NATIONAL FORESTRY CURRICULUM WORKSHOP PROCEEDINGS

Institute of Forestry

Pokhara, Nepal

Institute of Forestry Project
1990

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Pokhara, Nepal

November 29 - December 1 1990

Institute of Forestry Project

Tribhuvan University, Institute of forestry
Yale University, school of Forestry & Environmental Studies
International Resources Group, Ltd.
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INTRODUCTION

Michael Rechlin, PhD*

The National Forestry Curriculum Development Workshop was held at the Institute of Forestry's Pokhara campus from November 29 to December 1, 1990. It brought together over 90 participants to discuss the educational needs of natural resource personnel in Nepal. The workshop participants represented a wide spectrum of forestry, natural resources and educational interests. There were senior Ministry officials, Tribhuvan University and Ministry of Education officials, practicing Forest Officers and Rangers and students, as well as representatives of NGO's and donor agencies. Although of varying backgrounds, all these people came to the workshop with a shared interest in the education of natural resource managers for Nepal.

The success of forestry and other natural resource development efforts in Nepal will ultimately rest with the ability of educated personnel to implement, extend and expand upon the work already being done. The overall objective of the National Curriculum Development Workshop was to provide a forum for practitioners to work with the Institute of Forestry in improving the natural resource education offered by the Institute.

These Workshop Proceedings are a record of the papers presented, ideas generated, conclusions reached and recommendations made during the three day workshop. The Proceedings, while representing a conclusion to the workshop activities, are only a beginning in the process of curricular revision and educational change at the Institute. The National Forestry Curriculum Development Workshop was a 'milestone' in what must be a continuing process of review and upgrading in order for the Institute of Forestry to adequately educate natural resource managers for the future needs of Nepal.

Special acknowledgment goes to our many honored guests, including Dr. Chhabi Lal Gajurel, Member Secretary, National Education Committee, who presented brief but important remarks to the workshop.

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* Chief of Party and Forestry Adviser, IOF Project.

Cur Tum Dev Wor was organized by the Institute of Forestry Curriculum Task Force with the support of the USAID-sponsored Institute of Forestry Project. Curriculum Task Force members include: M.K. Balla, Coordinator; A.R. Tuladhar, Member-Secretary; and members A.K. Mallik, S.P. Lakhey, C.L. Das, C.P. Upadhyaya and M.D. Sharma.

The organization of this national workshop required a dedicated effort by all those at the Institute of Forestry. Special mention should be made of Dean I.C. Dutta, Assistant Dean Samsul Haque and Acting Dean Jai Metha for their long hours of effort. Equally important was the work of the Institute of Forestry staff in preparing the campus and managing workshop logistics. Similarly, the staff of the Institute of Forestry Project put in long work hours to keep the workshop moving along. We also acknowledge the 'hidden hand' of our project officers at USAID/Nepal, Thomas A. Pierce and Niranjan M.S. Regmi, for furthering the interests of the workshop and the Institute from their vantage point in Kathmandu. Finally, recognition should be made of Bhim K. Shrestha for his efficient and accurate work in typing these Proceedings.

Michael A. Rechlin, PhD
Senior Advisor

and

Donald A. Messerschmidt, PhD
Social Forestry/Research Advisor

Institute of Forestry Project
Pokhara, Nepal

WORKSHOP CONCLUSIONS

The following conclusions are based on the recommendations of the four Discussion Groups as presented during the plenary session on the last day of the workshop. These conclusions were agreed upon by consensus of the workshop participants.

These conclusions will serve as overall guiding directions to be referred to in formulating a new curriculum for the Institute. Specific recommendations regarding both the BSc and Proficiency Certificate Level programs are included in the Discussion Group Summaries (beginning on page 125).

