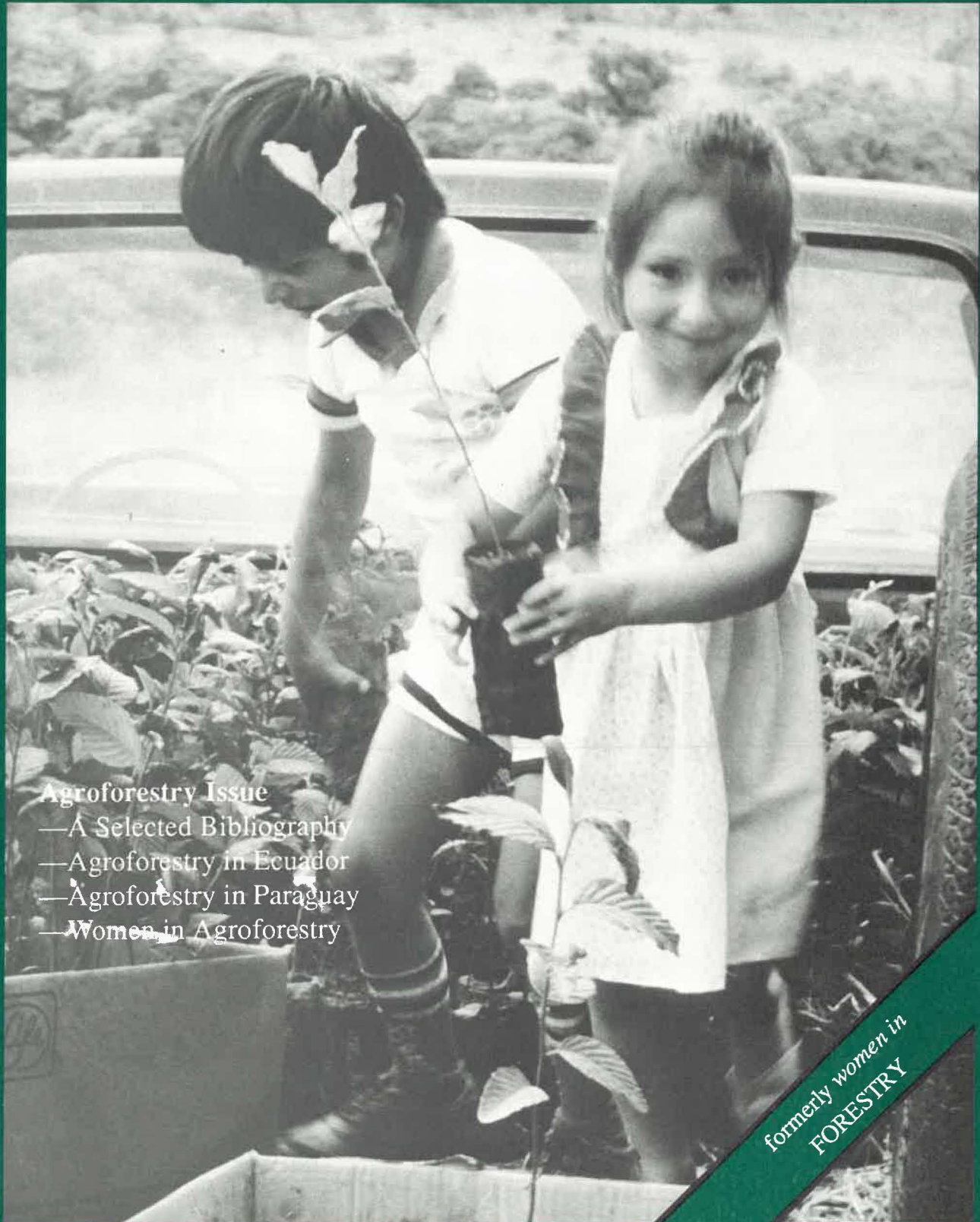


# WOMEN IN NATURAL RESOURCES

Volume 9, Number 2

for professionals in forestry, wildlife, range, fisheries,  
recreation, and related environmental and social sciences



## Agroforestry Issue

- A Selected Bibliography
- Agroforestry in Ecuador
- Agroforestry in Paraguay
- Women in Agroforestry

formerly women in  
FORESTRY

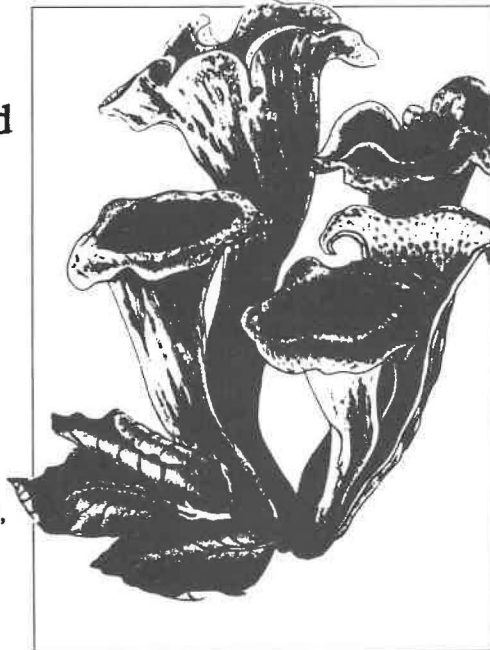
THE UNIVERSITY of IDAHO PRESS

Now Available:

Mushrooms of Idaho and the Pacific Northwest  
Volume 2.

Non-Gilled  
Hymenomycetes  
Boletes, Chanterelles,  
Coral Fungi,  
Polypores and Spine Fungi

BY EDMUND E. TYLUTKI  
ASSOCIATE PROFESSOR OF BOTANY,  
UNIVERSITY OF IDAHO

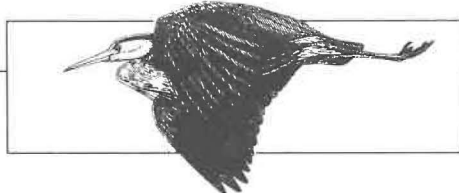


FROM THE AUTHOR of the highly successful first volume on discomycetes comes the second in a projected five-volume series of guides to the mushrooms of Idaho. Complete information is provided for 354 species of non-gilled mushrooms of the Northwest.

FIELD AND TECHNICAL keys, along with technical descriptions, make this a practical aid for amateur and professional alike.

232 pages, b/w photos, color plates, glossary, paper 097-9, \$14.95

Natural Sciences Backlist



QUANTITY	TITLE/AUTHOR	LIST PRICE	QUANTITY	TITLE/AUTHOR	LIST PRICE
_____	Amphibians and Reptiles of the Pacific Northwest/Nussbaum, et al.	\$22.95	_____	Mineral Atlas of the Pacific Northwest/DeLucia	\$ 9.95
_____	A Field Guide to Butterflies of the Pacific Northwest/Christensen	16.95	_____	The Peregrine/Baker	10.95
_____	Fishes of Idaho/Simpson, Wallace	11.95	_____	The Study of Raptor Populations/Johnson	5.95
_____	Idaho Soils Atlas/Barker, et al.	18.95	_____	Trematodes of North America/Schell	25.95
_____	Major Wood Decays/Partridge, Miller	5.95	_____	MUSHROOMS OF IDAHO AND THE PACIFIC NORTHWEST, Vol. 2/Tylutki	14.95
_____	Mammals of Idaho/Larrison, Johnson	9.95			
_____	Mammals of the Pacific Northwest/Christensen, Larrison	9.95			
				LIST PRICE TOTAL	_____

NAME \_\_\_\_\_

ADDRESS (STREET, CITY, STATE, ZIP) \_\_\_\_\_

I ENCLOSE \$ \_\_\_\_\_ INCLUDING \$1.50 SHIPPING FOR FIRST BOOK AND \$.50 FOR EACH ADDITIONAL BOOK (Idaho Residents add 5% sales tax.)

CHECK  
 MASTERCARD  VISA

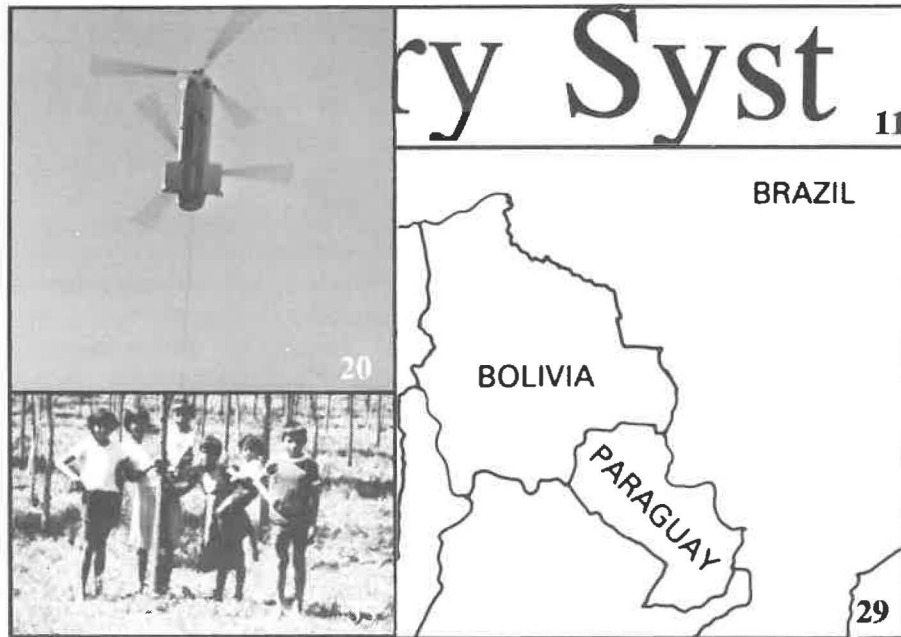
# \_\_\_\_\_  
EXP. DATE \_\_\_\_\_

Signature, if order is by VISA or MASTERCARD \_\_\_\_\_

THE UNIVERSITY OF IDAHO PRESS • BOX 3368 UNIVERSITY STATION • MOSCOW, IDAHO 83843 • 208 885-6245

# WOMEN IN NATURAL RESOURCES

Volume 9, Number 2



Cover photo by Cynthia Miner

**2** EDITORIAL, Linda Hardesty

**3** LETTERS AND OPINIONS

**5** BOOK REVIEW *Sistemas Agroforestales*, by Florencia Montagnini, Laurel Prevetti, Lori Ann Thrupp. Reviewed by Michael Jennings.

**6** PUBLICATIONS

**8** RESEARCH IN PROGRESS

**11** *A Selected Bibliography for Analyzing Joint Production Aspects of Agroforestry Systems*, L. Hardesty, G. Deffar, K.A. Blatner.

**20** *Helicopter Logging*, Karen Lyman. It makes the heart beat faster.

**22** *Agroforestry in Ecuador*, Cynthia Miner. Government efforts and a family's success story.

**27** *Wry Toasts*, Ann Banks. Mastering the art of toasting takes practice and planning.

**29** *Agroforestry in Paraguay*, Patrick Evans. Designing innovation to increase adoptability pays off for some small farmers.

**35** *Women in Agroforestry: Four Myths and Three Realities*, Louise Fortmann and Dianne Rocheleau.

**45** *Investment Clubs: What are they? How do they work?* Gene Bammel.

**47** INTERVIEW *The Peace Corps' Mary Killeen Smith, from Volunteer to Director of Training*, Sue Ann Rodman

**52** PEOPLE

**54** NEWS AND NOTES

**58** EVENTS

**60** KIOSK

Executive Editor	Dixie Ehrenreich	Section Editors	Christine Moffitt Linda Hardesty Berta Youtie	Art Director	Lorraine Ashland
Managing Editor	Alan Wittbecker	Editorial Assistants	Eileen Klein Sharon Santos, Ray Richmond	Design Consultant	Caroline Hagen
Editor	Lei Bammel			Production	Michal Miller
Contributing Editor	Karen Lyman			Business Manager	Cynthia Johnson Sally Lyon

*WOMEN IN NATURAL RESOURCES* is published quarterly at the University of Idaho, Moscow, Idaho. Subscriptions are available to anyone at advertised rates. Exchange and paid advertising welcome; for all other information, write to the Editor. Permission to reprint should be obtained from the Editor.

Address all communications to:  
Editor, *WOMEN IN NATURAL RESOURCES*,  
Bowers Laboratory, University of Idaho,  
Moscow, Idaho 83843 (208 885-6754).

## LETTERS AND OPINIONS

The new look of your journal is a great improvement. I like the more magazine-y cover and the addition of color. I'm glad you are making the transition to desktop publishing and typesetting. It gives the journal a much more professional look. The running heads and the format of your feature articles are a particularly nice change. In terms of content, I especially like your inclusion of articles that focus on conservation, and issue-oriented pieces like Elaine Zieroth's "Sheltered Workplaces."

My only concern has to do with your treatment of the new title. I think the change to *WOMEN IN NATURAL RESOURCES* is appropriate, but the style used within the journal "women in" in lower case letters and "NATURAL RESOURCES" in caps—seems a tad coy. It kind of reminds me of some magazines back in the late 60s and early 70s that rather self-consciously capitalized "Blacks" but kept lower case for "whites." The form you are using suggests that the fact that the magazine is for women is secondary to its natural resources content, and I don't think that is the case, at least from all I've read in the journal to date. There are dozens of natural resource magazines. The unique feature of this one is that it is for women and helps publicize women's ideas and concerns in a professional context. Somehow the teeny-tiny "women in" next to the big "NATURAL RESOURCES" suggests that we aren't proud of the fact that we have this magazine for women, and might not even be glad that we ARE

women. In each issue the "women in" gets smaller until the title remains only "NATURAL RESOURCES."

Enough of that. You are doing a great job. Keep up the good work!

Molly Stock

Forest Resources  
University of Idaho

I am a Peace Corps volunteer working as a community forestry extension/agroforestry specialist in the Terai Community Forestry Development Project. I recently learned of the journal through the FAO publication, *UNASYLVA*. The role of women in professional forestry in Nepal is increasing, but the drawbacks of working in a male-dominated profession and breaking away from traditional roles are extremely taxing for those Nepali women who choose forestry as a career. I am interested in receiving complimentary copies of *WOMEN IN NATURAL RESOURCES* to determine whether it would be of use to those women working in the profession in Nepal.

Mary A. Blasing  
U.S. Peace Corps  
GPO 613  
Kathmandu Nepal

*Eds. Note: We are always happy to send complimentary copies and will do so immediately. In this issue, the Fortmann and Rocheleau article addresses that cultural problem directly. Readers who have copies of other materials which might offer assistance to Blasing should send*

*them to her. We often hear about the cultural enigma, but have seen few solutions on how to deal with this. We would appreciate hearing about formulas which really work and will include them in future issues.*

I recently learned of your publication through a friend. It sounds exciting. I am in the field of wildlife biology, currently working with alligators. I would like more information about the magazine, subscription rate, etc. And, if possible, I'd appreciate it if you could send a copy of the publication.

Dena M. Schulte  
Baton Rouge, Louisiana

*Eds. Note: Thank you. It is exciting. We have sent a copy to you. General information about submitting and subscribing is on the inside back cover.*

I have read your Winter/Spring 1987 Edition of *women in Natural Resources* and am interested in submitting articles for publication. If you have a writer's guideline, I would appreciate receiving a copy.

Anne Dahl  
Condon, Montana

*Eds. Note: Thank you for your interest. We welcome the submission of professional articles. Follow the style guide for the journal of your discipline; we edit for clarity.*

## EDITORIAL

**A**groforestry is the practice of producing trees with crops and/or livestock and other products from an area of land in a sustainable fashion. Multiple products may be produced simultaneously or sequentially. The common denominator in the myriad of systems called agroforestry is the presence of trees. These trees may be producing timber, fodder, foods, and other harvestable crops, or may be providing a service such as shade or soil improvement. Agroforestry is a newly popular (but far from new) approach to natural resource management. As Louise Fortmann and Diane Rocheleau's work points out, women do have a special stake and role in many agroforestry schemes. We firmly believe, in addition, that the concept will be of interest to all natural resource managers.

Some definitions of agroforestry are more restrictive than the one given above. There are those who believe agroforestry is only appropriate in the tropics, on marginal lands, in humid regions, or in subsistence production systems. In this issue, we include the broadest spectrum of definitions and applications. Our interview with Mary Killeen Smith describes the Peace Corps' active agroforestry program, while papers by former Peace Corps volunteers Patrick Evans and Cynthia Miner demonstrate the complex social context in which we manage natural resources.

The Cornell agroforestry consortium report touches on work planned for the United States and elsewhere, but what is missing from this issue is a detailed report on systems here in the

United States: Hay and pasture under pine plantations, babysbreath in orchards, sugar maple and black walnuts combined with other crops. The annotated bibliography demonstrates the variety of literature either about, or pertinent to, agroforestry, and its relationship to more familiar natural resource management approaches.

I find the current interest in agroforestry useful because it creates an exotic aura around an "old" idea: Multiple-use of natural resources. Successful agroforestry systems demonstrate many tried and true ecological and natural resource management principles—synergy, complementarity, sustained yield, and of course, managing resources to meet the unimaginably wide range of human needs.

What is new to many are the settings in which agroforestry is currently practiced, and more importantly, the novel perspective it gives us on what we have been trained in, and in many cases internalized to the point of myopia: The basic principles of our professions. If this is true, then we are intrigued by agroforestry for the same reasons we chose our professions in the first place, and the interest in agroforestry becomes a sort of intellectual honeymoon. This interpretation may be a bit fanciful for your taste; in any case, I hope you will enjoy and gain new insights from these articles. I certainly enjoyed talking to those of you who called and wrote with ideas and support.

*Linda Hardesty*

Linda Hardesty is an assistant professor of Forestry and Range Management at Washington State University. After three years in northeastern Brazil, Hardesty has continued to work in the field of Agroforestry and is currently Chair of the Agroforestry Consortium at Washington State University.

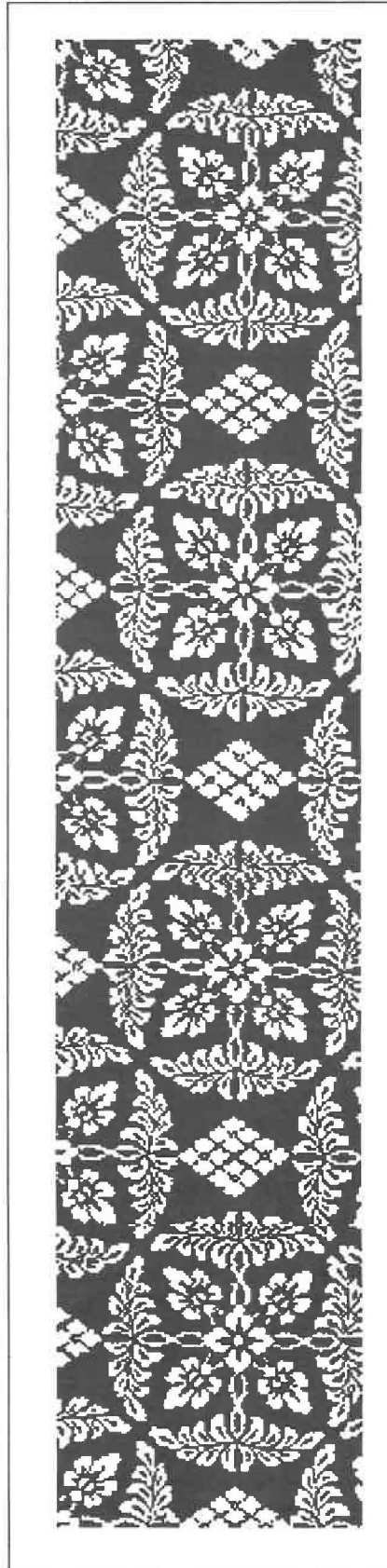
**Faculty Position  
in Conservation and Resource  
Studies And Women's Studies  
Program  
University of California,  
Berkeley**

A joint nine-month, tenure-level (Associate Professor, Full Professor) position between Conservation and Resource Studies (College of Natural Resources), 50%, and Women's Studies (College of Letters and Science), 50%, is available effective July 1, 1988, pending budgetary approval. Applicants should specialize in the environment and/or agriculture and in women's issues as they relate to the third world, international or U.S. public policy, or law. Applicants should have a Ph.D. from a relevant field with a record of publications and a program of research in the area of specialization and in women's issues. Responsibilities include the teaching of courses in both departments, the guidance and counseling of students in interdisciplinary majors, the conduct of an active research program that is broadly integrated with the teaching responsibilities, and university and public service. Interdisciplinary breadth and experience in a Women's Studies program or research unit are desirable. Salary is negotiable, commensurate with rank and experience.

Candidates should send duplicate copies of a cover letter, full curriculum vitae, a sample of relevant research, the names of at least three references, and other pertinent materials to:

Prof. Mary Ryan,  
Director of Women's Studies,  
Division of Special Programs,  
301 Campbell Hall,  
University of California,  
Berkeley, California 94720

by January 1, 1988. The University of California is an Equal Opportunity/Affirmative Action employer.



**Department Head and  
Professor  
Forestry and Natural Resources  
Purdue University**

**The Department** (26 faculty) integrates teaching, research, and extension functions for 30-40 graduate and 180-200 undergraduate students, in a variety of programs, including forest biology, forest management, forest recreation, forest engineering, remote sensing, harvesting, wood science, fisheries, and wildlife science. The department manages its own properties and assists in managing forest lands on Agricultural Experimental Station properties throughout the State of Indiana.

**Qualifications** are a Ph.D. degree and professional experience in a related area; leadership and administrative ability; appreciation of the interests and missions of the department; dedication to excellence and a willingness to help the department achieve greater national stature and leadership; strong commitment to scholarly achievement.

**Responsibilities** are fiscal and administrative; provide academic leadership; maintain liaison with university, government, and industry professionals; seek and develop new sources of funding for programs; and represent the department in professional activities.

**To Apply**, send an application, including a curriculum vitae, list of publications, and names of five references to:

R.L. Thompson,  
Dean of Agriculture  
Agricultural Administration Bldg.  
Purdue University,  
West Lafayette, Indiana 47907

Applications will be accepted until 31 December or until a suitable candidate is identified. Salary commensurate with qualifications and experience.

## BOOK REVIEW

### *Sistemas Agroforestales: Principios y Aplicaciones en los Tropicos\**

by Florencia Montagnini, Laurel Preveti and Lori Ann Thrupp

It is now clear that monocultural farm, forest, and livestock production methods are only sustainable under certain climatic, topographic, and edaphic conditions. Agroforestry is a land use system that combines trees with the stable production of crops or livestock, and it is emerging as one powerful and hopeful technical solution to the problem of human needs versus ecosystem degradation.

*Agroforestry Systems: Principles and Applications in the Tropics* (English translation) is the first basic text and a solid cornerstone of information about agroforestry. The first six chapters are a pragmatic guide to design and implementation of agroforestry systems. They include chapters on overviews, planning, site characterization, systems design, management, evaluation, and strategies for diffusing agroforestry concepts. The seventh, and last chapter, is research oriented, and is entitled "Perspectives of Agroforestry Systems." The appendices contain nearly two-thirds of the book and are a collection of valuable information completing the book's mission as text, teaching, and reference manual.

Five detailed case studies are presented in the appendix followed by sections of exercises, an instructors' guide, and 15 articles by the world's leading experts on the subject. The last three appendices are an extensive annotated bibliography, 123 sources of relevant information world-wide, a country-by-country review of institu-

tions involved in agroforestry work, a world guide to sources of seed and genetic material, and sources of audiovisual and periodical media (including *WOMEN IN NATURAL RESOURCES*). The last appendix is a 27 page index of plant species used in inventoried agroforestry systems in Latin America, and a 48 page catalog of existing agroforestry systems in Latin America.

This first work on agroforestry is a massive one. The senior author solicits suggestions for improvements to future editions. For one, the weakest part of *Agroforestry Systems* is the chapter: "Planning Agroforestry Systems: Characterization of an Area," due, no doubt, to the dearth of planning materials available. Part of the problem may also be because it is difficult to produce a technical manual that can cover potential applications of unspecified scale, although differing scales are indicated (regional, farm, field, species component) in a table with items to be considered in planning. The need for information to be used in assessment of environ-

is mentioned as a potential fiscal constraint. While finances may constitute realistic limits for projects, the lack of an adequate planning strategy, based upon ecological principles is a serious limitation to the comprehensive nature of this book. A reader might ask if this lack does not mimic the age-old problem which agroforestry concepts have the potential to ameliorate—immediate need (money) versus environmental degradation. This deficiency points out that there is still work to be done. Another limitation for non-Spanish readers is that an English version is

not yet available although inevitable.

The authors of *Agroforestry* have taken a gigantic first step, and their book is an unquestionable must for anyone interested in agroforestry.

Reviewer Michael D. Jennings is a graduate student at Washington State University in Environmental Science and Regional Planning. He was raised in Latin America and has worked in environmental science research, farming, and ranching since graduating from the Evergreen State College with a degree in Environmental Science.



\*Purchase price is US\$20 from Coordinadora Academica, Organizacion para Estudios Tropicales, Universidad de Costa Rica, Aptdo. 676-2050, San Jose COSTA RICA.

## PUBLICATIONS

**H**elen Singer Kaplan, director of the Human Sexuality Program at New York Hospital-Cornell Medical Center, wrote *The Real Truth About Women and AIDS* (Simon and Schuster). She is one of the leading sex therapists in this country and said that she was impelled to write the book because she believes strongly that American women have been dangerously misinformed about AIDS. Her frank descriptions may shock some, but they may save some too.

•

Often there are benefits to using private time to mull over work projects. Ann McGee-Cooper, author of *Time Management For Unmanageable People* suggests that you are more open to creative breakthroughs when you are switching back and forth between work and play. Studies by Teresa Amabile of Brandeis University bear this out. If you choose to work outside the office on your own time, you are lessening workplace constraints, increasing motivation and most likely boosting creativity.

•

A newly formed advocacy group, Americans for Safe Food, has published a 50-page booklet that details the lack of enforcement of federal food-contaminant levels. Some of the contaminants are pesticides and hormones commonly found in human foods. To order, send \$3.80 to Center for Science in the Public Interest, 1501 16th St. NW, Washington, DC 20036.

Development in women and the built environment research is heartening. Very little had been written when the magazine *Women and Environments* (Centre for Urban and Community Studies, Toronto) started as a newsletter in 1976; since then, the literature has burgeoned. The number of books, journal articles, and, indeed, whole journals devoted to women and environments has steadily increased. Women and environments as a field of study has become an accepted and respected area in many disciplines. The next stage is for these topics to be included in textbooks, which is slowly occurring. The appearance of entire texts is truly worth celebrating. For a bibliography of recent literature on the topics of space, the built environment, the workplace, and housing, consult *Women and Environments* Fall 1986, or write to them at Room 426, 455 Spadina Avenue, Toronto, Ontario CANADA M5S 2G8 for Rebecca Peterson's article "Ten Active Years." Subscriptions are \$9 per year plus mailing costs.

•

*In Making Space: Women and the Environment* (Matrix: Pluto Press, London) the authors, who are collectively known as Matrix, assert that the home is probably the only place where women can impose some of their own individuality on their environment. Women's influence on the design of the built environment has been negligible. People who read this book may never look upon their home, workplace, or urban setting in the same way again, for Matrix describes at length the ways in which the man-

designed and man-planned environment disempowers women.

•

The Project on the Status and Education of Women (PSEW) provides information concerning women students, faculty, and administrators, and works with institutions, government agencies, and other associations and programs related to women in higher education. Funded primarily by the Ford Foundation, PSEW develops and distributes materials that identify and highlight institutional and federal policies as well as other issues affecting women's status. PSEW is a program of the Association of American Colleges. They offer a publications and a price list brochure. To acquire that, write PSEW, Association of American Colleges, 1818 R. St. NW Washington DC 20009 (202-387-1300).

•

The *Wood Handbook* is a recently updated 23-chapter desk reference designed to aid in more efficient use of wood as a construction material. It has chapters on physical and mechanical properties, proper selection of common woods from around the world, and conditions of use. Characteristics of mechanical fasteners (nails, bolts), adhesives for joints, seasoning, preservatives, finishing, fire safety, and lists of selected references for more information, plus a glossary are some of the book's features. Send \$27 to Superintendent of Documents, US Government Printing Office, 710 N. Capitol Street, Washington DC 20402 and ask for Ag Handbook No. 72, *Wood Handbook*, #001-000-044-56-7.



More information about the reference can be obtained from the Forest Products Lab (608-264-5600).

The Washington State Department of Natural Resources has published an 82 page report *Information Circular 84; Earthquake Hypocenters In Washington And Northern Oregon* by Anthony Qamar, Ruth Ludwin, Robert S. Crosson, and Stephen D. Malone. The report describes the seismographic network and hypocenter location methods plus more earthquake data in two appendices. Send \$2 each plus \$1 for handling to DNR, Division of Geology and Earth Resources, Mail Stop PY-12, Olympia, Washington

The American Pulpwood Association has issued several publications dealing with safety during forestry operations for landowners and tree farmers. Write to the Association at 1025 Vermont Avenue NW, Washington DC 20005 and ask for a publications list. Along the same lines, the Mississippi Forestry Commission offers similar topical booklets. Write the Commission at 908 Robert E. Lee Building, Jackson, Mississippi 39201.

