Farming model for the E. Cape was discussed by the team. During the field visit to Ukulinga Farm at the University of Natal in Pietermaritzburg, the FCC team members were very impressed by seeing the activities of Small Farm model. They were very interested to put trail plots for small farm model at FCC which will be representative of the Farming Systems and climatic conditions in the E. Cape.

Thus, in addition to the Agroforestry R & D. which emphasizes crops, trees and fodder production, the small farm model at FCC will include production of poultry, sheep & goat, dairy and compost production. To implement this model at FCC poultry house, shade for cows, sheep and goats, piggery with outlet for compost production will be constructed. Also, an irrigation system will be established to guarantee successful establishment of fruit trees, woodlots, food crops and fodder production.

Extension and Rural Development

Working with three rural villages around FCC on tree planting and rural development is one of the objectives of the project. The three villages around FCC have already been identified by experts from OSU and FCC. To get farmers involvement and support to the project Participatory Rural Appraisal (PRA) will be carried out in February 2003. Henry and Thembisa from FCC will be involved in this PRA scheduled for February this year. The agroforestry Research and Demonstrations is designed to generate knowledge and information to assist farmers to improve their Farming Systems. However, through the PRA process we will fine tune our approach and methodology based on the feedbacks we get from the farmers in the E. Cape.

Part II

Affordable and Environmentally Sustainable Housing Preliminary Studies

Affordable and Environmentally Sustainable Housing: Preliminary Studies

Badege Bishaw[1], Philip Humphrey[1], John Sessions[1], Marion McNamara[1]

Summary

Availability, quality, and affordability of housing are measures used around the world to evaluate a country's economic growth and the quality of life of its citizens. In South Africa, housing, and more importantly, land, was historically used to attain social and economic power within and among tribal structures. At present, South Africa has a severe shortage of affordable housing, and sprawling slums and squatter settlements dominate its urban and suburban landscapes. These serve as constant reminders of the gap between the economically empowered and the economically deprived, and underscore the need for access to housing and basic urban services for the historically disadvantaged majority.

After Nelson Mandela and the African National Congress gained power in the country first democratic elections in 1994, the government's Reconstruction and Development Program built hundreds of thousands of homes for the poor, black majority population. During the last five years 1.2 million low-cost houses have been built. Although this achievement is dramatic, the typical low-cost houses are simple shelters of 30 square meters covered by corrugated galvanized steel roofing without insulation in the walls and ceilings (USAID, 2003). Despite the continuing effort to build affordable housing, many blacks, mostly women and children, remain in squatter settlements.

Since 1994, USAID has been assisting the South African government in their Housing and Urban development programs to improve access to sustainable shelter and services for the disadvantaged population. To achieve the above objectives USAID has set the following strategic goals: (1) Support for policy development, (2) provision of shelter finance, (3) assistance to shelter sector NGOs, and (4) improving urban environmental capacity. Although some progress has been made by the government of South Africa, the USAID and other donors, and NGO's to improve the housing problem in both urban and rural areas, South Africa still has a severe shortage of affordable housing and will maintain that shortage for some time to come.

Availability, quality, and affordability of housing are measures used around the world to evaluate a country's economic growth and the quality of life of its citizens.

1) Project Director and Project Coordinators, OSU.

Through the USAID-ALO Sustainability grant, OSU, FCC and UFH have initiated collaborative efforts at a "new" level of activity in the quest for affordable housing for South Africans – the "grass roots" level. The following were seen as potentially viable activities for UFH and FCC to undertake in support of improvements in affordable housing in Eastern Cape Province: (1) Vocational training in wood utilization and associated skills in house construction; (2) promoting entrepreneurial development of small businesses related to house construction; (3) engaging in research and development in the areas of (a) sociology and economics to assess quality of life and housing needs, (b) wood utilization and house construction, (c) sanitary services.

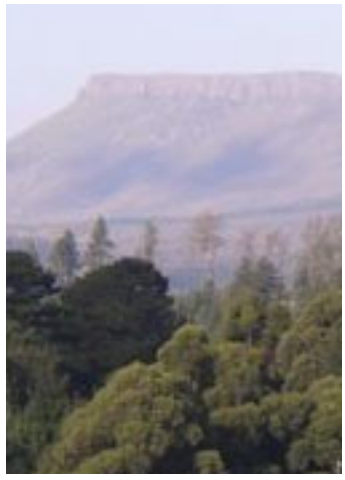
Before engaging fully in the above enterprises, we thought it would be important to launch a comprehensive feasibility or "scoping" study to assess the likelihood of success, and to identify how the objectives of the project may need to be modified. The goal was to examine, through closely-related and well-designed team studies, the feasibility of a major development activity aimed at providing environmentally sustainable and affordable housing and employment for the citizens of Eastern Cape Province, South Africa.

This report puts together the results of two major assessments. The first concerns the availability of local forest resources and the economic feasibility of locally processing wood; it is titled "Softwood Forest Resources in the Eastern Cape Province of South Africa" (Sessions, 2002.) The second assessment addresses challenges faced by village communities and their attitudes towards innovative housing alternatives (essentially 3a above); it is titled "Housing and Social Stress in Rural Eastern Cape Villages" (Humphrey, 2003).

These assessments were made by OSU lead faculty members in collaboration with UFH, FCC, government, and forest industry personnel. The assessments considered resource availability, societal, transportation, infrastructure, logistics, and environmental issues together with diverse issues such as the availability of local labor and training requirements.

Follow up studies are planned which will 1) establish innovative modular housing designs and determine the feasibility of establishing pilot-scale manufacturing facilities in rural villages, and 2) determine the potential for government, foundation, and industry support of pilot-scale projects aimed at providing affordable and environmentally sustainable housing and employment to Eastern Cape Province communities. These future activities will involve OSU, UFH and FCC and other governmental and private sector partnerships.

