Wageningen University - The Netherlands
P.O. Box 342, 6700 AH Wageningen
500 Forestry

F500-338 **Agroforestry Ecosystems**
12C-12PJ-2
Restricted optional for S13A (2), S13B (2)
Lecturer(s): dr FJJM Bongers, dr ir JF Wienk
Examiner(s): dr FJJM Bongers
Examination: written examination and presentation of group report.
Contents:
Concepts and classifiactions of agroforetry ecosystems, origin and evolution, structure and functioning, dynamics and manipulation through mangement, examples.
Objectives:
Knowledge of the subject presented, insight in the ecology of agroforestry ecosystems and in the possibilities and limitations of applications of these systems.
Actvities: Preparing for and attending to lectures, studying literature.

F500-218 **Community Forestry and Rural Development**
24C-L-3
Restricted optional for S13A (2)
Lecturer(s): dr ir KF Wiersum
Examiner(s): dr ir KF Wiersum
Examination: written exam, optional paper
Contents: Objective of course: to present an analytical framework for evaluation of the development relevance of forestry activities in tropical countries and to obtain an understanding about the various relevant factors influencing the possible role of forestry for rural development.
Subjects treated: diversity in forestry development strategies, socio-economic causes of deforestation, traditional and adaptive forest and tree management systems, social forestry strategies, role of forestry organizations in rural development.
Activities: Attending lectures and preparation of a paper
Examination: Written examination and paper.
Literature: Lectures note and reader.

CATIE

Tropical Agroforestry Systems Course
Coordinator: Alberto Camero
Date: 17 July - 4 August, 2000

OBJECTIVES:
Updating the agroforestry knowledge of the participants. Analysis of agroforestry techniques. Establishment of basic knowledge to promote the teaching, diffusion and implementation of agroforestry systems.

CONTENT:
Conceptualization, classification, structure and functioning, ecological, biophysics and socioeconomic interactions of agroforestry systems, interactions between the tree and soil, crop and animal components. Agroforestry systems with annual crops, amongst others.

Virginia Tech

FOR/CSES 4334

Principles and Practices of Agroforestry Systems
SYLLABUS

Instructor: Professor William F. Hyde, Forestry

Course Description:

The course will be problem-oriented. It will begin with the identity of problems in agroforestry and then discuss their solutions. These introductory discussions will provide context for subsequent and more detailed discussions of agroforestry species and agroforestry systems. The course will cover both biological and social science aspects of agroforestry.

Text and Readings:
The required text is: P.K.R. Nair. 1993. An Introduction to Agroforestry. Boston: Kluwer Academic Publ.

Additional readings may be added for particular classes. Students may wish to familiarize themselves with some of the following:
The publications of (a) the UN/FAO Community Forestry program and (b) the ODI Rural Development Forestry Network. Many of these are available from the instructor.
The journal, Agroforestry Systems, published by the International Center for Research in Agroforestry (ICRAF). This journal is in the Tech library.
Also, Anderson, 1987, The Economics of Afforestation. Baltimore: Johns-Hopkins, and books by W.R. Bentley, and J. MacDicken.

Course Objectives:
1.Define the principles and practices of agroforestry systems.
2.Identify the role (and limits of) agroforestry systems in meeting the food, fuel and fiber needs of farm household producers and consumers. Identify the general problems that agroforestry intends to address.
3.Discuss the process of planning and adoption of new agroforestry practices.

Course Format:
Class periods will include lectures and discussion. The instructor will be the principal lecturer, but the class will also draw on a remarkable array of Virginia Tech faculty talent available on this topic.

Class Presentation:
Each student will prepare a class presentation on a selected problem or case study in agroforestry. The problem can originate from tropical or temperate forestry, developed or developing countries, and it can feature biological or social science aspects of agroforestry. The assumption can be original, or it can draw on extensive external readings.

The topic of the presentation should be a source of genuine student interest. It will be discussed in class, and the topic must be approved by the instructor within the first four weeks of class.

Grading:
Credit toward a final grade will be allotted as:

Mid-term Exam I	40%
Class Assignments	30%
Class Presentation	30%

Exams will draw on lectures, classroom discussion and assigned readings.

Sequence of Lectures and Textbook Reading Assignments:
Additional outside readings may be assigned, and the lecture sequence may be altered to satisfy specialized student interests.

Lecture	Objective & Assignment
1	course organization
2-3	Agroforestry round table
4-8	Nair chapters 1-10
9	Feldhake/Beckley field trip
10-12,15	agroforestry systems & sustainability
13-14	soils, Nair Chapters 14-18
16	marketing, Nair chapters 22-23
17	mid-term exam
18-28	class projects or papers

University of Florida
AGROFORESTRY
Instructor: P.K. Nair
email pkn@gnv.ifas.ufl.edu

http://www.sfrc.ufl.edu/Faculty/Web_Pages/PKRNair/agrofor.html

Purpose of Course:

To familiarize the students with:
1. The concepts and principles of agroforestry (AF)
2. The complexity and diversity of AF
3. Improved AF technologies: tropical and temperate zones
4. Recent research initiatives and results
5. Problems and methodologies of AF research
6. Potentials of AF in land management and international development

Course Policy:
The emphasis of the course will be on the tropics and subtropics. Prerequisite to the course is an understanding of the problems and principles of land management, especially in developing countries: resource limitations, fragile soils, "basic needs" approach vs commercial production, multiple land-use systems. Students are expected to be familiar with the fundamentals of agri./forestry prod. systems and soil management particularly in the tropics. The course will consist primarily of lectures, classroom discussions, and library research. Each student is required to prepare a major term paper and present a poster based on that (see the attached guidelines).

Text Book:
Nair, P.K.R. 1993. An Introduction to Agroforestry. Kluwer Academic Publishers, Dordrecht, The Netherlands. Paperback, ISBN 0-7923-2135-9. Available at http//echonet.org/shopsite_sc/store/html/Agroforestry.html for $45.00 plus shipping.

* Reference Books:
Buck, Lassoie, Fernandes: Agroforestry in Sustainable Agri. Systems, CRC Press, 1999
Ashton and Motagnini: The Silvicultural Basis for Agroforestry Systems, CRC Press, 1999
Nair and Latt: Directions in Tropical Agroforestry Reseearch, Kluwer, 1998
Young: Agroforestry for Soil Management, 2nd ed., CABI Intl., 1997
Gordon and Newman: Agroforestry Systems in the Temperate Zone, CAB Intl., 1997
Ong and Huxley: Tree-Crop Interactions, CAB Intl. 1996
McDicken and Vergara: Agroforestry. Wiley, New York; 1990
Nair: Agroforestry Systems in the Tropics, Kluwer, Netherlands; 1989

*Copies of these, except the first two, are kept ON RESERVE in the Science Library.

Reference Journal:
Agroforestry Systems (Kluwer Academic Publishers) (Since 1982)

Course Outline
The history, definition, concepts, and principles of AF
Examples of existing AF systems
Classification of AF systems
Improved AF technologies
Improved fallow; homegardens; alley cropping; mulching/green manuring; fodder banks
Temperate-zone AF
Plant aspects of AF
AF species; multipurpose trees, tree fodder, and firewood species; fast-growing, N2-fixing trees; herbaceous species; plant management in AF
Soil aspects of AF
Nutrient cycling; mulch quality and decomposition; soil productivity management; soil conservation
Silvicultural management and forest operations related to AF
Economic aspects
Economic and financial analysis, valuation of products and benefits, cost:benefit, IRR, NPV.
Social aspects
Sociocultural linkages in AF; land tenure; gender issues in AF Institutional aspects of AF
The dichotomy between agri. and forestry; institutional dilemma of AF
Design and evaluation of agroforestry systems
Research methodologies and criteria; the Diagnosis and Design approach; analysis and interpretation of data in AF; evaluation of AF systems

Introduction to Agroforestry

http://www.rr.ualberta.ca/courses/RenR401.htm
REN R 401
Department of Renewable Resources, University of Alberta

Introduction to Agroforestry (REN R 401)

Instructor: P.D. Khasa
E-MAIL ADDRESS: Damase.Khasa@UAlberta.CA.

1. Course outline:

This course is designed to meet the needs of undergraduate and graduate students who are interested in the subject. It focuses on the principles and technologies of sustainable and efficient agroforestry systems with respect to the biophysical, socio-economic, political, and cultural environment. Now that there is a significant agroforestry activity in the temperate zone and developed countries, these applications will be examined with an emphasis on the more common applications from developing countries in tropical regions.

For graduate students, it is also relevant to add laboratory and field components to this course preferably with student's supervisor (s). Such exercises can illustrate aspects of agroforestry such as woody plant propagation, plant responses to interspecific competition, morphological and physiological characteristics of MPTs, various soil conservation practices (e.g., green manure, terracing, and grass bunds), system design and management in relation to environmental resource capture (both above- and below-ground), the underlying features of the biology of woody plants, aspects of nutrient cycling, mycorrhizal and rhizosphere investigations, socioeconomic and adaptive research, and use of software (MPTS, FADSS, SCUAF, IDRISI,arc/info, MESA, DATACHAIN, SAS, DESSAP, WBECON, LINDO, ELECTRE, etc.) and basic internet (electronic databases).