*The Women's Computer Literacy Handbook*, by Deborah Brecher (New American Library \$9.95) is not only the best female-oriented beginners' book on computers, it's one of the best, period. As cofounder of the Women's Computer Literacy Project in San Francisco, Brecher—a computer professional for more than two decades—found that it was important for her female students “to have a holistic sense of how the machine works” before they learned to use it. (Her male students had been more likely to plunge in, without worrying about whether they were going to break anything or whether they understood the big picture).

The Soil Conservation Society of America (SCSA) distributes *Farm And Food Bytes: Soil And Water Conservation*, a microcomputer software package designed for use by students in the 4th grade and above. Send \$29 for a two-sided disk, a 38-page student manual, and a 30-page teacher's guide with 50 activities and 60 teaching strategies. The program (for Apple computers) is available from SCSA 7515 NE Ankeny Road, Ankeny, Iowa 50021-9764.

### Job Information Exchange

If you have a job to offer in natural or cultural resources, list it with *WOMEN IN NATURAL RESOURCES'* Job Exchange.

If you are searching for one, send a brief résumé and describe the position you seek. Send them to:

Nancy Michaelsen, 306 Walnut Drive, Fredericksburg, Virginia 22405  
(703-371-7522).

Nancy also has the names of several publications that list available jobs. Send a stamped, self-addressed envelope, and ask for the names of those publications.

## Publications

Any individual or group desiring to receive the *Women in Technological History Newsletter* should send their name and address to Deborah Warner, National Museum of American History, Smithsonian Institution, Washington DC 20560. Dues are \$5 per year, but newsletters are sent even without payment due to a small but persistent budget surplus.

For those who are hiring, or those who are looking, job opportunities can be found or listed in the newsletter *Environmental Opportunities: Serving Environmental Job Interests Throughout The United States*. Subscription rates are \$39/year and single copies \$4. For more information contact them at PO Box 670, Walpole, New Hampshire 03608.

*WOMEN IN NATURAL RESOURCES* is looking for a few good area editors. If you have access to local newspapers, agency newsletters, and professional journals, we need you to become a WiNR representative for your section of the country or for your profession. We need your contributions to ensure regional coverage for all the departments, a representative sample of good manuscripts, and opinion gathering. If you have a few hours a month to devote to keeping our network healthy, let us know. A small honorarium is available. Send a resume and letter indicating interest to Executive Editor, WiNR, P.O. Box 9003, Moscow, Idaho 83843

# RESEARCH IN PROGRESS

## Images of the National Forest System

An examination of brochures produced by the National Forests reveal some exciting items and interesting attitudes. Documents produced and distributed by an organization are a direct reflection of the rules of an organization. Furthermore, documents not only mirror organizational rules, they reinforce them. An examination of the collective mass of documents, through the method of content analysis, provides insight into the underlying ideals of that organization.

In May 1986, letters of inquiry were sent to 115 administrative units of the National Forest Service System (NFS) on the United States mainland,

asking for NFS documents commonly distributed to visitors. Within forty five days, the response rate reached 100 percent. Approximately 1,300 individual documents were received. (The average cost of postage for a response was \$1.06; 26 of the responses were sent first class. About 30 percent of the responses contained hand-signed notes, and 25 of these were personal.) If this is any indication, the NFS seems to be a personable organization, ready to assist visitors.

In addition to brochures, documents were categorized as non-Forest Service, general Forest Service, and specific Forest Service. The study, however, concentrates on Forest Service brochures, which include those produced about a certain

National Forest or a special National Forest attraction.

Examination of the brochures addresses photographs, various aspects of text, and space allocation for different media of presentation. Thus far the results are not surprising. Natural photographs predominate; men are subjects more often than women; children are scarce, and activities are limited. Minorities, seniors, and the handicapped are rarely seen or mentioned. Further analysis is in process.

Kathy Kopitsky,  
Division of Forestry,  
West Virginia University,  
Morgantown, West Virginia 26506.

## A NATURAL RESOURCE FOR PROFESSIONAL WOMEN

### ■ WOMEN IN NATURAL RESOURCES ■

## A Great Gift

Gift Subscriptions are priced the same as regular subscriptions. For more information on gift subscriptions—message enclosures, activation time, renewal—contact the editor (on the back cover).

### **Initiation of a Long-Term Monitoring Program for Coral Reefs in the Virgin Islands National Park, St. John, U.S.V.I.**

A long-term monitoring program was initiated for the coral reefs of the Virgin Islands National Park and Biosphere Reserve in recognition of the need for quantitative baseline data to provide information for resource assessment and effective management. Major stresses to reefs in the park include terrigenous runoff following watershed development, storm damage, and damage associated with boating activities.

One of the major environmental concerns on St. John is siltation of nearshore marine habitats from accelerated erosion following watershed development. Erosion and runoff are potentially serious problems on St. John because of its extremely steep hillsides.

Rapid, and in some cases uncontrolled, development on St. John has led to increases in terrigenous runoff. After heavy rains, bays both within and outside the park have highly turbid water. St. John residents believe that corals in Hawksnest and Cinnamon Bays on the north shore of the island were killed from siltation following exceptionally heavy rains in April 1983 (18 inches in 24 hours). Development of private lands within the park boundary and development outside the park boundary can both contribute to turbidity in park waters. New roads are continuously being carved into the hillsides creating potential for accelerated erosion and runoff.

Storms have undoubtedly caused the greatest destruction to coral reefs off the south side of the island. Hurricanes David and Frederic (1979), known to have caused considerable damage to reefs off St. Croix, are most likely responsible for the widespread fragmentation of the dominant branching coral species seen in Fish

Bay, Reef Bay, Coral Bay and elsewhere. Tropical Storm Klaus hit the U.S.V.I. on Nov. 6-7, 1984 with winds gusting to 50 knots and very heavy sea swells. About 9 inches of rain fell during the storm but the damage was primarily from the heavy swells rather than turbidity. (The effects of the storm on one coral reef studied during this project are described below.)

Close to one million people annually visit the Virgin Islands National Park, with most of them using marine resources (boating, snorkeling, diving). While not as extensive as storm damage, damage from boats striking and grounding on coral reefs near and within popular bays is a serious problem in localized areas.

Collection of corals for souvenirs and breakage from careless snorkelers are other consequences of excessive use, particularly evident at the underwater trail at Trunk Bay.

White band disease has killed extensive amounts of the most abundant coral at Buck Island Reef National Monument, St. Croix, and on other St. Croix reefs. The disease has not been correlated with human activities. Although present on St. John reefs, it is not currently widespread.

Studies carried out in 1984 by the Virgin Islands Resource Management Cooperative (VIRMC) resulted in an extensive amount of general information on the nearshore marine ecosystems off St. John, including qualitative surveys and maps of major benthic communities (e.g. Beets et al, 1985). VIRMC projects for 1985 emphasize an interdisciplinary approach to watershed management in three bays on St. John, including studies of fisheries, sedimentation, and coral reefs. This VIRMC project was initiated as part of a long-term monitoring program for the coral reefs of the Virgin Islands National Park and Biosphere Reserve.

### **RESEARCH IN PROGRESS**

---

This study had both scientific and nonscientific objectives. The major scientific objective was to carefully select areas for long-term monitoring to allow documentation of deterioration or recovery of coral reefs around St. John. Research was carried out in disturbed and undisturbed watersheds in conjunction with other VIRMC studies. Several 1985 VIRMC studies were intended to begin to answer the following management questions: To what extent is terrigenous runoff affecting the reefs on St. John? Are the reefs within Virgin Islands National Park and Biosphere Reserve deteriorating and if so what can be done to eliminate or minimize the damage?

Critical nonscientific objectives of the project were to involve local people in an applied research study with educational and training aspects, and select methods that would be easily taught and repeated accurately without an extensive amount of training. The eventual goal would be a model monitoring program that could be used by other Caribbean island countries in their parks/reserves.

Caroline S. Rogers  
Evonne S. Zullo  
The Tropical Resources Institute  
Yale University  
New Haven Connecticut

## RESEARCH IN PROGRESS

---

### Cornell Agroforestry Study Group Addresses Environmental Degradation Of Marginal Lands

Environmental degradation resulting from unplanned and unsustainable land use practices poses one of the most challenging research, development, and management problems in the world today. Increased agricultural and livestock grazing pressures, fuelwood collecting activities, and the large-scale conversion of primary forests to goods throughout the developing world have resulted in severe soil erosion, and, hydrological disturbances. Ultimately, decreased agricultural productivity and worsening rural poverty affect generations of people. In developed countries such as the United States, flooding and sedimentation caused by poor land management practices cost taxpayers billions of dollars annually. The viability of farm families and rural communities is then threatened by the economic decline of the agricultural sector.

Environmental degradation and household economic stress are most pronounced on marginal lands, lands with thin soils in steep upland areas. Not only is the risk of soil erosion and water runoff high on marginal lands, but their development and management have been largely ignored in the effort to maximize productivity on more fertile lowlands. Because of growing population pressures, land tenure inequities, and poverty, the development and management of marginal lands can no longer be

ignored, especially in developing countries.

Agroforestry, the simultaneous or sequential intercropping of perennial crops with annual food or forage crops, is a sustainable and productive activity well suited to many marginal lands. In developing countries agroforestry systems are used for food, fuelwood, fodder, cash income, soil fertility enhancement, and slope stability. In the United States, agroforestry provides cash income (for example, maple syrup), fuelwood, and wildlife habitat.

#### Interdisciplinary Effort Required

The Cornell Agroforestry Study Group—consisting of some 20 faculty members and graduate students in many different departments and disciplines—was established in 1985 to address the need for sustainable development and management of marginal lands in both developing countries and North America. Each spring the group sponsors an interdisciplinary two-credit graduate course and a seminar series for invited and in-house speakers. In addition, Cornell sponsors an international agriculture course in Costa Rica in January and encourages student participation in the Yale University tropical forestry course in Puerto Rico.

Graduate students have conducted research in many areas including:

- Soil conservation and watershed management in Sumatra, Indonesia
- Physiological and genetic investigations of sugar maple sap sweetness
- Fuelwood and community forestry policy in Swaziland
- Nut tree crops for the northeastern United States
- National parks and watershed management in Venezuela
- Silvicultural improvement of village woodlots in Kashmir, India
- Resource conservation and agricultural development in Dominica
- Plant interactions in mixtures and monocultures

#### The Tree Crops Idea

The importance of tree crops agriculture has long been recognized, as, for example, in the Buddhist injunction to plant a tree every five years. The soil condition on parts of the Indian subcontinent attests, however, that the injunction was not consistently followed. In this century, the idea was presented by the late J. Russell Smith in his book *Tree Crops: A Permanent Agriculture*, but it has not yet been implemented in an integrated project. Partial efforts have been made: Briefly under the direction of the Tennessee Valley Authority; in the "hilliculture" effort in Ohio; the Northern Nut Growers Association have made progress in selecting high-quality examples of certain native nut crops as in the case of the University of Missouri's Walnut Project; and elsewhere.

To be effective, a research project must have a long-term commitment. Twenty-five years, with an initial start-up phase of five years, is what is planned for Cornell's Tree Crops Research Project which was made possible in the summer of 1978 with a gift of a 20-acre research site. The first phase will see the selecting and gathering of superior tree stock, planning, breeding, and evaluation. The project will undertake a unique approach, developing the idea and practice of tree crops agriculture as a source of food and forage from marginal lands. Such a program, first implemented regionally, then nationally, and eventually internationally, can return some of the vast acreage of presently marginal lands to useful production, control erosion, and yield harvests.

James P. Lassoie, Assoc. Prof. and Coordinator of Agroforestry Programs; Arthur S. Lieberman, Prof. Emeritus, Landscape Architecture; and Stephen F. Siebert, Graduate Student, Department of Natural Resources, Cornell University, Ithaca, New York

# A Selected Bibliography on Analyzing Joint Production Aspects of Agroforestry Systems

L.H. Hardesty, G. Deffar, K.A. Blatner

## Introduction

What makes agroforestry intuitively appealing as a solution to a variety of social, economic, and environmental problems is its ability to produce multiple benefits, both products and services. Often agroforestry is promoted as a means of increasing monetary and material outputs and increasing the well-being of targeted groups. The biological effects of trees and crops, as well as livestock, grown together, and the economic costs and benefits of joint production, are not well understood or documented. Very few studies have been able to clearly demonstrate the widely assumed superiority of agroforestry over monocultural systems. Many routinely-used analytical tools are unable to deal with mixtures of inputs and outputs, particularly when many of them are intangible.

Thus, analysis and evaluation of agroforestry systems is a complex task. For any interaction between two components there are three possible acceptable outcomes: Both components benefit, one benefits at the (acceptable) expense of the other, or one benefits without effect on the other. With multiple interactions between multiple components, outcomes become difficult to evaluate. The problem is further compounded by the fact that inputs and outputs may be monetary, environmental, and social, and that there is often no common currency or parameter for use in evaluating trade-offs. Research is needed to identify simple, practical, optimum combinations of inputs and outputs under various circumstances.

For this to be accomplished, we must have a better understanding of quantitative tools appropriate for examin-

ing the biological and economic efficiency of joint production systems. As interest in agroforestry grows, the number of published works on the various aspects of joint production is increasing. This bibliography was prepared to give an overview of existing work in this area. The articles cited range from basic works on joint production to agroforestry case studies and proposed methods for evaluating the costs and benefits associated with different types of agroforestry systems. This bibliography is not intended to be comprehensive, only representative of current thinking with the goal of stimulating further thought and effort on appropriate analytical tools.

1. Akachuku, A.E. 1985. Cost-benefit analysis of wood and food components of agrisilviculture in the Nigerian forest zone. *Agroforestry Systems*. 3:307-316.

The possibility of improving total production by combining trees with agricultural crops has been widely demonstrated, and there is little doubt that agrisilviculture can play an important role in increasing overall production. Interplanting tree seedlings (*Gmelia arborea* Roxb) with agricultural crops in the Nigerian forest zone rendered increased returns of crop and wood products. Cost-benefit analysis showed that optimum combinations generated significant revenue and increased farmers' net incomes.

2. Alpizar, L., H.W. Fassbender, J. Heuveldop, H. Folster, and G. Enriquez. 1986. Modeling agroforestry systems of cacao (*Theobroma cacao*) with laurel (*Cordia alliodora*) and poro (*Erythrina poeppigiana*) in

Costa Rica: I. Inventory of organic matter and nutrients. *Agroforestry Systems*. 4:175-189.

Models for the estimation of biomass organic matter and nutrient accumulation of cacao in association with shade trees in Costa Rica were developed. Organic matter and nutrients (N, P, K, Ca, and Mg) were inventoried. The advantages of the association were attributed to, among other things, better light and moisture use and transfer of nutrients within the system.

3. Alvim, R., and P.K.R. Nair. 1986. Combination of cacao with other plantation crops: An agroforestry system in southeast Bahia, Brazil. *Agroforestry Systems*. 4:3-15.

Agroforestry systems have the potential to diversify crop combinations, enhance overall productivity, and prevent reliance on a single commodity, thus minimizing the risks of monoculture cropping. Some combinations involving cacao and other plantation crops and their performance are described. Also discussed are the possibilities and limitations of application to other areas.

4. Anderson, G.W., and F.E. Batini. 1979. Clover and crop production under 13- to 15-year-old *Pinus radiata*. *Australian Journal of Experimental Agriculture and Animal Husbandry*. 19:362-368.

A discussion of an experiment conducted at Mundaring, Western Australia, designed to study the establishment, regeneration, and productivity of clovers among thinned 13-year-old *Pinus radiata*, and to compare yields of oats and lupines cropped for two successive years following one year of clover. Results indicated that seed yields were highest under the low tree density. No seedling establishment problems were encountered and healthy, productive pastures resulted.

5. Anderson, G.W., and F.E. Batini. 1983. Pasture, sheep and timber production from agroforestry systems with subterranean clover sown under 15-year-old *Pinus radiata* by a method simulating aerial seeding. *Australian Journal of Experimental Agriculture and Animal Husbandry*. 23:123-130.

A 15-year-old plantation of *Pinus radiata* thinned to densities of less than 100 trees/ha has been described as a successful system for rowing *P. radiata* jointly with sheep and pasture. The forest floor was sown with subterranean clover by a method simulating aerial seeding. The quantity of forage produced justified fertilizer application. Results indicated that sheep, pasture and timber production were compatible with minimal loss of agricultural productivity.

6. Anderson, G.W., and F.E. Batini. 1984. Comparison of production from an agroforestry system in a mid-rotation stand of *Pinus pinaster* with that from open pasture. *Australian Journal of Experimental Agriculture and Animal Husbandry*. 24:529-534.

Authors' summary: The growth, persistence, and sheep carrying capacity of clover pastures grown in the open and under the

thinned stands of *Pinus pinaster*, and the responses of the trees to annual applications of superphosphate, with and without clover, were measured from the 5th to the 18th years of the rotation.

Good clover establishment was achieved both under 90 trees/ha and in the open. In the second year, pastures under the stands of *P. pinaster* carried 93% of the numbers of sheep as on pastures without trees. By the fourth year, growth of the tree crowns had doubled their shading capacity, and the relative carrying capacity of the pastures was 76%.

Although significant increases in the soil levels of phosphorus, nitrogen, and organic matter were recorded in the pastured and fertilized treatments, foliar analysis of pine needles showed no difference between fertilizer treatments. Except for potassium, foliar levels were at or below the levels regarded as adequate for growth.

Annual increments in diameter and volume ranged from 1.4 to 2.1 cm, and 4.5 to 5.3 m<sup>3</sup>/ha, respectively. Whereas superphosphate increased diameter growth, superphosphate and clover together depressed diameter increment.

7. Anderson, G.W., M. Hawke, and R.W. Moore. 1985. Pine needle consumption and bark stripping by sheep grazing annual pastures in young stands of widely spaced *Pinus radiata* and *Pinus pinaster*. *Agroforestry Systems*. 3:37-45.

Pine needle consumption and bark stripping were prevalent in areas of low tree density and from trees in sheep resting places. Damage to denser stands of trees was less common and less severe. Rotational grazing is recommended as a better way of utilizing pastures under young pines than set stocking.

8. Anderson, G.W., and R.W. Moore. 1987. Productivity in the first seven years of a *Pinus radiata*-annual pasture agroforest in Western Australia. *Australian Journal of Experimental Agriculture and Animal Husbandry*. 27(2):231-238.

A description of an agroforestry experiment involving integration of *Pinus radiata* and pasture in western Australia is presented. Retaining 100 trees/ha showed the least conflict with agriculture as opposed to higher densities (150, 225 trees/ha), in terms of both management and production (especially saw logs). The authors conclude that densities of 50 to 100 trees per hectare permit joint production of timber and pasture at satisfactory levels.

9. Arnold, J.E.M. 1983. Economic considerations in agroforestry projects. *Agroforestry Systems*. 1:299-311.

Author's abstract: Economic benefits that can accrue to the small farmer from incorporating trees in his farm system, and the economic constraints and costs he may face in doing so, are reviewed. Various economic considerations other than cash outlays and incomings, such as impact of risk, need to be taken into account. Issues are discussed that can arise in identifying, designing, and implementing projects intended to help farmers to capture the economic potentials of agroforestry and to avoid or remove related economic impediments. Correct understanding of the factors which will affect the success of project interventions, valuation of the costs and benefits of trees as per-

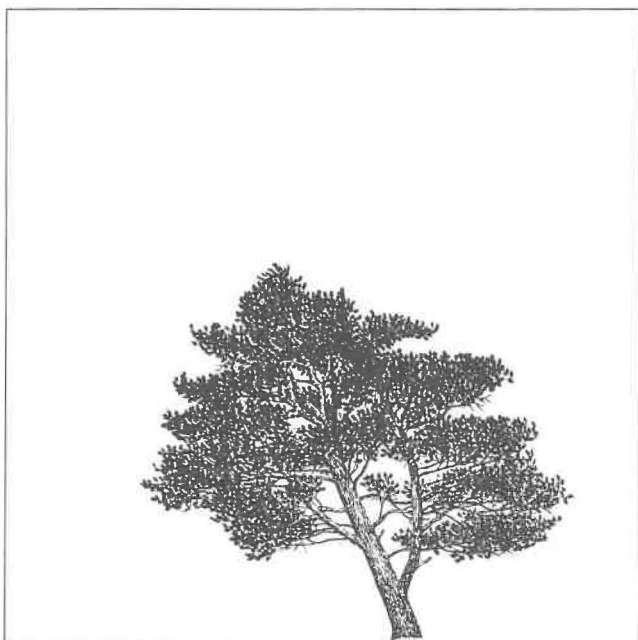
ceived by the farmer rather than by outsiders, distributional and equity issues, and identification of operational measures to ensure tangible short-term economic benefits are highlighted. The need for giving priority to research into the economic impacts of agroforestry practices on small farmer situations is stressed.

10. Bavappa, K.V.A., and J. Jacob. 1982. High intensity multi-species cropping. *World Crops* (March/April): 47-50.

In many tropical developing countries, population pressure has narrowed the land-to-man ratio, which in turn reduces the per capita availability of arable land. The question then is whether these smaller holdings can be made economically viable production units. A description of multiple cropping models is presented. The authors suggest that until adequate scientific data is collected, crop modelling with multiple species will continue to be more art than science.

11. Beets, W.C. 1978. Multiple cropping systems reviewed. *Span*. 21(3):114-116.

A brief account of different systems, their advantages, socioeconomic aspects, constraints, and future applications is presented. A chart of different multiple cropping systems, such as mixed cropping, strip cropping, or relay cropping, is discussed.



12. Beveridge, A.E., B.K. Klomp, and A.L. Knowles. 1973. Grazing in young plantations of radiata pine established after clearing logged and reverted indigenous forest. *New Zealand Journal of Forestry*. 18:152-156.

Authors' abstract: This note describes the conditions generally encountered in establishing and tending radiata pine on sites cleared of indigenous forest on the Mamaku plateau (New Zealand). Cattle grazing and tending according to a short-

rotation sawlog regime have been tried on an experimental scale and appear to overcome many of the problems arising from more conventional treatment.

13. Black, H.C., and B.T. Vladimiroff. 1963. Effects of grazing on regeneration of Douglas-fir in southwestern Oregon. *Proceedings: Society of American Foresters Annual Meeting*. Pp. 69-76.

Establishment of Douglas-fir seedlings on cut-over areas is inhibited by competition from herbaceous vegetation and damage from unrestricted livestock grazing. Managed sheep grazing has proved effective in the control of competing vegetation. Controlled sheep grazing did not interfere seriously with establishment of Douglas-fir seedlings. The effect of browsing and trampling on seedling survival and mortality was insignificant.

14. Bryant, J.A. 1985. Dynamics of fallow successions and introduction of robusta coffee in shifting cultivation areas in the lowlands of Papua New Guinea. *Agroforestry Systems*. 3:227-238.

The traditional shifting cultivators in Papua New Guinea have been incorporating trees and shrubs with production of yams (*Dioscorea* spp.) bananas and sugarcane. A cropping cycle of 18 months is followed by a fallow cycle of up to 30 years. Robusta coffee, a cash crop, has been recently added to the system, but a concise account of the crops most commonly grown as intercrops, arrangement of different crops, and research on the performance and productivity of the system is lacking. However, the shifting cultivators understand fallow succession characteristics, and they are willing to accept innovations if enough incentives are provided.

15. Couto, L., N.F. Barros, and G.C. de Rezende. 1982. Interplanting soybean with eucalypt in a 2-tier agroforestry venture in southeastern Brazil. *Australian Forest Research*. 12:329-332.

Authors' abstract: Soybean (*Glycine maxima* (L.) Merrill) was interplanted with eucalypt (*Eucalyptus grandis* w. Hill ex Maiden) as part of an agroforestry research project in southeastern Brazil, to determine its effect on weed control and eucalypt survival and growth. Soybean suppressed weeds without adversely affecting eucalypt survival and growth. Best soybean and wood production was obtained with 5 rows of soybeans spaced 0.5 meters apart between the rows of eucalypt trees. This 2-tier agroforestry practice does not adversely affect survival and growth of the trees, produces a normal crop of soybean and eliminates the necessity for weeding in the eucalypt culture.

16. Chingaipe, T.M. 1985. Early growth of *Eucalyptus camaldulensis* under agroforestry conditions at Mafina, Morogoro, Tanzania. *Forest Ecology and Management*. 11:241-244.

Author's abstract: The growth of *Eucalyptus camaldulensis* clean weeded, spot weeded, and intercropped with maize and beans was studied. At 4m X 4m and 5m X 5m spacings trees were significantly shorter after 15 months under a conventional spot weeding regime than with clean weeding or intercropping

with beans. A satisfactory maize yield (683 kg/ha<sup>-1</sup>) was recorded from plots with trees spaced at 5m X 5m. Plots where trees were spaced at 4m X 4m and 3m X 3m gave significantly lower yields (444 kg/ha<sup>-1</sup> and 283 kg/ha<sup>-1</sup>, respectively).

17. Clary, P.W., H.W. Kruse, and R.F. Larson. 1975. Cattle grazing and wood production with different basal areas of ponderosa pine (*Pinus ponderosa* Laws.) *Journal of Range Management*. 28(6):434-437.

Cattle grazing and wood production are often competitive. Heavy grazing reduces tree basal area, and, as tree dominance increases, herbage production declines. Experimental work from Arizona reveals that maximum beef gain was achieved at zero basal area. The economic optimum combination between animal production and wood production appears to be in stands having a basal area of 45 to 60 sq. ft per acre.

18. Clifford, E.L. 1985. Planting slash pine in a dense pasture sod. *Agroforestry Systems*. 3:267-274.

A research project using various techniques (partial weed control, direct planting) for growing pines and pasture together in an agroforestry environment in southern Georgia (U.S.A.) is described. Results indicate that planting slash pine (*Pinus elliotii*) directly into pasture sod is economically feasible. The application of fertilizers and cultivation showed significant positive impact on pine growth that could be of special interest to nonindustrial private land owners. Further research under different climatic conditions and with tree and pasture species combinations is recommended.

19. Cumming, D.G. 1981. Integration of agriculture and forestry: Overwintering cows with calves in Scottish plantations. *Scottish Forestry*. 35(4):256-266.

In northern Scotland overwintering cattle in young stands of Scots pine (*Pinus sylvestris* L.) and hybrid larch (*Larix eurolepis* Henry) was advantageous under certain soil conditions where plantation damage did not occur. The background and intermediate results of an experiment raising cattle in woodlands is presented. More investigation is needed to provide data for maintaining this type of multiple land use over a long period.

20. Dawson, J.O. 1983. Dinitrogen-fixing plant symbiosis for combined timber and livestock production. In: *Foothills for Food and Forests*, D.B. Hannaway, ed., Oregon State University College of Agricultural Sciences Symposium Series No. 2, Oregon State University, Corvallis. Pp. 95-112.

Combined production of agricultural and tree crops is efficient in capturing nutrients and maintaining an enriched topsoil. Increased use of livestock-timber combinations can be achieved by including dinitrogen-fixing plants. Plant combinations in the experiments reported involved leguminous herbs and woody plants with pasture plants, and nitrogen-fixing trees and shrubs with pasture plants. Problems included competition among trees and soil compaction and tree damage by livestock. Research is needed to determine the best combinations and to evaluate

costs, timing, and intensity of planting and grazing.

21. Desai, S.N., and P.G. Bhoi. 1982. Assessment of production potential of food and forage under an agroforestry system. *Journal of Maharashtra Agricultural Universities (India)*. 7(1):33-36.

Authors' abstract: An experiment to evaluate production potential of food and forage in one-system was conducted during the year 1978 and 1979. The results indicate a possibility of producing both food and forage profitably in an integrated system using Dashrath (a forage shrub) at wider row spacings of 2.0 meter and double inter-cropping with Bajra-wheat for grain production. This system produced maximum monetary returns.

22. Djafar, M.I., and M. Mamat. 1982. Animal production in an agroforestry system. Tropical forests source of energy through optimization and diversification. Penebit Universiti—Pertanian Malasia. Pp. 161-169.

Integrated forest-farming diversifies the farm economy and creates opportunities to use the best soils for increased production. It may also play a role in maintaining the economic potential and ecological stability of areas under intensive land use and population pressure. Integrating grazing and forestry could help reduce conflicts between farming and forestry. Integration of livestock in forest and forest plantations and the potential of wood by-products as livestock feed are also discussed.

23. Doyle, C.J., J. Evans, and J. Rossiter. 1986. Agroforestry: An economic appraisal of the benefits of intercropping trees with grasslands in lowland Britain. *Agricultural Systems*. 21:1-32.

Authors' summary: A mathematical model simulating the effect of intercropping trees (ash) with grassland on wood production, grass yields, and output of sheepmeat is described. Using the model, an assessment has been made of the implications of varying the density and the planting pattern of the trees on the combined income from the sale of wood and livestock over a number of years. The resultant incomes have been compared with that from an equivalent unafforested area to assess the likely economic implications of intercropping trees with grass. At a discount rate of 5%, the indications are that combining wood and sheepmeat production on the same area could be financially attractive. At higher discount rates, the economic attraction of growing trees is more dependent on an increase in timber prices relative to those prevailing at present. However, given the large number of assumptions necessitated by the limited availability of data and in the absence of any means of validating the model, extreme care is needed in interpreting the results. Confident economic projections of the value of intercropping trees with grass await further experimental work on appropriate growth models for open-grown trees, light interception, tree rooting patterns, and water uptake of tree roots.