SOFTWOOD FOREST RESOURCES IN THE EASTERN CAPE PROVINCE OF SOUTH AFRICA



John Sessions

Introduction

The Eastern Cape Province of South Africa is approximately 170,000 sq kilometers (17 million ha) divided into three eco-regions (Bailey 1995), the coastal region (temperate subtropical) proceeding inland through temperate prairie, and temperate mountain prairie. With the exception of a thin strip along the coast, the southern third of the Eastern Cape has a mean precipitation of 200-400 mm per year, the middle third is 400-600 mm and the northern third is 600-1200 mm. Forests in the southern third and middle third are largely limited to the higher elevations. Plantations occupy about 0.7% of the land area..

Species

Experimentation with pines in South Africa began in the late 1800's with Pinus radiata showing the greatest growth potential, but subject to hail damage. In the early 1900's plantings of *Pinus patula* and *Pinus caribaea* were started and many others have been tried (Sim, 1927). Environmental factors affecting choice of species are average precipitation, soil, hail, snow, and frequency of drought. Currently, five pines constitute the major softwood resource in South Africa; *Pinus patula*, *Pinus elliottii*, *Pinus taeda*, *Pinus radiata* and *Pinus pinaster*. All are grown in the Eastern Cape although *Pinus taeda* and *Pinus radiata* are relatively more abundant in other areas of South Africa and there has been little planting of *Pinus pinaster* during the last decade (Table 1).

Table 1. Area of softwoods by species in South Africa (DWAF 2002).

Species	South Africa (ha)	Eastern Cape (ha)	Percent
P. patula	349,989	58,693	17
P. elliottii	188,269	24,347	13
P. taeda	37,381	3,124	8
P. radiata	64,847	6,697	10
P. pinaster	19,641	4,201	21
Other softwoods	45,101	14,407	32
Total	705,227	111,469	16

Pinus patula is the major softwood species grown commercially in Southern Africa. It's potential growth has been estimated by Smith(1994) as a function of precipitation with a temperature adjustment. Using Smith's method, the mean annual increment of Pinus patula is 14-22 m3/ha (1 m3 approx = 1 tonne) with the highest growth along the coast and at higher elevations.

Pinus elliottii is thought to be the hardiest species with the lowest precipitation requirement (850 mm for optimum growth), able to withstand relatively higher temperatures, and poorer/wet/shallow soils, but its growth rate is lower (estimated 8-12 m3/ha). Because of it's relatively thick bark, it is quite fire hardy and survives better than most pines after a fire. It is therefore quite a popular species where fire is a problem.

Pinus taeda requires the deepest soils of the three pines and is the most susceptible to snow damage which can occur at the higher elevations in the Eastern Cape. The heaviest snow in 20 years reportedly occurred during our visit in July, 2002 with snow in the foothills in the Ugie / Maclear area and heavy snow on the Hogsback. Growth of Pinus taeda is 16-22 m3/ha.

Pinus radiata has the highest growth rate of the pines in South Africa although it is subject to hail damage. Radiata was introduced into South Africa in the late 1800's. It is the third most common pine in South Africa and the Eastern Cape following *P. patula* and *P. elliottii*. It is a soft, light wood that takes saws cleanly, takes varnish well, and does not split. It is subject to blue stain, so it must be sawn quickly and preferably kiln dried. Growth of *P. radiata* on good soils is 24-28 m3/ha.

Pinus pinaster is a native of the Mediterranean and used in France for sand reclamation work. Introduced into South Africa in the 1800's, it does well on a variety of soils. It grows well with winter rainfall and a dry summer although its growth rate is less than half of radiata. It was originally established as a source of railroad ties as it takes creosote well and is not as soft as Radiata. *P. pinaster* was originally established in the Western Cape, with later establishment in the Eastern Cape, mostly west of Port Elizabeth, the western half of the Eastern Cape. Almost no *P. pinaster* has been planted in the last 10 years (Table 2).

TABLE 2. PLANTATION AREA (HA) BY SOFTWOOD SPECIES IN THE EASTERN CAPE IN 2001 (DWAF 2002). AREAS DO NOT INCLUDE MINOR PLANTATION REVERSIONS TO NATIVE FOREST.

Age Class	P .patula	P. elliottii	P.taeda	P. radiata	P. pinaster	Other	Total
0-5	15,026	5,752	294	1,046	28	7,258	29,404
5-10	14,683	3,017	650	2,312	30	5,531	26,233
10-15	12,448	4,613	133	890	610	238	18,932
15-20	4,153	2,142	419	734	468	29	7,945
20-25	2,554	1,595	605	378	1947	19	7,098
25-30	2,485	2,013	409	601	889	175	6,572
30-34	1,980	835	548	434	225	231	4,523
34+	2,220	2,311	51	93	4	138	4,817
Unplanted	3,004	1,990	0	149	0	622	5,765
Total	58,558	24,264	3,104	6,633	4,201	14,240	111,000

Conflicting data from Forestry South Africa (personal communication, August 6, 2002) suggests that planting of pine in South Africa is slowing. Reasons for these differences might include a shift to eucalyptus with shorter rotations or a backlog in the issuing of afforestation permits.

Table 2a. Planted area in pine in the Eastern Cape 1998-2001 (Forestry South Africa, personal communication, August 6, 2002).

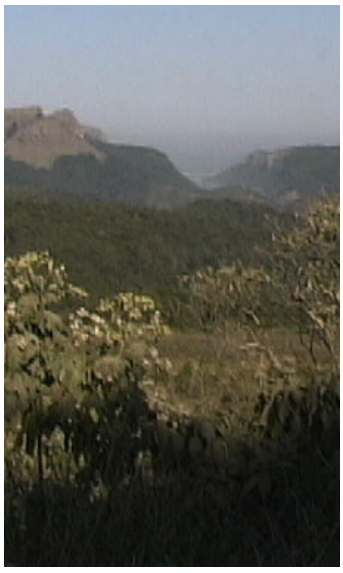
Year	Planted Area
1998	1,183 ha
1999	1,452 ha
2000	44 ha
2001	370 ha