2. Teaching philosophy:
Lectures, discussions and readings will give participants an appreciation of the fundamental characteristics inherent in agroforestry systems and an understanding of current issues in agroforestry. The course format will be approximately 80% formal presentation (e.g. lecture, videos), 10% group discussion, 5% questions/answers, and 5% laboratory exercises. Participants will receive substantial pre-course reading materials two weeks prior to the session.

3. Course requirements:
The students are encouraged to attend all lectures and participate during the lectures and discussions. A student absent during a lecture will be asked to make a 2-3 page critique of that lecture. According to his (her) background and experience, each student will make one presentation in the classroom. Attendance, presentation and participation will count for 30% of final grade. In addition, each student will have to complete a term paper or project (20-25 pages) to develop an agroforestry strategy that could be applied in a case study by using course concepts (70% of final grade). Analysis of the case studies will integrate all components of contemporary agroforestry. The different case studies will be available and must have prior
approval of the instructor. Grades will be apportioned as follows: 9: 90-100%, 8: 80-89%, 7: 70-79%, 6: 60-69%, 5:50-59%

4. Course objectives:
Upon completion of this course, you will:
1) understand basic problems and principles of land management and issues of sustainable development in a variety of agroecological zones and socioeconomic, political, and cultural conditions.
2) know and understand agroforestry principles and practices in tropical and temperate zones.
3) know and understand the different components of contemporary agroforestry systems.
4) have good skills in diagnosis and design, implementation, management, extension and assessment of agroforestry projects.

5. Course Topics:
1)Agroforestry: Genesis, problems of land-use systems in tropical and temperate areas.
2) Agroforestry and sustainable development: definitions, importance, advantages and disadvantages.
3) Classification of agroforestry systems.
4) Description of components: plant component and/or animal component; fishes; edible mushrooms; insects; soil; biotic interactions; microclimate; socio-economic, cultural and political components.
5) Principles of genetic improvement in agroforestry.
6) Practices of agroforestry: elements of experimental design in agroforestry, ecophysiological aspects and spatio-temporal associations.
7) Prospects of GPS/GIS in agroforestry and diagnosis and design (D&D) methodology.
8) Evaluation and adoption of agroforestry technologies: multiple objective programming, multiple criteria decision aid.
9) Agroforestry extension.
10) State of the art agroforestry in the temperate zone.

Seminar in Agroforestry (FOR 501)

Instructor: P.D. Khasa
E-MAIL ADDRESS: Damase.Khasa@UAlberta.CA.

1. Course outline:
This advanced course is designed for graduate students enrolled in graduate studies (M.Sc. or Ph.D.) in Agroforestry or related research areas. It focuses on the techniques and methods of planning and analysis of biophysical and socio-economic research in Agroforestry Science. Depending on interest, the participants will apply their know-how during a 2-month training in an agroforestry research centre established in either a developing or a developed country. There will be particular emphasis on tree-crop and/or animal interactions dealing with agroforestry systems,

people and forestry on small landholdings, and soil interrelations and socioeconomic characterizations, RRA/PRA/RAAKS assessment methodology, and gender analysis.

2. Teaching philosophy:
Lectures , discussions and readings will give participants an appreciation of the researrch methodology in agroforestry. The course format will be approximately 20% formal presentation (e.g. lecture, videos), 20% group discussion, 10 % mid-term exam. During the theoretical classes, participants will receive substantial pre-course reading materials two weeks prior to the session. Another 50% of the course will consist of field work in a developing or developed country and a 50 page report emphasizing background, justifications, methodologies, relevant findings or results and recommendations. A literature review is not the objective of the field exercise, which stresses the importance of relating the work to practical planned research either in
the tropics or in the temperate zone.

3. Course requirements:
The students are encouraged to attend all lectures and participate during the lectures and discussions. Attendance, participation, exam will count for 50%. In addition, each student will have to complete a 50 page report of his/her field training which will count for another 50% of final grade. Grades will be apportioned as follows: 9: 90-100%, 8: 80-89%, 7: 70-79%, 6: 60-69%, 5: 50-59%

4. Course objectives:
Upon completion of this course, you will:
1) have a solid knowledge in biophysical and socio-economic research in agroforestry.
2) practice agroforestry in the real world and work as an independent agroforester.

5. Purpose and objectives of field exercise (2 months):
The purpose is to:
- provide necessary practical (Hands-on) tools for visiting students.
- focus on planned research on tropical or temperate agroforestry systems within the context of sustainable agriculture andforestry productivity and rural development.

The objectives are to:
- enable visiting students the opportunity to be involved in agroforestry systems research within the programme for Sustainable Agriculture and Forestry that focuses on production systems using trees combined with agricultural crops and /or livestock.
- provide first-hand practical experience in agroforestry research methodologies in a tropical or temperate environment and enable visiting students the opportunity to apply relevant research material and significant findings to planned objectives.
- contribute to the development of new agroforestry research areas that are of primary interest to developing countries in efforts to relieve poverty, as well as to the developed countries.
- emphasize human equity and rights and contribute to economic social and ecological sustainability.
-to emphasize on-farm forestry/agroforestry, woodlot management initiatives involving the local farmers (men and women) to maintain a holistic gender approach to research and subsequent findings.
- strengthen ties and networking mechanisms with other international, regional, and local institutions operating in Costa Rica, Central America and the Caribbean, North America, Europe, Africa and Asia through integrated agricultural research and education systems.
- emphasize the importance of contributing to the publication of scientific and technical papers as well as teaching and rural extension methodologies.
- focus on research according to the sustainable development goal: 'Producing for conservation, and conservation for production'.

6. Course Topics:
1)Prospects of GPS/GIS in agroforestry and diagnosis and design (D&D)
2) Methods of biophysical research in agroforestry (plant component and/or animal component, edible mushrooms, edaphic and microclimatic components, biotic interactions, genetic improvement in agroforestry, elements of experimental design in agroforestry, ecophysiological aspects and spatio-temporal associations).

3) Methods of socio-economic research in agroforestry (socio-economic, cultural and political components, evaluation and adoption of agroforestry technologies, agroforestry extension)

School of Forestry
University of Melbourne

Undergraduate Subject in Agroforestry

http://www.mtg.unimelb.edu.au/courses/undergra.htm

As part of the degree courses in Agricultural Science and Forest Science the School of Forestry offer subjects in Agroforestry and Farm Forestry. Although these courses are generally only available to students enrolled in the faculty's own programs students from other faculties of The University of Melbourne and from other tertiary institutions are able to undertake the courses in some circumstances. Under the Universities Community Access Program, people not enrolled in our courses are able to participate in our agroforestry subjects as described below. The cost varies from about $300 to $600 depending on whether you require formal assessment and an academic record on completion. Successful applicants may receive credit towards a diploma or degree of the University although such credit is not automatic.

211-303 Farm Trees - Design Project
Third Year
Students of Forestry and Natural Resource Management are able to undertake studies in agroforestry and farm forestry beginning with a block release subject offered at Creswick and Dookie
Contact: 12 hours of lectures and 18 hours of practicals
Objectives:
By the end of the subject the student should be able to: Appreciate the principles of diagnosis and design in the development of agroforestry and farm forestry opportunities; have an understanding of the role of trees in providing for private landowner needs and aspirations; be able to undertake a multipurpose revegetation design project; and be familiar with the opportunities for landowners to produce commercial forest products from private native forests.
Content:
This field-based course covers fundamental aspects of farm revegetation planning, and relies on students' abilities to undertake self-directed learning. Students will be expected to participate in field-based learning exercises and information gathering so as to identify revegetation opportunities and constraints, and propose appropriate designs.
Presentation:
The course is presented in blocks and is largely focused on working directly with landowners interested in farm forestry projects
Assessment: One 2-hour written examination and 2 projects

211-441 Advanced Agroforestry
Forth Year Agricultural Science and Forest Science
The current forth year elective for students of forestry and agriculture offers students an introduction to agroforestry, farm forestry and property management planning for revegetation. In 1998 a third course will be developed for forestry students who have already completed Agroforestry 1.
Contact: 24 hours of lectures and 36 hours of practical work
Objectives:
By the end of the subject students should: have a working knowledge of agroforestry diagnosis and design as an approach to the development of farm tree management opportunities on farms in Australia and overseas; appreciate the importance of assessing landowners' needs, aspirations and performance criteria when designing agroforestry projects and development strategies; be able to develop technical design criteria for effective revegetation for resource conservation, agricultural production and direct commercial purposes; and be familiar with approaches to tree monitoring and evaluation.
Presentation:
The course includes weekly lectures and student tutorials, field trips and exercises. Students complete regional or farm based design projects and an examination (2 hours)
Assessment: Agroforestry design project (25 %), farm forestry strategy project (25 %) and 2-hour examination (50 %).