24. Etherington, D.M., and P.J. Mathews. 1983. Approaches to the economic evaluation of agroforestry farming systems. *Agroforestry Systems*. 1:347-360.



Most attempts to quantify and analyze the economic benefits of complex agroforestry systems have consisted of theoretical discussions. A simple and practical analytical tool is needed. Practical tools such as multiperiod linear programming, dynamic programming, and partial budgeting—a simple planning tool which relies on iterative manipulations of figures to obtain successively better alternatives—aided by specifically designed computer packages could provide the means by which the multi-faceted nature of agroforestry systems can be fairly and rapidly analyzed.

25. Evans, P.T., and J.S. Rombold. 1984. Paraiso (*Melia azedarach* var. "Gigante") woodlots: An agroforestry alternative for the small farmer in Paraguay. *Agroforestry Systems*. 2:199-214.

A description of an agroforestry system known as paraiso woodlots, which employs a combination of *Melia azedarach* var. "Gigante" with other trees, especially *Leucaena leucocephala*, and other crops, is provided. The system has proved to be popular for its production of high value sawlogs, poles, and fuelwood as well as food. Increased soil fertility from litter and leaf fall enhanced production of food and forest products.

26. Fernandes, E.C.M., A. Oktingati, and J. Maghembe. 1984. The Chagga homegardens: a multistoried agroforestry cropping system on Mt. Kilimanjaro (Northern Tanzania). *Agroforestry Systems*. 2:73-86.

The Chagga farmers have long practiced land use methods that combine tree crops, agronomic crops, and often domestic animals. Major components are identified and their interactions and management are described. Recommendations are made for further research on such areas as optimum crop production, efficient pest resistant species, and other cultural practices.

27. Ferrero, A., and L. Lisa. 1983. Integration of beef cattle grazing with coppice on hill lands. In: *Foothills for Food and Forests*, D.B. Hannaway, ed., Oregon State University College of Agricultural Sciences Symposium Series No. 2. Pp. 375-378.

Authors' abstract: The results of a 10-year experiment of rotation grazing of free-range cattle on steep hill land are reported. The coppice-pasture interaction was analyzed. The utilization of the coppice allowed about 29 percent increase in yearly grazing days. Coppices which were at least 5 years old were not significantly damaged.

28. Filemon, T. 1983. Potential contribution of leucaena hedgerows intercropped with maize to the production of organic nitrogen and fuelwood in the lowland tropics. *Agroforestry Systems*. 1:323-333.

*Leucaena leucocephala* may be a breakthrough in solving the food and firewood crisis of many countries. It can be grown with crops to provide soil nutrients, fodder and firewood. A study of the impact of intercropping leucaena hedgerows with maize showed increased maize production while protecting the soil and increasing nitrogen availability. Further research is recommended. A table showing yield of leucaena hedgerows for

countries such as Australia, Mauritius, the Philippines, and Fiji is also provided.

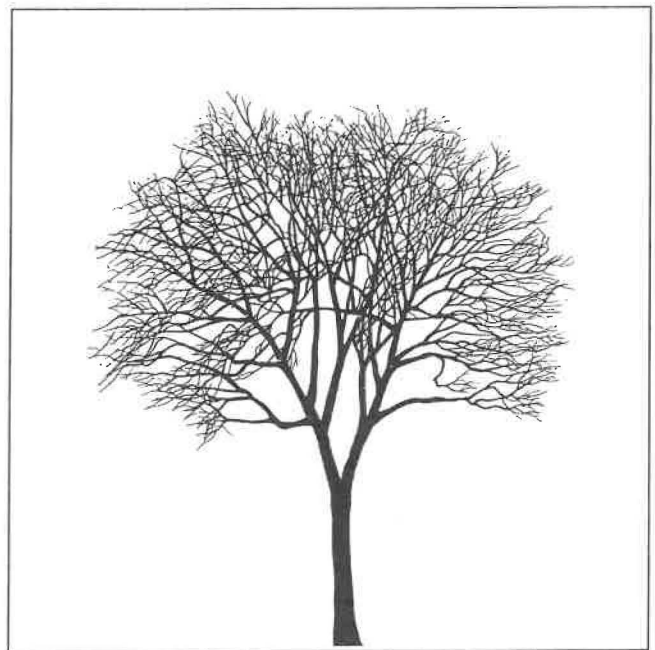
29. Fonzen, P.F., and E. Oberholzer. 1984. Use of multipurpose trees in hill farming systems in western Nepal. *Agroforestry Systems*. 2:187-197.

A large number of multipurpose trees and shrubs are deliberately retained or incorporated on farms in the subsistence farming systems on the steep slopes in parts of Nepal. The discussion is based on a survey of existing agroforestry systems of the hills of the western development region and presents some data on basic farm management aspects, production of crops, and other components of the system. The performance of the system is assessed and its merits and weaknesses highlighted.

30. Garret, H.E., and W.B. Kurtz. 1983. Silvicultural and economic relationships of integrated forestry-farming with black walnut. *Agroforestry Systems*. 1:245-256.

Integrated forestry-farming represents an improvement over traditional shifting cultivation as it increases the productivity of forest land by bringing it under multiple use. Multicropping systems involving black walnut can provide substantial benefits in increased food production and increased farm income. Four alternative black walnut management regimes developed in Missouri (U.S.A.), involving soybeans, winter wheat, fescue seed, and hay, are provided. The reasons why black walnut multicropping gives potentially higher yields and financial returns are associated with more intensive agricultural management regimes.

31. Gregory, R.G. 1955. An economic approach to multiple use. *Forest Science*. 1(1):6-13.



Multiple use is an attractive and valuable concept. When applied correctly, its contribution to the economic and social well-being of society is immense. An analysis of economic benefits and limitations (including positive and negative interactions among uses) and development of analytical techniques for evaluating trade-offs among different land uses merits special emphasis. An economic analysis of the multiple use concept, current approaches, and problems are reviewed.

32. Gupta, T. 1982. The economics of tree crops on marginal agricultural lands with special reference to the hot arid region in Rajasthan, India. *International Tree Crops Journal*. 2:155-194.

A combination of overcultivation, overgrazing, and deforestation as a result of firewood harvesting is leading to widespread soil erosion and desertification, which in turn is responsible for declining land productivity. The problem is further aggravated by increased livestock numbers to compensate for declining productivity. In order to assess what options are available, the net annual returns from raising annual crops and livestock was compared with estimated returns from an alternative system of pastures and multipurpose tree crops for production of fodder and fuelwood. Results indicated that a multiple-use silvopastoral system appeared to be attractive economically, in addition to the many ecological benefits that would also accrue.

33. Halls, L.K., and R.F. Suman. 1954. Improved forage under southern pines. *Journal of Forestry*. 52(11):848-851.

Optimum combinations of improved forage species such as white clover (*Trifolium repens*), carpet grass (*Axonopus affinis*), and dallisgrass (*Paspalum dilatatum*) and pines such as slash pine (*Pinus elliottii*) and longleaf pine (*Pinus palustris*) on the same unit of land produced increased returns. The effect of canopy on forage production was minimized by maintaining the tree stocking level under 50 sq. ft. basal area, and by periodically removing litter. Litter removal and maintenance of improved grasses and legumes provided adequate barriers to fire.

34. Hedrick, D.W., and R.F. Keniston. 1966. Grazing and Douglas-fir growth in the Oregon white-oak type. *Journal of Forestry*. 64(11):735-738.

Douglas-fir grew faster in controlled short-term spring sheep grazing plots than in the ungrazed plots. More abundant soil moisture at the 5-inch and 12-inch depths on the grazed plots correlated with removal of herbage by sheep. Ten years after grazing started Douglas-fir trees averaged 25 inches taller (27%) on the grazed plots than on the ungrazed plots.

35. Hoekstra, D.R. 1985. Choosing the discount rate for analyzing agroforestry systems/technologies from a private viewpoint. *Forest Ecology and Management*. 10:177-183.

The apparent economic attraction of agroforestry systems is influenced by the choice of discount rates. Discount rate selection plays a major role in comparing and evaluating future net benefits with present net benefits.

36. Knowles, R.L., and N.S. Percival. 1983. Combinations of *Pinus radiata* and pastoral agriculture on New Zealand hill country: Forestry productivity and economics. In: *Foothills for Food and Forests*. D.B. Hannaway, ed., Oregon State University College of Agricultural Sciences Symposium Series No. 2, Oregon State University, Corvallis. Pp. 203-218.

Authors' summary: A recently developed simulation model was used to compare the volumes and present net worth of stands of *Pinus radiata* with final crop stockings of 100 stems/ha, 200 stems/ha, and 400 stems/ha grown in conjunction with understory pasture. Various site and silvicultural variables were altered, and the effects on present net worth calculated. Final crop stockings of 100 stems/ha gave the lowest timber yields, but were more profitable than the other treatments. The addition of estimated revenues from livestock grazed under the trees further favored the lower tree stocking. These preliminary results indicate a considerable level of compatibility between agriculture and forestry on New Zealand hill country. The model, when complete, will allow site and management specific evaluation of agroforestry proposals involving combinations of *P. radiata* and pastoral agriculture.

37. Lewis, C.E., G.W. Burton, W.G. Monson, and W.C. McCormick. 1984. Integration of pines and pastures for hay and grazing. *Agroforestry Systems*. 2:31-41.

A discussion of the joint production of animals and pine trees on improved pastures in Georgia (U.S.A.) examined production of hay and animals separately and the effects of management of the system on survival and growth of pines at three year intervals. Results indicate that wide spacing permits mechanical forage harvesting. A survival rate of 83% was achieved after 6 years where trees averaged 6.5 m in height and 13.2 cm in diameter. Use of slash pine (*Pinus elliottii*) may require delaying grazing for several years to prevent seedling damage. Annual returns are provided for the land owner prior to harvesting slash pine timber.

38. Liyange, M., De S., K.G. Tejawani, and P.K.R. Nair. 1984. Intercropping under coconuts in Sri Lanka. *Agroforestry Systems*. 2:215-228.

This paper examines the intercropping of coconut with a number of other crops in Sri Lanka. It also summarizes the results of planting crops most commonly grown as intercrops, the arrangement of different crops, and early research results on the productivity of the intercrops and their effect on coconuts.

39. Maghembe, J.A., and J.F. Redhead. 1980. Agroforestry: Preliminary results of intercropping acacia, eucalyptus, and leucaena with maize and beans. In C.L. Keswau and B.J. Ndunguru, eds., *International Conference on Intercropping*. University of Dar es Salaam, Morogoro, Tanzania.

Studies of mixed cropping have shown that, in general, higher overall productivity can be achieved per unit area through intercropping as opposed to monocropping. Intercrop-

ping systems entail the development of efficient, stable combinations and sequences that are suitable to the biological and socioeconomic conditions of a majority of farmers. For the subsistence farmer in developing countries such as Tanzania, the use of wood for fuel and construction and as fodder for goats and cattle is of paramount importance. Research dealing with species compatibility and spacing offers encouragement to the farmer to interplant food crops with trees.

40. Maxwell, T.J., A.R. Sibbald, and J. Eadie. 1979. Integration of forestry and agriculture—a model. *Agricultural Systems*. 4:161-188.

Authors' summary: This paper describes a modeling approach to the allocation of land between forestry and agriculture in the context of hill and upland (in Scotland). The model can be used to examine objectively the outcome of some of the stated objectives and constraints concerned with integration. Examples in the use of the model are presented.

41. Medoza, G.A., G.E. Campbell, and G.L. Rolfe. 1986. Multiple objective programming: An approach to planning and evaluation of agroforestry systems—Part 1: Model description and development. *Agricultural Systems*. 22:243-253.

Authors' abstract: A conceptual framework for planning and evaluating agroforestry systems is described in this paper. The framework can accommodate the various features of agroforestry such as: (1) temporal and spatial dimensions, (2) multiple alternative uses of the land and (3) multiple and integrated production of forest and agricultural crops.

The nature of agroforestry lends itself well to multiple objective programming (MOP) formulation and decision making. The planning framework and MOP techniques outlined in this paper can be useful tools for the optimal allocation of land to a variety of alternative cropping systems.

42. Medoza, G.A., G.E. Campbell, and G.L. Rolfe. 1986. Multiple objective programming: An approach to planning and evaluation of agroforestry systems—Part 2: An illustrative example and analysis. *Agricultural Systems*. 23:1-18.

Authors' abstract: Four methods representing four different multiple objective programming (MOP) approaches are described in this paper. Some theoretical and computational characteristics of these methods are illustrated using an agroforestry planning problem. The solutions generated by each method correspond to alternative land allocation schemes identified by land compartment, site quality, management regime, which specifies the cropping system used, the length of the timber rotation, and the thinning schedule.

43. Morrison, D.A., Kingwell, R.S., D.J. Pannell, and M.A. Ewing. 1986. A mathematical programming model of a crop-livestock farm system. *Agricultural Systems*. 20:243-268.

Authors' abstract: A whole-farm mathematical programming model has been built for dryland crop-livestock farms in west-

ern Australia. The multidisciplinary approach used for model building is presented and the resulting model structure is described. It is a mixed integer programming model which represents, in some detail, the biological, technological and financial relationships of the farming system and stresses the interdependencies of enterprises. The model is used to investigate the extent to which positive interactions between different enterprises influence the optimal farm plan. The management issue considered is the division of land between crop and pasture production. It is concluded that, for the farming system considered, interactions do have an influence on profit and the optimal farm plan.

44. Muhlenberg, N. 1964. A method for approximating forest multiple-use optima. *Forest Science*. 10(2):209-212.

Author's abstract: Proposed is a method for considering forest multiple use alternatives within the framework of the joint output models of traditional economic theory. The model presented by Gregory (Forest Science 1955) is modified to accept empirical data, and quantitative trails are analyzed in a two product case. A four product matrix is considered for reviewing more complex multiple relationships.

45. Ngambeki, D.S. 1985. Economic evaluation of alley cropping leucaena (*Leucaena leucocephala*) with maize-maize and maize-cowpea in southern Nigeria. *Agricultural Systems*. 17:243-258.

Author's abstract: Alley cropping is an aspect of agroforestry being developed for small farmers in the tropics. It consists of establishing fast growing leguminous shrubs or tree species in rows, then controlling the shading from the trees during cropping by pruning the branches which can be used as mulch or green manure to benefit the companion crops planted between the alleys. This paper attempts to assess the economic implications on labor utilization for the management of the leucaena hedgerows, on crop yields, and the overall benefits from alley cropping with leucaena. The results show that although the management of leucaena trees increases labor requirements by about 50%, the system can sustain and increase maize yields by over 60%, reduce the use of nitrogenous fertilizers, and give an attractive net income and marginal rate of return per unit cost. It gave a reasonable benefit-cost ratio of 1.23 to 1.32 and looks promising, especially for maize production in tropical areas.

46. O'Connell, P.F., and H.E. Brown. 1972. Use of production functions to evaluate multiple use treatments on forested watersheds. *Water Resources Research*. 8(5):1188-1198.

Authors' abstract: Preliminary production functions are identified for alternative land treatments on the Beaver Creek watersheds in northern Arizona. These treatments are designed to increase water yield within a multiple use framework that includes timber, wildlife habitat, herbage, recreation, sediment, and environmental quality. Total, average, and marginal economic concepts are used to demonstrate the most efficient way to manage an area for one output. Even without price information, a range of 'best' input combinations can be identified. To determine how an area can be managed for multiple products in

the most efficient way, product-product functions were developed for water, timber, and herbage for five strip cutting alternatives. These functions indicate the supplementary, complementary, and competitive outputs obtained from a given expenditure. To account for the dynamic nature of production in the national forests, outputs and costs were evaluated over a 90-year period.

47. Penaloza, R., M. Herve, and L. Subarzo. 1985. Applied research on multiple land use through silvopastoral systems in southern Chile. *Agroforestry Systems*. 3:59-77.

One of the most promising agroforestry practices, applicable to many situations in developing countries, is mixed land use for forage, live-stock, and wood production. Multiple use land management for fuelwood production and grazing of domestic animals is being developed to promote rural development in Chile. Sheep farming with radiata pine (*Pinus radiata*) was found to be economically attractive between 1979 and 1982. An increase in reproduction, growth of lambs, and mean wool production indicate that the system can be beneficial to small farmers. Radiata pine plantations have not been damaged by browsing. Trees averaged 6.7 m and 15.2 cm height and diameter, respectively, after six years.

48. Percival, N.S, and R.L. Knowles. 1983. Combinations of *Pinus radiata* and pastoral agriculture on New Zealand hill country: Agricultural productivity. In: *Foothills for Food and Forests*, D.B. Hannaway, ed., Oregon State University College of Agricultural Sciences Symposium Series No. 2. Pp. 185-202.

A discussion of the effects of four tree stocking treatments on pasture yields of ryegrass (*Lolium perenne*) and white clover (*Trifolium repens*) is provided. Results indicate that the decline in pasture yields is attributed to high stocking of trees and competition from grasses and litter. Continuous grazing by sheep is possible at a stocking rate of 200 trees/ha. Stocking 100 trees/ha creates significant reduction in wood volume but retains a substantial level of agricultural production through most of the rotation.

49. Poschen, P. 1986. An evaluation of the *Acacia albida*-based agroforestry practices in the Hararaghe highlands of Eastern Ethiopia. *Agroforestry Systems*. 4:129-143.

In the eastern highlands of Ethiopia farmers grow cereals, vegetables, and coffee under *Acacia albida*. However, there has been practically no systematic data collection of the possible effects of the many other combinations of crops and trees. Results of an investigation into the effects of the presence of *Acacia albida* on farmlands on the yield of maize (*Zea mays* L.) and Sorghum (*Sorghum bicolor* L.) showed on average 56% increase for crops under the tree canopies compared to those away from the trees. Shortcomings and recommendations regarding propagation and participation in the program by various governmental agencies is highlighted.

50. Reid, V.H. 1954. Multiple land use: Timber, cattle, and bobwhite quail. *Journal of Forestry*. 52:575-578.

With proper management, cattle and timber can coexist on longleaf pine land in the southern United States. Interactions between livestock and wildlife such as quail could be beneficial if available knowledge of management possibilities is utilized. Fire is found to be helpful in handling the land for timber and forage production and in managing longleaf pine woods for quail, which in turn generates income from sportsmen.

51. Reynolds, S.G. 1980. Grazing cattle under coconuts. *World Animal Review*. 35:40-45.

Grazing experiments involving the joint production of livestock and tree crops indicate that opportunities to increase potential productivity and economic returns are immense. Major economic advantages of introducing cattle to coconut plantations are reduced weeding costs and income from beef sales. Combined livestock-coconut production can be maintained and improved through establishment of improved pastures under coconuts which, together with controlled grazing, increases the benefits per hectare for the farmer.

52. Ritters, K., and J.D. Brodie. 1983. Dynamic programming for optimization of forage and wood fiber production. In: *Foothills for Food and Forests*, D.B. Hannaway, ed., Oregon State University College of Agricultural Sciences Symposium Series No. 2. Pp. 325-327.

Authors' abstract: Given economic and biological models for forage and fiber production, dynamic programming is an alternative to simulation to find optimal joint production strategies. The methodology allows the comparison of single—and multiple—product strategies under present and future projections of value. Dynamic programming also can provide useful insights into joint production strategies that are not apparent in simulation studies.

53. Ritters, K., J.D. Brodie, and D.W. Hann. 1982. Dynamic programming for optimization of timber production and grazing in ponderosa pine. *Forest Science*. 28(3):517-526.

Authors' abstract: Dynamic programming procedures are presented for optimizing thinning and rotation of even-aged ponderosa pine by using the four descriptors: Age, basal area, number of trees, and time since thinning. Because both timber yield and grazing yield are functions of stand density, the two outputs—forage and timber—can both be optimized. The soil expectation values for single and joint production are derived and compared, and the impact of dynamic changes in relative price of the two products over the rotation is shown. Depending on relative prices and discount rate, the maximum soil expectations will be provided by timber alone, grazing alone, or an optimal schedule of joint production. Impacts of relative costs and values of the two outputs on management are discussed.

54. Sharrow, S.H., and W.C. Leininger. 1983. Sheep as a silvicultural tool in coastal Douglas-fir forest. In: *Foothills for Food and Forests*, D.B. Hannaway, ed., Oregon State University College of Agricultural Sciences Symposium Series No. 2. Pp. 219-231.

The results of a study conducted to evaluate the feasibility of using herded sheep as a silvicultural tool to suppress brush in Douglas-fir (*Pseudotsuga menziesii*) plantations are provided. Sheep browsed Douglas-fir trees intensively in spring and very little during summer to fall periods. Results revealed that trees growing in grazed plantations showed a 7-14% increase in diameter. Regrowth of herbaceous plants was stimulated.

55. Tajuddin, I. 1986. Integration of animals in rubber plantations. *Agroforestry Systems*. 4:55-66.

A unique agroforestry approach aimed at maximizing land use and diversifying agricultural production that integrates sheep, poultry, and bees in smallholder rubber plantations is provided. Given favorable conditions—adequate labor, suitable microclimate, economic returns from reduced weeding costs—increased poultry, sheep, and honey production on a unit of land seem to be technically, socially, and economically feasible. More research on various aspects of the system is needed.

56. Tustin, J.R., and R.L. Knowles. 1975. Integrated farm forestry. *New Zealand Journal of Forestry*. 20(1):83-88.

Authors' abstract: Two tier combinations of pastoral farming and exotic forestry have been shown to be technically feasible. Research is proceeding into the long-term effects of trees on both pastures and livestock and into land preparation and tree establishment measures appropriate to the technique. Further expansion on a management scale may be limited by financial, advisory, management, and marketing constraints. Combined land use promises higher financial returns and less conflict in land allocation than traditional pastoral farming or exotic forestry.

57. Tustin, J.R., R.L. Knowles, and B.K. Klomp. 1979. Forest farming: A multiple land-use production system in New Zealand. *Forest Ecology and Management*. 2:169-189.

The name agroforestry is variously defined in different countries to suit the socioeconomic conditions of the country. In New Zealand it is referred to as "forest farming" and involves growing widely spaced pruned radiata pine with an understory crop (cattle or pasture). Research results reveal that spraying pasture with herbicide prior to planting followed by excluding cattle grazing for 6 months increased tree survival and growth. Increased grazing returns, ranging from 20-80% over those achieved from open pastures, were found in the first three years of establishment. The approach was found to be appealing and promising both technically and financially to the hill-country farmers.

58. Wilson, A.D., and A.D. Graetz. 1980. Cattle and sheep production on an *Atriplex vesicaria* (salt bush) community. *Australian Journal of Agricultural Research*. 31:369-378.

Joint production of cattle and sheep on a salt bush community in New South Wales, Australia, showed similar productivity, despite the higher digestibility and nitrogen content of the sheep diet. Comparisons of diet selection revealed that sheep consumed a higher proportion of grass and a lower proportion of salt bush than cattle. Comparisons are provided based on production on a land area basis, water requirements, and volume consumed between sheep and cattle grazing on the lands.

*From the Nature and Natural Sciences List*

**The Peregrine**  
John Baker

"One of the most beautifully written, carefully observed, and evocative wildlife accounts I have ever read. Baker's patience, his discriminating and unsentimental eye, and his passionate deliberation are utterly captivating."

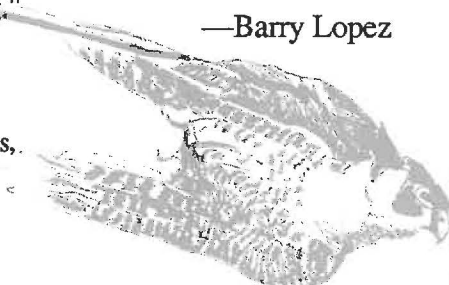
—Barry Lopez

191 pages, paper 115-0, \$10.95

To order, or for information on other titles,  
write to the Sales Manager.



THE UNIVERSITY OF IDAHO PRESS  
3368 UNIVERSITY STATION • MOSCOW, IDAHO 83843





# Helicopter Logging

## Makes the Heart Beat in Time

Karen Lyman

High above the Tucannon River in eastern Washington state lies the USDA Forest Service Cannon Timber Sale property, situated with a pleasant view of the Wenaha-Tucannon Wilderness Area. Forest Service officials consider this area to be “sensitive,” not only because of its proximity to wilderness but because of its terrain—steep and rocky, with a straight shot into the Tucannon River.

Building roads into this beautiful country costs plenty. In fact, according to Bud Deveney, Timber Sale Assistant with the Pomeroy Ranger District, “We calculated that with the road building, to skyline this sale would cost more than helicopter logging.”

Helicopters aren't cheap. Deveney figures that logging this site costs about \$178 per thousand board feet (MBF) just to get the logs into the deck. Compare that with tractor logging in surrounding Columbia County which might run around \$90 per MBF. Add to that the cost of transportation (which varies according to distance and mode—in this case truck or barge), and you have expensive timber. Fortunately, the timber proved to be valuable. The sale went up for bid in November 1985 with Guy Bennett Lumber of Clarkston, Washington as purchaser. Bennett wanted it mainly for the Ponderosa pine, which comprises 77% of the six million board foot volume.

But forget money for the moment, it's the helicopter

itself that's really awesome. The throbbing sound made by the rotors on a helicopter creates a certain feeling. Perhaps it matches your heart beat or maybe the throb controls your breathing. Whatever it is, there is no doubt that the machine that makes the wup-wup noise is electrifying.

The craft used by Columbia Helicopters, the contractor for the Canon Timber Sale, is a double-rotor Boeing Vertol. The copter, originally designed by the army for troop transport, is huge. It's been modified for it's present use, but still has the original windows on the side where infantry must have watched the ground. The Vertol is empty now, except for the two motors, a giant cable attachment, the pilots, and their instruments.

The Vertol has a load capacity of 11,500 pounds in favorable conditions. With this fall's hot weather, the capacity has been reduced. Dave Horrax, forester for Columbia Helicopter, says that in logging, their objective has been to carry a load of about 7,000 pounds but they've had to settle for between 5,000 and 6,000 pound loads instead. As with other types of logging, time is money. When the craft can't quite get its load up to the landing and must circle around trying to gain altitude, it's wasted time.

Every helicopter minute is expensive. This one uses 160 gallons of jet fuel per hour and runs about 11 hours per day. On the Cannon Sale, the Vertol has been averaging 3.5 to 5 minutes per turn, and about 600 board feet per turn with a grand total of 100,000 board feet per day.

When the craft needs to refuel, the scene resembles an Indianapolis 500 pit stop. The Vertol lands at it's service landing, where a mechanic awaits with the fuel pump revved up. He races to the machine and fills both of the

ships tanks faster than it takes a car at the Chevron station to gas up. The pilot or co-pilot leap out for pit stops of their own. And then off they go—in barely five minutes.

After the Virtol's long day, two Columbia Helicopter mechanics will spend the night, under bright lights, servicing it. The helicopter is also given a quick check-up during the lunch break. These mechanics are meticulous. They trace and wipe up tiny dribbles of grease and oil carefully, always alert for the signals of a breakdown. And there is a reason for this care. The army trashed the helicopters at 7,000 hours, but this machine has 24,000 hours on it and is still going strong. Columbia Helicopter has thus been re-writing the service book on the Virtol.

Not that accidents never happen. Horrax recalls an accident three years ago in which the drive shaft to the forward rotor (both engines are in the rear) broke. The craft dropped like a rock to the ground killing both the pilot and co-pilot. But Horrax quickly notes, "It's not any more dangerous than any other kind of logging." He adds that, in fact, it has one of the best safety records in the business.

The basic methodology isn't very different from conventional logging:

- Timber fallers cut down trees marked (by paint) for that purpose.
- Choker setters wrap pre-set cables around the fallen tree.
- The cable around the log is attached to the static cable hooked onto the helicopter.
- The helicopter lifts the log up, clearing the ground, and moves toward the landing.
- On the landing, the craft gently lowers the load until the cable is slack. The pilot operates an electronic release, which sets the logs loose, still

with the pre-set cable.

- A landing worker removes the pre-set cable, so that the cat can push these new offerings into the area where landing workers will saw off limbs and generally prepare the log for loading.
- When the log is clean, a tractor moves the log near the log deck, where the loader stacks it into a deck. When the time comes, the log is lifted onto a truck.

One of the differences between conventional logging and helicopter logging are the landing sizes. There are fewer of them, but they are usually much larger than conventional ones. They have larger slash problems, too. Helicopter logs aren't dragged along the ground breaking off the limbs, so most of the limbs and needles make it to the landing to be removed and piled up for later burning.

Running the action at the one site requires an enormous number of people. In addition to the two mechanics and night watchmen, there are 10 timber fallers, four choker setters, two knot bumpers, and others—a total of 30 persons.

Happily, the folks at Columbia Helicopter are old hands at this. It's their primary bread and butter. They may handle a construction job or two on the weekends and help fight the occasional fire with the helicopters, but they pay their way with this spectacular logging format.

Karen E. Lyman is a contributing editor of *WInR*. She has been a timber sale administrator for a log export firm, and a forester for Champion and Boise Cascade. Currently, Lyman writes for the *Dayton Chronicle* and operates her own forestry consulting firm.