Silviculture

Most of the pine is grown on a 25-35 year rotation. Trees are planted on spacing varying from 2.7 meters x 2.7 meters (1370 sph) to 3 meters x 4 meters (833 sph) depending on site and species and fertilized at time of planting. Competing vegetation is kept clear of the seedlings using a combination of manual hoeing and chemical treatment. A first thinning is carried out at 8 years; a second thinning at 13 years, and depending on the site, a third thinning may be carried out at 18 years. Clear felling takes place at 25-35 years depending on the quality of the site and mean annual increment. Most of the stands are pruned. *P. Patula* generally receives 4 pruning over its life span to a height of 7 meters. *P. Elliottii* has three pruning to a height of 5 meters, with a rare pruning to seven meters. Weed control is carried out periodically, but at most annually during the first three years of it's life. Tree diameter at the first thinning (8-yr) is 10-16 cm, at the second thinning (13-yr) is 18-24 cm., and at final harvest is 35-42 cm. Depending on access to markets, the first thinning is to waste or it can be utilized for fence posts.

Harvesting Methods

Trees are manually felled by chainsaw. Thinnings are either skidded directly to the landing by rubber-tired skidders or tractors or are skidded to a main skid trail by animals followed by skidding by rubber-tired skidders or tractors to the landing. Trees from clear fellings are skidded directly to the landing by rubber-tired skidder or tractor. Trees are bucked into logs on the landing and are loaded by hydraulic loaders onto 24-40 tonne capacity trucks for transport to processing centers. Transport to chip markets is prohibitive in some areas (such as Hogsback) so lower value parts of the trees are left in the woods. Concern over the availability of a healthy work force in the future has prompted companies to the north to consider increased logging mechanization to substitute for labor. It is not clear to what extent this will be a factor in the Eastern Cape.



Damage by Fire and Other Causes

Fire is the main damage agent in South African forests, although drought, hail, snow, wind, insects and rodents can contribute to forest mortality. Fire has caused significant damage to the pine plantations on the Eastern Cape during the last two years burning almost 3% of the pine plantations in 2000 and again in 2001 (Table 3).

TABLE 3: PINE PLANTATION AREA BURNED FROM 1998 TO 2001 IN THE EASTERN CAPE (FORESTRY SOUTH AFRICA, PERSONAL COMMUNICATION, AUGUST 6, 2002).

Year	Burned Area
1998	685 ha
1999	960 ha
2000	3,598 ha
2001	3,018 ha

Fire has been especially severe in the Hogsback / Stutterheim areas, these past two years. Fires often originate in the surrounding grazing veld and are driven by wind into the forest. Fires are due to both natural (lightning) and human caused (accidental and arson). DWAF (2002) estimated area burned in the Eastern Cape during 2001 due to various causes to be natural (12%), accidental (41%), arson (17%) and unknown (29%).

Lightning is considered the important natural source of fire causing 25-30% of fires (Edwards 1984) in South Africa with one successful lightning induced fire per 500 flashes. On a scale of 0-14 flashes per square kilometer per year, the Eastern Cape is in the moderate lightning zone with 1-6 flashes per sq km per year with the lowest frequency along the coast and the highest frequency in the northern third of the Eastern Cape. The KwaZulu-Natal area has the highest lightning frequency in South Africa (Schulze et al, 1997).

Aerial attack service in the northern part of the Eastern Cape is provided through the KwaZulu Natal Fire Protection Association from bases at Langeni, Harding, and Ugie from mid May through to August of each year.

Ownership

Until recently most of the pine forests in the Eastern Cape have been in public ownership either with the South African Forestry Company Ltd (SAFCOL), a registered company with the government as its sole shareholder or with the Department of Water Affairs and Forestry (DWAF). In 1998 the South African government decided to "privatize" most of the public plantations offering all state-owned commercial forest resources in the Eastern Cape to interested bidders. In 1999 Amathole Timber Holdings (Rance Group of Companies) and Singisi Forest Products (Merensky Group) were selected as the preferred bidders, with Amathole Timber Holdings leasing the lands in Eastern Cape South and Singisi Forest Products leasing the lands in the Eastern Cape North.

The Government, through various state bodies, will retain share holding of about 25% of the public forests in the Eastern Cape for watershed and local community

development projects. Prior to privatization, almost the entire softwood harvest in the Eastern Cape came from pubic lands.

Utilization

Almost 90% of the pine plantations in the Eastern Cape are reportedly grown for the purpose of providing sawtimber (Table 4). The 2001 sawlog harvest in the Eastern Cape was about 600,000 m3 or about 14% of the total sawlog harvest in South Africa. Hardwood contributes very little to the sawlog harvest (1%) in the Eastern Cape and less than 5% of the South Africa sawlog harvest.

TABLE 4. PURPOSE FOR WHICH PLANTATIONS AREA GROWN IN THE EASTERN CAPE (DWAF 2002).

Product	Area (%)
Sawtimber	90.6
Pulpwood	9.3
Other	0.1

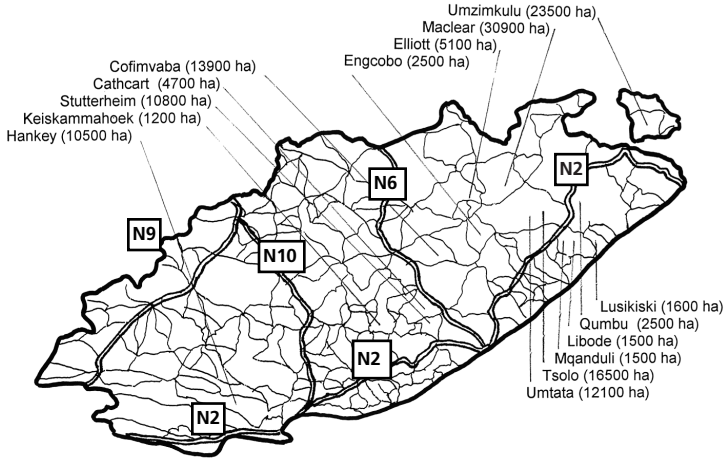
Major Processing Centers

The major wood processing centers in the Eastern Cape are at Umtata (sawmills, veneer, chipboard), Weza (sawmill), Stutterheim (sawmills as well as pole plants), Tsitsikamma area west of Humansdorp (sawmill as well as pole plant). Some small millers (pallets, poles, and fruit bins as well as small construction) are in the Port Elizabeth, Stutterheim and scattered through the former Transkei area (DWAF, Danie Gous, King William's Town, personal communication, September 2002). The large plantations in the Ugie area (Maclear, Elliott) are not near maturity and it is unclear if processing will be done locally, if logs will be transported to existing processing centers, or if logs will be exported. Recently some softwood logs have been exported from the port at East London to overseas buyers due to an oversupply resulting from the fire salvage by SAFCOL at their Hogsback Plantation near Cathcart.