Graduate Certificate in Forest Science (Farm Forestry)

http://www.mtg.unimelb.edu.au/courses/graduate.htm

Course Synopsis

The Federal Government has provided partial funding to the School of Forestry at The University of Melbourne to provide a block release course in farm forestry and agroforestry as part of the National Farm Forestry Program (FFP). The objective of the FFP is to promote commercial wood production on cleared agricultural land.

Graduate Certificate in Forest Science (Farm Forestry).
First presented in 1993 the Graduate Certificate in Forest Science (Farm Forestry) has been presented in five states and has attracted more than 150 participants. The three-subject certificate course is conducted in blocks. Subjects 1 and 2 are one-week residential blocks located in appropriate regional centres approximately 3 months apart. Subject 3 is initiated at a 2 or 3 day meeting where participants themselves make presentations and are then required to undertake a major project in their own time. The subjects a conducted over approximately one year. The presenters are drawn from research organisations, industry, the community and academic institutions. Commonly, more than 10 presenters are involved in one teaching block.

Course objectives
1.To provide extension advisers, outstanding landholders and industrial forestry staff involved in farm forestry with the knowledge, skills and facilities to provide advice to those requiring farm forestry services.
2.To promote, through the dissemination of reliable information, commercial wood production on cleared agricultural land and the development of regional farm forestry industries to assist rural communities.
3.To assist the development of cooperative arrangements and interactions between existing State extension services, landcare programs, farm-based tree-planting groups and the forest industries.
4.To assist in the identification and development of possible demonstration farms and to use existing demonstration farms as part of the training program.
5.To facilitate the development of local, regional and national farm forestry networks.

Course outline
Participants will be required to attend three teaching block presentations, submit assignments for subjects One and Two, and prepare a regional strategy as a major project for Subject Three. The emphasis of the course is on the design of appropriate commercial agroforestry systems that not only produce quality produce for industry but also meet landowner and community needs. Each course involves field visits and practical exercises including field measurement, inspection of farms and research trials, visits to timber processing plants, and group exercises. The broad experience and expertise of the participants themselves is drawn on to enhance the course. Subjects 1 and 2 will be presented in two five-day blocks. Subject 3, the major project, will be initiated by a two or three day meeting of participants. Leading researchers, academics and practitioners from throughout Australia will be involved in the team teaching of each course. Content will reflect regional farm forestry potential while providing a sound national overview. Local field trips and demonstrations will be conducted during each subject to complement course work.

Subject 1 - Farm Planning and Sustainable Land Management
(5 days course work plus assignments)
Planning approaches to system design
Processes of land degradation: soil erosion, salinity, structural and fertility decline
Soil assessment and classification
Role of trees and shrubs in controlling land degradation
Provision of shade and shelter
Shelterbelt design and performance
Habitat design and management
Property and regional planning

Subject 2 - Integrating commercial tree growing with farming
(5 days course work plus assignments)
Regional, National and International timber markets and expected wood flows
Timber harvesting, marketing and processing
Farm Forestry and agroforestry design, establishment and management
Plantation and native forest silviculture
Economic evaluation of farm forestry
Research design and evaluation of options
Multiple use approaches to farm forestry

Subject 3 - Regional Agroforestry Project
(3 days of seminars and a 10 000 word project)
Design and development of research and extension strategies.
Each participant will be required to undertake and regional agroforestry diagnosis and design project and develop an agroforestry development plan for a region or farming system. Plans will include a site description, assessment of stakeholders and their

perceived needs and resources, design and management prescriptions for commercial timber production options, an economic and priority assessment and a research and extension plan.

TROPICAL AND SUB-TROPICAL AGROFORESTRY
Langara College
Vancouver, Canada

COURSE DESCRIPTION:

The course will examine biodiversity in tropical crops and will relate it to plant science principles involving plant physiology, genetics, plant breeding and propagation. Discussions will focus on the role of these principles in the agronomy and utilization of tropical and sub-tropical agriculture. Lectures will cover the identification, crop origin, botany, physiology, genetics and culture of some tropical and sub-tropical crops:
Field crops: sugar-cane, tea, coffee, sisal, cocoa, cotton, rice, sorghum.
Fruits: bananas, mango, citrus, cashew, pineapple, avocado, papaya, coconut, guava, passion fruit, breadfruit.
Spices: cloves, cinnamon, pepper, vanilla, cardamon, ginger, turneric, nutmeg.
Vegetables: tubers, corms, legumes, fruit and leafy vegetables.
Floriculture: cut flowers and ornamentals

The role of these crops in an integrated farming system will be reviewed, with main emphasis on Small-Holder agriculture in the tropics as well as new business development evolving for special niche markets and estate agriculture. The seminar theme section of the course could focus on either medicinal tropical plants or agroforestry systems as practiced in Africa, Asia, South Pacific and Central/South America.

Seminar topics:
I Agroforestry systems in Eastern Africa (Tanzania, Kenya, Rwanda, Sudan, Ethiopia).
Agroforestry systems in Western Africa (Cameroon, Nigeria).
Agroforestry systems in Southern Asia (India, Nepal, Sri Lanka, Bangladesh).
Agroforestry systems in S. East Asia (Thailand, Indonesia, Malaysia, Papua New Guinea).
Agroforestry systems in South America (Brazil, Venezuela, Paraguay).
II Medicinal, sacred religious, beverage, culinary, drug, poison, purgative and cosmetic tropical plants.

Field visits will include ICRAF in Nairobi (Int. Centre for Research in Agro-forcstry), sugar-cane/ tea/ coconut/cashew estates and floriculture greenhouses.

GRADING SYSTEM:
Mid-term
30%
Final
40%
Seminar/Term Paper
30%

REFERENCE TEXTS:

Cobley, L. S. and W.M. Steele. (1976). An introduction to the Botany of Tropical Crops. Longman, London.

Nair, P.K.R- (1989). Agroforestry Systems in the Tropics. Kluwer Academic Publishers.

Norman, M.J.T., C.J. Pearson and D.G.E. Searly. (1984). The Ecology of Tropical Food Crops. Cambridge Univ. Press.

Purscylove, J.W. (1975). Tropical Crops I Monocotyledons. H Dicotyledons. Longman, London.

Smith, N.J.H., J.T. Williams, D.L. Pluckett and J.T. Talbot. (1992). Tropical forests and their crops. Comstock/Cornell.

Viola, H.J. and C. Margolis. (1991). Seeds of Change. Five hundred years sine Columbus. Smithsonian Institution Press.

Yamaguchi, M. (1983). World Vegetables. Principles, production and nutritive values. AVI Publ. Co. Connecticut.

Young, A. (1989). Agroforestry for Soil Conservation. CAB International.

JOURNALS:

Agoforestry Systems S600 A37
Tropical Agriculture
Queensland Agriculture
Agroforestry Today

The University of Adelaide/Australia

1536 Agroforestry
level: III points value: 3 duration: semester 2
contact hours: 2 hours of lectures plus associated practical work and excursions per week
content: the focus of this subject is the practical application of agroforestry in low and high rainfall environments in Australia. It also exposes students to agroforestry as it is practised elsewhere in the world. Topics include: the management of trees/shrubs for timber, fodder and other products; agroforestry for the control of salinity and ground water, soil erosion, and habitat management; practical tree establishment, maintenance and harvest; ecological interactions in agroforestry systems; the effect of shelter on crop, pasture and animal productivity, planning agroforestry on the farm; modelling agroforestry systems; agroforestry research and development in Australia; agroforestry in developing countries.
assessment: theory exam 55%; practical exam 15% assignments 30%

CRANFIELD UNIVERSITY/ SISLOE CAMPUS/ UK
http://www.silsoe.cranfield.ac.uk/IWE/courses/MScNRM.htm

Natural Resource Systems
This elective will provide you with the necessary knowledge and skills to design and manage productive and sustainable systems integrating tree, crop and animal production. A major attraction of the elective is that it brings together a wide range of disciplines including agroforestry, forestry, crop and animal management, socio-economics, and soil conservation.
At the end of this elective you will be able to:
Diagnose constraints on the development of natural resources.
Implement management techniques to improve the productivity and sustainability of natural resource systems.
Soil Plant Water Relationships Soil water movement The need for water, water uptake and transpiration, water stress. Evapotranspiration: Modelling approaches. The use of computer models to simulate soil water dynamics in cropped and uncropped systems.
Soil Science Soil structure and texture, porous media physics. Soil chemistry in the context of the availability and behavior of plant nutrients: Soil water relations, retention, conductivity, soil mechanics, soil strength and behavior. Salinity and sodicity.
Natural Resource Production Systems Provides the student with an understanding of how sustainable natural resource production systems must integrate productivity with social, environmental and economic factors. Objectives and classifications of

natural resource systems. Farming system research methods, socio-cultural considerations. Sustainability: definitions and methods for assessment. Case-studies: High potential systems; Semi-arid systems;
Hillside production systems; The Forest-agriculture interface; The Peri-urban interface; The Land-water interface.
Natural Resource Productivity Provides the student with scientific and systematic frameworks for explaining and determining the productivity of tree, crop and animal production systems. Evaluating the environment, frameworks for yield analysis. Light interception, radiation use-efficiency, dry matter partitioning. Water use and water supply, water use efficiency. Soil fertility, soil conservation and shelter. Weeds, pests and diseases; effects of plant density. Animal productivity, forage quality. Utilisation of nutrients and energy

Agroforestry
The aim of this elective is to provide you with the necessary knowledge and skills to design and manage productive and sustainable systems integrating tree, crop and animal production. A major attraction of this elective is that it brings together a wide range of disciplines including agroforestry, forestry, crop management, plantation agriculture, socio-economics, and soil conservation.
At the end of this elective you should be able to:
Diagnose constraints on the development of natural resources.
Implement management techniques to improve the productivity and sustainability of natural resource systems.