# AGROFORESTRY IN ECUADOR

## Success Stories Can Be Found To Meet the Problems of Regions and Peoples

Cynthia Miner

### One Family's Story

The Hidalgo family lives along the river Aliso on the low eastern slopes of the Andes. Most mornings Teresa awakens early, as do her husband Jorge and the six Hidalgo children. Teresa fills plates with mounds of rice and adds a hard-boiled egg to each. After finishing their meal and sipping coffee, Jorge and the three eldest sons put on their knee-high, black rubber boots. One of the sons grabs a chainsaw, and they leave to cut timber either on their own property, or on that of someone else who has hired them.

The Hidalgos obtained 125 acres from the Institute of Ecuadorian Agrarian Reform and Colonization 12 years ago. Except for a few trees, five acres have been cleared and tropical grass has been planted. Four cows, three calves, and a young bull graze in the pasture. Three of the cows are producing four liters of milk per day. The Hidalgos have about 30 acres that are in various stages of agricultural development. Like their neighbors, they clear an area of native trees and shrubs, plant corn and other vegetables for two or three years, and then convert the area to pasture when vegetable production drops as the soil is depleted of nutrients.

In 1986, Jorge heard about and applied for financial assistance from the Ministry of Agriculture and Livestock to reforest 45 acres. He decided that he wanted to plant aliso (*Alnus jorullensis*) because the tree grew naturally nearby and the alisos he had cut previously sold for a fair price. Jorge filled out, with the help of his children, the necessary forms to obtain a plantation establishment loan. After his application was approved, however, Jorge decided not to accept the loan because he was not certain the trees would survive a rotation, and he was unclear as to how the government agreement

addressed catastrophes such as disease. This was a valid concern because no aliso plantations existed in the area, and, several years before, the region's citrus groves had been destroyed by disease.

As a Peace Corps volunteer, I primarily promoted silvopastoral systems using aliso. I worked closely with another volunteer and an Ecuadorian veterinarian, both of whom had expertise with dairy cattle. We had tried several methods to establish aliso in pasture—including individually fenced seedlings planted in pastures, and planting in pastures that were to be protected from livestock for two years. These efforts almost all failed because fencing that was affordable to farmers could not keep out the livestock.

I met Jorge when he was applying for financial assistance. By coincidence, the same week he decided against the agreement with the government, I received 600 six-month-old aliso seedlings from a research forester with the Agency for International Development (USAID). I was especially interested in aliso because, as a nitrogen-fixer, the tree has a great potential to improve soils (Carlson 1984). The tree can be harvested on a 25-year rotation for light-construction wood, firewood, and small fabrications such as cooking utensils and shoe heels.

I was delighted to find that before I met Jorge, he had decided to plant aliso despite ministry officials encouraging him to plant exotic species. Some ministry officials are willing to experiment with new species, but most prefer the exotics and a few natives that have established use. This can provide greater certainty; however, what is sometimes overlooked is that a wide range of climatic zones exist in Ecuador, and what may work in one area may not work in another.



On a visit to the farm (while Jorge was cutting timber) Teresa accepted my offer of 250 alisos. In Ecuador, women make and influence many decisions on family farms that are officially owned by their husbands. Furthermore, in the zone where I worked, several women owned farms. Teresa showed me the site where they wanted to establish an aliso plantation and I described to her, in poor Spanish, how to plant them at 4 x 4 meter spacings. The 4-acre site had a slope of about 70 percent, was close to the Hidalgo house, and had been recently cleared of shrubs and most trees.

One rainy day in May 1986, I borrowed a truck and delivered the trees to a site one mile from the house. Before I could get to the Hidalgo farm the next afternoon, the family had loaded the trees into baskets on two horses, brought the trees to their farm and planted them. When I visited, Teresa, her 14-year-old and 6-year-old daughters and I climbed the steep slope to check the trees. I found they had been planted very well, except, unfortunately, their roots remained in black plastic bags. The trees were dug up, bags removed, and trees replanted.

Within a month, the family had planted corn, squash, lettuce, and other vegetables among the trees. In February 1987 (nine months later), 85 percent of the alisos had survived. They were six feet tall. Almost all mortality was caused by flooding in the flat areas; a few trees were killed when cows had gotten in. Because the trees were planted with food crops, the family was highly motivated to protect the site from livestock. By the time the alisos shade out the crops, the trees should be tall enough to escape trampling.



Although the Hidalgos planted trees for plantation purposes, the lesson we learned from them applied to silvopastoral systems and to species other than aliso. Trees need to be planted simultaneously with crops. The short-term food crops are normally protected from livestock and the trees benefit from this protection. The area where the Hidalgo's trees were planted was not fenced, but they were watched by family members. After two years of protection, trees should be tall enough to survive livestock. When aliso plantings are not simultaneous with food-crop plantings, secure fencing or other forms of protection are needed.

### The Government's Story

Agroforestry has traditionally been practiced by some indigenous people and by tropical colonists such as the Hidalgos. Only recently has agroforestry been formally recognized. Now the Ecuadorian government (primarily the Ministry of Agriculture and Livestock and National Institute of Agricultural Investigation) is beginning to encourage the practice.

One effort (Plan Bosque) by the Ecuadorian Ministry of Agriculture and Livestock has the potential to make a significant contribution to agroforestry on a national scope. Plan Bosque, for which Jorge Hidalgo had applied when he originally planned to plant aliso on his property, provides financial incentives for plantation establishment with interest-free loans if reforestation activities are done in accordance with site plans. The loans are for technical consultation, site preparation, plantation stock, planting costs, and pest control.

Although it is a plantation program, Plan Bosque is implemented with the understanding that crops may be planted in conjunction with trees, as the Hidalgos planted crops within their aliso plantation. During the years that the food crops are raised, Plan Bosque can be used to finance pest control. This is a great incentive for farmers who are interested in financing crop protection.

Plan Bosque is most suitable for use by colonists who own around 125 acres, cooperatives with large landholdings, and wealthy landowners. Because the application process is fairly complicated and requires complex reading skills, Plan Bosque is also most easily implemented by the educated. Jorge Hidalgo, although he could not read, managed the process with the help of his literate children. Jorge was the exception; most farmers in the region who applied for and received loans from Plan Bosque were educated and often wealthy.

Perhaps Plan Bosque's major drawback is that it does not provide incentives or management through the full rotation, about 25 years for many species now being planted. This lack of long-term planning is what caused Jorge Hidalgo to forego his loan. He could not risk having to repay the loan under Plan Bosque if the plantation failed.

## Agroforestry Practices In Ecuador

Agroforestry practices differ greatly with climate and are regional or local in scope. The two major climactic areas are the Sierra mountains and the tropics, which include part of the Pacific Coast and the Amazon regions.

### Sierra

In the mountain region, Ecuador's annual population growth rate of almost 3 percent (U.S. Department of State, Bureau of Public Affairs, 1984) is most apparent. The centuries-old cities are crowded and the human flow toward the urban areas continues. The capital city of Quito, for instance, had a population of 800,000 in 1983; it passed one million in 1986. Most of the surrounding farmland is intensely cultivated. The mountainsides have long been deforested, and the few remaining trees are found in isolated pockets.

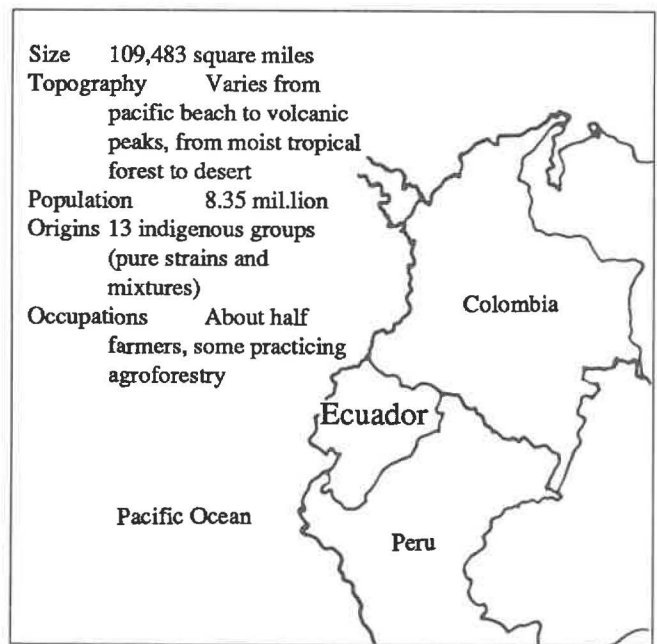
The Spaniards and their descendents took the best, flattest lands, forcing the indigenous people to farm steep hillsides. Today, the average family farm on those hillsides is less than five acres in size. Some family farms have been passed from generation to generation; other family farms and landholdings by indigenous cooperatives resulted from agrarian reform in the 1960s and 1970s.

In the Sierra, people farm on steep mountainsides up to 80 percent slope with minimal soil conservation practice. With the ever-increasing population growth rates and decreasing soil productivity, farmers know the necessity of producing as much food as possible. They can spare little room for long-term crops such as trees. They need firewood, however, to cook meals and boil water as well as to produce some goods, such as pottery, tiles, and bricks.

While agroforestry in the lower tropics helps maintain the trees in that region, the practice has the potential to bring trees back to the denuded Sierra. In addition to fuelwood, trees, such as *Gliricidium* sp., can be coppiced for animal forage or for green manure. Trees and shrubs are now increasingly planted as soil erosion barriers and windbreaks and along property boundaries and fences. Live fences ("cercas vivas") are sometimes used instead of post-and-wire fences or adobe walls. Live-fence trees do not have to be replaced as frequently as untreated fence posts.

Starting in 1985, several farmers established trial agroforestry plantings using native species. The nitrogen-fixing aliso, for instance, has been planted in 10 x 10 meter spacing with kikuyu grass (*Pennisetum clandestinum*) to improve pasture production in various parts of the Sierra. This silvopastoral system is common in Costa Rica.

Eucalyptus (*Eucalyptus globulus*) is now the most commonly planted and accepted species in the Sierra because of availability in nurseries. One agroforestry system using eucalyptus has evolved for good sites on large



landholdings: Eucalyptus is planted in an area of native pasture where animals are fenced out. Two or three years later when the trees are tall and no longer in danger of being eaten or trampled, sheep are brought in to graze the pasture beneath the trees. When the trees are taller, cattle are then introduced and their manure is used to propagate kikuyu grass that eventually replaces the native pasture, which has a lower protein content than kikuyu (Lojan 1979).

Young eucalyptus provide fuelwood, herbal medicines, and other products, as well as potentially prevent erosion, depending on site factors and management. At maturity they are harvested for sawlogs, posts, and power poles together with more firewood. Once cut, the trees can be coppiced and a new stand of trees arises from the stumps. Although eucalyptus can be grown appropriately on good sites, on poor sites the tree is detrimental because it absorbs large quantities of water preventing useful understory plants from growing.

Because erosion is the most critical problem in the Sierra, efforts are being made to encourage wide use of species other than eucalyptus through promotion and by making other trees available from nurseries. Some exotic species that are commonly planted in the Sierra, especially as live fences and for boundaries, include cypress (*Cupressus macrocarpa* and *lusitanica*) and pine (*Pinus radiata*). Native species such as arrayanes (*Eugenia* sp.), tropical walnut (*Juglans neotropica*), guaba (*Inga* sp.), and capuli, or native cherry (*Prunus capuli*), have only recently been made available from nurseries. These trees have been used in the past to provide fruit, nuts, live fences and boundary markers. Propagates of the trees have been collected by traveling, sometimes long distances, to forested areas in the subtropics. Now these and

other native and exotic species are being raised in nurseries.

## Tropics

Each year thousands of Sierrans leave their homes in the highlands for homesteads in the Amazon region or the northern coastal area that includes rolling hills and flatland between the Sierra and the Pacific beaches. The Ecuadorian government loosely directs colonization of this land, which is usually not of the quality to attract agribusinesses. The government is eager to assert Ecuador's borders by establishing communities throughout its interior, especially in the southeast region bordering Peru, and it sees farming the tropics as a means to increase food production.

Three categories of colonists are moving into the tropics: Poor Sierran farmers like the Hidalgo family (particularly from the Loja province where drought has forced farmers to leave); upperclass landowners who buy land as an investment and have their land farmed for personal satisfaction and social prestige; and agro-industrial landowners who invest heavily to cultivate African palm, bananas, coffee, cocoa, and other export crops. This last group often owns the land with the best soils.

Each year colonizers, loggers, and agro-industrialists clear more than 2.5 percent of Ecuador's current forest area (Food and Agriculture Organization 1981); at this rate, by 2021 no primary forests would remain. In many instances, of course, the primary forest is replaced by secondary forest. Parks and ecological reserves have been established to maintain primary forests. The government is attempting, with difficulty, to protect these areas from trespassing colonizers.

Colonists, who obtain parcels from the Institute of Colonization in the Amazon Region or the Institute of Ecuadorian Agrarian Reform and Colonization, usually clear the area slowly. Very few of these parcels have been totally cleared yet, with one-half to two-thirds of the parcels still in shrubs and trees. Jorge Hidalgo is typical of most colonists as he first selectively cuts the best timber (high-grading) and later returns to clear areas for agricultural use. Some farmers are unable to maintain their crops and cattle and abandon their parcels; others sometimes sell or abandon land that has yielded its best resources and go on to other primary forest lands.

Settlers often lay claim to land that once was inhabited by tropical indigenous peoples, both in the Coast and Amazon. In the Amazon region, indigenous people practiced shifting cultivation with little interruption until oil exploitation began in the mid-1970s. These people cut small patches of forest to raise crops for a few years. When the area is depleted of nutrients, the farmers move on and the land goes back to forest. Recently, oil interests and the government have built roads into the area making it accessible to settlers. The very large forest ex-

panses required by indigenous farmers and hunters are quickly disappearing.

Agroforestry causes the least erosion of the common land-uses after tropical forest clearing, followed by grazing and agriculture cropping (Lal 1986). Because most nutrients on rain and cloud forest sites are concentrated in trees or the extremely thin organic layer of the soil, when trees are cleared, remaining nutrients are quickly carried off by rainwater. Lal states that erosion depends on soil characteristics, remaining plant and crop cover and root distribution, rainfall, method of deforestation, post-clearing management, and land use. Conversion to cattle pastures is especially harmful because these heavy animals cause soil damage that can prevent the area from reverting to forest.

Farmers frequently leave timber trees among crops and in cattle pastures. These trees can provide added income from sale as construction material, firewood, food from fruit and associated mushrooms, and shade for cattle. The trees are usually survivors of the original forest or the result of natural regeneration. For instance, laurel (*Cordia alliodora*) was originally grown with cacao, and now the tree naturally regenerates by seed on farms. Robert Peck (1982) estimates 1,500 km<sup>2</sup> have regenerated in association with crops and pasture in the coastal area of San Lorenzo and Santo Domingo de Colorados. In the Amazon Region, he similarly estimates 500 km<sup>2</sup> of laurel growing with crops and pastures.

In the Coast and Amazon regions, tree nurseries and agroforestry demonstration areas have been established that include laurel, pachaco (*Schizolobium parahyba*), and others. Demand, however, exceeds supply of nursery stock. A variety of demonstration areas exist that show timber and fuelwood species growing with cocoa, coffee, papaya, pineapple, and pasture.

Agroforestry research and promotional efforts are generally scattered and lack long-term planning in much of Ecuador. In the northern Amazon region, however, research effort has been underway for over a decade to develop and promote plant and animal systems including livestock-forestry and agriculture-swine-forestry (Bishop 1979 a,b). In a project that began in 1984 with 15,000 settlers and indigenous people, research identified potential native and exotic tree species for silvopastoral systems including combinations of various tropical grasses, clover, and other pasture species.

African hair sheep have been introduced to the area as an alternative to cattle. The sheep are lightweight with small hooves and are thought to cause less damage to pastures than much heavier cattle with larger hooves. As a small meat animal, sheep have advantages over cattle for family consumption. The small size creates problems for extensionists, however, because settlers receive social prestige in being "cattlemen" by owning big, visible animals. Nevertheless, demonstration areas of the system are being established with 10 x 10 meter plantings of

kikuyu and tropical clover where tropical sheep will be pastured. Various live-fencing demonstrations are also being established to contain them.

### Discussion

Although agroforestry has great potential in Ecuador, how much this practice will benefit the country is questionable, and its success will depend upon many factors. Promotion is required that not only encourages establishment but teaches long-term management of agroforestry systems. Because a variety of agroforestry efforts are being made, coordination and information exchange is essential within and between organizations.

More research would optimize the practice: Individual plant and animal species, and their interactions under various site conditions, need analysis. Present practices of indigenous-tribes, peoples, and settlers lack documentation. The ecological, economical, and social effects of agroforestry need to be studied. Trial and demonstration areas are scarce and more need to be established and managed. Most importantly, agroforestry promotion, development, and research need to be done hand-in-hand with those who not only have the most to gain or lose from the practice, but also the most to contribute: The farmers.

### Literature Cited

- Bishop, John P. 1979a. Family agriculture-swine-forestry production in the Spanish-American humid tropics. In: de las Salas, G., ed., Proceedings of a workshop, *Agro-forestry systems in Latin America*. 26-30 March 1979, Turrialba, Costa Rica: CATIE: 140-144.
- Bishop, John P. 1979b. Development and transfer of technology for small farms in the Ecuadorian Amazon region. In: de las Salas, G., ed., Proceedings of a workshop, *Agro-forestry systems in Latin America*. 26-30 March 1979, Turrialba, Costa Rica: CATIE: 145-150.
- Carlson, Paul James. 1984. Effects of soil drainage on early growth and soil nitrogen accretion of *Alnus jorullensis* in the Andean highlands of Colombia. University of Illinois at Urbana-Champaign. 29 p. M. S. thesis.
- Food and Agriculture Organization. United Nations Environmental Programme. 1981. Tropical Forest Resources Assessment Project (GEMS): Tropical Africa, Tropical Asia, Tropical America. Rome: 4 vols.
- Forsyth, Adrian and Miyata, Ken. 1984. *Tropical Nature: Life and Death in the Rain Forests of Central and South America*. New York: Charles Scribner's Sons.
- Lal, R. 1986. Deforestation and soil erosion. In: Lal, R.; Sanchez, P.A.; Cummings, R.W., Jr., Land Clearing and Development in the Tropics. Boston: A.A. Balkema Publishers: 299-315.
- Lojan, Leoncio. 1979. Agroforestry in southern Ecuador. In: de las Salas, G., ed., Proceedings of a workshop, *Agroforestry Systems in Latin America*. 26-30 March 1979, Turrialba, Costa Rica: CATIE: 127-129.
- Meyers, Norman. 1984. *The Primary Source — Tropical Forests and Our Future*. New York: W.W. Norton and Company.
- Oldfield, Margery L. 1981. Tropical deforestation and genetic resources conservation. In: *Blowing in the wind: deforestation and long-range implications*. Studies in the Third World Societies. 14: 277-346.
- Peck, Robert B. 1982. Forest research activities and the importance of multi-strata production systems in the Amazon Basin (humid neo-tropics). In: Hecht, Susanna B., ed., Proceedings of a conference; *Amazonia: Agriculture and Land Use Research*. 16-18 April 1980; Cali Columbia. Cali, Colombia: Centro Internacional de Agricultura Tropical: 373-386.
- United States Department of State, Bureau of Public Affairs. 1984. *Ecuador: Background Notes*. Washington D.C.: United States Department of State, Bureau of Public Affairs.

# KIDMA

Israel Journal of Development

- Published in English (with French and Spanish resumés of principal articles) by the ISRAEL CHAPTER of the SOCIETY FOR INTERNATIONAL DEVELOPMENT (SID)
- Devoted to questions of social, economic and cultural development with special (but not exclusive) reference to Israel
- Features articles, bookreviews, news-briefs, editorials, letters, and a calendar of relevant training courses and conferences, symposia, etc., in Israel

#### SUBSCRIPTION

4 consecutive issues:

\$12 (seamail); \$18 (airmail).

Single copy:

\$3.50 (seamail); \$5 (airmail)

For further information or to subscribe please write to:

Editor  
KIDMA

Israel Journal of Development  
P.O.B. 13130 JERUSALEM 91131 ISRAEL



## Wry Toasts\*

Here's to marking occasions  
with a few well-chosen words

### Ann Banks

I TRIED EVERY WAY I could think of to get out of it. I urged my sister to consider whether she wanted to risk being humiliated in front of her friends. I whined that it was unfair—she taught public speaking for a living, whereas I made a career of hiding behind a typewriter. I offered what I thought was a reasonable substitute: I would instead recite that wonderfully droll love poem, *The Owl and the Pussycat*. But finally it became clear that there was no escape, at least no escape with honor. If I was ever going to hold my head up in the family again, I would have to make a toast at my sister's wedding.

Actually, I'd had a dreadful sense of inevitability about it all along. Maybe it wasn't the very first thing that crossed my mind when Jane announced her wedding plans, but shortly thereafter I voiced the narcissist's lament: How could you do this to me? My sister was implacable. No, she would not elope in order to spare me stage fright. Yes, if I drank enough champagne at the wedding party, I could do any fool thing I wanted, including a rendition of *The Owl and the Pussycat*. But that would not exempt me from making a toast.

Eventually, I got the picture: After years of facing down college students whose grandmothers had conveniently become gravely ill, my sister was no sucker for a lame excuse. She understood the problem, of course.

\* Reprinted by permission from *Savvy Magazine* (July 1987)

At my wedding, she'd climbed on a chair in a room full of 150 people, most of them strangers to her, and given a warm, funny, likable toast. She'd done me proud, and I wanted to reciprocate. But I didn't have to sit through

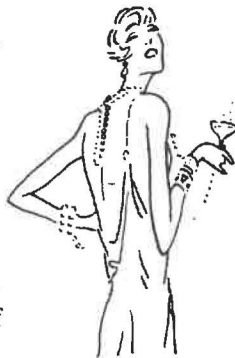
Jane's class on ceremonial speaking to know something important about giving a formal toast: Good intentions are not enough. I not only had to do the right thing, I had to do it right. No weak jokes; no quavery voice; no canned phrases or Hallmark sentiments.



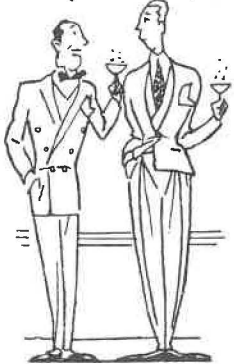
I felt I'd have to shine, not only for my sister's sake, but also on behalf of my entire gender. Thinking back over the weddings I'd attended in the last half-dozen years, it occurred to me that proposing toasts was one area where

modern liberated women have not exactly assumed their share of traditional male chores. The same women who'd never dream of automatically assuming that their male dinner partners would pick up the check often remained demurely seated at rehearsal dinners and other toast-making occasions. In fact, there seemed to be a certain shirking of responsibility that was politically incorrect, not to mention being bad form. As a goad, Jane sent me an article she had clipped from a magazine for gentlemen, titled "The Manly Art of Toasting." The author had introduced his subject with the words, "Sooner or later, all men will have to propose a toast. Women can dodge the obligation without losing points . . ."

At weddings, I'd seen some women dodge the obligation and then hate themselves in the morning. I'd seen other women attempt to rise to the occasion with spur-of-the-moment remarks that, however well-meaning, did

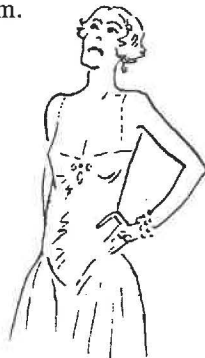


nothing to expand the frontiers of sexual equality. Actually, I was among their number. I had once performed an emergency wedding toast under battlefield conditions. At the wedding reception, both the groom's brother and the groom's partner had clinked glasses and offered formal, that is, prepared, toasts. Although both of these witty and otherwise charming men had known the bride for nearly a decade, they somehow managed virtually to ignore her in their remarks. The partner dwelt on his long and satisfying business relationship with the groom—their rare harmony, their good times—to the point where it seemed a pity that the two of them weren't the ones getting hitched. As for the brother, he used the occasion to reminisce about his own and the groom's respective childhoods, carefully placing them in the context of their parents' marriage. He bolstered this historical and biographical angle by reading selected excerpts from the early correspondence between the mother and father of the groom.



One didn't have to be a close personal friend of the bride to notice the puffs of steam coming from her ears. Not one to overlook a slight, she was quick to notice that the relationships receiving tributes at her wedding party were ones that entirely excluded her. There was nothing else to do once the exercises in male bonding had wound to a close but to climb on a chair and say something, anything—as long as it mentioned the bride's name. Which is what I did, with great trepidation and after a certain amount of prodding by a covey of her friends at the back of the room. Beyond the terror of the moment, I recall nothing, and neither did the bride when I asked her about it recently. "It didn't matter what you said," she told me. "You could have fired a gun in the air and I would have been just as happy."

I couldn't count that experience as practice for my sister's wedding, but it did confirm my fear that toasting is an unusually perilous activity; that a person standing up in front of a roomful of people delivering a toast has more reason to worry than someone who's in front of a roomful of people competing in a spelling bee. At my friend's wedding, both the groom's partner and his brother made a common mistake: They failed to discuss their remarks in advance with a qualified psychotherapist. They quite literally didn't know what they were saying, whereas the rest of us in the room knew exactly what they were saying, implications and all. The underlying wail of abandonment was all too clear.



No wonder women traditionally have been reluctant to

get into the toasting business. Who wants to have their well-meaning remarks searched for hidden meanings? Wedding toasts lend themselves perfectly to the currently fashionable exercise in literary criticism known as deconstruction. This voguish theory holds that words may mean both what the speaker intends and something more, often opposite to what was consciously meant. In contemplating the toast I would give at my sister's wedding, it seemed that stage fright was the least of my concerns. Could I instruct my subconscious to stay home from the party? If I said something that was memorable, I wanted it to be for the right reasons. A gentle barb or two was permissible, and even expected, but any hint of unchecked sibling rivalry would be certain to be remarked upon for years to come.

Jane herself put it most succinctly: "Tempting though it may be, wedding toasts are not the time to tell funny stories about the time the bride wet her pants in fourth grade."

So I didn't. If audience reaction is any gauge, the toast I proposed to my sister and her new husband was warm, funny and likable (as hers had been at my wedding, but who's counting?). All it took was weeks of preparation time—first polishing my words and then practicing my delivery. But the hard work paid off. Jane said if I'd delivered it in her public-speaking class, she would certainly have given me an A.



*Ann Banks is a freelance writer who lives in New York City.*

# AGROFORESTRY IN PARAGUAY

## Getting a System Adopted Takes Skill and Planning, While Supporting It Afterwards Requires Continuous Agency Interaction or a Simpler Support Network

Patrick T. Evans

### Attributes of Innovations

**T**HERE ARE MANY TRADITIONAL land use systems which could be classified as agroforestry. Traditional systems range from simple forest grazing practices to intensive multi-cropping systems such as the Chaga Home Gardens on the slopes of Mt. Kilimanjaro (Fernandes 1984). Many development agencies and local governments are now emphasizing refinement of traditional systems and the development of new, more productive systems which are ecologically sound, i.e., sustainable, and are attractive to the local populations. Adoption of these new systems is the key. The best thought-out and designed agroforestry system is useless if the intended users are not willing to accept it.

Adoption of innovations has been the subject of extensive research over the past 30 years. A widely used theoretical framework is that proposed by E.M. Rogers in his *Diffusion of Innovation Theory* (1983). This theory summarizes much of the past and current literature on the diffusion of innovations. Rogers, and most other authors on diffusion theory, take the 'adoption perspective'—focusing on the process by which adoption occurs or the demand aspect of diffusion. According to Rogers, there are three sequential stages in the adoption process:

- Invention. The process by which new ideas are created or developed.
- Diffusion. The process by which these ideas are communicated to the members of a given social system, and
- Consequences. The changes that occur within the social system as a result of the adoption or rejection of the innovation.

An innovation, which an individual or agency wishes to communicate, must be suitable for the target population if adoption is to be feasible. The innovation should have attributes which are compatible with the needs of the potential adopters (Thio 1971). The communication system should be a two-way system, soliciting input from the potential adopters which is used to modify or change the innovation to better meet their needs. "What are the advantages, disadvantages, and consequences?" are questions typically asked.

Some authors suggest that rural populations in less developed countries are opposed to new innovations because they are bound by tradition and resistant to change. Roling et al. (1976) found in their studies on the diffusion of innovations that rural populations are not bound by tradition but rather are restricted by lack of opportunity and economics. Research shows that even poor, illiterate rural populations are responsive to economics. Katz et al. (1963) stated that the lower the initial capital outlay—the greater the anticipated profitability and the lower the risk of possible loss—the greater the rate of adoption for a given innovation. This is consistent with data generated from the introduction of new techniques for maize production in the widely reported Pueblo Project in Mexico. In a 1974 analysis of that project, it was reported that the rural farmers were fundamentally 'risk avoiders' and the adoption of new techniques was wholly dependent on the degree of risk involved (Biggs 1974). The degree of risk involved as compared to the probability of economic return is fundamental in the acceptance or rejection of a new innovation for both developed and

less developed countries.

### Paraguay as a Test Case

Guayaybi is a small town with 800 inhabitants located in northeastern Paraguay. The term 'region' refers to the area and towns within a 50 kilometer radius of Guayaybi. A newly paved road links Guayaybi with the capital city of Asuncion, 240 kilometers to the southwest.