Transportation

The location of the major timber producing areas in the Eastern Cape are shown in Figure 1. Haul costs average about 0.5 rand per tonne-km. Haul costs are higher on lower standard roads. The national highway system (N roads) in South Africa is excellent and the regional roads are generally good for heavy truck transport. Local roads leading to some forest plantations are in poor condition and will require reconstruction and regular road maintenance to be usable.

FIGURE 1. MAJOR TIMBER PRODUCING AREAS IN THE EASTERN CAPE



Future Prospects

The long term sustained yield of the existing plantations is probably about 1.2 million m3 per year, about twice the current harvest. However there are several challenges (1) the current forest is not regulated (too many younger acres), (2) access to some plantations still in DWAF management is limited, (3) and fires have damaged a number of plantations. Fire management is urgent. The privatization of forests with it's financial spin off arrangements for local communities, could lead to improved prevention and pre-suppression, keeping fire losses to acceptable levels. Direct benefits to communities from these forests, compared to the situation in the past, will possibly make them more concerned about long term sustainability than previously.

DWAF believes that significant expansions of forest plantations are possible in the Eastern Cape. In 1998 the government introduced the Wild Coast Development Initiative to invite companies and community representatives to express interest in forestry projects on communal land. Potentially afforestable areas have been identified and amount to almost double the existing plantation area.

TABLE 5. POSSIBLE EXPANSION OF FORESTRY IN THE EASTERN CAPE (DWAF 1998).

Region	Current Area (ha)	Possible new (ha)	Comments
Amotole	16,500	10,000	May be water limited
North East Cape	40,000	20,000	Development already in progress on private and communal lands
Umtata/Langeni	36,500	10,000	Expansion of existing forests
Wild Coast North	4,100	40,000	High potential opportunities in Lusikisiki and Mt. Ayliff-Bizana
Wild Coast South	0	10,000	Small plantation forestry on good soils. Needs coordination.
Umzimkulu	17,200	10,000	High potential area.

Climate Change

Climate change forecasts for the Eastern Cape are for warmer and possibly drier (less precipitation) conditions (Scholes, 2002). If the climate does become warmer and drier over the next decades the growing conditions for the most common pine, *P. Patula*, will decline. Lower precipitation will reduce the growth of *P. Patula* and may make it marginal in much of the Eastern Cape. *P. Elliottii* which can thrive under higher temperatures and lower precipitation than *P. Patula* is a possible substitute, however its yield is lower than *P. Patula*. Projected changes in the climate for the Eastern Cape may also increase fire severity and the thicker bark of *P. Elliottii* may give it an additional advantage over the thinner barked *P. Patula*.

Prospects for Wood Housing

Although this report surveys the softwood resource for timber frame housing, there appear to be social and institutional challenges to the introduction of timber frame housing. Wood is primarily used for roof support systems, windows, and doors in concrete block houses.

A timber frame house is thought to have several advantages over concrete houses in the Eastern Cape:

1. It provides more insulation against the cold, and this area has a cold winter.
2. It can be constructed more quickly.
3. It can be adapted to any terrain, ie no need for site leveling; the house can be built on poles and adjusted to any level.
4. A concrete pad is not necessary.

Several initiatives to introduce wood housing have taken place in the recent past. C. J. Rance (Stutterheim) introduced a timber frame house in late 1990's and was prepared to produce it, but demand did not materialize. Chip Board Industries, a press board manufacturer who purchases chips in the Umtata area developed a section that can be used in low cost, flame proof, housing. They had an assembly factory in Berlin (near Bisho), but they closed the plant earlier this year due to lack of interest.

There seem to be a number of reasons including:

1. Some rural communities think lumber houses are a greater fire risk than traditional mud or concrete block houses.
2. Financing for wood houses is limited due to perceived fire risk.
3. Builders want the same construction fee for building a wood house as a concrete block house although the wood house can be constructed in shorter time.

Although the Eastern Cape has the potential to supply timber frame housing, attention to social and institutional factors seems necessary if such an effort is to be successful.

Housing and Social Stress in Rural Eastern Cape Villages

Philip E. Humphrey and Marion McNamara

Introduction and Summary

Housing in rural Eastern Cape Province villages has been assessed with a view to identifying strategies for improving quality of life and self sufficiency. To that end, current living conditions were evaluated, particularly in terms of the impact of housing on social structure and lifestyle, the receptiveness of rural village communities to alternative or modified building approaches, and the need to provide employment. The housing situation of the urban poor is also considered since it bears on one possible means of addressing the needs of the rural village communities.

Housing in the villages was found to consist of a mix of traditional rondavel sun-dried mud and thatch and quite diverse rectangular structures made from materials ranging from mud to durable rendered concrete blocks. Quality and condition were seen to vary widely. The limited durability of most mud block and mud layered structures presents maintenance challenges for the highly stressed village communities. Stress seems due in large measure to the ravages of HIV/AIDS (anecdotally pitched at 45% HIV positive) and unemployment — which hovers around 70% in Maipasa, the village selected for focused evaluation in the project. The terrain within and around this and other villages was also found to be markedly devoid of trees and crops, considering climate, soil types, and the reported lushness of former times. This seems to be attributable to poor control of grazing animals (mainly goats), inconsistent motivation to farm, and lack of irrigation. That said, the quality of most village housing, though low, exceeds that to be seen in urban squatting areas that have coalesced around most large and mid-sized cities throughout South Africa. Our survey of rural East Cape housing and associated community structure suggests that the biggest opportunity to alleviate social deprivation and stress lies in finding ways to stimulate village-based employment — rather than directly providing housing assistance.