It is concluded that,

1. in teaching forestry and other natural resource management subjects at the IOF, efforts should be made to design courses that fully integrate technical bio-physical knowledge and skills with sociological knowledge and skills,

2. since graduates of the IOF need to be good communicators, there should be more emphasis on communications skills training - oral, listening and written; communications training should focus on oral and listening skills that allow the graduates, in their role as technical assistants in managing community forest lands, to converse freely with, listen to and learn from villagers; they should also focus on written skills that allow the graduate to properly report field activities to their supervisors,

3. in designing courses, course objectives should be stated as educational outcomes; the questions to be asked is, "what should this person be able to do (an outcome) upon completion of this course?",

4. to better teach their courses, faculty at the Institute should be cognizant of the activities and responsibilities that the graduates will assume on the job, for which an Institute/field exchange program should be established wherein faculty will spend time in the field with forest officers and rangers and wherein forest officers and rangers will spend time at the Institute of Forestry,

5. because the students need more 'hands on' experiences in forestry and natural resource management, the training offered at the Institute be applied and practical,

6. because students should be prepared to work with user groups as technical assistants on a broad range of topics, community forestry should be taught encompassing forestry operations from planting trees to formulating community forestry management plans,

7. because students should possess the ability to conduct applied research in both bio-physical and social subjects, BSc level students should be well grounded in basic investigative research skills; this is not to say, however, that they should become research scientists, but that they they should possess the research skills necessary to facilitate them in their assignments and to improve their job outcomes,

8. due to a diversifying job market, Institute students need to be prepared in ways which encourage flexibility in their skills and approach to work; their training should not tie them to a specific job description but should give them the skills and knowledge to take advantage of new opportunities, such as in nature-based tourism and environmental management,

9. to be well rounded and prepared in a range of fundamental knowledge, Institute students should be provided with a better understanding of the basic sciences, and

10. since the Institute should remain flexible in meeting the changing needs of the nation, curriculum development needs to be an on-going process.

WELCOME ADDRESS

I.C. Dutta, PhD*

Distinguished participants, ladies and gentlemen:

It is a matter of great pleasure for me to wish you a warm welcome to this National Forestry Curriculum Development Workshop here at the Institute of Forestry. Over the last two decades, a number of important events and changes in the field of forestry have taken place which have brought new challenges to our organization, the IOF.

Changes in the forestry curriculum have evolved in response to external pressure, such as changes in the forestry accreditation standard, requests made by employers and requirements of the Department of Forests.

Due to increasing population and heavy pressure on the nation's forests for firewood, fodder and building materials, forest areas are shrinking day by day. Deforestation and degradation of natural resources have resulted, with serious soil erosion, sedimentation and flood problems which have devastated the hills and are desertifing the main agricultural land in Terai plains, thereby reducing productivity which, in turn, affects the economy of the country.

Therefore, conservation of natural resources has become an issue of grave concern to all of us.

The Master Plan for the Forestry Sector and government policy puts priority on developing a community-based forestry, stressing sustainability, proper utilization and environmental conservation - primarily for community benefits.

Improved community practices aim to reduce and stop the mounting pressure on the forest area. Now it is time to pay particular attention to multiple-use management to combine the production of timber and non-timber products on a sustained basis.

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* Dean, Institute of Forestry.

I to your , and gentleman, towards environmental issues which have, in recent years, emerged in the forefront on the global agenda. There is a need for balanced perspective in addressing environmental issues. The need to fully understand the conservation of biological diversity is equally important.

The IOF has felt it worthwhile to review its program in order to meet the changing needs of our time. As a result, the IOF Curriculum Development Task Force was formed in 1989 in order to:

a) get a clear view of employer needs and objectives, and

b) propose a new curricula, that is more responsive and pragmatic to the needs of the nation.

The result of interviews, questionnaire surveys and observations made by the Task Force will be reflected later during the sessions.

Distinguished participants, ladies and gentlemen. I invite you now to share your knowledge and expertise in preparation of a more effective and practical curriculum.

I wish you a happy deliberation and pledge the IOF and IOF Project's total cooperation and assistance. I thank you for your kind attention.

With these brief remarks, I declare the National Forestry Curriculum Development Workshop open.