Located within the Paraguay River watershed, the topography of the region is gently rolling with an average elevation ranging between 200 and 250 meters. The climate is humid temperate to sub-tropical with a well-distributed average annual rainfall of roughly 1,500 mm. The mean annual temperature for the area is 24° C with hot, humid summers and cool winters. Some years are frost-free while others experience several light freezes, the average being two frosts a year.

Soils in the area are sandy, red-yellow podzols derived from Triassic and upper Permian red sandstones. Most of the soils are acidic sandy loams with a variable clay fraction and pH in the range of 4.2 to 6.5. Soils used for agriculture are more acidic, have a lower percent of organic matter content, and are more extensively leached than corresponding soils under forest cover. Bedrock depth ranges from 15 to 25 meters.

A tall, humid, semi-deciduous forest forms the climax vegetation of the Guayaybi region. Scattered emergent trees such as lapacho (*Tabebuia ipe*), yvyra-pyta (*Peltophorum dubium*) and kurupaykuru (*Anadenanthera macrocarpa*) rise above a layer of co-dominant species characterized by guatambu (*Balfourodendron riedelianum*), laurel (*Ocotea* sp.) and yvyra-pepe (*Holocalyx balansae*). The understory is dense and woody.

Twenty-five percent of the Guayaybi area is covered with natural forests; the rest has been cleared for agriculture. In the 1960s, selective cuts were made removing only the most valuable species, such as lapacho, peterevy (*Cordia trichotoma*), yvyra-ro (*Pterogyne nintens*) and cedro (*Cedrela tubiflora*). The remaining forest contains species with little or no market value. For this reason, the cutover forest is not highly valued and there are few wood-based industries in the area.

### Land Use/Economy

Paraguay is primarily a rural country with approximately 75 percent of its population employed in the agricultural sector. The majority of these people are considered small farmers with land holdings of 20 hectares or less. They practice subsistence farming often including a cash crop to meet their needs for cash as well as agricultural and animal products.

Farmers in Paraguay have traditionally practiced shifting cultivation where they slash and burn a portion of the forest to expose 'virgin' soil. These clearings are cul-

tivated for four or more years until the soil fertility is depleted. The clearings are then abandoned and the farmers move on to clear more forest. The abandoned clearings are left to revegetate naturally and after 10 to 20 years again regain sufficient fertility to support agriculture.

The Guayaybi region was permanently settled by farmers of mixed Spanish-Guarani descent within the past 30 years. They moved here from older, less fertile, and more crowded regions of the country under a national settlement plan. Farmers are clearing their average 10-20 hectares of land at a rate of 0.5 to 1 hectare per farm family per year (Evans and Rombold 1984) to plant cotton and tobacco. The soil is worked using oxen or by hand; there is no mechanized farming in this region. These nutrient demanding crops grow well for two to four years until the soil fertility declines. Then maize (*Zea mays*), peanuts (*Arachis hypogea*), beans (*Phaseolus vulgaris*) or bananas (*Musa* sp.) are planted, primarily for home consumption. As the soil fertility continues to decline, cassava (*Manihot* sp.) is planted and serves as the staple crop. Fertilizers are expensive or not readily available and, as a rule, are not used by small farmers. Older, nutrient-depleted soils are left as pasture for the few cattle that each family owns. The family's pigs and chickens are sometimes fed table scraps and maize but are generally allowed to fend for themselves. The cattle, grazing on abandoned farm lands, gain weight slowly on forages high in roughage, low in protein and insufficient in quantity. Milk yields are low. Chickens yield small amounts of meat and eggs. The cattle and pigs are both



Maize with 14-month-old *Melia azedarach* and an Ortiz daughter.





**Local farmers, who later took seed and information**

sold during difficult times or for emergency cash.

In 1977, an FAO consultant estimated that in 1945, eastern Paraguay had 68,000 square kilometers of forested land. By 1975, that figure had been reduced to 42,000 square kilometers, a 39 percent reduction in 30 years. The primary cause of land clearing is for agriculture. Usually, the forest is selectively cut (sometimes only six to eight trees per hectare) by government contractors or others who gain the rights to harvest an area. Small farmers enter on the logging roads. With increasing population pressure and dwindling forest areas, farmers are abandoning the traditional shifting cultivation and remaining more or less permanently settled. This results in shortened fallow periods, loss of soil fertility, and decreased crop yields. The current farming practices do not appear to be ecologically sustainable. More and more farmers are abandoning their non productive farms and seeking hard-to-find employment in the capital city of Asuncion.

### **Forestry Extension Program**

A study by the FAO in 1969 helped to bring the accelerating rate of deforestation and subsequent loss of top soil and soil fertility to the government's attention (Wadsworth 1969). In 1973, the Paraguayan government created a national forest service to address these problems through a national reforestation program. The new forest service developed a 10-year reforestation plan in 1975 with the goal of planting 90,000 hectares (Leyton 1976). The program never approached its stated goals due to a lack of funding and institutional support. The area reforested over the first five years of the program was es-

timated at roughly 5,000 hectares or less than 25% of the stated goal (Earhart 1981). Funding was cut and the program was virtually abandoned after the fifth year.

In 1980, the Paraguayan Forest Service asked the U.S. Peace Corps for assistance. An agreement establishing a forestry extension program was drawn up between the forest service, the Paraguayan Agricultural Extension Service, the Swiss Technical Mission, and the U.S. Peace Corps. The objective was to establish 20 small nurseries located throughout eastern Paraguay, to meet the needs of local communities. All four agencies helped in the selection of sites to serve as the 'nuclei' for initiation of extension programs. For each site, the Agricultural Extension Service provided land for the nursery where possible, and the forest service supplied Swiss-trained Paraguayan forestry technicians. These resources were augmented by a Peace Corps forestry volunteer to help establish the nursery and forestry extension nucleus. Because appropriate scientific data on forestry practices and extension guidelines were virtually nonexistent, the first task was to develop forestry innovations which would be adopted by the local people.

### **Problem/Needs Identification**

The Government of Paraguay selected the Guayaybi area as a site of the Forestry Extension Program because of decreasing supplies of wood products, potential fuelwood shortages, and loss of soil fertility. Guidelines were vague. They called for establishment of a forest tree nursery, experimentation with local and introduced tree species, and reforestation efforts with local farmers.

Farmers of this region rarely planted trees and tended to view the forest as an obstacle to farming. A Peace Corps volunteer and a Paraguayan forestry technician (henceforth called the 'extension team') were assigned the task of developing forestry innovations adoptable by local farmers. The extension team was to establish rapport with local farmers, develop an agroforestry innovation, and motivate farmers to adopt the system.

The extension team's first step was to gain the trust of the community members by living in the community and participating in local cultural events. A tree nursery was established after consulting the farmers and their wives as to the types of wood most favored for posts, poles, construction materials, and fuelwood. Local farmers were asked to identify their needs or problems. Decreasing crop yields and increasing distances to walk to collect fuelwood were stated problems. The farmers' main concern, however, was cash income.

### **Innovation Development**

The extension team hoped to design a forestry system or innovation that would be consistent with W. Firey's (1960) theory on resource systems—a sustainable resource system that is ecologically possible, ethnologically adoptable, and economically beneficial to those involved.

The extension team believed that if they could find an ecologically sustainable system that was economically advantageous to farmers it would be ethnologically adoptable.

The first year of the program involved experiments with both native and exotic tree species in a variety of forestry systems to identify those species and systems most favored by the farmers. Of the seven participating farmers, three would be classified as 'innovators' or risk takers, while the others were simply friends of the extension team who agreed to participate in the program. Direct reforestation on very nutrient deficient soils was attempted on three farms utilizing a variety of native and exotic tree seedlings to gather information on growth and survival. Two farmers who still had six hectares of forested land agreed to manage the natural forest in order to keep it intact. Two agroforestry systems were tried on other farms. Tree seeds were sowed between planted crops on one, and two tree species interplanted among the farmer's crops on the other.

Data was gathered from each of these projects on tree species' survival, growth and the farmers' attitudes. It was discovered that when trees are planted apart from the crops, the farmers do not have enough time—or motivation—to tend their crops in one field and do the periodic weeding around the young trees in another. The forest management project proved to be too labor intensive, and the potential for economic return was questionable. The forest management system was complex (site preparation on abandoned farm land and control of grazing) and the relative advantage appeared low compared with clearing the land for agriculture. The farmers lost interest.

Direct sowing of tree seeds between crops also proved



too complex for the farmers. The seeds required treatment before sowing and it was easy to sow the seeds too deep. Newly germinated trees looked like weeds and were difficult to identify during weeding. Germination and survival were not uniform and the system required transplanting to fill the gaps. These projects were considered failures by the extension team.

The agroforestry system, where two tree species were interplanted with a farmer's crops was different. In this 0.5 hectare plantation, the trees survived well and grew rapidly reaching average heights of two meters within six months (Evans and Rombold 1984).

The key to the success of the agroforestry plantation as an innovation was that the farmer believed in its potential for economic return. The trees survived well and grew rapidly as they were interplanted among crops, on plowed soil, and cared for as the farmer tended the crops. The system required little additional labor on the farmer's part. In addition, one of the tree species (*Melia azedarach* var. *Gigante*) was an introduced Asian species that had been genetically selected by a group of Germans in northern Argentina for fast growth and good form (Cozzo 1959). This one species became the extension team's main selling point upon which to promote agroforestry as an innovation. The farmers were primarily interested in income and an analysis of the domestic and international timber markets indicated this species should provide an economic return on rotations as short as 12 years (Rey 1976). The other interplanted tree species was *Leucaena leucocephala*, a leguminous nitrogen-fixing tree which would enhance the soil fertility while serving as a source of fuelwood, posts, poles, and fodder.

The objective of this agroforestry system was sustained multiple production from a given unit of land. The two tree species were interplanted in rows at a spacing of 2.5 meters between trees in a row and 4 meters between rows (see Evans and Rombold 1984). Crops such as maize, beans, or peanuts were cultivated annually or bi-annually between the row of trees. As the trees grow, periodic thinnings reduce the shading effect, and crop cultivation continues between the trees. As the trees mature, either bananas are introduced between them or animals are permitted to graze the understory. *Melia azedarach* is managed for sale as sawlogs at the age of 12 to 15 years. The leguminous tree component is harvested on an "as needed" basis for fuelwood, fodder, posts, and poles.

### Adoption

During the second year of the forestry extension program, this one agroforestry plantation was used as the extension team's *model* innovation. Local farmers visited the agroforestry plantation, providing *observability*. The extension team gave informal presentations before groups of farmers as they stood among the trees in the planta-

tion. The *relative advantage* of agroforestry was presented as a cost/benefit analysis comparing present farming practices with agroforestry. The potential for economic gain from agroforestry was highlighted and the return on labor and capital stressed. The *compatibility* of agroforestry with existing farming practices impressed the farmers. They could continue to cultivate their land while producing trees which would supply them with wood products for home use and sale. *Complexity* presented no problem as the system was understandable and similar to existing farming systems. Guidelines for subsequent management such as prunings, thinnings, and harvesting were presented and understood by the farmers. *Trailability* was encouraged as the extension team hoped to reach as many farmers as possible with their limited supply of trees. The tree nursery was producing only 20,000 trees per year. Farmers were encouraged to plant only 0.25 hectare the first year and expand the planted area in subsequent years if they so desired. This presented minimal risk to farmers with small holdings of arable land. Still the *observability* was the key selling point as the farmers, while walking among the trees, could readily observe the rapid growth rates and the compatibility of the trees with interplanted crops.

### Definitions

#### Characteristics of Innovations Which Influence Rate of Adoption (Rogers 1983)

1. **Relative Advantage.** The degree to which an innovation is perceived as better than the idea it supercedes. The new idea needs to provide gain in economics, social prestige, convenience, and satisfaction.
2. **Compatibility.** The degree to which an innovation is perceived as being consistent with past experiences, existing values, and potential needs. It may require the adoption of a new value system prior to the adoption of an incompatible innovation.
3. **Complexity.** The degree to which an innovation is perceived as difficult to understand and use. The simpler an idea, usually the more easily adopted.
4. **Trailability.** The degree to which an innovation may be experimented with on a limited basis. Innovations tried on the installment plan are more quickly adopted.
5. **Observability.** The degree to which the results of an innovation are visible to others. The easier the results are to see, the more likely is adoption.

Most who visited the plantation decided to adopt the innovation. They were impressed with the survival and growth of the trees and believed in the potential economic gain they could provide. The demand for seedlings the second year of the project far exceeded the available supply of 20,000 seedlings. Trees cost the farmers 10 Guaranis each (six cents). *Melia azedarach* was in big demand for its economic potential, but the extension team re-

quired that each plantation be established with a leguminous tree component with the aim of multiple production of products and soil enrichment through nitrogen-fixation. In addition to the *Leucaena* sp., the extension team promoted the use of native leguminous trees in combination with the *Melia*, such as *Enterolobium contortisiliquum*, *Pterogyne nitens*, and *Peltophorum dubium* (although the nitrogen-fixing potential of these species was unknown). Twenty-five new plantations were established before the seedling supply was exhausted and the extension team finished the second season with a waiting list of 30 farmers desiring seedlings.

In accordance with Firey's theory, the three optimum conditions of a sustainable natural resource system had been met. The system appeared to be *ecologically possible* for the farmers as they were able to see interplanted trees and the crops growing well on a given piece of land. The system was *ethnologically adoptable* or culturally acceptable as it was consistent with the general farming systems that were in use. Interplanting of trees among their crops required minimal labor input and met their needs for fuelwood and other wood products. The potential for *economic gain* from the sale of wood products is what most interested the farmers and motivated them to adopt this new innovation.

### Agencies Need Support Until Farmers Can Take Over

The establishment of a forestry extension program requires adoptable innovations backed with a supportive infrastructure. This case study illustrates a viable forestry innovation that is being readily adopted by the local farmers. The farmers, communicating among themselves, are spreading the innovation, i.e., the demand for agroforestry plantations with *Melia*. The Peace Corps recognized the value of the new innovation and established three additional tree nurseries in the area in 1983-84. The nurseries were all small, producing 10,000 to 20,000 trees per year. By the end of 1986, 125 farmers had a total of 55 hectares devoted to agroforestry plantations (Starr 1986). The numbers would be substantially higher if additional nurseries had existed to supply the demand.

The agencies involved viewed the agroforestry plantations in this region as productive and sustainable. The original plan called for the training of Paraguayan forestry technicians by the Swiss Technical Mission to be employed by the National Forest Service and assigned to work as counterparts to forestry Peace Corps volunteers. The volunteers were to further train the technicians and assist in establishing nurseries and developing forestry extension programs. Eventually, Peace Corps personnel would depart and each site would be managed by the forest service. In late 1983, however, the Swiss Technical Mission director changed and the mission lost interest in the program. The National Forest Service, which was to

have taken control of the extension program also withdrew support due to the lack of funds and the improbability of the extension program generating revenue for the forest service. The Peace Corps still supports the program but their support too is diminishing due to the lack of interest from the forest service. Only the farmers remain truly interested and supportive of the program (Starr 1986). The earliest agroforestry plantations are now producing seed and some farmers are starting their own small nurseries to expand the plantations on their land. An adoptable, apparently sustainable, land use system has been introduced. The real goal of forestry extensionists is to make themselves redundant: When the project is successful, people can carry on the forestry activities themselves; the foresters are no longer needed (Cernea 1985). The innovation is now in the hands of the people and there is hope that, due to its economic potential, it will spread and reach more and more of the small farmers who may benefit from its adoption.

### Areas of Concern in Designing Agroforestry Innovations

#### *Client and Institutional Success Criteria*

Clearly defined and realistic goals are important to the design process:

- Expressed needs/goals of clients
- Donor/governmental concerns
- Rate of adoption
- Sustainability of programs with or without assistance
- Economic and cultural impacts

#### *Characteristics of Target Population and Environment*

What are the cultural constraints, education, financial status, markets, as well as the nature of soils, climate, existing crop systems?

#### *Nature of the Innovation*

Is the innovation appropriate and adaptable to the needs of the target population? How complex is it in physical, biological, or other terms? What risk is created for the farmer, the lending institution, the extension agency and others? Can the innovation be readily demonstrated and tried on a limited basis?

#### *Diffusion*

The process of selling an idea is complex and normally requires various communication and motivational steps. Institutions may be required to provide technical direction and to minimize risk for those involved. Participation of the target population in planning the program is often a key factor in successful innovation development and diffusion.

### Conclusion: Refine the Model to Minimize the Role of Government Agencies

The forestry extension team, working directly with the farmers, was successful in designing an adoptable agroforestry innovation in Paraguay. The innovation was ecologically adapted to the region and appeared to have good potential for economic gain. It was readily adopted by the farmer who perceived it to have a relative economic advantage over their traditional land use systems. The agroforestry system was compatible with their agricultural practice and helped to meet their needs for wood products and fodder. The new system was simple to understand and easy to try on a limited basis so as to minimize risk. Also, the tree species used were fast growing which impressed the farmers and made the plantations highly visible to others. This *observability* of functioning agroforestry systems plus the belief in the potential for economic gain were the key factors in the rapid adoption of agroforestry as a new land use system in the Guayaybi Region of eastern Paraguay.

To promote the widespread adoption of successful innovations, a good institutional and organizational structure is required. This does not always exist in less developed countries. In the Paraguayan case study, an adoptable agroforestry innovation was developed and introduced, but the infrastructure to sustain it is failing due to a variety of reasons unrelated to the innovation itself. To avoid this problem, designers of agroforestry systems should strive to develop adoptable systems which are self-supporting and minimize the need for a continuing support system. This can be achieved by promoting economically gainful systems and then instilling in the target population the necessary skills and knowledge for establishing development of the system. In other words, successful designers of agroforestry systems will work themselves out of a job in any given region.

Patrick Evans is Assistant Professional Officer in Agroforestry with FAO in Nepal. With degrees in forest science and agroforestry, Evans has worked with the Peace Corps in Paraguay and India.



# WOMEN AND AGROFORESTRY: FOUR MYTHS AND THREE CASE STUDIES\*

Louise Fortmann and Dianne Rocheleau

OVER A DECADE AGO Boserup<sup>10</sup> documented the role of women in development. Nonetheless, many development projects continue to be designed without consideration of their effect on women or of the role of women in their implementation. Forestry and agroforestry projects are no exception. A study of 43 World Bank forestry projects found that only eight made specific reference to women.<sup>47</sup>

In part, this state of affairs is due to the masculine images conjured up by the word forestry. The reality is, in fact, often the opposite of the image. This article reviews the literature on women's involvement in agroforestry and presents three case studies on the results of including or excluding women from agroforestry projects.

## Myths and Realities

Women have traditionally played important roles in agricultural production and in the use and management of trees. The importance of these roles is, however, often obscured by the prevailing myths held both by donors and by the local personnel in ministries about the roles and status of women:

Myth 1: Women are housewives and are not heavily involved in agricultural production

Myth 2: Women are not significantly involved in tree production and use

Myth 3: Every woman has a husband or is part of a male-headed household

Myth 4: Women are not influential or active in public affairs.

These are the myths.

## Agricultural production is a traditional role of women: Reality 1

Women are not just housewives. In many, if not most, societies they are, in fact, farmers often bearing the major or sole responsibility for food production.

Region by region, country by country, ethnic group by ethnic group, detailed studies have documented Boserup's point that women's labor and women's decision-making are crucial to agricultural production and development.

A study of 95 developing countries found that women comprised from 17.5% (in Central and South America) to 46.2% (Sub-Saharan Africa) of the total agricultural labor force in 1970.<sup>18</sup> If only food production were to be considered, these figures could be expected to be far higher. The predominant role of women in both plow and hoe agriculture has been demonstrated for sub-Saharan Africa.<sup>11</sup> The involvement of women, particularly poor women, in agricultural production in India has been reported.<sup>49</sup> Women have been demonstrated to play a major role in agricultural work and agricultural decision making in Nepal.<sup>1,7,40,42,43</sup> Mazumdar<sup>36</sup> states that in Asia "rural women constitute the single largest group engaged in agriculture and the production of food".

\*Reprinted with permission from the journal of *Agroforestry Systems*, 2:253-272, 1985.

Colfer<sup>15</sup> documents the central role of women in swidden agriculture in East Kalimantan. Women in Latin America have been shown to be actively involved in agricultural production.<sup>3,16</sup> Women are frequently responsible for small stock husbandry and for the feeding of larger livestock, particularly milk cows and calves. Thus, agroforestry projects which involve fodder trees, the servicing of crops by trees, or intercropping of crops and trees, must include women, since it is often women who grow the crops or care for the livestock which will be involved.

#### The gathering and use of forest products is a traditional role for women: Reality 2

A second myth is that only men are users of and responsible for trees. In fact, women are often the prime users of forestry products such as fuelwood, wild foods, and fodder. Wood et al.<sup>58</sup> noted that women "are primarily responsible for wood collection and utilization and often the initial establishment and tending of the wood stock around the village". Bennett<sup>7</sup> found in Nepal that 78% of the fuel collection was done by women and 84% by women and girls combined. The 1980 report of the Expert Group of Women and Forest Industries of UNESCAP noted that as much as two-thirds of the time spent collecting fuelwood was that of women. In the Sahel it is women who collect fuelwood.<sup>33</sup>

Women may make different uses of forest products than men do. Hoskins<sup>3</sup> contrasts the interest of men and women in forest resources. Men are more likely to be interested in forest products for commercial sale and in the use of products farther from home. Women collect fuelwood and both human and animal food from forests and individual trees. They are knowledgeable about the burning characteristics of various species and about species which have food values. Both men and women make medicine from forest products but for different purposes. Women also use forest products for such purposes as basket making and dyeing. It might be expected that women would have a more detailed knowledge of trees and their uses. And indeed, Hoskins<sup>28</sup> found in Sierra Leone that women could list 31 products which were harvested or produced in nearby bushes and trees while men could list only eight. Similarly, the priorities of men and women in species preference for Indian afforestation programs often conflict.<sup>48</sup>

Women's close involvement with forest products and agricultural production often results in their having a greater awareness of environmental problems than men. For example, the implementers of a soil and water conservation project in Mali discovered that local women had already undertaken conservation efforts which would have been destroyed by the project.<sup>29</sup>

Wiff<sup>57</sup> describes a reforestation and soil conservation project in which women were deliberately denied access to credit and technical support. Nevertheless, in those

places where they could work without credit, it was the women who led the conservation movement.

Thus, the presumption that it is only men who are involved in forestry is often totally wrong. In the case of fuelwood and minor forest products it is often *only* women who are involved. It is women who know what is needed for these uses. It is women who know which trees are suitable and which are not. And it is women who will use the final product.

#### Women as heads of households are assuming non-traditional roles in agriculture and forestry: Reality 3

Increasing numbers of women head their own household, sometimes by choice, sometimes as a result of personal events such as death of a spouse, divorce, desertion, abandonment, or of social trends such as male out-migration.

The woman-headed household is an increasingly common social unit found in substantial numbers in every region of the world. It has been estimated that between 25 and 33% of all households in the *world* (emphasis in the original) are de facto headed by women.<sup>12</sup> In a study of 73 developing countries, the lowest percentage of women-headed households was 10.1% in Kuwait. The highest was Panama with 40%. Thirty-seven percent of the countries had 10-14% women-headed households; 43% had 15-19%; 23% had 20 to 24%; and 7% of the countries had over 25% women-headed households.<sup>12</sup>

As a result of heading their households, women have assumed new roles. An historical process of women undertaking 'male' tasks and working in 'male' sectors in the absence of men has been reported for a number of societies.<sup>4,14,34</sup> The lesson for agroforestry projects is that 'male' roles and 'male' sector jobs are not fixed but are increasingly being undertaken by women household heads as well as by other women.

#### Women and women's groups are important in community organization and mobilization: Reality 4

March and Taqu<sup>35</sup> have documented the important influence of women's informal associations in both the private and public sphere. Within the domestic sphere women exercise influence on public events through their information links based on lineage ties and through their ability to withhold goods necessary for men's public participation.<sup>35</sup>

Women's solidarity groups may take a very active stance in defending their own interests. In the Nigerian 'Women's War' of 1929, women, incensed over the rumor that an on-going census meant that they were about to be taxed, refused to allow census enumerators to count them on their property. Women organized confrontations with the colonial administration which at times led to the use

of armed force on the part of the latter.<sup>35</sup>

Women gain leverage in the economic sphere through rotating work and credit associations.<sup>35</sup> They may also influence events through their roles as healers or religious figures.<sup>35</sup>

Women also participate in leadership roles in formal institutions. For example, in Botswana women are generally the mainstay of social welfare organizations and even hold positions of authority in 'male' organizations such as farmers committees.<sup>22</sup>

The influence of women is demonstrated by a project in Cameroon where a protective nursery fence was torn down by men fearing that the government was trying to seize their land by planting trees. The women who recognized the need for fuelwood persuaded the men to rebuild it.<sup>29</sup>

Women, then, both individually and in groups have private influence on public action by men and undertake public action themselves. The potential for women's public action in areas such as reforestation, soil and water conservation, and the like is especially high because they are the principal sufferers from environmental degradation.<sup>23</sup> It is they who must walk farther for water, fuelwood and fodder. It is they who must produce subsistence on increasingly degraded soils. It is they who often are both able and likely to organize the community for action.

### Three case studies

The following three case studies examine women's involvement in different aspects of agroforestry. The first is a study of women's involvement in the implementation and benefits of an agroforestry project. The second examines women's importance in mobilizing a community. The third looks at some of the techniques necessary to involve women in agroforestry projects.

#### Plan Sierra development project, Dominican Republic

Plan Sierra is an integrated rural development project with strong agroforestry and reforestation programs. During its first three years (1979-1981) Plan Sierra developed innovative approaches to agroforestry, soil conservation, and forestry training and extension. While women were consciously included in some aspects of these programs, nonetheless their interests in 'invisible' subsistence activities were overlooked. Securing women's participation and serving women's interests were sometimes confounded. Both the successes and the failures of Plan Sierra's early years exemplify many of the key issues for women in agroforestry development projects.

The Sierra is a rugged, relatively isolated region in the Central Mountains of the Dominican Republic. House-

hold income, health status, and educational levels of residents are well below national averages. The economy has suffered from boom-bust cycles in mining and lumbering. Out-migration has been high, particularly among men 20-40 years of age. The area has been largely deforested through commercial timber exploitation and the practice of shifting cultivation which continues on the forest fringes. Soil degradation and erosion are widespread and the region's hydrologic balance has been severely disrupted.<sup>46,5</sup>

Most agricultural production takes place within agroforestry systems based on mixtures of field crops, coffee, pasture, and forest. These are combined in simultaneous intercropping mixtures as well as in rotations over time. Most farm families manage such diverse holdings for both subsistence and commercial ends.

Coffee and cattle are the major commercial enterprises among large landowners, while smallholders sell coffee or annual crops for cash. Most smallholder households are also heavily dependent on off-farm employment. Subsistence and cash crops are intercropped. Pastures are usually studded with multipurpose palm trees. Local cottage industries include furniture making, food processing, and production of palm fiber containers for sale to the tobacco industry and for local use with pack animals.<sup>44</sup>

Women share with men the harvesting of annual crops and the coffee harvest (as owners and/or hired farmworkers). Women raise the small animals (hogs and chickens) for meat and egg production, they usually milk the cows (for home consumption) and they tend home gardens with vegetables, bananas, and herbs. Responsibility for fuelwood and water gathering falls mostly on the women with some help from the children.

Cheese, candy, and cassava processing are almost entirely women's enterprises. Palm fiber containers are produced and sold by women with help from children and elderly family members. Women artisans also weave the seats and backs onto locally manufactured wooden chair frames. The weaving is subcontracted as piecemeal work from men's woodworking shops.

Plan Sierra was an integrated rural development project designed to serve a 2,500km<sup>2</sup> area within the Sierra. It included strong agricultural, reforestation, and soil conservation components from the outset. Agroforestry initiatives emphasized coffee systems. Farmers (mostly small-holders) received subsidized credit and intensive training courses to facilitate establishment of multipurpose shaded coffee stands. Credit and technical assistance were also provided for the establishment or improvement of fruit orchards, often intercropped with annual food crops.<sup>46</sup> Aside from coffee and fruit, tree planting on small farms was not treated separately from reforestation of large scale state and private holdings. Reforestation efforts focused on indigenous and exotic pine trees for watershed management or timber. Most small farmers were

unwilling to plant these trees on their own property because, in the Sierra, the prohibition against cutting trees (regardless of land title) has been most strongly enforced in the case of pines and other timber species.

Support services for agroforestry and reforestation included soil conservation, nursery development, employee training and community education programs. Hundreds of local men were hired to construct nurseries and to engage in soil conservation/forestry training, extension, and construction activities throughout the 2,500 km<sup>2</sup> project area. Agroforestry and reforestation were promoted through teacher training courses in local ecology, reforestation, and sustainable production systems. The teachers were later enlisted as participants/promoters in community tree-planting campaigns.

As in many similar projects in Latin America<sup>57</sup> local women's participation in Plan Sierra was initially limited to health services/home hygiene/home economics.<sup>45</sup> Women professionals were concentrated primarily in Health, Education, and Rural Organization units (M. Fernandez, personal communication).

The maturation of Plan Sierra programs and their respective inclusion/exclusion of women provides some insight into issues that need to be addressed in future agroforestry/development projects in Latin America. The key concerns include access to employment, training, credit, land, and appropriate technical assistance.