Building on the findings of our investigation, opportunities are thought to exist to simultaneously address both rural employment and urban housing challenges. Suggested is the sustained and coordinated village-based manufacture of innovative light and strong modular building components. Such components could be specially designed to increase the affordability and quality of subsidized housing for the poorest of those squatting in urban areas. Urban migration may thereby be reduced by increasing rural employment and economic stability. It is suggested that such houses could be erected in rural areas too, but encouraging the adoption of enhancements to traditional rural

building methods (principally mud-augmentation and design improvement) is also seen as worthwhile for these areas.

Information Gathering Methods and Activities

Information sources

Project personnel (OSU faculty Humphrey and McNamara) surveyed villages and their surrounding terrain in the Eastern portion of the Eastern Cape Province over a two week period (in September 2003). Both informal and structured dialogues were held with tribal and village council representatives and assembled villagers, and visual surveys of housing methods and conditions were conducted. Some preliminary observations were also made of shelter in an urban squatting community on the periphery of Soweto. In addition to meetings with assembled villagers, discussions were also held with the following:

- Tribal and Village leaders
- Faculty at Fort Hare University and Fort Cox Agricultural College
- Senior personnel from CSIR's Building and Construction Technology Division (Pretoria): Messrs. Michael Bolton, Jeremy Hubbard, and Don MacLeod.
- Representatives and administrators of the Regional Department of Housing and Nkonkobe Municipality (Thembisile Badi, Tahsanqa Mxoli, Thembisa Dwanya, Nfyebo Masiza and Mzwandile Mgengo.

The greatest interaction was, however, established with the rural Eastern Cape Province village of Maipasa.

Mapasa is located about 110 km west of the Coastal city of East London, about midway between the towns of Bisho and Fort Beaufort. It is reached by leaving highway N63 and traveling south about 5km along a dirt road, passing near to Dimbaza, a past employment center. The village lies within 25km of Fort Hare University (FHU) and Fort Cox Agricultural College (FCC), institutions with which the project has linkages. It is one of six villages selected for study and assistance in the Agro-Forestry component of an ongoing complementary USAID funded project [(Education for Development and Democracy (EDDI).] The six villages were originally chosen after consultation with the Tribal council and the Department of Agriculture, and in light of their proximity to FHU and FCC.

Maipasa is a rather typical rural village for the area although, based on prior interactions of project members, its community spirit, level of cooperation, and council leadership may be somewhat stronger than in some surrounding villages. Maipasa has a population of approximately 2,500 (plus or minus 400) living in about 300 houses (exact figures are not recorded by the village or Provincial administration). The village has a primary school, secondary school, community meeting center, a number of

churches, and a small number of shops for provisions. Potable water is available throughout the village through communal taps; those few who can afford it have taps in their homestead. Sanitary latrines appear to be the norm.

The primary source of income for the village is old age pensions and remittances from family working in urban areas. Members of the village are making some efforts to develop their local economy; a group of about 10 women has organized a community garden, and one young woman (former student at Fort Cox College) has developed a plant propagation nursery. Agricultural productivity has been on the decline, with villagers citing the lack of tools and inputs, poor infrastructure, disruptive weather patterns, and lack of knowledge as the chief causes.

Village meetings

Village elders were asked to call village meetings principally for the purpose of exploring attitudes towards housing. Some difficulty was encountered in finding available dates because of the abundance of funerals (largely AIDS-related). Approximately 35 people attended the first meeting and 105 people attended the main five-hour long session four days later. About 52 women and 46 men (together with 3 infants and four children) attended the main meeting and they had a median age of approximately 45 (based on a combination of selective questioning combined with visual assessment.)

The meeting was organized according to the schedule included as Appendix 1. Discussion questions were deliberately made rather non-specific so as to encourage a free flow of ideas among the group. Prior experience of project personnel working in such village situations suggest that dividing the groups by gender can help to stimulate open and frank exchanges. For this reason, a combination of whole-group and divided-group discussions was employed. Translators greatly assisted in communication. One was a Fort Hare University staff member and the other a young male schoolteacher from the village who volunteered. Approximately 50% of the villagers appeared to have some proficiency in English (mainly, but not exclusively, the younger ones.) During the lunch period one team member (Humphrey) was escorted on a guided tour of buildings within the village. Life in the village and how housing influences this were discussed during the walk.

Project Results

Summary of verbal responses at the Maipasa village meeting

Responses are shown on the following pages in the order raised by the group. Indication of age, gender, and level of consensus is provided parenthetically where possible, along with some background information. The first two questions were deliberately broad. This was in order to let people voice their concerns and feelings about their village in a spontaneous and unlimited way, before the conversation was guided to housing issues.

Question: What do you think would make your village a better place in which to live?

Combined responses:

- Tractors for farming.
  (Proposed by at least three men. The village now has only about two working tractors and a number of broken ones. They are somewhat reticent about going back to using oxen or donkeys to plough fields, having had access to tractors in the quite recent past, and cultivation is therefore hindered)
- A bakery in the village.
  (Proposed by about three women and three men)
- Free education for our children.
  (Proposed by women and supported by many. Primary school fees are manageable (about 6R/yr), but secondary and college fees are prohibitive for many families)
- Recreation centre to reduce crime.
  (Proposed by older men and women. They linked this need to social tensions due to a high unemployment rate – estimated at 70-80% in Maipasa)
- Sawmill for house building (poles) and jobs.
  (There is however little standing timber in the vicinity of the village)
- Crèche – while women work.
  (With large family responsibilities, women have to make unwilling compromises about child care)
- Music center – to bring village together socially — old and young.
  (The elders seemed concerned about keeping the village's social fabric intact)
- Street lamps – for security
  (Security was a recurring concern among mothers)
- Dairy farming

Question: What dreams do you have for your children?