WORKSHOP OBJECTIVES

Mike Rechlin, PhD*

I would like to add my welcome to that of Dean Dutta's. I see many old friends here, some new friends and some friends I have not met yet, but should have. My project manager in USAID, Tobey Pierce, and my partner here in Pokhara, Dr. Don Messerschmidt are always chiding me for not getting out and meeting more people working in forestry in Nepal. My time in Kathmandu seems to be so limited and always so busy. So, we invited you to the Institute of Forestry, here in Pokhara, and I look forward to making your acquaintance over the next few days.

The reason we are all here is to help give direction to a new curriculum for the Institute of Forestry. We have invited you to participate in this process because you are the ones who are out there trying to make forestry work in Nepal. Academic institutions tend to get separated from the reality of life on the job. We often teach what we have been taught or what we want to teach instead of what our graduates need to know.

By inviting you to take part in this workshop we hope to accomplish three objectives:

(1) We want you to help us define the skills and concepts that Institute of Forestry graduates need to know in order to work effectively in the field. We want you to think about what our graduates should know and what they should be able to do when they leave the Institute.

(2) We want to make you all part of the Institute of Forestry. You are giving us your valuable time to help us prepare graduates to do a better job for you. We want you to feel that you have a stake in what happens here. Our success in training foresters ultimately effects your success in practicing forestry.

(3) We want to make the Institute of Forestry part of what you are doing in forestry development. Your very presence here signifies that the Institute is reaching out to become part of the bigger forestry scene in Nepal. Before I came to Nepal for this job, Dr. Bill

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* Chief of Party and Forestry Adviser, Institute of Forestry Project.

I was writing to me describing live at the Institute of Forestry. At one time he described the Institute as kind of a quiet place, serenely situated between the precipitous gorge and raging torrent of the Seti River and a leprosy hospital. It sounded like a nice place to live. Well, we are not changing the physical location

of the Institute. From today on, however, the Institute is going to assume an active role throughout Nepal in the education of natural resource managers.

This workshop will lead to curricular change at the Institute of Forestry. The workshop will be immediately followed by two full days of meetings of the Institute's Curriculum Development Task Force, Subject Committee Chairmen and curriculum development experts from abroad.* These are the academics, people who are experts in education and know-how to package ideas into courses. In those meetings, the outline of a new curriculum for the Institute of Forestry will be developed. Your recommendations from this workshop will form the basis for those deliberations. We think that we know some of the charges that need to be made in the curriculum. Our ideas may be right or they may be wrong. Your work here will tell us what we need to know, it will be a mandate for change.

There should be an accountability to this process. You are giving of your valuable time to help us and you should know that your time counts. When we first started work on this workshop, I was concerned that no one would show up. Pokhara was too far away, the roads too rough to drive. As the list of participants began to grow, my anxiety took on another form. Some of you traveled half way across Nepal to attend. Others traveled half way around the world. Desks at the Ministry of Forests and Soil Conservation and in the Department of Forests, and other departments and agencies, were left vacant. Project evaluation teams were told to wait. Important work at the district and range levels was left undone. My concern was to make certain that this workshop must be worth all of this attention.

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* These include Dr. Niwat Raungpanit, Dean, Faculty of Forestry, Kasetsart University, Bangkok, Thailand; Dr. William R. Burch, Jr., Hixon Professor of Social Forestry and IOF Project Director from Yale University's School of Forestry and Environmental Studies (F&ES); Dr. Eugene Rubin, Instructional Psychologist and Director, Centre for Distance Education, Athabasca University, Alberta, Canada; and Dr. R. Bruce Morrison, Associate Professor of Anthropology, Athabasca University.

The Institute of Forestry will produce a Proceedings of this workshop. From the recommendations you give us will come a new curriculum for the Institute. Finally, and most importantly, the Institute will educate forest officers and rangers who are better qualified to do their jobs. Your time deserves these outcomes, and you should demand nothing less.

The workshop is organized around speakers who have been asked to give papers on topics identified by the faculty. Each of the speakers has been asked to present a paper that addresses the needs of graduates that are to work in that field or to relate their area of expertise to curricular development at the Institute. The purpose of these papers is to get you thinking and to initiate discussion. We are not so much to learn from the speakers as we are to be challenged by them.