NEBRASKA

Course Schedule - Fall 1999

August 24 Introduction, Overview and Semester Project
Reading assignment:
NRCS - Agroforestry - Functions and Values

August 26 Principles of Agroforestry
Reading assignment:
Gordon and Newman - pages 1-8

August 31 **Sample publications due**
Ecological Foundations for Temperate Agroforestry
Reading assignment:
Gordon and Newman - pages 9-20

September 2 **Quiz #1**
Windbreak Systems - Principles
Reading assignment:
Brandle and Finch - How Windbreaks Work

September 7 **List of 3 topics due**
Windbreak Systems - Field Windbreaks - Crop Response
Reading assignment:
Gordon and Newman - pages 21-27; 105-106; 128-133
Brandle et al. - Field Windbreaks: Are They Economical?

September 9 Windbreak Systems - Field Windbreaks - Snow and Wind Erosion
Reading Assignment:
Brandle and Nickerson - Windbreaks for Snow Management

September 14 **Field Trip to ARDC**
Return to Lincoln by 8 PM. Dinner (pizza) will be provided.

September 16 **Final topic due**
Alley-cropping Systems
Reading Assignment:
Gordon and Newman - pages 35-48

September 21 **Quiz #2**
Alley-cropping Systems
Reading Assignment:

Gordon and Newman - pages 169-177; 201-220

September 23 Inter-cropping Systems

Reading Assignment:

Williams and Gordon - The potential of intercropping as an alternative land use system in temperate North America

September 28 **Outline due**

Lay-out and design of your paper (Kim Isaacson, National Agroforestry Center)

September 30 Silvopastoral Systems - Livestock and Forage

Reading Assignment:

Gordon and Newman - pages 27-35; 85-104; 181-197

October 5 **First Exam**

Covers all material presented through and including September 23. It does not include silvopastoral systems

October 7 Silvopastoral Systems - Timber Production

Reading assignment:

Sharrow - Silvopastoralism: Competition and facilitation between trees, livestock, and improved grass-clover pastures on temperate rainfed lands

October 12 Livestock and Farmstead Windbreaks

Reading Assignment:

Wight and Brandle - Windbreaks for Rural Living

Quam et al - Windbreaks for Livestock Operations

October 14 **First draft of paper due**

Windbreaks and Wildlife

Reading Assignment:

Cable - Nonagricultural benefits of windbreaks in Kansas

Johnson et al - Windbreaks and Wildlife

October 19 **No Class Fall Break**

October 21 **Quiz #3**

Tropical Systems - An overview

Reading Assignment:

Nair - Distribution of agroforestry systems in the tropics, pages 39-53

October 26 Tropical Systems - Home garden Systems and Forest Farming Systems

Reading Assignment:

Nair - Home gardens, pages 85-97

October 28 Tropical Systems - Sociocultural considerations

Nair - Sociocultural considerations, pages 413-427

November 2 **Quiz #4**

Riparian Systems - Overview

Reading Assignment:

Gordon and Newman pages 48-55

Gregory et al. - An ecosystem perspective of riparian zones

November 4 **Second draft due**

Riparian Systems - Water Quality

Reading Assignment:

Osborne and Kovacic - Riparian vegetated buffer strips in water-quality restoration and stream management

November 9 Riparian Systems - Wildlife

Reading Assignment:

Schaefer and Brown - Designing and protecting river corridors for wildlife

Croonquist and Brooks - Effects of habitat disturbance on bird communities in riparian corridors

November 11 Riparian Systems - Forest Management

Reading Assignment

Sykes et al. - Crop tree management in riparian zones

November 16 Forest Management

Reading Assignment:

Smith et al - Silviculture and its place in forestry

November 18 **Final draft due**

Speciality Crops/Products - Overview

Reading Assignment:

Quam et al. - Windbreaks in Sustainable Agricultural Systems

Chamberlain et al. - Non-timber forest products

November 23 **Second Exam due in my office by 5 PM**

This will be a take-home exam and will cover all the material presented this semester.

November 25 **No class - Thanksgiving break**

November 30 **Final Camera Ready Copy due**

Agroforestry - Policies for the future

Reading assignment:

Gordon and Newman - pages 63-70; 251-266

Naiman et al. - The role of riparian corridors in maintaining regional biodiversity

December 2 Paper Presentations

Reading assignment:

Four student papers

December 7 Paper Presentations

Reading assignment

Four student papers

December 9 Paper Presentations

Reading assignment

Four student papers

AGROFORESTRY SYSTEMS IN SUSTAINABLE AGRICULTURE

FFW 417/817

COURSE OUTLINE

Fall 1999

Jim Brandle and Sarah Workman

Class Meeting: 3:45 - 5:00 Tuesday and Thursday
272 Plant Sciences

INTRODUCTION: A study of the roles of woody plants in sustainable agricultural systems of temperate regions. Emphasis will be on the ecological and economic benefits of trees and shrubs in the agricultural landscape.

Topics include:

1. Principles of and ecological foundations for agroforestry
2. Shelterbelts, structure, function, benefits and design.
3. Intercropping systems and silvopastoral systems.
4. Structure and function of riparian systems.
5. Production of timber and specialty crops as part of agricultural systems.
6. A comparison of temperate agroforestry systems to those of tropical areas.

OBJECTIVES: Upon completion of the course, the student should be able to:

1) Identify the benefits and limitations of woody plants in agricultural systems at both the local and regional scale.

2) Describe the relationships between shelterbelt structure, aerodynamics and the resulting microclimate and demonstrate this understanding by designing shelterbelt systems for various objectives.

3) Describe the mechanisms by which riparian buffer strips function in reducing non-point source pollution from agricultural systems.

4) Compare and contrast the different types of agroforestry systems common to temperate regions.

5) Identify and evaluate the economic costs and benefits of woody plants in sustainable agricultural systems.

6) Identify, compare, and contrast the positive and negative attributes of tropical agroforestry systems.

TEXTBOOK: **Temperate Agroforestry Systems** by A. Gordon and S. Newman
Additional reprint materials will be distributed in class.

OFFICE HOURS:

Jim Brandle	Office - Room 3B Plant Industry Building Office hours are 8-10 AM. T/Th or By appointment (472-6626) or when I am in. I am generally not available from 2:00 to 3:30 on T/Th.
Sarah Workman	Office - Room 111, National Agroforestry Center, USFS Bldg. Office hours are 1-3 PM M/W By appointment (437-5178 extension 40)

GENERAL POLICIES: Although roll will not always be taken, students are expected to attend all class periods. You are responsible for the material covered each period. If you find it necessary to miss a class meeting, it is your responsibility to arrange for obtaining the information covered. Class participation is encouraged and expected and counts as part of your grade.

In any case where dishonesty is a consideration, the Procedural Policy - Academic Honesty, College of Agricultural Sciences and Natural Resources, will be followed. Plagiarism will NOT be tolerated!

GRADING: There are a total of 1000 points to be earned in the semester.

1) **Exams - 2 at 125 pts each, for a total 250 points or 25% of the final grade.**

There will be two exams. Both will be comprehensive and cover all material to date. The first is an in class exam and is scheduled for October 5. The second will be a take home exam and will be due by 5PM, Tuesday November 23. It will be distributed November 18.

2) **Quizzes - 4 quizzes at 50 points each, for a total of 200 points or 20% of the final grade.**

The quizzes will emphasize recall of information presented since the last quiz **and** all assigned reading material. Dates for quizzes will not be changed.

3) **Term Paper - 400 points or 40% of the final grade.**

This semester we will be preparing a full-color extension type publication. Each student will receive a set of all the finished publications of the class. The finished product will be 3 or 4 typeset pages (for graduate students it will be 5 or 6 typeset pages). There are approximately two typed pages (12 point type, doubled spaced pages) per typeset page. The audience is considered to be practicing professionals such as an extension educators, NRD managers, or NRCS district conservationists **and** the general public with an interest in the topic. All of the topics will relate to Agroforestry or the use of woody vegetation in the agricultural landscape. This is a semester long project and has a number of different tasks which **must** be completed. Each task will be evaluated and will be part of the final term paper grade. Penalties (2 points per day) will be assessed for late materials **All materials must be typed!**

Evaluation of sample publications - Find 3 examples of extension publications representing 3 different styles **and** 3 different topics. Topics do not have to be agroforestry related but it will help in the long run if they are. You cannot use the ones handed out in class! Make a copy of each. Copies of extension publications from UNL are available from ICCS located in the warehouse near the bridge on the north side of East Campus. The mailroom is on the south side of the building. For each publication, identify what you liked about the publication and what you did not like about the publication. This is the same as identifying the strengths and weaknesses of the publication. Identify the intended audience. Maximum of 1 typed page per example. You need to turn in the publication and the critique. **Due August 31** (15 points out of 400).