Combined responses:

- Better housing
  (Proposed by many women and some older men. Health and social stress on children was attributed in part to poor housing)
- Better and free education *(See above)*
- Alleviation of poverty
- HIV/AIDS-free environment
  (said with much emotion)
- Availability of medicines in the clinic
  (general medicines, but particularly anti-virals)
- Tarred roads
  (Proposed by men and women. The roads are very muddy in rain, sustaining considerable erosion and are often impassible)
- Hospital here in the village or nearby
  (The closest hospital is in King William's Town 35 km away)
- Counseling center for HIV-positive children
  (Such children were seen as having special emotional needs)
- Access to computers
  (Televisions are in even the most impoverished houses and the desire for computers is high)

Horse-racing training center
(How relevant this is was not explored)

Question: What characteristics of your house are important to you and what would you like to change about it?

Men's responses:

— Inside the house

- Would like to have a ceiling – maybe made of wood
  (This, they agreed, would provide improved thermal effi-

ciency both in hot and cold weather – particularly for houses with galvanized steel corrugated roofing – and to a lesser extent thatched roofing)

Nice colored painted walls

— Outside the house

- Decorative stones around the outside
- Fencing around plot
  (to keep goats out)

Women's responses:

— Inside the house:

- Would like hardened floors
  (Compacted earth floors are hard to keep clean, can have rising damp, can smell, and can be unhygienic.)
- Would like roofs with ceilings for insulation and warmth
  (As for men)
- To be more spacious
  (because we have big families)
- We like walls to be painted nicely
- It would be nice to have a tiled floor
- We would like to have water supply and sanitation in the house.
  (Water is available from communal stand pipes and government installed water mains run along most tracks. About 30% (anecdotal data) of houses are connected to the mains. The remaining 70% carry water. Water is not metered and consumption is not limited. Most houses have a sanitation pit remote from the house (housed in a mud or iron shed).
- Rooms to be properly divided and with more than one exit.
- Inside wc and bathroom.

Outside of the house:

- It is important to have a well fastened roof so it won't blow away
  (Strong winter winds can lift roofs – particularly iron ones. Rocks are used to hold them down)
- We would like to have cement covered walls so the house will last
  (this is too expensive for many but is known to prolong building life)
- We would like wind breaks (trees) around our houses.
  (The impact of winter wind and driven rain, and summer sun are severe because of the barren and exposed hillside landscape)
- Our house MUST be secure
  (burglar proof)
- We like to have flowers outside
  – but they get eaten!

Properly erected verandah
(verandahs seem to be popular, likely because they offer the prospect of being walling in for future living space)

Question: What would you like a new house to have?

Women's responses:

- Wish it could have been a rondavel house
  (it was not!)
- Wish it had been an "eight cornered" house with a verandah and thatched roof.
- Wish the roof had been made of clay tiles
- I chose a mud-walled house
- We wanted big windows
- A pine ceiling
- Air-conditioning
- Burglar-proof with an alarm.

Question: What are pluses and minuses of round and rectangular houses?

Combined responses:

Round (rondavel) houses:

Advantages:

- Very appropriate for ceremonies
- When thatched, they have very good heat properties
  - cool in heat and warm in winter- due both to roof and thick heavy walls.
- Not easy for house breaking
  (This is because walls are thick, windows are small, and there is usually just one room so all can be seen)
- Not easily blown away by the wind
- Good maternity house

Disadvantages:

- Difficult to divide into separate rooms
- No privacy
  (but then also no child abuse!)

Rectangular houses:

Advantages:

- Room may be divided
- Provides good privacy for adults
- Possibility of multiple families living in one house

Disadvantages:

- Easily broken into *Can't watch all rooms (Reduced security for family members)*

Easily blown down
– especially the flat roof.

Question: What are the difficulties of maintaining your house?

COMBINED RESPONSES:

- Cleaning- it is interrupted by many social demands
  (funerals and village meetings)
- Weather effects house and how we can look after it
  (water getting inside, wind blowing)
- We paint our houses
  if we can afford it
- Cooking/smoke
  makes the house dirty
- We try to keep the surroundings clean
  but it is difficult (mud, animals)

Question: What building materials are available and what would you like to be?

COMBINED RESPONSES:

- Bricks
  we can make from mud but clay bricks are expensive
- Cement and sand
  good but expensive
- Water
  (often have to carry it a long way)
- Nails
- Timber
  (It is expensive)
- Corrugated iron
- Windows
- Tiles
- Doors and frames
- Wire
- Mud and poles
- Thatch grass

Question: What would you think of living in a house with more wood in it?

COMBINED RESPONSES:

- "Wooden houses are not suitable for our villages"
- Highly flammable in case of fire
  (Fire is an issue: a house nearby burned down from a cooking fire two months ago – it was a rondavel with thatched roof)
- Does not last long.
  (Attack from termites and decay fungi would be a design challenge for wood. In high quality houses all wood is treated with CCA, although this is expensive for most villagers and also presents environmental challenges.)

Hot in summer and cold in winter –
poor thermal performance

Question: What building skills do you have in your village?

- *Responses:*
- Carpenter
- Plasterer
- Bricklayer
- Plumber
- Electrician
- Roofer
- Structural building person.

Question: Who builds houses and owns the village houses?

COMBINED RESPONSES:

- There is no buying of buildings or land
  (Houses and land are owned by the chief and administered by the village council)
- Some people build their own houses and others hire a builder to help.

Question: How is your income used up (in order)?

WOMEN'S RESPONSES:

- Educate the children
- Groceries (food)
- Building costs (maintenance, electricity)
- Clothing
- Church
- Health services
- Community affairs
- Entertainment

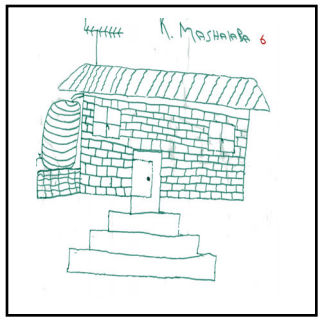
Question: What are the most important things we have discussed today?