Each hour of presentations will be followed by an hour and a half of working group discussions. Here is where the real work of the workshop will take place. You, as participants, become the most important element of the workshop. By working towards a group consensus, recommendations for change will emerge. Two groups have been assigned to consider the Certificate level technician program, and two groups the BSc Diploma level program.

On the third day of the workshop, each group will have the opportunity to report out to the whole body on their working group discussions. Areas of agreement across working groups will be presented as workshop conclusions, and the specifics of the group discussions will stand as recommendations for change.

This is a big job to accomplish in only three days. We have a lot of work to do, so I ask you to work hard. As we work together, let's also remember to have fun. From our reception last night, it was obvious to me that this is one of the nicest groups of people ever to gather in Nepal. Enjoy your stay at the Institute of Forestry, and I look forward to working with all of you in the next three days.

KEYNOTE ADDRESS:

HISTORICAL DEVELOPMENT OF THE INSTITUTE OF FORESTRY

B. P. Kayastha*

The soul of education is the education of soul.
- Anonymous

Introduction

In our society the 'guru' has always commanded great respect, as he is the one who removes darkness or ignorance from the minds of his disciples. Forests, which are an inseparable part of nature, are complex organisms performing myriads of life supporting activities several of which remain to be unraveled. Forestry 'gurus' have to shoulder this responsibility and generate knowledge and skills for the benefit of mankind at large. In recent years, forestry has been in the process of rapid transformation. What used to be called the 'indirect benefits' of forests have come to be realized as direct benefits. The influence of the forest knows no geographical boundaries. Forests are considered indispensable for environmental protection and socio-economic amelioration. Commenting on the forest, Lord Buddha once preached that the forest is a peculiar organism of unlimited kindness and benevolence that makes no demand for sustenance and affords its various products to mankind, offering shade even to the axeman.

The forestry situation is deteriorating worldwide. In recent years,the tropical forest degradation has steadily accelerated. In our own country, I am forced to paint a very gloomy picture. The forests are fast disappearing from the Terai and inner Terai. The ecological balance in several of the watersheds have been adversely affected. Under a steady and relentless population growth, the poor are forced to seek their survival on forest lands. Fortunately, some realization has dawned in the minds of right thinking people that the indiscriminate clearing of forests will lead to a situation whereby valuable land resources may turn into barren desert. Much needs to be done, however, to bring awareness to the people. Forestry institutions have to come up with appropriate program to

* Additional Secretary, Ministry of Forests and Soil Conservation.

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halt the degradation process and gradually restore ecological balance. To this extent, the IOF can offer a right venue for deliberations on current forestry problems.

History of the IOF

Having said that, I now focus my attention to the main theme of the workshop. But before coming to the actual theme, I would like to trace the development of the IOF and its contribution to the development of the forestry sector as a whole. I will also briefly mention some of the issues that influence the working environment of the Institute.

The IOF is one of the pioneering and the only institution imparting forestry education in Nepal. It was established as the 'Nepal Forestry Institute' in 1947 in Kathmandu, with the responsibility of training technician level foresters to fulfill the manpower demand of the Forestry Department. Later, the Institute was shifted to Bhimphedi and then to Hetauda in a newly built campus of its own.

In 1972, the IOF along with other technical institutions was taken over by Tribhuvan University under a new education plan. Under the university system, a second IOF Pokhara campus was established where graduate level (BSc Forestry) students have been receiving their education since 1981. For graduate level education, the faculty has been developed to give special courses in forest management, wildlife management, and soil and water conservation. Thus the IOF has been playing a vital role in human resource development for the forestry sector from the very beginning. But for the IOF, the MFSC would not have extended nationwide networks of its various departments. The future of the Ministry of Forests and Soil Conservation (MFSC) very much depends on the quality of graduates and undergraduates produced at the IOF.

Human Resources Development

The development of human resources is the most complicated and sensitive of all resource development efforts. Since all works and their management are human activities and are constantly supervised, monitored and assessed by people, there are many factors which influence human resource development in varying degrees at different times.