List of 3 topics - You need to develop a list of 3 possible topics that **you** want to write about. List in priority. A list of possible topics is attached to get you started. You are not restricted to the list! For each topic you need to provide a brief (2 to 3 sentences) explanation of the topic. We will provide you with feedback on these topics. **Due September 7** (15 points out of 400). We will comment and return on September 17.

Your final topic choice - Based on our comments and your interests you need to select and define your topic. You need to provide a short paragraph (4 to 6 sentences) which explains your topic and the approach you will take. **Due September 16** (20 points out of 400). We will comment and return by September 21. To change topics after this date ***requires approval by instructors***.

Detailed outline of paper - You need to provide a detailed topic outline of the paper. It should include the main topics you will be discussing and some level of detail about the main points. It should be a maximum of 2 pages, double spaced. **Due September 28** (50 points out of 400). We will comment and return by October 5.

First draft - Essentially a completed paper. Emphasis will be on the text but all figures, tables, and photos should be included. Attached to the paper should be a list of references which you used. They are not included in the paper but they MUST be attached. You will be using other people=s information and it is important to give credit. Typically Extension publications do not cite references but we will need to acknowledge the work of others. For undergraduates this paper should be between 7 and 10 typed pages including all figures, tables, and photos. For graduate students it should be 12 to 15 pages. **Due October 14** (75 points out of 400). We will comment and return by October 19.

Second draft - This draft is equally important and should incorporate the comments received on the first draft. This is the first time format will be important. You will need to decide on a format based on your review of sample extension publications. We will be using Adobe PageMaker 6.5 and will have people to help layout your paper and you will need to work with us as you do this. Scanners and printers will be available to help and there are other locations on campus that provide this kind of service. We will talk about this in class. Details and lay out are very important. Publication is still in black and white. Typeset page limits will prevail so we will be looking at 3 to 4 pages for undergraduates and 5 to 6 pages for graduate students. **Due November 4** (75 points out of 400 We will comment and return by November 9.

Final draft - This draft should address all of our comments. It should be the very best you can do and should be a finished paper. This will be the first full color version of your paper. Photos and figures should be in full color. **Due November 18** (75 points out of 400). We will comment and return by November 23. You can pick it up when you turn in your take home exam..

Camera ready copy - Corrections based on comments on the final draft must be addressed. You will need to provide a copy for each member of the class. These will be printed in our lab at no cost to you. Papers must be prepared on Adobe PageMaker 6.5 including all figures, photos and tables. Other publication packages may be used but then you must provide a final color copy for each member of the class. **Due November 30** (75 points out of 400).

4) **Presentation of your paper 50 points or 5% of the final grade.**

Each student will be expected to present their paper to the class during the last two weeks of the semester. The order will be based on the topics and will be provided in early November. You will have a total of 15 minutes; 10 minutes for the presentation and 5 minutes for questions.

5) **Class participation - 100 points or 10% of your final grade**

You are encouraged and expected to participate in class discussions on a regular basis. Please ask questions and offer suggestions or ideas. Excessive absences will not help your grade. Your active participation in the discussion is extremely important.

Grading scale

970- 1000			A+		700 - 770
				C	
900 - 970			A		670 - 700
				D+	
870 - 900			B+		650 - 670
				D	
800 - 870			B		0 - 650
				F	
770 - 800	C+				

We reserve the right to lower the points required for a particular letter grade but will NOT raise them.

SUPPLEMENTAL READING AND REFERENCES

The following items are for your information. You may choose to read as many or as few as you wish. They are intended to provide additional information not presented in class and will enhance your understanding of various topics and provide additional background information for class discussions. The list also includes general reference material.

Brandle, J.R., D.L. Hintz and J.W. Sturrock (eds), 1988. Windbreak Technology. Elsevier Science Publishers, Amsterdam, 598 pages.

Buck, L.E., J.P. Lassoie, and E.C.M. Fernandes, 1999. Agroforestry in Sustainable Agricultural Systems. CRC/Lewis Publishers, Boca Raton, 416 pages.

Bunce, R.G.H., L. Ryszkowski and M.G. Paoletti, 1993. Landscape Ecology and Agroecosystems. Lewis Publishers, Boca Raton, 241 pages.

Felker, P. (ed), 1986. Tree Plantings in Semi-Arid Regions. Elsevier, Amsterdam, 444 pages.

Forman, R.T.T., 1995. Land Mosaics. Cambridge Press, Cambridge, 632 pages.

Kidd, C.V. and D. Pimentel (eds), 1992. Integrated Resource Management - Agroforestry for Development. Academic Press, San Diego, 223 pages.

MacDicken, K.G. and N.T. Vergara (eds), 1990. Agroforestry: Classification and Management. John Wiley & Sons, NY. 382 pages.
Nair, P.K.R., 1993. An Introduction to Agroforestry. Kluwer Academic Publishers, The Netherlands, 499 pages.
Ong, C.K. and P. Huxley (eds), 1996. Tree-Crop Interactions: A Physiological Approach. CAB International, Nairobi, Kenya, 386 pages.
Paoletti, M.G., B.R. Stinner and G.G. Lorenzoni. 1989. Agricultural Ecology and Environment, Elsevier, Amsterdam. 636 pages.
Prinsley, R.T. (ed). 1992. The Role of Trees in Sustainable Agriculture. Kluwer Academic Publ., Dordrecht, The Netherlands, 186 pages.
Sinclair, F.L., 1995. Agroforestry: Science Policy and Practice. Agroforestry Systems Vol 30, Nos. 1 and 2.
Seemann, J., Y.I. Chirkov, J. Lomas, B. Primault, 1979. Agrometeorology. Springer-Verlag, Berlin, 324 pages.

Syllabus MTU

FW571 - Trees in Agricultural Systems

Text: Raising and Sustaining Productivity of Smallholder Farming Systems
in the Tropics by Willem C. Beets.
The New Forester by Barry van Gelder and Phil O'Keefe
Other Readings will be assigned.

Week 1:
Tuesday: Introduction.
Thursday: Reading and Discussion: Chapter 1 of Beets

Week 2:
Tuesday: Farming Systems
Main:
Babu, K.S., D. Jose, and C. Gokulapalan. 1992. Species diversity in a Kerala home garden. Agroforestry Today 1992(July-Sept.):15
Harris, F. 1996. Intensification of agriculture in semi-arid areas: lessons from the Kano Close-Settled Reserve, Nigeria. IIED
Gatekeepers series. No. 59. 20 pp.
Individual Readings:
Fernandes, L.C.M., A. Oktingati, and J. Maghembe. 1984. The Chagga home garderns: a multistoried agroforestry cropping
system on Mt. Kilimanjaro (Northern Tanzania) Agroforestry Systems 2:73-86.
Thom, D.J., and J.C. Wells. 1987. Farming systems in the Niger inland delta, Mali. The Geographical Review 77(3):328-342
Works, M.A. date? Aguaruna agriculture in eastern Peru. The geographical review. date? vol? 343-358..
Zurick, D.N. 1990 Traditional knowledge and conservation as a basis for development in a west Nepal village. Mountain. Res.
and Dev. 10(1):23-33.
Supplementary Readings:
Bunch, R., and G. Lopez 1995 Soil recuperation in central America: sustaining innovation after intervention.. Gatekeeper series
No. 55. International Institute for Environment and Development. London, 16 pp.
de Vries, J. 1990. Zero grazing: successfully using liverstock in a regenerative farming system. VITA News April, 1990, 11-12.

Dichter, T.W. 1988. @41 @41.2 @41.4 @76 A commodity sector approach to small enterprise development: a paradoxical

new synthesis. VITA News January, 1988 pp 8-11, 20.
Hammer, J.S. 1986 "Subsistence first": farm allocation decisions in Senegal. J. Dev. Econ. 23(1986):355-369
Ivens, G. 1983. The natural control of Imperata cylindrica: Nigeria and northern Thailand. Mountain Research and
Development 3(4):372-377.
Sperling, L., and U. Scheidegger. 1995 Participatory selection of beans in Rwanda: results, methods, and institutional issues.
Gatekeeper series No. 51. International Institute for Environment and Development. London, 16 pp.