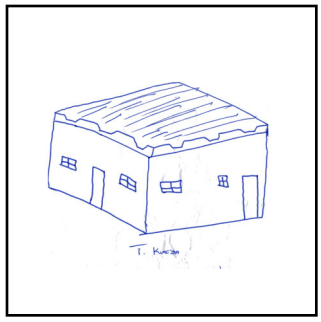
COMBINED RESPONSES:

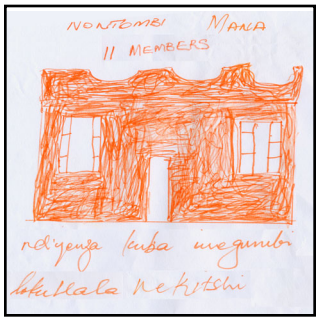
- Poverty
- Planting tress
- Houses
- Education
- Crime
- Health

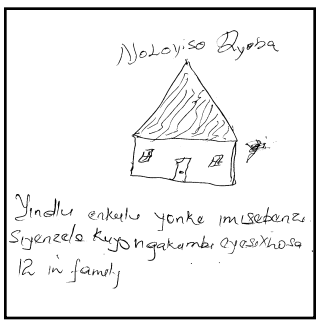
Villagers' sketches of their houses

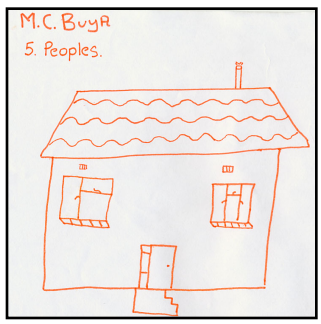
Sixty three of the adults sketched their house during a period of about 35 minutes. Many added information about how many people lived there and from what the house was made. Eight people said they had two houses (occupied by family members) and one had four. A number of the older villagers elected not to draw. Eight representative drawings are shown below.











Houses: their construction and social function

Rondavel houses

These traditional houses typically range in diameter from 4.5 to 8 metres, have walls ranging in thickness between 225mm and 300mm, and are built on a circular rock foundation. The mud blocks are from immediately adjacent soil and randomly contain grass and roots (which may provide some haphazard reinforcement). Little care appears to be taken in selecting soil type (though loamy top soil is known to be weak and the ratio of clay to sand effects strength and durability.) A mortar of mud is typically used, though sand and cement is sometimes used around door and window openings.

Rondavels in Maipasa have one door opening and typically have two wood framed windows, with either wood or, in one case, concrete lintels. The walls are mostly rendered with a mixture of mud and cow dung, though some in the village have sand and cement supported with chicken wire and nails (too expensive for most families though.) Most roofs in the village are either of traditional fine textured grass thatch or of corrugated steel sheeting.

Two rondavels with tiled roofs were also seen, while some had metal laid over thatch (regarded as efficient because of rain impenetrability combined with thermal insulation.) Roofs are pitched at angles ranging between about 20^{o} and 40^{o} and are supported with radial timbers which are bound together at the apex (and circumferential laths when thatch is used.) The walls of older houses showed severe signs of weathering (pitting on the side facing prevailing winds and rain.) and the projection of lintels beyond the openings was sometimes seen to be too small and led to distortion. Floors are mostly of compacted earth, though rock, paving slabs, and pored concrete were also seen.

Many (but not all) rondavels are well cared for and attractively painted. They are used both for ceremonial purposes and as primary habitation. Their massive walls effectively moderate temperature extremes, while thatch can act as a pretty good thermal insulator. The addition of an internal ceiling does, however, greatly improve insulation by reducing convection. Few rondavels have ceilings however.

Rectangular mud block houses

The wall construction of these houses is often similar to that for rondavels. Roofs are predominantly corrugated galvanized steel (again presenting seasonal thermal problems) with some tile (though expensive.) The absence of the redundant conical ceiling space in rondavels limits the addition of insulating ceilings in these flat roofed houses, however. Wall height is minimized to reduce compressive stresses (dead loads) at the base of the walls. Material choice (particularly earth and mortar type and rendering material), site location (avoiding surface water), and maintenance critically influence life span of these buildings. Below are shown three photos of a new earth block building under construction. Following these is another one showing signs of the onset of collapse (block separation and foundation settling.)



There is potential to improve construction methods for such buildings and thereby substantially extend their useful life and reduce maintenance needs. This includes:

- Carefully positioning the building to avoid surface water runoff (and providing perimeter drainage if necessary)
- Including an above-grade damp proof membrane (DPC) over the foundation rocks
- Conducting soil tests before making blocks to ensure correct clay, sand and fiber contents and to avoid loamy soil, and amending as necessary.
- Using cement-augmented mud mortar between blocks around window and door openings and at the foundation.
- Supplementing the wall rendering with sand and cement and providing effective keying to wall.
- Applying the roof with a large overhang and fastening it down to the wall.

All the above increase costs somewhat but would likely be cost effective in the mid and long terms. Excellent approaches for upgrading traditional rural earth block building methods have been developed by CSIR personnel in the Building and Construction

Technology Division in Pretoria (Bolton and Burroughs, 2001) and it is recommended that they be implemented as widely as possible.

Extension of buildings with improvised corrugated steel is common and reflects the need for extended families to adapt rapidly to changing family structure – often the result of the loss of adults to AIDS. With the absence of sanitation in most village houses, sanitation pits are often enclosed in crude mud-block or corrugated steel structures.

Rectangular wattle and daub houses

This is a construction method found attractive by the Maipasa community – although villagers said wood is quite difficult to acquire there. The interwoven wood wall structure and round-wood structural framing provides support for the applied mud and dung mixture. Walls are of somewhat lower mass than block walls and the wood acts as a reinforcing structure to reduce settling and cracking. Weathering of the mud and dung rendering remains a disadvantage. Foundations for these buildings seem to be less well prepared than those for earth block ones and decay of the wood at ground contact is common.