### *Women are actively sought as volunteer laborers and promoters for community reforestation.*

Local women were initially hired as home economists, secretaries, cooks, and cleaners. Eventually some of the nurseries hired women to water seedlings and to fill polyethylene bags with potting soil. Male nursery supervisors considered women to be more efficient and patient at this tedious task. Some women who originally took this non-traditional work with reservations later acquired an active interest in plant propagation techniques. Plan Sierra administrators and some technical staff encouraged this trend. They trained a group of para-technical women horticulturists who became known as the 'budders and grafters.' The job attained a high status and was accepted as a women's task, setting a precedent for inclusion of more women in technical nursery work. As in many other similar projects, sexual harassment by a few co-workers and managers made work difficult for some women employees, but administrators eventually ousted the offenders. Women began to specifically request assignment to the nurseries and a few expressed interest in conducting forestry or soil conservation field work with visiting women researchers. Some of the 'budders and grafters' talked of investing part of their earnings in land and/or small citrus groves, an option they would not have considered previously.

Women are actively sought as volunteer laborers and

promoters for community reforestation. They also become involved in technical training and project implementation through the teacher's training courses. About half the teachers in the Sierra were women and all teachers attended the same training sessions regardless of individual specialization or prior training. But it was the project, not the women themselves, who benefited from these activities. This was not by design but by default. Since they were not consulted in project design, their concerns and needs were not adequately addressed in the technical programs. During a mid-project evaluation of women's needs, women requested, among other things, assistance with home gardens and cottage industries (weaving and food processing), all within the domain of agroforestry.<sup>13,44,45</sup>

Some women who produced woven containers complained of lack of access and/or swindling, insecure supplies of palm fiber (E. Georges, personal communication). The palms (*Sabal umberculifera* Martius and others) are also important sources of wood, food, and animal feed, and they are often located in pastures or fallow land owned by neighbors or relatives. The women have free access (an apparent advantage) but no guarantee of future access and no control over cutting and replacement. The palm frond supply is both free and unreliable. Supplies in some instances were threatened by the felling of palms for cheap construction material.

Many local men decided to use the trees for construction or cash income after their hog-feed value was undermined by a swine fever epidemic and a subsequent embargo on hog raising.

The management and improvement of this disrupted multiple use agroforestry system were not integrated into either the pasture management or rural industry programs. The marketing of the finished products was addressed by Plan Sierra (Marketing and Rural Industry Unit), nearly doubling the farm gate price of containers. Neglect of the technical and management aspects of this enterprise may have been conditioned, in part, by the low cash income (and low priority) relative to such enterprises as coffee. The importance of this cottage industry to rural women lies in the fact that it requires neither land nor capital and work can be performed by women, children, and the elderly.

The fuelwood shortage also hit hardest in small holdings. Some women had closed down their cassava bread processing operations due to lack of fuelwood nearby and the high cost of purchased fuelwood. Others commented on the increasing time and effort (and trespass) necessary to secure the same quantity of fuel for home use.

Gathering, selection, consumption, and the potential for subsistence production of fuelwood in rural farms or



towns were not directly addressed in any of the programs. Research on commercial charcoal production in dry forests had been conducted in the region, but these studies were not utilized during this period.<sup>31,37</sup> Some trials of exotic species including fuelwood species were initiated in 1981 (V. Montero, unpublished) but no experiments or farm trials were conducted with proven indigenous fuelwood trees.

The fuelwood problem was not initially recognized as a high priority issue. When the issue did arise there was a lack of training and experience among technical staff in the choice, propagation, management, and promotion of fuelwood species, particularly for planting on farms. Nor were there any women foresters (or agroforesters) available within the country. As such, a major opportunity to involve and serve local women in agroforestry and reforestation was lost.

Women were more likely to benefit directly from the technical assistance if their cash income or food sources coincided with those most often managed by men. For example, those who had (or wished to establish) coffee holdings (as heads-of-households or as spouses of owners/managers) were invited to attend training courses for improved agroforestry systems based on coffee. Women were consciously included although they were not considered to be the main clients of this training/extension/credit program. They were, in effect, given equal access to training and equal formal commitments for technical assistance in a field considered to be a man's domain. Obtaining credit proved to be more difficult, depending on marital status.

Some selected subsidized credit and land reform programs were included within the overall project but lack of access to credit and land constituted serious obstacles to implementation of on-farm or community tree-planting projects by and for women, particularly those settled in small towns, on nontitled land or on property of absentee husbands.

Plan Sierra illustrates both the possibility for employment and training of women and the need to utilize experience in project definition, technology design, and extension/implementation. This example demonstrated that even in regions where women do not traditionally till the soil, they can and should be offered employment and training in nursery and horticultural techniques, some of which can be identified as women's occupations.

The experience of Plan Sierra also indicates the need for prior consultation with (women) clients of agroforestry development projects about issues of immediate concern to them and about potential action to solve problems or otherwise improve their lot. This would, in many cases, imply a reordering of priorities in project identification, technology design, and species selection criteria to better meet the needs of rural women. Employment and training of women in fields already recognized as important (but not exclusively defined as men's

work) could then be extended to training of women personnel for more flexible roles in agroforestry extension programs for rural families, including subsistence farmers and smallholders.

### An NGO — the Chipko Movement

The history of the Chipko Movement in the Uttarakhand region of India illustrates the active role of women in mobilizing for forest protection and reforestation. In some cases the divergent interests of men and women served as a key factor leading the women to act as a group both to save existing forests and to choose useful species for reforestation and agroforestry projects.

The Uttarakhand region encompasses a variety of ethnic groups and a diversity of ecological zones with some features common throughout. Most of the people live in rugged formerly-forested hill country in small, isolated villages. Relative to the rest of India the hill regions are poor and underdeveloped.<sup>8</sup> Large commercial enterprises (mining and lumbering) have been extractive, economically unstable and ecologically unsound.<sup>9</sup> Out-migration has been substantial, particularly among young men.<sup>8</sup>

The people of Uttarakhand rely on their immediate surroundings (including the forests) for production of most necessities. Smallholder agriculture is based on subsistence food production (grains and pulses) with supplementary cash crops. Larger landowners rely more on commercial crops including fruit, grains, and other annuals. Animals are kept by both small and largeholders for milk production, draught power, hides, wool, and sometimes meat.

Cropland and homesteads are privately owned while communally owned forests and grazing lands are managed by village *Panchayats* (councils). Communal forests are sources of fuelwood, food, herbs, medicine, and construction poles, as well as fiber and wood for handicrafts. Forests may also be grazed directly or may serve as sources of 'cut and carry' fodder for stall-fed animals. Many of the remaining large tracts of forest held by the state are also used for these purposes by nearby villagers.<sup>9</sup>

Women plant, weed and harvest the crops after the men prepare the soil. The burden of fuelwood and water gathering (a 1-15 km daily journey in rough terrain) also falls on the women. Women usually tend the small animals and must often collect fodder for larger stock. Child care, food preparation, and housekeeping are also women's responsibilities. Women have a clear interest in the management of cropland as well as in the multiple products of the existing forests.<sup>2</sup>

Women's domain tends to be subsistence production, while men concern themselves more with wage labor and/or cash crops.<sup>48</sup> Women's labor, however, is often required by male heads of household for their cash crops enterprises. Men's and women's priorities are largely

differentiated along cash and subsistence lines.

The Chipko movement began with confrontations between hill people and outsiders over rights to develop or harvest the forests. In one of the first incidents, in 1972, the people of Uttarakashi, a village in Chamoli district, adopted the practice of tree-protection demonstrations, hugging trees to prevent their being cut down. These actions were responses to large-scale deforestation of the Himalayan Foothills. Clearcutting had denuded the mountains and resulted in widespread environmental damage (erosion and floods) as well as the loss of a productive resource for nearby villages.<sup>6</sup>

Chipko has gradually developed from a protective movement to prevent commercial clearcutting, to a broad 'movement for the ecological and human rights of the hill people and for adherence to a conservation ethic'.<sup>3</sup> Since 1975, afforestation has been increasingly emphasized. There are now two distinct sectors within Chipko, one focusing more on protection of existing forests (led by Bahuguna) and the other promoting afforestation and development of sustainable village production systems based on forests and agroforestry. This latter group (led by Chandi Prasad Bhatt of Chamoli District) has joined the Ministry of Environment and others to conduct 'eco-development' camps for massive tree planting campaigns.<sup>9,22</sup> Through local participation these voluntary afforestation efforts have achieved 85-90% survival rates.

The potential of Chipko in promoting sustainable agroforestry systems for the Himalayas has been widely recognized in nongovernment circles.<sup>2,56</sup> The potential role of Chipko and the hill women has also been recognized by government officials. In a letter to the Chief Secretary of the Government of Uttah Pradesh, Swaminathan<sup>53</sup> urged the forest department to follow the lead of Chipko and to support and train the hill women for the task they had already begun.

The success of Chipko has been largely due to the continued initiative and support of the hill women.<sup>2</sup> While some of the earlier demonstrations focused more on men's demands for local control and the development of timber production, by 1978 the women (and their concerns) had assumed a more prominent role. They emphasized the multiple use/subsistence value of the forests for Himalayan villages.<sup>32</sup>

Reports from Himalayan villages indicate that women are prepared to confront their own communities, as well as outsiders to protect Panchayat forests (village commons) from encroachment. One of the key incidents occurred in 1974 when 27 women of Reni village (near the Tibetan border) successfully protected the Panchayat forest against 60 men (some armed) from a neighboring village while their own men were away engaging in a protest against the contractor. In a more recent case the Women of Dungari Paitoli (Chamoli district, Uttah Pradesh) who had not even heard of Chipko, reacted spontaneously to a move by their own men to sell the

Panchayat forest in exchange for a potato cultivation project. Loss of this forest stand would have added 5 km per day to their fuelwood collection journeys. With their own efforts and subsequent help from Chipko the women defeated the project but also incurred the wrath of the men. The incident pointed out the need to include women in village decision-making and sparked demands for election of women to Forest Panchayats in Chamoli District.<sup>2,32</sup>

Women have also influenced the species selection criteria and general orientation of the tree-planting projects conducted by Chipko, the Ministry of Environment and other groups.<sup>48</sup> They have requested fuelwood, fodder, and food producing trees for home use in contrast to the men's preference for fruit or timber trees for sale.

The first lesson to be learned from Chipko is that there may be considerable divergence between the interests and priorities of the local community and those of the encompassing state or national system. Similarly, there may be equally strong divergence between the interests of men and women in the local community. Implicit in both is the potential conflict in the needs of the cash and subsistence sectors.

The second lesson is the clear demonstration of women's strong and conscious interest in the management of trees at both farm and village levels. Because they are more dependent on resources gathered off-farm (water, fuel, fodder), women may also be the first to recognize the need for balanced management (or rehabilitation) of local ecosystems. In order for women to bring this about, they must have access to land and/or decision-making about land at the farm and village levels, and they must receive technical training in the management of existing forests, in reforestation, and in the integration of trees into village and farm grazing lands, croplands, boundaries, and roadsides.

The third lesson is the potential impact of women and women's groups even in the face of superior physical force and the opposition of men in their own families. The dramatic confrontations at Reni and Dungari Paitoli, mentioned above, were based on small women's mutual aid groups.<sup>39</sup> Although none of the Chipko literature analyzes this or other women's organizations involved in the movement, it is not unlikely that much of the women's ability to organize and sustain action flows from women's informal solidarity networks and associations. The similarity to the Women's War described above is striking. The clear lesson for agroforestry projects is the need to include women in decision making about forest use and management in order to insure both that their interests are included in the project and that their very considerable organizational energies are on the side of the project.

## Tree planting and agroforestry workshops in Kenya

KENGO (Kenya Energy Non-Government Organizations Association) Tree-Planting and Agroforestry Workshops are conducted in cooperation with the Kenya Ministries of Energy, Environment, and Agriculture. These week-long meetings combine training and consultation of rural constituents and implementers of grass-roots forestry and agroforestry projects relevant to fuelwood production and use. Because of the nature of the workshops, questions and issues surface which might normally take years to manifest themselves clearly within projects or government programs. The Kisii district workshop typifies many of the women's issues facing agroforestry in Kenya. Additional information was also drawn from proceedings of a prior meeting in Kitui.<sup>38</sup> These events serve not only as sources of information per se but as concrete examples of how to set about (begin) consulting and involving rural people in decision-making and training. Women and women's concerns are explicitly included in this process.

Kisii is a densely populated, intensively cultivated, high rainfall district within Nyanza Province. The hilly terrain is almost entirely devoted to privately owned crop and pasture land in equal proportions. Smallholder farms of similar size predominate. Crop production systems are a mix of cash and subsistence enterprises with emphasis on commercial products (tea, coffee, pyrethrum, and sugar cane). Maize and bananas are the subsistence staple crops.<sup>52</sup> Animal production is a supplementary enterprise that supplies milk for home consumption and sale.

Exotic fuelwood and timber trees (*Eucalyptus saligna*, *Acacia mearnsii* and *Cupressus* spp) are closely fit into the farmlands.<sup>52</sup> These exotic trees have displaced but have not completely replaced indigenous vegetation in the region. They are planted along fence rows, in ravines, in small woodlots near boundaries and are sometimes intercropped with cash and food crops. Building poles grown on-farm are a source of cash for many households. Fuelwood has also become a commercial good which families purchase regularly from those who manage to produce a surplus.

Hedgerows between farms consist of a diverse species mix, including herbaceous and woody plants used for fuelwood, cattle fodder, medicines, and fiber. Fallow plots are often grazed or may be planted to soil-improving multipurpose herbaceous and woody species. Scattered swamps and hilltop woodlands also provide fuelwood, a wide selection of fibers and medicinal plants. Communal swamp and hilltop lands are managed by the county councils.

Off-farm labor is a major source of income in Kisii. Both men and women pick tea for piece-work wages and many men work in the towns or in urban areas outside the district.

Women who head households are the main decision makers and perform or manage most of the farm work, including soil tillage, maintenance of buildings, and other tasks considered men's work. In all cases women collect the water and fuelwood; even purchased fuelwood must be transported, a service performed (for a fee) by women's groups. Women also collect fodder for cattle, grass for thatching, fiber for handicrafts, and a wide variety of medicinal plants. While the men are considered to be the main crop managers in Kisii, women always participate in planting and harvesting. Food preparation, child care and housekeeping are also women's work. Most women weave baskets and mats with fibers gathered from woody shrubs in the swamps. These may be used in the home and can also be an important source of cash income.

Approximately 40 people attended the Kisii workshop, including five representatives of women's groups (local and district levels) and a fairly even mix of men representing church groups, farmers, and local officials (chiefs, sub-chiefs). Two district forest officers (Busia and Kisii) and the district agricultural officer were key participants, as government representatives directly responsible for nursery management, extension programs, and implementation of special projects. Ministry of Energy and Ministry of Agriculture personnel from the Farmer's Training Center nurseries served as tutors. Also present were ten technical resource people from outside the region, five of whom were women.

The five-day workshop itinerary included presentations by resource people, group discussions, and group participation in practical nursery exercises and cook-stove demonstrations. A field trip combined observation and discussion of existing farming systems with visits to small nurseries and to forestry and agricultural project sites. Small group discussions of extant agroforestry systems produced a list of existing practices and useful species. The groups also identified potentials and constraints for agroforestry improvement/development in the region. A separate informal meeting/consultation was held for women participants, resource people, and FTC employees.

Although the women are included throughout, their most valuable contributions and their strongest expression of interest were confined largely to the informal small-group activities, such as the nursery practicum, identification and description of plant and practices during the field trip, and open exchange and discussion of information during the informal women's meeting. During the frequent and even heated exchanges of questions, answers, criticisms and suggestions among the men in the larger sessions, the women were silent—even when topics directly relevant to them, such as improved stoves or intercropping food, fuel and cash crops, were under discussion. In subsequent interviews, the women requested that they be involved more with separate discussions of fuelwood, fiber, fodder, and cookstoves, and that

'agroforestry' be left to the men. The decisions about cropping systems, they contended, would not be theirs to make. The men echoed similar sentiments about division of interests (though not about spheres of control) when they asked why they were being subjected to 'irrelevant' discussions of cooking, cookstoves, and fuelwood.

During the women's meeting, both existing production systems and potential improvements were discussed. Information was freely offered as to the amount of fuelwood used, the time and/or money spent to collect and deliver it, and role of women's groups in fuelwood delivery, the degree of dependence on off-farm sources, and the species used, in order of preference. The group also touched on fodder collection, since most women in the area were said to collect fodder off-farm. Another issue that surfaced, both in this context and on the field trip, was the importance of woody shrubs and herbaceous plants found in hedgerows, along roads, and in uncultivated bottomlands. Some of the women identified more than 20 indigenous species highly valued and frequently used by them. The forestry and agricultural personnel were unfamiliar with most of these, especially the non-commercial shrubs and herbs. These plants are often multipurpose and may provide fuel, fiber (two or more types), fodder, and medicinal ingredients. This is a critical consideration to incorporate into decisions about the future development of bottomlands in the area.<sup>52</sup>

*... strongest among them is the need for programs, personnel, and training material geared specifically for women . . .*

The interview-discussion with women participants raised issues about the kinds of fuelwood required, the type of multipurpose trees/shrubs that might be introduced, indigenous trees and shrubs that could be propagated/managed more intensively, the potential for incorporating more of these plants on-farm, and constraints. Among the constraints cited were control of farm land and labor and negative attitudes of extension agents (and husbands) towards trees in the cropland. The separate meeting was necessary, but not sufficient, to define the social specifications for agroforestry systems to meet the women's needs. With their information it was possible to pose more pertinent questions to the men in order to identify points of convergence or conflicts of interest. Fencerows were suggested by both men and women as a potential niche for fuelwood trees. Other possible niches are small fuel/fodder lots in improved fallow plots (short rotation), and interplanted rows of fuel and polewood trees, the latter being more of interest to the men, who could provide land and labor for clearing. The use of separate species for fuel and poles would avoid problems with allocation of a given plant to two conflicting uses by different parties.

The contrast in the apparent interest and knowledge exhibited by the women in formal and informal contexts

was striking. The mere format of the mixed group evidently imposed restrictions on the level of participation by women. It would be even less likely to elicit conflicts between men and women in the distribution and management of farm resources. Issues of control and decision-making can hardly be raised, let alone worked out, unless there is a chance to consider these as a separate group.

The experience from this workshop indicates the need not only to include women and issues of concern to them, but to provide a flexible format for them to explore and express those concerns. Some provision for separate discussion by women is critical, for reasons of both form and content of participation.

Another issue critical to the development and implementation of agroforestry technologies is the nature of available training, from district level supervisors to farm household members. Agroforestry is not generally well understood, and the aspects most relevant to women are rarely included in the training of technical personnel. Further, local knowledge about indigenous plants (including shrubs and herbs) needs to be recorded, disseminated, and incorporated into improved technologies and training programs.

Existent knowledge and technology need to be taught to both men and women who are expected to apply it on the farm. The district women's group representative

asked the resource people: "What can you give me to show a group of people how to choose the right plants, where to get seeds or seedlings, and how to grow them? I need something to work with." The answer is, at present there is almost no basic training and promotional material on agroforestry, indigenous plants, seed collection/distribution<sup>54</sup>, multi-purpose trees, and preparation techniques. In addition, training personnel and documents need to be quite distinct for men and women in Kisii, given their differences in language and literacy, and divergent perspectives on agroforestry technologies and plant species.

The Kisii workshop raised several issues but perhaps strongest among them is the need for programs, personnel, and training material geared specifically for women, taking into account the complete range of roles in rural production (existing and potential) and in community affairs. Within such programs (whether in forestry, agriculture, home economics, or rural development institutions) the sexual division of labor, interests, control and benefits on-farm and within community must be recognized and addressed. This applies to both form and content of any program that is to succeed in involving and serving rural women.

## Lessons for the future

We can learn a number of lessons about women's involvement in agroforestry from these case studies and the literature reviewed.

*Participation in implementation and benefits are not the same.* The women who worked as 'budders and grafters' in Plan Sierra benefited in terms of wages and knowledge which they could transfer to their own private economic activity. The number of such women was limited by the size of the project. Women also participated in tree planting. However, the project did not address two of the issues most important to women as a whole: fuelwood and fiber for handicrafts. Unless care is taken, women's participation in a project in the form of their labor may give them relatively little in return.

*Men's and women's priorities for agroforestry may differ.* The division of labor in agriculture has often resulted in men's involvement with export cash crops and women's involvement in the subsistence sector. Plan Sierra focused on the men's export crop of coffee while the women's non-export cash enterprises received lower priorities. In Chipko, women's subsistence needs conflicted with men's interest in wage employment. Similarly, in Kisii women's desire for fuel and fodder trees conflicted with the male extension worker's image of good farming practices. There is a clear need to establish who uses what trees for what purposes before planning a project.

*Men and women have differential access to resources.* The women in Plan Sierra suffered from lack of access to credit and land. This is a problem experienced by women, especially women heads of household the world over.<sup>1,3,17,20,21,26,27,36</sup> The women of Kisii were ignored by their agricultural extension agent. Lack of extension contact is also a problem typically faced by women farmers.<sup>3,20,31,37,51</sup> The rights of men and women over trees may also differ.<sup>41</sup>

Project design must take into consideration what resources women actually have to work with. Either resource constraints must be alleviated or the project must be geared to the resources women actually control. Failure to do this will result in an exclusion of women from project benefits. In terms of extension contact, the case has been made repeatedly for female extension workers to work with women. This strategy not only avoids restrictions on male-female contact and interaction, but it is likely to facilitate communication between the female farmer and the extension worker. Reluctance on the part of male forestry officials or extension staff work with women may have to be overcome by requiring them to report their visits with women.<sup>5</sup>

*Not all women are alike.* The nature of women's participation in agriculture has been shown to differ by social class and control of resources.<sup>16,20,21,49</sup> Just as men and women's priorities may differ, the priorities of rich and poor may differ.

This point is especially important to remember when women's organizations (formal or informal) are to be involved in promoting/utilizing agroforestry. It is often the case that only wealthier, better educated women have the leisure time to spend in formal organizations. It is also often the case that such women capture the leadership of both formal and informal organizations. While there is a great deal to be said for utilizing the organizational capacity of women's organizations and associations, care must be taken that the poor are not excluded by this means. Associations should be identified which are 'structured so as to redistribute introduced resources equitably' and in which 'all members participate equally in or have equal access' to group decision-making procedures and avenues of redress.<sup>35</sup>

Different women and different women's groups and associations will have distinct interests and capacities. This should be viewed as a programming strength, not a difficulty.

*Special arrangements may need to be made for women's participation.* The Kisii meeting demonstrated the chilling effect the presence of men may have on women's participation. In some cases it may be necessary to approach women separately in order to learn what they know and what they want. But at other times, it is necessary to be sure that men and women are involved together in order to alleviate any fears that men may have about their wives' activities and to coordinate family participation.

## Summary

Women are traditionally active participants in both the agricultural and forestry components of agroforestry production systems. They are also private and public participants in community life and decision-making. The failure to include women in agroforestry projects has several detrimental effects. It excludes the increasing proportion of rural households which are headed by women from project benefits. It may prevent project designers from benefiting from women's special knowledge. It may exclude (or even harm) activities and products such as fuelwood, basket making, and minor forest products which are part of women's economic sphere.

The inclusion of women is essential for the success of agroforestry projects but it may require change in both approach and personnel of forestry and extension departments. This would include diagnosing the existing agricultural and resource management systems to determine what women presently use and what they need; analyzing the constraint imposed on women's agroforestry by social institutions such as land tenure or property laws or the division of labor by gender; arranging a format for discussions with women which enables them to

express their concerns and questions freely; and by hiring women extension workers and technical personnel who can work easily with both men and women.

Louise Fortmann is with the Department of Forestry and Natural Resources at the University of California—Berkeley. Fortman has a long involvement in agroforestry in developing countries and has worked extensively with international institutions, including ICRAF, USAID, and FAO.

Dianne Rocheleau is with the Rockefeller Foundation and International Council for Research in Agroforestry in Nairobi, Kenya.

## References

- 1 Acharya, M. and Bennett, L. 1981. The rural women of Nepal. Volume II, Part 9, Kathmandu, Center for Economic Development and Administration.
- 2 Agarwal, A., Chopta, R. and Sharm, K. 1982. The state of India's environment 1982, a citizen's report. New Delhi, Center for Science and Environment, pp. 33-55.
- 3 Alberti, A. (n.d.) Some observations of the productive role of women and development efforts in the Andes. Unpublished manuscript.
- 4 Allan, W. 1965. The African husbandman. Edinburgh, Oliver and Boyd.
- 5 Antonini, G., Ewel, K. and Tupper, H. 1975. Population and energy: A system analysis of resource utilization in the Dominican Republic. Gainesville, University of Florida Press.
- 6 Bahuguna, S. 1982. Walking with the Chipko message. Tehri-Garhwal, Chipko Information Center.
- 7 Bennett, L. 1981. The Parbatiya women of Bakundal. The Status of women in Nepal. Volume II, Part 7. Kathmandu, Center for Economic Development and Administration.
- 8 Berreman, G.D. 1972. Hindus of the Himalayas: Ethnography and change. Berkeley, University of California Press.
- 9 Bhatt, C.P. 1980. Ecosystem of the Central Himalayas and Chipko movement, determination of hill people to save their forests, Copeshwar (UP), Dashauli Gram Swarajya Sangh, pp. 7-31.
- 10 Boserup, E. 1970. Women's role in economic development. London, George Allen and Unwin.
- 11 Bryson, J.C. 1981. Women and agriculture in Sub-Saharan Africa: Implications for development (an exploratory study). *J. Develop Stud* 17(3): 28-45.
- 12 Buvinic, M. and Youssef, N.H. 1978. Women-headed household: The ignored factor in developing planning. Washington, D.C. International Center for Research on Women.
- 13 Chaney, E. and Lewis, M. 1980. Planning a family food production program, some alternatives and suggestions for Plan Sierra, San Jose de las Matas, Plan Sierra.
- 14 Cliffe, L. 1975. Labor migration and peasant differentiation: Zambian experiences. *J. Peasant Stud* 5(3): 326-346.
- 15 Colfer, C.J.P. 1981. Women, men and time in the forests of East Kalimantan Borneo Research Bulletin 1981 (September), pp. 75-85.
- 16 Deere, C.D. 1982. The division of labor by sex in agriculture: A Peruvian case study. *Evon Dev Cu* 30(4): 795-811.
- 17 Cietel, E. 1982. A profile of small-scale traders in Western Kenya: An alternative credit approach for women. Cornell University, Unpublished Masters Thesis.
- 18 Dixon, R. 1983. Land, labor and the sex composition of the agricultural labor force: An international comparison. *Develop Cha* 14(3): 347-372.
- 19 FAO Committee on Agriculture. 1982. Follow-up to WCARRD: the role of women in agricultural production. Rome, FAO.
- 20 Fortmann, L. 1979. Women and agricultural development. In Kim, K.S. Mabele, R., and Schultheis, M.J., eds., *Papers on the political economy of Tanzania*. Nairobi Heinemann Educational Books, Ltd.
- 21 Fortmann, L. 1984. Economic status and women's participation in agriculture: A Botswana case study. *Rur Soc* 49(2): 452-464.
- 22 Fortmann, L. 1983. The role of local institutions in communal area development. Gaborone, Applied Research Unit, Ministry of Local Government and Lands.
- 23 Fouad, I. 1982. The role of women peasants in the process of desertification in Western Sudan. *Geojournal* 6(1): 25-30.
- 24 Bupta, R.K. 1980. Alternate strategies for rural development in Garhwal Himalaya. In: Singh, T. and Kaur, J., eds., *Studies in Himalayan ecology and development strategies*. New Delhi, The English Book Store, pp. 218-228.
- 25 Gupta, R.K., Singh, G., Katiyar, V.S., Bhardwaj, S.P., Puri, D.N., Ram Babu and Tejwani, K.G. 1979. Watershed management—a tool for integrated rural development and flood control. Paper presented at the National Symposium on 'Soil Conservation and Water Management in the 1980s'. Dehra Dun, Central Soil and Water Conservation Research and Training Institute.
- 26 Hammer, T. 1977. Wood for fuel: Energy crisis implying desertification. The case of Bara, the Sudan. University of Bergen.
- 27 Hammer, T. 1982. Reforestation and community development in the Sudan. Bergen, Development Research and Action Program, The Chr. Michelsen Institute.
- 28 Hoskins, M. 1982a. Observations on indigenous and modern agroforestry activities in West Africa. Paper presented at the United Nations University Workshop 'Problems of Agro-forestry', University of Freiburg.
- 29 Hoskins, M. 1982b. Social Forestry in West Africa: myths and realities. Paper presented at the annual meeting of the American Association for the Advancement of Science. Washington, D.C.
- 30 Hoskins, M. 1883. Rural women, forest outputs and forestry projects. Rome, FAO.
- 31 Jennings, P. and Perreiras, B. 1979. Recursos energeticos de bosques secos en la Republica Dominicana. Santiago R D, Centro de Investigaciones Economicas y Alimenticias, Instituto Superior de Agricultura.
- 32 Joshi, G. 1982. Men propose, women oppose the destruction of forests. New Delhi. Information Service on Science and Society-Related Issues, Center for Science and Environment, pp. 1-5.

continued on page 46

# Investment Clubs

## What Are They? How Do They Work?

Gene Bammel

When you have money you do not need to meet current expenses, and you can afford to invest it to meet future needs, one very logical place to invest that money is in the stock market. The problem is, how does one go about getting advice as to how to invest that money? There are essentially three choices:

1. *Using a stockbroker.* A stockbroker is essentially a salesperson who makes a living by getting customers to buy and sell stocks. Since a stockbroker earns a commission on each buy or sell order, there is a powerful incentive to get a client to make transactions. The "good" stockbroker rises above this motivation, discerns the best information from the company's research office, and tailors selections to match particular needs. There is no "science" to choosing a broker, no way of knowing what particular consequences will be, short of monitoring results after a complete market cycle, which can last five to ten years. Few of us have the time, patience, or money to engage in that kind of experiment. People called "financial planners" may be helpful in putting together a financial plan; but many are simply salespeople with the same motivations as brokers, but with additional packages to sell, like insurance, or real estate partnerships, or mutual funds. I have been a stock market investor for over 20 years, and while I have occasionally used a broker, I believe I can do better elsewhere, and so can most investors.