The MFSC is the leading agency utilizing trained forestry manpower and, therefore, it is important to understand how its tasks have been changing over the years. A close linkage is essential between the IOF, MFSC and its various departments. The Faculty Board of the IOF, where the members of the MFSC and its

various departments are represented, is the right kind of body to reinforce the linkage. Adequate representation of the MFSC and its various departments in this workshop is the evidence of the desire for the close linkage.

Another important issue which the IOF should address is the role of women in forestry. With an increase in the participatory approach, educated women have to play a central role as natural communicators to other women. In our society, women shoulder the responsibility of running the household affairs. They have to prepare food for the family and feed for the livestock. For this these needs they must collect fuelwood and fodder from the forest. Hence, their participation in forest management is of vital importance. In principle, this has been very much appreciated but, in practice, progress is rather slow. More effective measures are needed to encourage female students to opt for forestry studies. This is also in keeping with the spirit of SAARC which is going to celebrate the 'Decade of Girl Child.'

Linkages

Yet another important factor that the IOF must recognize is that it can not proceed with its activities in isolation. On the one hand, it has to maintain strong linkage with the MFSC and other consuming parties and, on the other, it has to coordinate its activities with other technical institutions within the university system. Similarly IOF can not ignore the socioeconomic environment in which it functions. It has to reorient its program to benefit the poorest sections of the society, in particular, those living in the close vicinity of the forests.

The IOF, as the only center of learning in forestry, has the unique opportunity to develop itself as a center of excellence. For this, concerted efforts have to be made to develop various faculties and strengthen its research program. Fortunately, the development of the IOF is being supported by USAID for which we are thankful to the U.S. Government. With this support, I am confident that the IOF will continue to make rapid progress. And, I assure the continued support of MFSC in this regard.

Curriculum Development

Coming now to the theme of this workshop, curriculum development is undoubtedly essential for determining appropriate courses of studies at various levels. In the field of forestry, the horizon of knowledge has been expanding. Several new concepts and practices have evolved. The curricula of various levels must embrace these transformations. I suggest that while reviewing the curricula, it may be worthwhile looking into the rationale and duration of various levels for which the curricula

are to be designed. Various levels of education should also be matched with other technical institutions in the Tribhuvan University system.

In designing the curricula of various levels, I suggest that the following topics should be considered:

(1) Forestry Research

The subject of forestry research has still not received sufficient attention despite its crucial role in the future of forests. I, therefore, feel strongly that the IOF should develop a sound research organization to play a leading role in forestry research. It should establish strong linkages with similar institutions, particularly those in the SAARC region.

(2) Forestry and the Environment

The very concept of forestry is inseparable from the notion of time. A forest always represents the climax of a long past and a pledge for the future. It was with this purpose that, nearly 2,500 years ago, Lord Buddha preached to his disciples: "each one to plant one tree and protect it for 5 years." Forests are essential to survival of the environment, but to assure survival we have to create a congenial environment to conserve the forest. The IOF can contribute significantly in bringing an awareness and creating such an environment.

(3) Community Forestry

Since one and a half decades, the main thrust of forest policy has been on the participatory approach. In keeping with the policy guidelines, the community forestry program is being implemented on a nation wide scale. However, IOF has not given sufficient attention to integrating this approach within the traditional forestry education. Such a synthesis will call on a high degree of knowledge and skill on the part of faculty members. If this is achieved, it will be a significant breakthrough. Therefore, I strongly urge the IOF to develop a full-fledged Faculty of Community Forestry.

(4) Communication and Extension

In the participatory approach to forestry, there is a clear emphasis on extension activities to activate people's participation. At present, forestry extension is considered to be a major activity in almost all forestry projects. The

MFSC has already established a Communication and Extension Division within the ministry. It is now the responsibility of IOF to fulfill the demands of extension foresters.

Indeed, the IOF has a great responsibility to produce a new kind of dynamic foresters with sound knowledge of environment, conservation, social forestry, extension, etc. Undoubtedly, a real forester has to be a humanist. He has to gauge the extent to which careful management of the natural environment can maintain the equilibrium of our planet and ensure sustainable development.