Roofs are typically either steel of thatch (for square or octagonal floor plans) and therefore suffer the same thermal deficiencies mentioned above for earth-block construction. Again, upgrading this building method has the potential of significantly prolonging their service life.

Rectangular cinder block houses

Concrete cinder blocks offer the best durability if well constructed, but are clearly more expensive than earth blocks and mud – and therefore are not possible for many. The houses are often rendered with sand and cement and have tile roofs. They are often extended as family size grows (not possible with rondavels.)

Challenges in the village

Dirt roads are highly susceptible to erosion and are often impassible in rainy periods. Water is carried from standpipes to approximately 70% of households. Land is grazed by free ranging goats and cattle, and there is little shade or wind breaks.

The poorest live in poverty in overcrowded conditions. Mortality from HIV-AIDS leaves many families only partially able to maintain their house or extend it as the number of children and other dependents increase.

Although Maipasa has adequate (if not well distributed) water supply within the village itself, agricultural irrigation is very limited. This leads to overgrazing and seasonal stress on land and on stock. The stimulation of village-based employment could generate village income which would support improvements in such community services. A nearby village has been able to establish an irrigated olive plantation, apparently because of it proximity to employment at Hogsback, a local tourist center.

Urban poor' (squatter) housing in Soweto

Below are shown photographs taken around the perimeter of one of the five urban squatting areas that surround Johannesburg. The housing conditions of people in such circumstances are considerably poorer than those to be found in the rural villages. The ANC government has worked hard to provide simple houses for these people but their number continues to rise as people migrate from poor rural areas with high unemployment in search of work. Although urban employment prospects are marginally better than those in rural areas, pay rates are very low and rental accommodation is prohibitively expensive.

Conclusions and Suggestions for Future Action

Unemployment hovering around 70% in rural East Cape villages and severe housing needs in urban satellite squatting communities throughout much of South Africa present separate, but potentially related, social challenges. The most significant conclusion of the survey is that priority should be given to providing employment for Eastern Cape Province villagers. This may be a more effective way of stimulating vitalization of the societal structure than directly providing housing. Tackling this need does, however, present formidable challenges. Summarized below is one possible strategy which is the subject of a planned follow-on initiative (Humphrey and McNamara, 2003).

Suggested is the village-based manufacture of new and efficient (light, strong and durable) composite modules by developing innovative labor-intensive fabrication techniques. Such modules would be used for housing in urban squatting communities. Expensive automated factories would be needed in the developed world to achieve the levels of structural performance envisioned here. The use of an underemployed rural labor force in concert with specially developed reliable and easily maintained machinery and quality control methods offers an attractive alternative for rural communities of the developing world. This substitution of labor for capital may make it possible to cost-effectively produce building components with high levels of performance and structural efficiency.

The concept would draw on state-of the-art approaches in materials science and systems design. Use of non-local raw materials such as cement may well prove to be necessary — but will be minimized, while village-based propagation of specially selected reinforcing plant fibers will be explored.

The initiative would involve the following elements:

- Broadly based resource assessment, establishment of building system performance requirements, design conceptualization, and infrastructural assessments.
- Modular building component development and preliminary evaluation.
- Rural village and urban trials (module fabrication and erection of demonstration of buildings).

The above activities would necessarily lead to a broadly based critical analysis of social, economic and environmental opportunities offered by the initiative – both for the rural villagers who would make the components and the urban poor who would live in houses made with them. Cost-benefit and social-impact analyses would involve Government, financial institutions, tribal and village representatives, and the private sector. Included would be considerations of how best to stimulate and coordinate the manufacturing activity and what means would best be used to administer it – and at what scale. This initiative is developed in a project concept paper (Humphrey and McNamara, 2003).

APPENDIX I

Organizational sheet for Maipasa village meeting:
A village meeting about housing

Organization and discussion topics

Maipasa village meeting Hall

September 30th. 2003

Agenda

Personal introductions and thanks (survey team members and village elders)
Why are we here? (brief summary of goals for housing sub-project)

- Plan for this session on housing
- Whole group discussion and activity

Discussion questions:

- What do you think would make your village a better place in which to live?
- What dreams do you have for your children?

Please sketch a picture of your house on the piece of paper we've given you.
Lunch (about noon - 1pm)

- Prepare and distribute lunch (provided by us)

Humphrey walk among some village houses with six villagers (pre-planned route during lunch break)
Split into two groups (facilitators/recorders: Men – Philip and Marion; Women – Nymrod and Donna)
Discussion questions:

- What characteristics of your house are important to you and what would you like to change about it? Outside and Inside.
- What choices could you make about your house when you were first got it?
- What are the advantages and disadvantages of round and rectangular houses?
- What jobs do you have to do to maintain your house and what can't you put right?
- What building materials are available and what others would you like to use?
- What would you think of living in a house made with more wood in it?
- What different building skills do people in your village have?
- Do people buy their own houses in the village (and the land)?
- How is your income used up? (i.e. different things you spend your income on -- maybe proportion on each)Whole group get-together
- What are the most important things that we have discussed and learned from each other today?

Concluding remarks, thanks, and group song.

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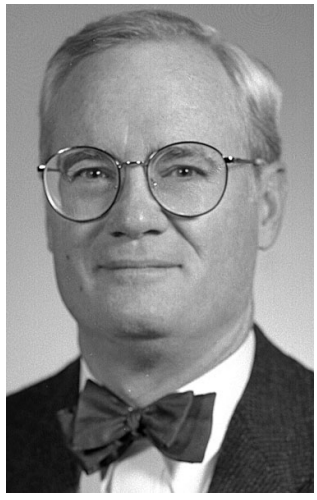

Badege Bishaw and Robin Rose of the Department of Forest Science have been selected as the 2002-03 recipients of the Oregon State University International Service Award. This award, sponsored by International Programs, recognizes "exemplary, on-going contributions of OSU faculty and staff to the internationalization of the University by enhancing student, faculty, and staff awareness and participation in international education, research, and related activities." The College of Forestry proudly congratulates our two honorees!