2. *Choosing the right newspapers, magazines, newsletters.* The *Wall Street Journal* and *Investors Daily* are two national daily newspapers which provide both technical and theoretical information about the stockmarket. No one who

makes individual stock market decisions can afford to play the game without the assistance of at least one of these newspapers. Both provide analyses of general market conditions, advice on individual stocks and mutual funds, interviews with major market players, and daily reports on some 7,000 stocks listed on the major exchanges.

Several magazines—most prominent among them *Forbes*, *Business Week*, and *Fortune*—provide a weekly, bi-weekly, or monthly chronicle of stock market events, and can offer more detailed analysis. Newsletters, produced by a whole spectrum of advisors, are rated in terms of performance by *The Hulbert Digest*. Currently, Al Frank's *The Prudent Speculator* is the top-rated newsletter for performance over the past five years. There is some "science" of investing discernible behind the facade of the financial press, but it can be exceedingly difficult for the individual investor to distinguish the good advice from the bad.

3. *Joining an Investment Club.* An individual new to the world of financial investing is much more likely to be successful by joining an investment club than by any other route. There are a few places in life where governance by a committee really works, but stock market investing appears to be one of them. Many heads prove to be better than one, because some members may have a conservative bent, others seek to play hunches (never a good strategy), some are technically oriented and patient, others want to jump on the latest bandwagon. In a club, extremes tend to cancel out, improving the chances for good decision-making.

You may form an investment club just by getting

together a compatible group and discussing investments, or you may join the largest group of investment clubs in America, the National Association of Investors Corporation, (N.A.I.C.), located at 1515 East Eleven Mile Road, Royal Oak, Michigan, 48067. A letter of inquiry will bring a brochure detailing costs and benefits of membership, and information about clubs in your area. NAIC publishes a monthly magazine, *Better Investing*, which is an excellent source of stock market information. Also available are "stock selection guides," one of the best mathematical formulas for making a science of stock selecting. NAIC can arrange meetings to help develop clubs, and has a guidebook on the advantages, legalities, and format for developing a club.

Another organization is the American Association of Individual Investors (AAII) located at 612 N. Michigan Ave., Suite 317, Chicago Illinois, 60611. AAII publishes a monthly magazine, has chapter meetings, special interest groups, and periodic national conferences. As the title indicates, this is a much more individual-oriented group, but retains much of the club approach. Their emphasis is the pursuit of "shadow" stocks—small company growth stocks, which over the long haul may produce greater returns than investing in companies that are already household names, and whose great growth is already past.

Most clubs invest a small amount per member per month, meet on a regular basis, and decide which stock to buy at that time. Stock is bought, usually through a discount broker, in the name of the club. This way, costs of purchase are kept small, and within a year's time, considerable diversity is obtained. Many clubs have about a dozen members, and "charge" \$25.00 a month. Some community of interests, apart from making money, usually insures that club meetings will be pleasurable as well as educational. Many clubs use basic stock market literature published by *Value Line* or *Standard and Poors*, (and the proper use of these texts will be discussed in a forthcoming issue). If you live in a remote area, membership in an investment club may be impossible to you, and you will need to utilize the very best sources of information available. While *U.S.A. Today* can keep you informed on an amateur basis, you need to use what the professionals read, and that is *Value Line* and *Standard and Poors*. More on that later.

Gene Bammel is a professor and forest scientist in the Recreation and Parks Management Program in the Division of Forestry, West Virginia University. Bammel has offered a number of personal finance workshops.

continued from page 44

- 33 Ki-zerbo, J. 1981. Women and the energy crisis in the Sahel, *Unasylya* 33(133): 5-10.
- 34 Kuper, H., Hughes, A.J.B. and van Velson, J. 1954. The Shona and Ndebele of Southern Rhodesia. London, International African Institute.
- 35 March, K. and Taqu, R. 1982. Women's informal associations and the organizational capacity for development. Ithaca, Cornell University Rural Development Committee.
- 36 Mazumdar, V. 1982. Another development with women: a view from Asia. *Development Dialogue* 1982(1-2): 65-73.
- 37 Mercedes, J. 1980. Estudios Para el dise;no de un sistema de manejo entegrado en areas de bosque seco en La Republica Dominicana. Eg Eng Thesis, Santiago, Instituto Superior de Agricultura Universidad Catolica Madre y Maestra.
- 38 Mengech, A. and Aworry, A. 1982. Proceedings of the Kengo Workshop held in Kitui in October, 1982. Nairobi: Kenya Energy Non-governmental Organizations Association.
- 39 Mishra, A. and Tripathi, S. 1978. Chipko Movement, Uttarakhnad women's bid to save forest wealth. New Delhi, People's Action.
- 40 Molnar, A. 1981. The Kham Magar women of Thabang. The status of women in Nepal. Volume II, Part 2. Kathmandu, Center for Economic Development and Administration.
- 41 Obi SNC. 1963. The Ibo law of property. London, Butterworth.
- 42 Pradhan, B. 1981. The Newar Women of Bulu, The status of women in Nepal. Volume II, Part 6. Kathmandu, Center for Economic Development and Administration.
- 43 Rajaure, D. 1981. The Tharu women of Sukhwar. The status of women in Nepal. Volume II, Part 3. Kathmandu, Center for Economic Development and Administration.
- 44 Rocheleau, D. 1983. An ecological analysis of soil and water conservation in hillslope farming systems: Plan Sierra, Dominican Republic. Gainesville, University of Florida, Department of Geography.
- 45 Safa, H. and Gladwin, C. 1981. Designing a women's component for Plan Sierra. Gainesville, Center for Latin American Studies, University of Florida.
- 46 Santos, B. 1981. El Plan Sierra: Una experiencia de desarrollo rural en las montanas de la Republica Deminicana. In: Novoa A. and Posner J., eds., *Agricultura de ladera en American Tropical*. Turrialbo, C.A.T.I.E.
- 47 Scott, G. 1980. Forestry projects and women. Washington, D.C. The World Bank.
- 48 Sharma, R. 1981. Greening the countryside. New Delhi, Information Service on Science and Society-Related Issues, Center for Science and Environment, pp. 1-4.
- 49 Sharma, U. 1980. Women, work and property in northwest India. London, Tavistock Publications.
- 50 Spring, A. 1983. Extension services in Malawi. Paper presented at the XIth international congress of anthropological and ethnographic sciences, Vancouver.

continued on page 51



## INTERVIEW

# Peace Corps' Mary Killeen Smith

## From Volunteer To Director of Training and Program Support

Interview by Sue Ann Rodman

Edited by Linda Hardesty

**WiNR:** Could you give me some background about yourself and how you got where you are?

**Smith:** For the past 20 years, I have worked for both nonprofit and for-profit corporations. I started in 1966 with Westinghouse and managed government and private-sector contracts. I worked for Time-Life after that—essentially doing the same thing—and did management consulting all over the world. In 1974, I joined the Action Agency, which at that time was the umbrella organization for the Peace Corps and the Domestic Poverty Programs. I designed an upward mobility, affirmative action program for the agency. In 1977, I was offered a position as Director of Program Services for Youth for Understanding, which is the largest student exchange program in the world. I managed seven operating departments, which provided admissions and registration, data processing, training, orientation, personnel, counseling, and support in the program area to all the U.S. students in 26 countries and to all of the 14,000 foreign students coming to the United States to study each year. Then, I was Vice President of the American Symphony Orchestra League, where I set up management systems. Next, I was Executive Vice President of the National Center for Citizen Involvement, which is a private group that oversees major volunteer efforts all over the world. After that, I was doing my own management consulting for a variety of firms, such as Meridian House International and Miranda Associates here in Washington, D.C.

**WiNR:** When did you start back to work for the Peace Corps?

**Smith:** I accepted this post at the Peace Corps in September, 1986. In my full capacity, I am Director of the Office of Training and Program Support. I have about 40 permanent staff members. We have three divisions: The programming division, the training division, and the information collection and exchange division. Our mandate is to provide technical assistance in the form of training, in the form of assistance in programming, and in the form of material support to all of our Peace Corps posts operating in over 60 countries. When we train volunteers or provide in-service training, we do it along with the counterparts who are host-country nationals. We provide technical assistance in the fields of education, water and energy, health and nutrition, agriculture, the fishery sector, the natural resources sector, small enterprise development, community and youth development, women and development, and small project assistance.

**WiNR:** What sort of budget do you have to do all of this?

**Smith:** Well, we have an appropriated dollar budget this current fiscal year (1988) of about three million, and we have additional external funding support from other agencies, in particular AID, through what is called a PASA Agreement, Participating Agencies Service Agreements. I would say that we probably have two million dollars in support for FY 88 and 89 from AID that supplements our appropriated dollars. One of the key reasons is that our appropriated dollars cannot be used to train host-country nationals; AID provides us with the ability to train, through these funds, host-country nation-

al counterparts along with volunteers.

**WiNR:** I know that when I worked with the Peace Corps in Nepal, friends of mine often worked in AID projects as Peace Corps volunteers.

**Smith:** Yes, they do. When our director, Loret Miller Ruppe, assumed the agency directorship in 1981, and Peter McPherson, a former Peace Corps volunteer, became an administrator of AID, they both saw the unique collaboration that could occur between the Peace Corps and AID. This kind of collaboration in the field has been supported and encouraged very, very strongly by both Loret and Peter throughout their tenures.

**WiNR:** There used to be a rule that you could not work for Peace Corps for more than five years. Is that still in effect?

**Smith:** In the original legislation, I think it was a total of five years that you could work for the Peace Corps as a staff member. This was done deliberately to keep the Peace Corps as a nonbureaucratic government agency and to keep us as current as possible with new staff coming into the agency. Volunteers currently serve for two years, as you probably did. Many of them do extend for a third year, especially if they are working on projects that have a long-term impact and they want to stay for the third year.

**WiNR:** Does that time limit exclude someone in your position or does that include you?

**Smith:** That includes me. That includes all staff working in the field and all Washington headquarters staff.

**WiNR:** Do you have any plans after the Peace Corps?

**Smith:** I certainly would like to have another tour as a staff member with the Peace Corps. My plans would be to stay in the development field and work for one of the agencies that is instrumental in development, like AID or the state department.

**WiNR:** When and how did Peace Corps get involved in agroforestry?

**Smith:** In the 1970s, there was a strong effort in Latin America (particularly Chile and Brazil), where the agroforestry concept really started to take shape. But I would say we have been involved in it since 1963, because Peace Corps volunteers, as you know, worked with small farmers from the very beginning. Now, in the 1980s, there is a tremendous upsurge of agroforestry projects worldwide for Peace Corps. Part of that is

because host-country ministries are now asking for volunteers to work in agroforestry and related fields. But we have always had an emphasis on rural development.

**WiNR:** How do you distinguish between forestry and agroforestry? What is the definition?

**Smith:** Agroforestry we define as the integration of forestry, farming, and agriculture. It has been difficult for us to get degreed foresters to enter the Peace Corps. So when we fill positions in agroforestry projects we accept volunteers with a science background and skill-train them for work in particular agroforestry projects. When we consider degreed foresters for the Peace Corps we are really focusing on forest or park management. Agroforestry allows us much more latitude in the integration of forestry with agriculture.

**WiNR:** How many projects do you have going on now that you would call agroforestry projects?

**Smith:** We have natural resources programs in 46 countries, 26 of which are real agroforestry projects, with 330 volunteers in the field. That comes out (in terms of support for volunteers) to about \$8.25 million a year, because it takes \$25,000 per volunteer. We have large programs in Ecuador, Guatemala, and the Dominican Republic; in Africa, we have them in Senegal, Kenya, and Benin; and in Asia, in the Philippines. We are getting ready for a country-wide agroforestry conference in the Philippines to be held in January, which will involve over 200 key people working in agroforestry. The fact that there are about 75 volunteers and about 85 of their counterparts, including both regional and country-wide officials, signifies the level of awareness that many of the developing countries now have of agroforestry.

**WiNR:** That leads me to a question about the number of requests you have to fill.

**Smith:** I think we currently have 120 requests for this year. As I said before, we have difficulty if countries request straight foresters. It is difficult to get foresters to go overseas. Because of our skill-training, volunteers who have biology and botany backgrounds can fill requests for agroforesters.

**WiNR:** How many volunteers apply, and how many do you accept per year?

**Smith:** Normally we get 150,000 applications; and of those applications, this is on a yearly basis, we might invite 30,000 at the next level. Of that group, only 2,700 to 3,700 will make it into training. So it is a pretty competitive arena. Part of our problem is that we are

getting more and more requests from host-country ministries and host-country governments for skilled volunteers, so we have less potential to place our generalist volunteers unless we can skill-train them in particular areas.

**WiNR:** For the agroforestry program, what kind of science background are you looking for?

**Smith:** We look for biology and botany. We also look for a high degree of interest in agroforestry, forestry, or the whole movement we currently call conservation. I think the interest is important as opposed to just a career step into a new field.

**WiNR:** What kind of a ratio does Peace Corps have of females to males in agroforestry programs and in the operation as a whole?

**Smith:** For the whole Peace Corps operation we have 49% females, 51% males, almost an even ratio. In the agroforestry area, 40% are females.

**WiNR:** That is really a lot better than most agencies do.

**Smith:** Well, it is, and I think it represents an interest in agroforestry in the eighties. I suspect that the ratio is reflective of more women going into the field generally.

**WiNR:** Could you give us an idea about how long people serve in the Peace Corps and how their pay is determined?

**Smith:** Yes. Peace Corps volunteers serve for a tour of two years and many of them can extend to a third year. They always have been paid at subsistence levels. In my day it was \$75 a month but now it is often pegged to the currency and income of the host-country people. Seventy five dollars a month is probably a little low now, but they do not make much more than what they need for food and housing since they live, as you probably did as a volunteer, in the local communities. They are certainly not living as middle class professionals.

**WiNR:** The training period is not included in the two years, is it? How long is the training period for agroforestry?

**Smith:** The upfront training can last anywhere from two to three months. I was in Mali in January, and we had volunteers who had just started training learning both Bambara and French on the first day. That is a difficult kind of situation. These volunteers had 10-13 weeks of training in the United States in technical areas, but they still would spend another two months in-country

learning the language.

**WiNR:** I remember that was one of the toughest parts.

**Smith:** I'm sure. Is that the kind of training you had as a volunteer?

**WiNR:** We did all our training in-country. The language was pretty much full-time for two or three weeks and then we did technical training with language for the next two months.

**Smith:** Right. We do move toward an integrated curriculum where, after the initial two or three weeks of straight language, most of the curriculum in the technical area, as well as in the cultural area, will be integrated into the language. It is difficult, as I am sure you know. Did it prepare you well for your service as a volunteer in Nepal?

**WiNR:** It prepared me better than no training at all, I suppose. I was a math and science teacher, so I had to start—right after training—teaching 40-minute periods in Nepali.

**Smith:** That must have been rough.

**WiNR:** For about two months it was. Those were the two roughest months of my life.

**Smith:** When I was in Mali in January, I went to visit a volunteer who had been there for three months and was still struggling desperately with the language. And I visited a volunteer who had, during her tenure, taught village women how to make mud stoves to increase the efficiency of the wood they were using for cooking. At the 18-month point, she said it was the first time that she felt comfortable in both French and Bambara.

**WiNR:** Are there new countries you are not involved in now that you think you will be soon? I have heard rumors about China.

**Smith:** Well, I do think if we ever were to be involved with China, we would have to have an official request from that government, which we do not have. We certainly do have the resources, the volunteer expertise in natural resources, agriculture, and health that China has indicated major interests in. I think that China will work with a few private voluntary organizations first, before they work with Peace Corps.

**WiNR:** We talked a little bit about the collaboration between the Peace Corps and AID on some projects. What other agencies are involved? I remember that water projects in Nepal were coordinated with UNICEF.

**Smith:** We collaborate with AID, the World Bank, and private voluntary organizations like CARE and Save the Children. Four out of five of our permanent staff in natural resources, for example, are on loan from, or are subsidized by, other agencies, and that really demonstrates an amazing commitment by AID, the Forest Service, the Park Service, and Man and the Biosphere. I would have to conclude from these collaborations that the Peace Corps is one of the few entities working on such an extensive scale in agroforestry.

**WiNR:** Are most of the projects people work on designed by the host country? Are they AID projects that you become part of, or are they your own creations?

**Smith:** They are all three. If you look at a project in Kenya, for instance, that started in the early eighties at the request of the government, we had volunteers who came in and worked setting up nurseries and demonstration plots. They had to start from scratch. They went out all over Kenya and set up regional nurseries and agroforestry demonstration plots at seven major sites. They trained Kenyans to take over the nurseries. Now, they have evolved into extension agents, working with small farmers throughout the country. They bring farmers in and demonstrate agroforestry on the plots. The Kenyans who are working there will continue to work with the Peace Corps volunteers and the small farmers into the future, all with an eye towards phasing the Corps out and having trained nationals take over.

**WiNR:** How do you feel about the success so far of the agroforestry program?

**Smith:** I think it is one of the things that we can point to as a very clear and concrete Peace Corps success. It is the best response to an immediate and definite need in all of the developing world to save the forests, which saves the land, which allows the small subsistence farmer to stay on the land. We focus on the grass roots, indigenous, small-plot farmers who need to rehabilitate their land to get it up to a level to produce more crops not only for food, but as cash crops. I think, given the condition of the developing world currently, as well as of our own, in terms of deforestation, topsoil runoff, and land that is no longer productive, we are responding to a critical need.

**WiNR:** There is no question that there is a critical need. I would like to know if you have any way to evaluate how effectively you are meeting that need?

**Smith:** Aside from the evaluations that we do, I think that the response of host-country governments since the early 1980s in requesting more assistance, not only in agroforestry but also in forestry, park management, and

wildlife management, is a real indication of success. Certainly all of Africa is involved across the board in the environmental conservation movement. They care about agroforestry and the preservation and the conservation of resources. It is absolutely vital to the survival of their people.

**WiNR:** You have talked about some of the good things about your programs, but I know from my own experience that it is never that clear. What are the problems in implementing these agroforestry programs?

**Smith:** In terms of implementing the programs, I think one of our biggest problems is that even though a host-country ministry may draw up a development plan for agroforestry, they often do not have the material support in terms of personnel to make it work. It makes it more difficult for a volunteer to work without a liaison. We have some problems that become very complex in terms of land tenure for agroforestry. It has to be land that will stay stable in terms of government set-aside or, at least, not pass on in ownership. Land tenure and tree tenure are critical in terms of land resources.

**WiNR:** What about cultural problems for volunteers?

**Smith:** I think on the volunteer level we have problems that volunteers have always had culturally. Women volunteers in Latin America for the last twenty years have had problems being taken seriously by host-country men. There are situations in Islamic Africa where female expert volunteers attend meetings with Muslim forestry officials who will not direct any conversation to them. That is a very difficult cultural situation for American female volunteers. You may have the same kind of problem in Latin America, though it is probably more subtle. You are not outrightly ignored or indifferently treated, but you are not taken seriously either. We try to prepare female volunteers as well as male volunteers to deal with the cultural contingencies and conditions, because their success is only going to be within that cultural context. Now, on the positive side, many of the users of agroforestry products in Africa are women. Our women volunteers there have a great deal of success because they have an immediate credibility and acceptance with the women and can start working through and with them in the villages. So it cuts both ways, but there is no question that there are cultural difficulties.

**WiNR:** I found these situations in Asia as well. I had some advantages because the male volunteers could only talk to the women with difficulty and I could talk to both men and women.

**Smith:** Exactly. Where the female volunteer is the one who can work with both males and females, it is to their

advantage. In straight forestry, where departments are staffed mainly by men, there may be tremendous cultural prohibitions against women working outside of their cultural context; in a Muslim culture, it can be more difficult, for example.

**WiNR:** I assume that most agroforestry projects are subsistence projects. Are there opportunities for commercial agroforestry projects?

**Smith:** Very few, because the grass-roots subsistence level is where our primary focus is and where our energies and efforts go. As you know, volunteers are often assigned to AID-supported projects with private voluntary organizations. Although the volunteer might work at the subsistence level, the project itself may also be aimed at the mid-level infrastructure. So there is a link there, but we really depend on the private sector or other large development agencies to work at the commercial agroforestry level.

**WiNR:** I want to ask about how, in your opinion, the returned volunteers' experience might help them professionally?

**Smith:** Returned volunteers work at AID, at the World Bank, and with private voluntary organizations like CARE, Save the Children, and Catholic Relief. I think the Peace Corps experience prepares volunteers to work in development in a way that most people do not experience. Having worked at the grass roots level, at the village level, at the community level, you can build a career from there. Many organizations are looking for people who have cross-cultural sensitivity, who understand other cultures, who have a language, and who can fit right in, take a project, and manage it. So I think the returned Peace Corps volunteers have a great advantage whether it is in their home states, in Washington, D.C., or in another country.

Interview by Sue Ann Rodman. After finishing her B.A. in geology at Princeton, Rodman taught high school mathematics and science in Nepal for the Peace Corps. While working there, she developed interests in agriculture and forestry; she is now working on an M.S. in soils at Washington State University.

We need a Peace Corps volunteer.  
Call us at 1-800-424-8580, Ext. 93.

**PeaceCorps.**

The toughest job you'll ever love.

continued from page 46

- 51 Staudt, K. 1975/76. Women farmers and inequities in agricultural services, *Rur Afr* 9: 81-94.
- 52 Stroud, A. 1983. A vegetation assessment of Kisii District, Kenya. Nairobi, National Environment and Human Settlement Secretariat.
- 53 Swaminathan, M.S. 1980. Ecodevelopment of the Uttarakhand Region. *In: Bhatt, C.P. Ecosystem of the Central Himalayas and Chipko Movement*, Copeshwar, Deshauri Gram Swarajya Sangh, pp. 3-6.
- 54 Teal, W. 1984. The Kenya public tree seed directory. Nairobi, Heinemann Educational Books, Ltd. (In press).
- 55 United Nations Economic and Social Commission for Asia and the Pacific. 1980. Report of the expert group meeting on women and forest industries. Bangkok.
- 56 Varghese, B.G. 1978. Introduction. *In: Mishra, A. and Tripathi, S, Chipko Movement, Uttarakhand women's bid to save forest wealth*. New Delhi, People's Action, pp. 1-3.
- 57 Wiff, M. 1977. La mujer en el desarrollo agroforestal en America Central. Annex to the report on the FAO/SIDA seminar on the role of silviculture in rural development in Latin America. Rome, FAO.
- 58 Wood, D.H. et al. 1980. The socio-economic context of firewood use in small rural communities. Washington, D.C., USAID.

## IDAHO TRADING COMPANY

is a full-service timber  
products trading company.

Serving the inland northwest,  
we export logs and lumber to  
seven countries via the  
Columbia River system.

In providing that service, we:

- purchase and cruise timber
- manage sales and logging operations
- yard and sort
- provide specific dimension lumber
- facilitate paperwork/financing/export documents
- oversee shipping and loading

Idaho Trading Co., Inc.  
1225 6th Avenue North  
Port of Lewiston  
Lewiston, Idaho 83501  
(208) 883-0726  
Telefax 208-883-4323  
Telex 705870 IDAHO O/S UD

## PEOPLE

**T**he new president of the Ecological Society, **Margaret B. Davis**, has been a lifelong leader in the use of palynological data to study past vegetation dynamics, ecosystem processes, and response to climatic change. She began her work at Harvard, did postdoctoral work there, at Cal Tech and Yale, on clarifying the relationship between pollen in lake sediments and vegetation composition. The ultimate goal of this work was to enhance the precision of pollen records for describing past vegetation. Later, combining her interest in lake sedimentation and vegetation history, Davis became involved with ecosystem studies at the Hubbard Brook Experimental Forest where she examined Mirror Lake sediment. This was an attempt to understand the postglacial history of lake, watershed, and regional ecosystems. At this same time she studied the development of forest zonation in the White Mountains of New Hampshire.

Currently, Davis is examining the stability of canopy mosaics in hemlock-hardwood forests of northern Michigan. Formerly the head of the department of Ecology and Behavioral Biology (1976-1983) she is now Regents Professor at the University of Minnesota.

**JoAnn Kyril**, Superintendent at Fort Smith NHS received the Department of the Interior's Meritorious Service Award in recognition of her outstanding contributions toward resource management and community relations for the Park Service. Superintendent since 1979, she has made

substantial changes in visitation and interpretation procedures.

Eighty women from 23 National Parks gathered in Asheville, North Carolina for a workshop entitled "Expanding the Limits of Your Potential." The featured speaker was Rocky Mountain Regional Director **Lorraine Mintzmyer**. She asked the participants to define what it was they wanted in a career, to work on their liabilities, to set goals, recognize that employees make their own opportunities, find several mentors, participate in the social functions of the employing unit, be persistent, be a self-starter. Her logical last bit of advice was to be a mentor for others when success arrived.

**Jean R. Flack** is the Assistant Director of the University of Vermont's Environmental Program, an Assistant Professor in the School of Natural Resources, and a Vermont Natural Resources Council board member. She is a Kellogg National Fellow, and through that foundation and the university, she visited the Soviet Union as part of a long-term, comparative study of the relative effectiveness of land-use planning mechanisms in several nations. Her commentary on various issues confronting China and Kenya appeared in *Vermont Environmental Report* (1986) and her comments about the USSR appeared in the Spring 1987 issue. She noted that "beginning in the 1930s, the Soviets planned their urban and ex-urban landscapes very well—and then planned and built

again as World War II took a severe toll on their society. Apartment blocks are about ten stories high, spaced widely apart to allow for maximum sunlight penetration, formed into blocks as though around a courtyard, but on such a large scale that the courtyards contain a kindergarten, grade schools, and playing fields complete with winter ice hockey rinks.

Soviet citizens spoke with great pride about such aspects as trees and open green spaces in and around their towns and cities. Kiev residents boasted that they have more trees per person than any other city, and more beautiful and extensive parks. In most urban areas, town and regional plans require a specified amount of open space per person, so many trees per person, and so many new plantings per year. The exact ratios are high and vary from region to region. Greenbelts break up the spreading urban areas, and good-quality farmland cannot be developed. I thought of the planned open space concepts used so commonly throughout much of western Europe over the last 40 years, and I again imagined how fruitfully such concepts of planning could be used in Vermont."

**Christine Padoch** began studying indigenous agroforestry systems in the Iquitos area of Peru to figure out how the marketing systems works. Today she studies the native fruits of the Peruvian Amazon to identify and promote little-known but economically promising fruits. She has collaborated with several Peruvian

agencies in interdisciplinary studies since 1981.

•  
**Linda Hardesty** earned the first Ph.D. in Range Management in the United States. She reflected (August 31, 1987) about changes in opportunities for women with reporter Julie Bailey of the *Daily Evergreen* staff at Washington State University (WSU) where she is an assistant professor. "Everywhere I went, I was the first. Now women make up 40 percent of the total." Overall, as with many other departments in the U.S., enrollment in forestry, range management, and wildland recreation has declined in the recent past. Although the department has always had a few female students, Hardesty noted that there are no entering freshmen women this year. "We blame it on Reagan," she said. "He cut funding for range management and jobs disappeared. Now the industry is back, and there are no people to fill the new positions."

Enhancing the competitiveness of US forest products through research was the subject of the 1987 Forest Products Research Conference, held at the USDA Forest Service's Forest Products Laboratory in Madison, Wisconsin. Building quality into wood products and matching customer needs were two recurrent themes. One of the featured speakers was **Peg McNamara**, vice chair of the Federal Laboratory Consortium for Technology Transfer.

•  
As part of this year's activities at the College of Environmental Science and Forestry (ESF), State University of New York, the College held "Overview of Research by Women" at ESF wherein 13 women, including two faculty members, took the opportunity to present their research. Those presenting were **Ann Moore** Environment Science/Water Resources; **Deborah Shanahan** Landscape Architecture; **Sarah Wiles-Ehmann**

Forest Biology; **Stacy Guerin** Resources Management and Policy; **Susan Anagnost** Wood Products Engineering; **Marianne Burke** Forest Biology; **Melissa Ballard** Environmental Science; **Kathleen Stribley** Landscape Architecture; **Kathleen Kavanagh** Forest Biology; **Bernardita Calinao** Environmental Science; **Chun Juan Wang** Forest Biology; **Joanne Arany** Landscape Architecture. **Darleen Coleman** Deecher Biology, served as moderator, and **Judy Kimberlin** Personnel and Affirmative Action offered closing remarks.