Thursday: Chapter 2 Beets

Week 3:
Tuesday: Agroforestry
Main Readings:
Mollet, M. et al. 1995. The "Top 10" species in Cameroon: a survey of farmers' views on trees. Agroforestry Today
7(3/4):14-16
Raintree, J.B. 1986. Agroforestry pathways: land tenure, shifting cultivation, and sustainable agriculture. Unasylva 38(4):2-15
Individual Readings:
Alteri, M.A., and J. Farrel. 1984. Traditional farming systems in south-central Chile, with special emphasis on agroforestry.
Agrofor. Sys. 2:3-18
Anon. 1989. The Apple Ring: Whether you call it Faidherbia or Acacia, it's a very useful tree. Agroforestry Today 1(2):11-12
Brook, R.M. 1994. Alley cropping for sweet potato in Papua New Guinea. Nitrogen Fixing Tree Research Report.
11(1993):35-39.
Liyange, M. de S., K.G. Tejwani, and P.K.R. Nair. 1984. Intercropping under coconuts in Sri Lanka. Agrofor. Sys.
2:215-228.
Miehe, S. 1986 Acacia albida and other multipurpose trees on the Fur farmlands in the Jebel Marra highlands, Western Dafur,
Sudan. Agroforestry Systems. 4:89-119
Poschen, P. 1986 An evaluation of the Acacia albida based agroforestry practices in the Hararghe highlands of eastern
Ethiopia. Agroforestry Systems 4:129-143.
Skutsch, M.M., 1983 Why people don't plant trees: the socioeconomic impacts of existing woodfuel programs: village case
studies in Tanzania.
Turk, D. 1990 Leguminous trees as forage for edible caterpillers. Nitrogen Fixing Tree Research Reports 8:75-77.
Weinstock, J.A. and N.T. Vergara. 1987. Land or plants: agricultural tenure in agroforestry systems. Econ. Botany.
41(2):217-234.
Supplementary Readings:
Anderson, A.B., et al. 1995. Forest management patterns in the floodplain of the Amazon estuary. Conservation Biology
9(1):47-61.
Chandrakanth, M.G., et al. 1990? Temple forests in India's forest development. Agroforestry Systems. forthcoming
Fagg, C.W., and J.L. Stewart. 1994. The value of Acacia and Prosopis in arid and semi-arid environments. J. Arid
Environments 27:3-25.

Fernandes, L.C.M., A. Oktingati, and J. Maghembe. 1984. The Chagga home garderns: a multistoried agroforestry cropping
system on Mt. Kilimanjaro (Northern Tanzania) Agroforestry Systems 2:73-86.
Hardesty, L.H. 1988. Multiple Use management in the Brazilian Caatinga. J. For. 86(8):35-37.
Ivens, G. 1983. The natural control of Imperata cylindrica: Nigeria and northern Thailand. Mountain Research and
Development 3(4):372-377.
Kunstadter, P., 1983. Karen agroforestry: processes, functions, and implications for socio-economic, demographic annd
environmental change in northern Thailand. Mountain Research and Devleopment. 3(4):326-337.
Lawrence, D.C., et al. 1995. Availability and extraction of forest products in managed and primary forest around a Dayak
Village in West Kalimantan, Indonesia. Conservation Biology 9(1):76-88.
Lazaro, M., M. Pariona, and R. Simeone. 1993. A Natural harvest: The Yanesha Forestry Cooperative in Peru combines
western science and indigenous knowledge. Cultural Survival Quarterly. Spring 1993, pp48-51.
Noronha, R. 1981. Why is it so difficult to grow fuelwood? Unasylva 23(131):4-12
Rambo, A.T. 1982. Human ecology research on the tropical agroecosystems ins Southeast Asia. Singapore Journal of Tropical
Geography. 3(1):86-99.
Saxena, N.C. 1992. Farm forestry and land-use in India: Some Policy Issues. Ambio 21(6):420-425
Stewart, M., and T. Blomley. 1994. Use of Melia volkensii in a semi-arid agroforestry system in Kenya. Commonwealth For.
Rev.. 73(2):128-131.
Thursday: Chapter 3 of Beets

Week 4:
Tuesday: PRA
Main Readings:
Chambers, R. 1994. Twenty-one tips for short PRA workshops with lots of people. PLA Notes 19:105-108.
Jones, Carolyn 1996. Insider and outsider voting: reflections from Scotland. PLA Notes 27:84.
Mearns, R., et al. 1994. Natural resource mapping and seasonal variations and stresses in Mongolia. PLA Notes 20:95-105.
Individual Readings:
Bernadas, C.N., Jr. 1991. Lessons in upland farmer participation: the case of enriched fallows in Jaro, Leyte, Phillipines. Forest
Trees and People Newsletter 14:10-13.
Carter, J. et al. 1995. Local people's participation in forest resource assessment: an analysis of recent experience with case
studies form Indonesia and Mexico. Commonwealth For. Rev.. 74(4):333-342.
Emerton, L., and H. Mogaka. 1996. Participatory environmental valuation of forest resources in Aberdares, Kenya. PLA
Notes 26:6-10.
Fairhead, J. 1991 Methodological notes of exploring indigenous knowldge and management of crop health. RRA Notes
14:39-42.
Gill, G.J. 1991. "But how does it compare with the real data?" RRA Notes 14:5-13.
Inglis, A. 1991. Harvesting local forestry knowledge: a comparison of RRA and conventional techniques. RRA Notes
12:32-40.
Ortega-Espaldon, V., and L.M. Florece. 1990. Rapid rural appraisal: lessons learnt from experiences in Palawan, The
Philippines. RRA Notes 9:12-17.
Schaefer, S. 1992. The "Beans-Game": experiences with a variation of wealth ranking in the Kivu region, eastern Zaire. RRA
Notes 15:27-28.

Shah, P., G. Bharadwaj, and R. Ambastha. 1991. Farmers as analysts and facilitators in participatory rural appraisal and
planning. RRA Notes 13:84-94.
Shah, P., G. Bharadwaj, and R. Ambastha. 1991. Participatory impact monitoring of a soil and water conservation programme
by farmers, extension volunteers, and AKRSP in Gujarat. RRA Notes 13:128-131.
Zurick, D.N. 1990 Traditional knowledge and conservation as a basis for development in a west Nepal village. Mountain. Res.
and Dev. 10(1):23-33.
Supplementary Readings:
Carter, S.E. et a l., 1993. Some observations on wealth ranking after and RRA looking at soil fertility management in
northeastern Zimbabwe. RRA Notes 18:47-52.
Groverman, V. 1990. Wealth ranking in Swaziland: A method to identify the poorest. RRA Notes 9:6-11.
Kumar, K. 1989. Conducting key informant interviews in developing countries.
Mearns, R., et al. 1994. Direct and indirect uses of wealth ranking in Mongolia. RRA Notes 15:29-38.
Mearns, R. 1988. Direct matrix ranking (DMR) in highland Papua New Guinea. RRA Notes 3:11-15.
Sharrock, G. O'G., K.J Waldie, and Y.R. Joshi. 1993. Wealth ranking for agricultural research purposes in the eastern hills of
Nepal. RRA Notes 18:53-59.
Stocking, M. and N. Abel. 1981. Ecological and environmental indicators for the rapid appraisal of natural resources.
Agricultural Administration 8(1981):473-484.

Thursday: Chapter 4 of Beets

Week 5:
Seminar: Crops and Soils
Main Reading:
Dialla, B.E. 1994. @41 @75 The Mossi indigenous soil classification in Burkina Fasso. Indigenous Knowledge and
Development Monitor. 1(3):17-18.
Reij, C. 1991. Indigenous Soil and Water Conservation in Africa. SA27. Sustainable Agriculture Gatekeeper Series. IIED
London
Individual Readings:
Bellon, M.R., and J.E. Taylor. 1993. "Folk" Soil taxonomy and the partial adoption of new seed varieties. Econ. Devel. Cult.
Change 41(4):763-786.
BOSTID. 1996. "Fonio" pp. 59-75 in Lost Crops of Africa: vol 1. Grains. National Academy Press, Washington DC. 383 pp.
Brush, S. et al. 1995. @41 @41.2 @76 Potato diversity in the Andean Center of crop domestication. Conservation Biology
9(5):1189-1198.
Carter, J. 1996. @41 @75 Alley farming: have resource-poor farmers benefited? Agroforestry Today 8(2):5-7
Dregne, H.E. 1990. @41 @75 Erosion and soil productivity in Africa. J. Soil and Water Conservation. 1990(July-August):431-436.
Ghersa, C.M., M.L. Roush, S.R. Radosevich, and S.M. Cordray. Coevolution of Agroecosystems and Weed Management.
Bioscience 44(2):85-94.
Hudson, N.W. 1983. @41 @75 Soil conservation strategies in the third world. J. of soil and water conservation. 38:446-450.
Larsson, Helena. 1996. @76 @78 @78.9 Relationships between rainfall and sorghum, millet and seame in Kassala Provinece,
Eastern Sudan. J. Arid Env. 32:211-223.

Sanchez, P., and C. Palm. 1996 @41 @75 Nitrogen and phosphorus in African soils, what role for agroforestry? Agroforestry
Today 8(4):14-16.
Supplementary Readings:
anon. 1990. @70 @75 @41 Advances raise hope for crops that grow in salty conditions. The New York Times, Tues., June
19, 1990 pg. B6
Bunch, R., and G. Lopez 1995 Soil recuperation in central America: sustaining innovation after intervention.. Gatekeeper series
No. 55. International Institute for Environment and Development. London, 16 pp.
Sutcliffe, J.P. 1995. @41 @42 @75 Soil conservation and land tenure in highland Ethiopia. Ethiopian journal of development
research, 17(1)63-88. LTC Periodical Shelf
Wolkomir, R. 1997. @75 Getting down and dirty for science. Smithsonian 27(12):74-83.

Thursday: Chapter 5 of Beets

Week 6:
Tuesday: Seminar: Arid Lands:
Main Reading:
Gardner, A.S., and M. Fisher. 1994. How the forest lost its trees: Just so storytelling about Juniperus excelsa in Arabia. J. Arid
Env. 26:299-301
Routhage, A., 1998. New ecological perceptions of arid rangelands. Paper presented at the 2nd Nambian Rangelands Forum
Meeting, March 31, 1998. Neudamm Agricultural College, Windhoek, Namibia.
Individual Readings:
Belakere, Remegowda, and K.M. Jayaramaiah. 1997. Community development in drought-prone areas. Community
development Journal 32(2):133-140.
Campbell, B.M., et al. 1997. Local-level valuation of savanna resources: A case study from Zimbabwe. Economic Botany
51(1):59-77.
Cunnison, I. 1960 The social role of cattle. The Sudan J. of Veternary Science and Animal Husbandry 1(1):8-25
Walker, B.H. 1993. Rangeland ecology: Understanding and managing change. Ambio 22(2-3):80-87.
Westoby, M., B. Walker, and I. Noy-Meir. 1989. Opportunistic management for ranglelands not at equilibrium. J. Range
Management. 42:266-274.
White, C. (1984). Herd reconstitution: the role of credit among Wodaabe herders in central Niger. London. Overseas
Development Institute, Pastoral Development Network. 18 pp.
Supplementary Readings:
Barnes, J.I. 1995. Economic analysis of community-based wildlife utilisation initiatives in Botswana. Development Southern
Africa, 12(6):783-804)
Barnes, J.I. 1996. @41 @72 Economic characteristics of the demand for wildlife-viewing tourism in Botswana. Development
Southern Africa, 12(6):783-804.
Barnes, J.I. 1996. Changes in the economic use value of elephant in Botswana: the effect of international trade prohibition.
Ecological Economics. 18(3):213-228
Behnke, R.H., and I. Scoones. 1992. Rethinking range policy: implications for rangeland management in Africa. Wash. D.C.
World Bank. 31 pp. Environment Working Paper No. 24.

Blench, Roger, and Zoe Marriage. 1998. Drought and livestock in Semi-Arid Africa and the Near East: Introductory essay
with annotated bibliography. [Draft Only: prepared for circulation at FAO electronic conference 'Drought and livestock in
Semi-Arid Africa and the Near East'] http://www.oneworld.org/odi/rfs/r.blench
Blench, R. 1998. Rangeland degradation and socio-economic changes among the Bedu of Jordan: results of the 1995 IFAD
Survey. (Ch 30, pp397-424) in Squires, V.R. and Sidahmed, A.E. (eds) (1998) Drylands. Sustainable use of rangelands into
the twenty-first century. IFAD SERIES: Technical Reports. IFAD:Rome. ISBN 92-9072-006-9
Bourn, D. 1978 Cattle, rainfall, and tsetse in Africa. J. of Arid Environments 1:49-61
Breman, H. and C.T. de Wit. 1983. Rangeland Productivity and Exploitation in the Sahel. Science. Sept. 30. 1983. No. 221
1341-1347
Frank, D.A., S.J. McNaughton, and B.F. Tracy. 1998. The ecology of the Earth's grazing ecosystems. BioScience
48(7):513-521.
Fuls, E.R., 1992. Semi-arid and arid rangelands: a resource under siege due to patch-selective grazing. J. of Arid Env.
22:191-193.
Kohler-Rollefson, I. 1994. Traditional pastoralists as guardians of biological diversity. Indigenous Knowledge and
Development Monitor 1(3):14-16.
Le Houerou, H.N. 1984. Rain use efficiency: a unifying concept in arid-land ecology. J. Arid Environments. 7:213-247.
Le Houerou, H.N. 1989. The grazing land ecosystems of the African Sahel. Springer-Verlag, Ecological Studies No. 78.
Nicholson, S.E. (1978). Climatic variations in the Sahel and other African regions during the past five centuries. Journal of Arid
Environments 1:3-24.
Pedersen, J. 1995. Drought, migration, and population growth in the Sahel. The case of the Malian Gourma: 1900-1991.
Population Studies 49:111-126.
Picardi, A.C. 1975 A systems analysis of pastoralism in the West African Sahel. PhD. dissertation. Mass. Inst. Tech. 352 pp.
Swallow, B. 1994. The role of mobility within risk management strategies of pastoralists and agro-pastoralists. Gatekeeper
Series No. 47, IIED
Starkey, P. 1996. Networking for sustainable agriculture: Lessons from animal traction development. Gatekeeper Series No.
58, IIED

Thursday: Chapter 6 of Beets

Week 7:
Tuesday: Lecture, Tree Plantings and Nurseries.
Thursday: Chapter 7 of Beets through page 530.

Week 8:
Tuesday: Project Seminar.
Thursday: Finish Chapter 7 of Beets.

Week 9
Tuesday: Project Seminar.
Thursday: Chapter 8 of Beets

Week 10
Tuesday: No class.
Thursday: The New Forester
Main Readings:
The New Forester
Waters, T. 1989. Money in Development: necessities and contradictions. VITA News July, 1989, pp. 17-19
Supplementary Readings:
Cernea, M.M. 1981. Land tenure systems and social implications of Forestry Development programs. World Bank Staff
Working Paper No. 452
Freudenberger, K.S. 1991. Mbegue: the disingenuous destruction of a Sahelian forest. LTC Files Sen 43.8 F72
Gardner, A.S., and M. Fisher. 1994. How the forest lost its trees: Just So storytelling about Juniperus excelsa in Arabia. J.
Arid Env. 26:299-301.
Githinji, Mwangi-wa, and C. Perrings, 1993 Social and ecological sustainability in the use of biotic resources in Sub-Saharan
Africa. Ambio 22(2/3):110-116
Alteri, M.A., L.C. Merrick, and M.K. Anderson. 1987. Peasant agriculture and the conservation of crop and wild plant
resources. Cons. Bio. 1(1):49-58.
Bromley, D.W., and M.M. Cernea The management of common property natural resources: some conceptual and operational
fallacies. World Bank Discussion Paper No. 57
Butterfield, R.P., 1996. Early species selection for tropical reforestation: a consideration of stability. Forest Ecology and
Management 81:161-168
Hammer, J.S. 1986 "Subsistence first": farm allocation decisions in Senegal. J. Dev. Econ. 23(1986):355-369
Johnson, A.W. Individuality and experimentation in traditional agriculture. Human Ecology 1(2):149-159.
Leinbach, Thomas R., and Adrian Smith/ 1994. Off-farm employment, land, and life cycle : transmigrant households in South
Sumatra, Indonesia. Economic geography, 70:3, 1994, p. 273-296
Lentz, C. 1988. Why the most incompetent are on the village council: development projects in an Indian village in Ecuador.
Sociologia Ruralis 28(2/3):199-215
Ubinig 1991 Women and trees: some exploratory observations from Kaijuri village in Bangladesh. 22 p.

Final Exam: Due by Thursday, May 20, 9:45 a.m.

Grading:
30% class participation, scored -3,-2, -1, 0, 1, 2, 3
20% written report - a three page executive summary + bibliography (pairs)
25% seminar (pairs or threes)
25% final exam - Open book/Open note - take home.
* I reserve the right to move final grades up or down up to 5 points.

Other material which you can easily ignore if you so choose:

BOSTID. 1996. Lost Crops of Africa: vol 1. Grains. National Academy Press, Washington DC. 383 pp.

Carter, Jane. 1996. Recent Approaches to participatory forest resources assessment. Overseas Development Institute Rural
Development Study Guide No. 2. Regents Park, London. 322 pp.

Feldstein, Hillary, and Susan Coates. 1989. Working together: gender analysis in agriculture (2 vols.). Kumarian Press.
Paperback. $30.45. ISBN 0-931816-59-9. Out of Print.

Hildebrand, P.E., and J.T. Russell 1996. Adaptability Analysis: A method for the design analysis, and interpretation of on-farm
research-extension. Iowa State U. Press.

Shaner, W.W., P.F. Philipp, and W.R. Schmehl. 1982. Farming Systems Research and Development: Guidelines for
developing countries. Westview Press. Boulder CO 414 pp. Out of print.