PEOPLE



## NEWS AND NOTES

### **The Four-Year Itch Do Divorce Patterns Reflect Our Evolutionary Heritage?**

Most striking, in a sample of 58 populations where data are complete, there are three divorce peaks—among couples married for four years, among people between the ages of 25 and 29, and among couples with no children or one dependent child. The risk of divorce for men and women in their late twenties is always high, however, regardless of where the divorce peak falls with respect to numbers of years married.

A three-peak pattern appears unrelated to a country's high or low divorce rates. Finland is a typical example. In the 1950s, the divorce rate was relatively low; it has risen steadily since. But the "profile" of divorce has remained almost the same. In 1950, divorces peaked among couples married four years and among women aged 25 to 29 and men aged 35 to 39. Seventy-one percent of divorces involved couples with one dependent child. In 1966, divorce peaked after the third year of marriage, then shifted back to the four-year peak in 1974 and 1981; for these years, the peak for men and women was in the 25 to 29 age group. The overall pattern remained remarkably similar in all four decades, despite a doubling of divorces. With some variation, this pattern is seen around the world. Across the United Nations sample, an average of 48 percent of the divorces occur within seven years of marriage; they cluster around the four-year peak. So divorce commonly occurs early in marriage among couples at the height of their

reproductive and parenting years.

So here is my theory: Perhaps, like serial monogamy in robins, foxes, and other species that mate only for a breeding season, the human pair bond originally evolved to last long enough to raise a single child through infancy. The seven-year itch, recast as a four-year human reproductive cycle, may be a *biological* phenomenon.

For early human groups, serial monogamy, as opposed to lifelong bonding, would have extended an individual's ties. Contemporary observers have commented on the growing role of the "new" extended family, which includes stepparents and other steprelatives. Given the hypothesis that serial pair bonding evolved on the grasslands of Africa two million years ago, these multiconnected households are not new at all. ....Helen E. Fisher, *Natural History* October 1987

### **Record Tree-Planting Program Underway in the US**

The Conservation Reserve Program (CRP), established under the 1985 Farm Bill, should result in a record 3-5 million acres of tree-planting through 1991. Reaching that goal would make it the largest tree-planting program in the U.S. history, eclipsing efforts of the Civilian Conservation Corps (CCC), The Soil Bank, Forestry Incentives Program (FIP/ACP), and planting on the national forests during any five-year period. ....*Forest Industry Newslines*, September 1987

### **How Comfortable Are You With Being Alone?**

For some, being alone is a welcome grace period between time with friends, work, and family. For others, it stirs up feelings of loneliness, anxiety, or vague fears. Are you uncomfortable being alone? You are, if you often use the excuse that you're too busy to find time for yourself, believes Carol Bandini, a psychotherapist who teaches a course in "The Capacity to Be Alone" at Marymount College in New York. Compulsively flipping on the TV or doing household chores when you're by yourself is another sign of a solitude-avoider.

To become more comfortable being alone, set aside a distraction-free block of time. If you feel tense, relax your body with stretches. After a few moments, spontaneous thoughts and feelings will begin to surface. Pay attention. Often they will prove to be the thoughts and anxieties that you block out with activity. Try to determine what it is that you may have been avoiding. You might realize, for instance, that an amorphous feeling of loneliness can be traced to the absence of a particular person or that the anxiety you feel when you are alone stems from an unheeded desire to change some aspect of your personal or work life. Identifying the origins of your feelings should lessen their control over you. You may discover that it's suddenly easier for you to find time for quiet introspection. ....*Glamour* August 1987

WiNR invites you to submit your manuscript for consideration.



**ICRAF Celebrates 10th Year**

The International Council for Research in Agroforestry (ICRAF), with world headquarters in Nairobi, will celebrate its tenth anniversary this year. The highlights of this occasion will be the inauguration of the Council's new headquarters in Gigiri, Nairobi, an international conference for planners and policy-makers, and a technical seminar for research workers. The land for the headquarters, measuring 2.783 ha, was donated by the government of Kenya and the funds for the construction of the building were provided by the Canadian International Development Agency, the government of the Netherlands, and the Swiss government.

The Council, which is the only organization with an exclusive global mandate to conduct agroforestry research, has the objective of initiating, stimulating, and supporting research leading to more sustainable and productive land use in developing countries through the integration or better management of trees in land use systems. The Council derives its operational funds from voluntary contributions from various bilateral, multilateral, and private donor organizations. The budget for Financial Year 1987 is about US\$ 4 million. ....*Stop Press* April 1987

**Forest Service, BLM Urged To Salvage Burned Timber And Count it Nonchargeable To The Allowable Sale Quantity**

The Western Wood Products Association (WWPA) urged federal agencies to place the highest possible priority on harvesting timber damaged by this summer's fires in the west. WWPA's Resources and Environment Committee recommended that burned roadless areas not designated as Wilderness be accessed immediately for site rehabilitation, timber salvage, and reforestation, and that all timber recovered should be counted as nonchargeable to the allowable sale quantity of each

forest. Similar action has also been proposed by northwest legislators. More than 750,000 acres were burned, containing 2-3 billion board feet of timber. In response, California Forest Service officials said they planned to salvage 1.3 billion making it the largest in the state's history. Officials said that about 85 percent of the 1.6 billion feet of timber killed in the fires will be salvaged within the next two years, before insects and fungus make the timber unmarketable. Estimated value (pre-fire) of the timber was more than \$240 million. The fires were the worst in two decades for the west.

....*Plumb Line* September 25, 1987

*If I do not control food, there is nothing else I can control in this world—*

**Women and Africa's Food Crisis**

Our rulers today—our ministers of agriculture today—are busy interlinking with the multinationals, with international markets, and forgetting that we are the basis of their power. If we are starving, they should be ashamed. While we are starving, they have the power to ask for more and more aid over our poverty. As a village woman, I know what it means to be without a seed. I know what it was in the good old days when I used to go and harvest and come back and select the seed for the following year. And I know that because of the hybrid seed, I can no longer do that.

But I can tell you, when one day I was in a meeting in Harare and I stood up to say that kind of thing the then minister of agriculture stood up to say, "Here is a woman who wants to take people back to the 18th century. That is no longer possible." And yet I know that before, I had control over my seed. I could select the seed for the following year. But because today I am using the hybrid seed, I cannot reuse it. I have to go back to the one who controls the seed.

I know also that my well is in my field so that when I come from my agricultural chores, I can take a bucket

of water back home. But where I have used lots of fertiliser around my well, my water has been contaminated by that fertiliser. I know that if you intercrop, some crops during drought will survive, others will die. But my agricultural experts tell me not to

do that because it is primitive.

If I do not control food, there is nothing else I can control in this world because food is also used as a political weapon on me and my children.

....Sithembiso Nyoni (Executive Officer, Organisation for Rural Associations for Progress, Zimbabwe) in *Women and Environments* Fall 1986

**Agencies Agree On Oregon Trail Plan**

The great transcontinental migrations of the 1840s and 50s will receive new emphasis at Ft. Laramie National Historic Site, Wyoming, in the coming months following an agreement between the National Park Service and the Bureau of Land Management to mutually administer two recently "rediscovered" sections of Oregon Trail Ruts located near the fort. Thousands of emigrants annually stopped at Ft. Laramie which is located along the Oregon/Mormon Pioneer National Historic Trails some 600 miles or about 40 days by wagon out of St. Joseph, Missouri, a popular emigrant starting point. As the wagon trains converged on and then departed the fort they made an ever deepening mark on the land and today two pristine ruts, one to the east and one to

## NEWS AND NOTES

---

the west of the fort, mark their passing.

Today, the scene from this point is little changed from that viewed by the emigrants as they continued their westward trek. Today's traveller can gaze without obstruction on the fort to the south, the Platte River to the north and Laramie Peak 40 miles west.

*Lorraine Mintzmyer*, director of the National Park Service's Rocky Mountain Region and *Hillary A. Oden*, Wyoming State Director of the Bureau of Land Management signed a memorandum of understanding which provides for joint management of the two sites. At present, visitation at these ruts is infrequent and light. Improvements and additional publicity should generate interest among many of the fort's 90,000 visitors.

....John C. Burns, *Headquarters Heliogram* August 1987

### **Enrollments Of Women in Natural Resources Increase At SUNY**

The number of women enrolled at the College of Environmental Science and Forestry (SUNY) has increased significantly over the past 10 years. In 1977, 71 women represented 20.5 percent of the total of 346. In 1977, 71 women represented 20.5 percent of the total graduate enrollment of 346. In 1986, 131 women represented 34 percent of the enrollment of 385. The percentage of advanced degrees awarded also shows an increase. In 1977, five women represented 8.2 percent of the 61 master's degrees awarded; in 1986, 17 women represented 23 percent of the 74 master's degrees awarded. When examining

### **Wildlife Plays Around Cemeteries, Highways, and Golf Courses**

The residents of Boston have extended the idea of wildlife observation in parks to their cemeteries. About one-third of the remaining open space in Boston exists in cemeteries. Several cemeteries across the country, such as Forest Lawn in New York, publish brochures about the plants and animals found on the grounds. Golf courses and corporate and institutional grounds are generally similar to cemeteries in vegetative composition.

Rock Creek Park in Washington, DC, and the Wheat Ridge Greenbelt in Denver are good examples of vegetated creek corridors that are veritable havens for many wildlife species. Municipalities and highway departments are doing wildlife a favor by mowing less frequently and planting wildflowers along road embankments.

It is commonly perceived that only animals from dense populations outside the city use the corridors to enter urban areas. However, given the lack of large predators, the high diversity of plant life, and the local abundance of some foods, the opposite may also be true, because urban squirrel, rabbit, and raccoon densities are typically much higher than those in the surrounding rural lands. In Tucson, sensitive wildlife corridors have been identified and protected to ensure the passage of roadrunners and javelina in and out of the city limits. ....Dave Tylka, *American Forests*, September/October 1987

### **Leave Band-aids at Home**

For years wound treatment has centered around the scab that forms over a freshly healing wound. Actually scabs impair optimal wound healing because they allow wounds to dry out. The skin is one of the few organs that is capable of regeneration of cells, and this regeneration occurs much more slowly in a dry wound than in a moist one. A scab impairs oxygen transfer to the new cells that

are growing in the base of the wound—with increased scarring a definite possibility.

Dressings which completely cover the wound and the surrounding skin are made of polyurethane, which allows the skin to breathe yet traps the protein-rich cellular juices that accumulate around a wound. Water and bacteria are effectively blocked, allowing normal washing. Since polyurethane films are transparent, the wound can be observed without removing the dressing. It looks slightly bloody and is surrounded by a pocket of straw-colored fluid. We usually associate this kind of wet appearance with an infection, but it is normal with this new approach to dressing wounds. Called Tegaderm, the dressings conform to knees and elbows, stitches, and gouges. Manufacturers have already begun marketing these easily removed dressings to consumers. They are more expensive initially—but are much more durable and hence last much longer.

....Carl Melina, M.D., *Daily News/Idahonian* September 24, 1987

### **Women in Horticulture**

Horticulture deals with the development of growing things—plants, fruits, flowers and vegetables. For many people, horticulture is just a hobby, but for a growing number of women, it offers many different career opportunities, from working in public parks to owning a plant nursery. Women now make up about half of all horticulture majors, compared to only 20 percent 15 years ago says Bruno Moser, head of the horticulture department at Purdue University. Jobs that require an education in horticulture “make up one of the fastest growing areas in the service professions,” he noted.

....*Glamour* August 1987

**Moving?** Send us your new address. Your issue is not forwarded unless you make arrangements with the post office.

### Don't Give Everyone a Computer

• **Plan Ahead.** Real office productivity comes from changing work processes and eliminating steps throughout the organization, not just speeding up work. That may mean rethinking the entire management system and structure to tap automation's full potential. This is a job for top managers/executives, not information systems managers.

• **Be Selective.** Don't automate across the board. Identify one or two, well-defined tasks that are critical to the agency/company mission and make sure the objective is measurable. Don't give everyone computers at first. Target the 20% who can assure the success of the initial experiments. The other 80% will follow.

• **Be Patient.** Climbing the learning curve takes time. Technology will change your organization's culture, as well as its methods, and it could take two years or more for employees to adjust. Don't let data processing managers try to protect their own turf. Reward them for actively anticipating the needs of employees.

• **Measure the benefits.** Doing things faster is a change but not necessarily a benefit. Monitor whether the technology alters behavior, assess whether that is good, and calculate the value of that change. Figure out where the time went. The highest payoff may come not from cutting staff but from using that extra time to do a better job.

• **Communicate.** Tell your employees why you want to automate, and get their help in designing and implementing the system. Appoint a complaint czar and encourage employees to identify what's not going smoothly. Fix it quickly. If the new equipment includes personal computers, expect to spend about the same amount on training and support that you spend on computers.

....*Business Week* October 12, 1987

### Great News! A Park is Born!

On August 15th a new national park was added to the venerable list of the oldies and goodies. Nevada's Great Basin Park is the first new one in the contiguous 48 states in a long time. It is 76,800 acres in area and boasts the groves of picturesque bristlecone pines which are estimated to be 3-4,000 years old. They are rare, and they grow at high elevations. They can be seen after climbing seven miles from Wheeler Park Campground. Other features of the park include Sonoran sagebrush communities and arctic tundra life zones.

....*CK Grapevine* October 1987

### WINR accepts Advertising!

Our rates: \$300.00 for a full page, or \$150.00 for a half, \$100.00 for a third, and \$75.00 for a quarter page. Call us at (208) 885-6754

### Black Walnut, The Ideal Agroforestry Tree Species

Eastern black walnut (*Juglans nigra* L.) is, and historically has been, the most valuable of American native woods. Its wide use in the production of furniture, wall paneling and gunstocks has resulted in accelerated reductions in the availability of large-size trees beginning as early as 1960. Its outstanding physical properties, aesthetic qualities, the scarcity of large-diameter, high quality stems and certain characteristics of the foliage and root system further endears black walnut as an "ideal" species for agroforestry practices.

Black walnut is one of the latest species to break dormancy in the spring and one of the first to defoliate in the fall. It typically has a growth period of only 90 to 135 days. For an intercrop species such as winter wheat, any extension of full sunlight in the spring can be very important if yields are to be maximized. Early foliage loss in the fall means more

direct sunlight for intercrop species and a reduction in competition for moisture which is frequently in short supply in late summer. Thirty-five-year-old trees planted at 30-foot spacings have been shown to have average light intensities of more than 3000 foot candles for up to five hours in the middle of the day (Hupe 1980). Smith (1942) reported that average light intensities under walnuts were greater than for any other common tree species in the southeastern Ohio area.

A black walnut's root system is also uniquely designed for agroforestry practices and leads to reduced competition for soil moisture and nutrients between the trees and intercrops. While walnut grows best on deep, well-drained nearly neutral soils, root characteristics are similar over a fairly wide range of soil conditions. Typically it produces a deep, penetrating taproot which may extend to over seven feet in the absence of physical barriers. Its long branch roots are found close to the surface, but most of the smaller branches turn down sharply into the soil. While 85 percent of all roots greater than 0.04 inches in diameter may occupy the upper two feet of soil, the greatest concentration is normally found at four-to-eight inches. This leaves a shallow zone near the soil surface for maximum root development of intercropped species.

....H. E. Garrett, W. B. Kurtz and J. P. Slusher *Eastern Black Walnut Plus Agronomic Crops Equals Profitable Diversification* (Adapt 100 Conference paper).

# EVENTS

## 1988

### January

*Restoring the Earth*, 13-16 January 1988 Berkeley, California. Topics include restoration of coastal ecosystems and estuaries, rivers and lakes, streams and fisheries, rangelands, prairies, forestry, toxic wastes, and a host of others. For information contact the conference chair at 1713 Martin Luther King Jr. Way, Berkeley, California (415-777-9515).

*Society for Historical and Underwater Archaeology* 14-16 January 1988 Reno, Nevada. At the meeting, members will discuss organizing a women's caucus. This group would not be a "committee" within SHA because of specific functional and legal policies of the Society. Because of a reduced number of women entering Ph.D. programs, holding tenure-track positions, and obtaining research grants, a committee of five circulated to the members a request for comments and suggestions. Many women archaeologists from the Society work for the Forest Service, the BLM, and the Park Service. For information on the general meeting contact Donald L. Hardesty, Department of Anthropology, University of Nevada, Reno, Nevada 89557. For information on the caucus, contact Julia Costello, SHA Board Representative, Box 288, Mokelumne Hill, California 95245, or Mary C. Beaudry, Archaeology Department, Boston University, 232 Bay State Road, Boston, Massachusetts 02215 (617-969-8382).

### February

*Western Section of the Wildlife Society*, 10-13 February 1988 Hilo, Hawaii. The theme for the annual meeting is conservation biology's role in wildlife management as it pertains to issues, concerns and opportunities. Contact John G. Kie, Program Chair, Forestry Sciences Laboratory, 2081 E. Sierra Avenue, Fresno, California 93710 (209-487-5589).

*American Association for the Advancement of Science*, 11-15 February 1988 Boston. For information contact Arthur Herschman, Head, Meetings and Publications Center, AAAS, 1333 H Street NW, Washington DC 20005 (202-326-6448).

*Association for Cross-Cultural Research*, 19-21 February 1988 El Paso, Texas. Contact Alice Schlegel, Program Chair, Department of Anthropology, University of Arizona, Tucson, Arizona 85721

*Shadetree Shortcourse*, 20-24 February 1988 University of Minnesota. Sponsored by the Minnesota Department of Agriculture and Minnesota Extension Service. Contact Ken Holman, Extension office, University of Minnesota (612-296-3343).

*Society for Range Management*, 21-26 February 1988 Corpus Christi, Texas. The theme for the annual meeting is "Ranching through the eyes of Texas." For registration materials write W. Allan McGinty, Texas Agricultural Extension Center, Box 1298 Fort Stockton, Texas 79735.

### March

*North American Wildlife and Natural Resources Conference*, 18-23 March 1988 Louisville, Kentucky. For information contact L. R. Jahn, Wildlife Management Institute, 1101 14th Street NW, Suite 725, Washington, DC 20005 (202-371-1808).

*Trends in Wildlife Resources Use—Impact on Future Programs*, 27-30 March 1988 White Sulphur Springs, West Virginia. For information contact Bob Miles, West Virginia Department of Natural Resources, Division of Wildlife Resources, 1800 Washington St. East, Charleston, West Virginia 25305.

*Systems Analysis in Forest Resources Management Symposium*, 29 March to 1 April 1988, Asilomar, California. Sponsored by SAF. For more information contact Brian M. Kent, USDAFS, 3825 E. Mulberry, Fort Collins, Colorado 80524 (303-224-1750).

### April

*Women in the Year 2000: Utopian and Dystopian Visions*, 7-9 APRIL 1988 Indiana University-Purdue University. The impact of changing social practices on women—as the 21st Century arrives—will be assessed. Sponsored by the IUPUI Women's Research and Resources Program, School of Liberal Arts and Women's Studies program. For information contact IUPUI Women in the Year 2000 Chair, CA 001D, 425 Agnes St., Indianapolis, Indiana 46202.

*Fishing with Electricity*, 11-15 April 1988 England. Sessions will cover electrophysiology of fish, electric fishing apparatus, and the electrical field. For information write I. Crowx, Humberstone College, School of Science, Cottingham Road, Hall, England.

*TAPPI Environmental Conference and Trade Fair*, 18-20 April 1988 Charleston, South Carolina. For more information, contact Gary L. Vosler, Willamette Industries, Inc., P.O. Box 339, Albany, Oregon 97321 (503-926-2281).

*Association for Arid Land Studies*, 27-30 April 1988 Denver, Colorado. The annual meeting will be held in conjunction with the Western Social Science Association. For information contact Andrew Schoolmaster, Dept of Geog/Anth, North Texas State University, Denton, Texas 76203.

*Brown Trout Biology, Use, and Management*, 28-30 APRIL 1988 Asheville, North Carolina. Sponsored by the Trout Committee, AFS, and the North Carolina Council of Trout Unlimited. Contact T. Wayne Jones, Division of Boating and Fisheries, 512 N. Salisbury Street, Raleigh, North Carolina 27611.

## June

*History and Ecology of Salt Marshes in the Gulf of Maine*, June 1988 University of Maine. Topics include marsh formation, changes, farming of salt hay, and current regulations of marshes. Field trips to eastern Maine and Nova Scotia are included. Contact Becky Grant, Canadian-American Center, University of Maine, 154 College Avenue, Orono, Maine 04469.

*History of the USDA*, 15-18 June 1988 Ames, Iowa. Sponsored by the Agricultural History Society and the Center for Historical Studies of

Technology and Science at Iowa State University (ISU). Several sessions will deal with USDA scientific, technological efforts, and others will mark the centennial of the USDA to cabinet rank. Contact Alan I. Marcus, 635 Ross Hall, ISU, Ames, Iowa 50011.

*Leadership and Power: Women's Alliances for Social Change*, 22-26 June 1988 University of Minnesota. The National Women's Studies Association and the University of Minnesota are co-sponsors of the conference whose theme is how women of various backgrounds can work together. For more information contact Lori Graven 217 Nolte Center, 315 Pillsbury Drive SE, Minneapolis, Minnesota 5545-0139 (612-625-9023).

## August

*Billfishes of the Atlantic, Pacific, and Indian Oceans*, 1-5 August 1988 Kailua-Kona Hawaii. The Marine Recreational Fisheries meeting is sponsored by the National Coalition for Marine Conservation, the International Game Fish Association, the Sport Fishing Institute, the National Marine Fisheries Service, and the Billfish Foundation. To submit a paper, contact Ken Hinman, National Coalition for Marine Conservation, PO Box 23298, Savannah, Georgia 31403.

*Ecological Society of America and American Institute of Biological Sciences*, 14-18 August 1988, Call for papers. The theme of the annual meeting will be biological diversity with special emphasis on conservation biology and an overall program which will be comprehensive in nature, covering the full breadth of ecological subdisciplines. Abstracts will be reviewed (on abstract forms) no later than 29 January 1988. For information contact Stephen J. Chaplin, ESA Program Chair, The Nature Conser-

## EVENTS

### 1989

#### April

*Planning and Implementing Agroforestry Programs: An International Symposium*, April 1989 Washington State University (WSU), Pullman, Washington. For information contact Linda Hardesty, Department of Forestry and Range Management or William Budd, Program in Environmental Science and Regional Planning, both of WSU, Pullman, Washington 99164 (Telex 510-774-1099 COLL AG PMAN).

MICHAELSEN'S  
MICRO MAGIC  
306 Walnut Drive  
Fredericksburg,  
Virginia 22405

To Natural Resource Professionals:

The fastest-changing field to learn about today is computer uses in natural resources. I write the Natural Resources Computer Newsletter, which covers computer applications with special relevance to fish and wildlife biologists, foresters, ecologists, soil scientists, naturalists, and land managers.

Regular features include One Person's Opinion, the Consultant's Corner, and a Question and Answer Column, in addition to articles.

This newsletter is published six times a year and is available only by subscription. For more information, contact Nancy Michaelsen at 306 Walnut Drive, Fredericksburg, Virginia 22405 (703-371-7522), or send \$1 to receive a sample issue.

## KIOSK

The Society of American Foresters (SAF) is inviting **nominations** for the Technology Transfer and Extension Award which goes to a SAF member who is active in the field of technology transfer and/or a working group. All nominations must be mailed no later than December 31, 1987 and should be accompanied by a one-page biographical sketch of the nominee and his/her contributions. For more information contact SAF's Department of Science and Education, 5400 Grosvenor Lane, Bethesda, Maryland 20814 (301-897-8720).

The **Park Service Education Trust Fund** receives all of the proceeds from the sale of *What's Cooking in the National Parks*, published by Cookbook Publishers, Inc. There are photos to look at while you cook and the good thoughts of your \$6.35 purchase price benefitting a Park Service employee's child to keep your heart warm. Send orders to P.O. Box 5068, Kansas City, Kansas 66119.

When a person suffers from **chronic lower-back pain** or severe arthritis, it is likely that they could benefit from a physiatrist's care. Always get a second opinion from these rehabilitation physicians before agreeing to surgery. For general, chronic, debilitating pain, the chances are good, also, that a physiatrist can help. To request a list of board-certified physiatrists in your state, write to *Ike Mayeda*, Executive Director, American Academy of Physical Medicine and Rehabilitation, Department P, 122 S. Michigan Avenue, Suite 1300, Chicago, Illinois 60603-6107.

The Forest Industries Political Action Committee hopes to raise \$200,000 for **political contributions**

in the 1988 congressional elections. More information is available from the committee at 1250 Connecticut Avenue NW, Washington DC 20036 (800-345-NFPA).

In a **Peace Corps** recruiting letter sent out by Director *Loret Miller Ruppe* and *R. Max Peterson*, Chief of the Forest Service Emeritus, they note that there are some very practical reasons for enlisting in the Corps. They write, "In a competitive field one needs an edge. In the Peace Corps not only will you be gaining additional professional experience and skills, when you come back to the States you'll receive a one year non-competitive eligibility for federal jobs. That means, as long as you meet the basic requirements of a federal job, you will go to the top of the list; effectively cutting competition and directly enhancing your ability to be placed in that job."

"What's a Natural Resource?" is a 15 1/2 minute 16mm film with study guide for primary students. A park ranger helps children understand the difference between renewable and nonrenewable natural resources in a picnic setting. Contact *Alfred Higgins* Productions, Inc., 9100 Sunset Blvd., Los Angeles, California 90069 for video, preview, and rental options.

A free **fact sheet on PCBs** in Lake Michigan fish is available from the University of Wisconsin Sea Grant Institute. It summarizes the current state fish consumption advisory for PCBs, tells which fish are considered safe to eat, and explains how to

properly clean and cook fish to reduce PCB levels by as much as 30 percent in lake trout, and up to 50 percent in chinook salmon. Write the Institute at 1800 University Avenue, Madison Wisconsin 53705 for the free sheet.

Two fellowships will be awarded in 1988-89 to post-doctoral scholars to work on a book-length, original manuscript that focuses on the relationship between cultural context, domestic or international, and women's lives. Scholars will be in residence at the University of Arizona and will receive a \$30,000 stipend. The proposal requirements can be obtained from Women's Studies/SIROW, University of Arizona, Tucson, Arizona 85721 (602-621-7338). Complete materials must be postmarked by January 15, 1988.

Washington State University has been conducting a series of **agroforestry presentations** (during fall semester) which are now available in proceedings form. The seven speakers were invited from this country and abroad and covered a broad range of topics. For more information or copies, contact *John Bassman*, Department of Forestry and Range Management, Washington State University, Pullman, Washington 99164-6410.

The International Education Department at Berkeley announces an opportunity for graduate students to do research and **fieldwork in India**. Participants work with Indian faculty and professionals in developing projects related to their professional and research interests. The deadline for applications is January 4, 1988. Contact *Linnea Soderlund*, International Education U.C. Berkeley, 2538 Channing Way, Berkeley, California 94720 (415-642-1356).

# Information for Contributors

The journal, *WOMEN IN NATURAL RESOURCES*, aims to provide information and ideas for, from, and about women on topics related to the natural resource professions of forestry, wildlife, range, fisheries, recreation, arboriculture, ecology, biology, and the social sciences as they relate to natural resources. We address issues of administration and personnel, gender-related topics, educational resources, and support mechanisms. *women in Natural Resources* seeks contributions that will effectively integrate the factual, the personal, and the philosophical aspects of the working professional. We also seek technical articles suitable for reading by professionals in many natural resource fields. Information from readers tailored for the departments is also solicited.

As seen by this issue, the format is flexible. Submit manuscripts in the style dictated by your profession or agency. Clarification of that style is the prerogative of the editors. Please check with the editorial office about sending manuscripts on Apple Macintosh or IBM disks.



# Information for Advertisers

Advertising suitable for *WOMEN IN NATURAL RESOURCES* readers is solicited. Camera-ready black and white, or copy suitable for our graphics department is priced from \$30.00 (2 1/2" x 2 1/2") to \$300.00 (whole page). For more information, contact the editorial offices.

# Information for Subscribers

The basic subscription rate is \$15.00 per year. Individual issues are printed and sent quarterly. The journal is sent bulk mail, which is not forwarded (unless *special* forms are submitted to the post office); nor are unclaimed journals returned to us. Subscribers are billed after four issues have been sent. For new subscribers, fill out the coupon below.



Return this form with payment to:

*WOMEN IN NATURAL RESOURCES*  
Bowers Laboratory  
University of Idaho  
Moscow, Idaho 83843 U.S.A.  
(208) 885-6754

Name

Telephone

Address

City/State/Country

Position or Title (major, if student)

Organization (school, if student)

Amount enclosed (check one):

Make check payable to WiNR

\$15.00 U.S. subscribers

\$10.00 student

\$30.00 government/agencies/libraries/foreign

Check here if you will permit *WOMEN IN NATURAL RESOURCES* to use this information in a published network listing. If you do not check this box, your name will not be released



University of Idaho

WOMEN IN NATURAL RESOURCES

Bowers Laboratory

Moscow, Idaho 83843

Non-profit Organization

U. S. Postage

PAID

Moscow, Idaho 83843

Permit No. 120

152-Y225