Turner, B.L. and Steven Brush. 1987 Comparative Farming Systems. Guilford Press $42.95 ISBN 0-89862-780-X

University of MN

FR 3251 Role of Renewable Natural Resources in Developing Countires
| Class Schedule | Bookstore |
same as: FR 5251, LAS 3251, A-F only, SP - =5251, 1 cr
Instructor: STAFF
An international perspecitve on environmental, social, and economic issues associated with renewable natural resources use
and misuse in developing countires. Issues covered include: deforestation in the tropics, watershed management and
protection of investment in the Green Revolution, agroforestry, the role of women in sustainable development projects, and
case sutdies form various countries. Target audience: all university students.
Class URL: http://www.cue.umn.edu/fr3250
Class time: 50% lecture, 50% discussion
Work load: 30 pages of reading per week, 3 paper(s)
Grade: 95% written report(s)/paper(s), 5% class participation
Exam format: essays

Syllabi and course descriptions from FAO Latin American Agroforestry Network
(separated by country)

Argentina

Universidad Nacional de Misiones
Program of study in the course of agroforestry:
The agroforestry theme includes its concepts and importance.
The agrosilviculture theme includes the systems, perspectives, and purposes of agroforestry.
The agropastoral theme includes systems, perspectives, and purposes.

Universidad Nacional de la Plata
Description of agroforestry course:
- Definition and significance of agrosilvopastoral systems
- diversification
- polycultures and monocultures and their comparative effects on the use of the earth

- factors condicional on the production of the components of the system
- intercropping trees
- evaluation techniques of biological, ecological, social and political aspects
- measuring productivity
- strategies for the planning, design, management, and use of agrosilvopastoral systems

Bolivia

Universidad Autónoma "Gabriel René Moreno"
Description of agroforestry course:
4 parts:
1. perennial crops and forest resources
2. classification of agroforestry systems
3. planning
4. evaluation following (more or less) *Agroforestry Systems,Principles, and Applications in the Tropics*, published by CATIE/OTS (1986)

Universidad Mayor de San Andrés

Agroforestry: Agroforestry systems
Definition
Simple system
Complex system
Open and closed systems
Componenets of a primary and secondary system
Advantages and disadvantages of agroforestry systems
Meterological problems in the valleys and the *altiplano*

Agroforestry systems:
Windbreak
Live fences
Slow formation of terraces
Protection of terraces
Protection of infiltration ditches
Formation of small forests
Cattle protection
Trees with agricultural crops

Recommended forestry species
Entomology/forestry

Learning materials used for the course in agroforestry:
Videos:
Erosion: everyone's problem
Where and how to plant trees for our benefit
Community forestry development
Q'uapacqueña
The community tree nursery

Slides:
Manual of forest extension
Slides on agroforestry systems in Bolivia

Brasil
Faculdade de Engenharia Florestal
Program of studies for the agroforestry course:
Conceptualization, ecological bases, classification of agroforestry systems, methods, management of agroforestry systems, diagnostic of systems, and case studies.

? University ?
Departamento que ofrece el curso agroforestal

Departamento de Engenharia Florestal
Caixa Postal 308
36570-000 Viçosa, MG, Brasil

I. introduction
history
soil use capacity
current use of the land
II. conceptualization and classification
agrosilviculture
silvopastoral
agrosilvopastoral
III. ecological parameters for agroforestry systems
biomass: productivity and production of biomass, succession and climax state, determination of biomass, structural aspects of the vegetable community, heterogeneity of species, complexity of structure, structural analysis, soil and microenvironment, nutrient cycling, microenvironmental indicators
IV. economic parameters
criteria of economic analysis
V. species selection for agroforestry systems
agricultural crops
perennial crops
forestry species
forrage species
animal species
VI. case studies
agrosilviculture, silvopastoral, and agrosilvopastoral
VII project procedure
identification of problems
solutions

Universidad de Brasilia

Course in agroforestry:
Classification of systems
Planning
Management and evaluation
Ecological aspects
Case studies

Escola Superior de Agricultura de Lavras
Course description:
Basic silvo-eco-physiological concepts
Classification
Advantages and disadvantages

Potential and limitations
Practices and methods of management of agroforestry systems
Potential agroforestry systems for the various regions of Brazil
Case studies

At the end of the course, students must produce, present and defend an agroforestry project. At the end of the year, students will have a technical/scientific field trip to the Forestal de la Compañia Vale do Rio Doce reserve in Linhares, Epirito Santo to know and study some agroforestry experiences in this location.

Course description (post graduate):
Sustainability of agroforestry systems
Above-ground analysis related to agroforestry systems
Species selection
Management of agroforestry systems
Research
Extension techniques

Universidade de São Paulo
Escola Superior de Agricultura "Luiz de Queiroz" Departamento de Ciências Florestais
Description of agroforestry course:
Principal components: technical base of agroforestry systems and examples in Brazil and worldwide, with major emphasis on humid and semi-humid tropical areas of Brazil.

COLOMBIA

Universidad de Tolima
Facultad de Ingeniería Forestal

Course includes:
Definition of agroforestry
Agroforestry as a systematic concept
Classification of agroforestry systems
Evaluation of agroforestry systems
Home gardens of the Colombian Pacific communities seen as agroforestry systems

COSTA RICA

Escuela de Agricultura de la Región Tropical Húmeda (EARTH)
Course description:
Characterize and analyze components of an agroforestry system and their interactions

CHILE

Escuela de Ciencias Forestales

Course content:
Introduction: concept and definition of agroforestry
Classification of agroforestry systems
Classification system of ICRAF
Sustainability vs. productivity
Ecophysiology of agroforestry systems
Limiting factors of production and design in agroforestry systems: light, water, nutrients
Forest community development

Technology transfer
Diagnosis and Design (ICRAF)
Agrforestry extension methodologies
Evaluation, monitoring, and research methodologies
Economic evaluation of agroforestry systems
Estimation and prediction of prices and markets
The incorporation of risk and uncertainty in the economic analysis

Ecuador
Universidad Nacional de Loja
Facultad de Ciencias Agrícolas
Escuela de Ingeniería Forestal
Course content:
Concepts, advantages and disadvantages of agroforestry
Agroforestry systems; description and function
Agroforestry practices and management of agroforestry systems
Applicability of agroforestry systems in conservation of soils, provision of fuelwood, timber, and improvement of crop production
Communities and the tree
Identification of agroforestry systems in la Hoya de Loja
Design of agroforestry systems, mixed gardens

GUATEMALA
Universidad de San Carlos de Guatemala

Course description:
Introduction to agroforestry systems
Agroforestry practices and technologies
Design of agroforestry systems
Extension and diffusion techniques
Research techniques of agroforestry systems

Honduras
Escuela Nacional de Ciencias Forestales

Course content:
Fundamentals of agroforestry
Current use and potential of soil and its classification
Classification of agroforestry systems
Identification of different techniques of agroforestry for conservation of soils
Identification of vegetable and animal species used in agroforestry systems
Planning and implementation of agroforestry systems
Evaluation of adoption by the user in accordance with the socioeconomic and environmental conditions present

NICARAGUA

Universidad Nacional Agraria

Course content:

- Concepts and history of agroforestry
- Agforestry perspective
- Potential of agroforestry
- Classification of agroforestry systems
- Planning of agroforestry systems
- Management and evaluation of agroforestry systems

Perú

Universidad Nacional de la Amazonía Peruana

Course content:

- Definition
- Principles of agroforestry
- Role of integrated vegetation management in the agricultural cycle
- Role of agroforestry in environmental conservation
- Agroforestry models used in the humid tropics and Amazonia
- Case studies
- Socioeconomic aspects
- Planning agroforestry systems

Unversidad Nacional Agraria de la Selva

Agroforestry course:

I. Introduction
- Concepts and objectives
- Identification, classification, and functions
- Principle systems

II. Soil and tree cover
- Agricultural production in forest soils

III. Functions of the forest component with respect to the soil
- Nutrient competition
- Determination of biomass
- Determination of vegetable residues

IV. Analysis of agroforestry systems
- Socioeconomic survey
- Design of systems
  - Percentage of sunlight
  - Lateral view
  - Horizontal view
  - Vertical view
- Equilibrium between silviculture and agriculture
- Monoculture, its advantages
- Social aspect of agroforestry

V. Agroforestry models
- Agrisilviculture
- Silvopastoral
- Integrated systems

VI. Component selection
- Economically important agricultural crops
- Subsistence agricultural crops
- Native fruits
- Multiple use trees in agroforestry systems

Forrage trees

VII. Management of agroforestry systems
Evaluation of agroforestry systems
Ecological benefits
Costs
Case studies

VIII. Socioeconomic diagnostics
Selection of species: agricultural, pasture, and forest
Installation of demonstration plots

Universidad Nacional de Ucayali

Course content:

Introduction to agroforestry (concept, history, other aspects)
Classification of agroforestry systems
Management and evaluation of agroforestry systems
Design of agroforestry systems

REPUBLICA DOMINICANA

Instituto Superior de Agricultura

Course content:

Production techniques
Advantages and disadvantages of agroforestry systems
Socioeconomic aspects of agroforestry systems
Ecological aspects of agroforestry systems

VENEZUELA

Universidad de los Andes

Course description:

Agroforestry description and definition
Systems in agroforestry
National inventory of agroforestry, with focus on successful systems
Soil fertility and conservation in agroforestry systems
Diagnosis and Design of agroforestry systems
Research of agroforestry systems
Socioeconomic effects of agroforestry systems