Conclusions

Finally, the teaching and learning process is of vital interest to us. Galileo once said, "You cannot teach a man, you can only make him learn." Hence learning is more important than teaching. On learning I am reminded of a Chinese Proverb which says:

I hear I forget,
I see I remember,
I do I understand.

I am sure that our deliberations on curriculum development will further reinforce the academic programs of the Institute of Forestry. I wish this workshop a grand success.

I. CURRICULUM RESEARCH AT THE IOF

PERCEPTION OF POLICY-MAKERS TOWARDS GRADUATES AND PROGRAM DEVELOPMENTS AT THE INSTITUTE OF FORESTRY (IOF)

Chiranjibi Prasad Upadhyaya*

Introduction

This paper presents preliminary findings from the IOF Curriculum Task Force questionnaires, interviews and observations with government policy makers made on 7-21 January, 1990. Findings suggest that the IOF should change and improve its classroom and practical curricula to give its Certificate and BSc level students better training in basic technical, topical, social and communications skills to perform their jobs in forestry better. The future curriculum should be directed toward quality preparation for careers in forestry, wildlife, soil and watershed conservation, rural development, environmental and natural resources management and nature-based tourism. Many question arise concerning the length of training, the amount of practical field experience versus classroom and theoretical training, the nature of community forestry skills training, the importance of research, management and planning skills and the relationship between pre-service and in-service training.

Background

In striving for educational quality, continuity and adaptability, and in the context of the changing national, regional and international environment concerning all aspects of natural resources management (NRM), the Institute of Forestry feels the need to change and improve its curriculum. The overriding need is for the IOF to produce the best graduates who are prepared to address and improve natural resource management to match the perceptions, values, needs and benefits of the Nepalese people.

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* Member, IOF Curriculum Development Task Force.

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While planning to improve the IOF curriculum, we must pay particular attention to:

- students,
- employing agencies, changing social and political circumstances,
- evolving national needs vis-a-vis natural resources, and
- rapidly changing information and knowledge systems.

Therefore, the IOF's Curriculum Task Force set out earlier this year to obtain information regarding perceived and potential change in curriculum through interviews, observations and consultation, particularly from the employers of its graduates.

This paper gives a brief synopsis of employers' views of IOF graduates and information about their new and changing natural resource management needs.

We at the IOF would like to produce graduates equipped with the necessary basic skills and knowledge so that upon entering service they can begin NRM implementation immediately in the field. In view of our main objective, and of anticipated changes in the skill needs and knowledge of our graduates, the IOF formed a Curriculum Task Force in 1989 in order to:

(1) get a clear view of employer needs and objectives, and

(2) use that information, in part, to develop a new and fundamentally more responsive and practical NRM curriculum.

Our first task was to determine specifically what our students need to know and need to be able to do. Part of that task was accomplished through questionnaires and interviews, and part through observation.

Task Force members have discussed the topic of curriculum development with employing agencies, NGOs, Forestry Training Wing officers and with departmental policy-makers within the Ministry of Forest and Soil Conservation, the Ministry of Tourism, the Ministry of Education, Tribhuvan University and the National Education Commission. Furthermore, we have incorporated comments forwarded by participants in the Forestry Master Plan Workshop of September 1989. The present Forestry Curriculum Workshop is the next step in the process of preparing a draft new NRM curriculum for the IOF and for Nepal.

Our emphasis in this paper is to give central attention to employer views regarding IOF curriculum needs, perceptions of our graduates and the future role of the Institute in meeting the educational aspirations and national needs in NRM.

Findings

There are seven main points to our findings:

(1) Curriculum Needs

To produce well trained and practical natural resource managers, equipped with adequate skills - both technical and topical - ready to take up field responsibilities in Natural Resources Management.

NRM skills include these areas of importance:

a. soil and water conservation and watershed management,

b. conservation and park management,

c. forest extension and communication,

d. research and planning,

e. environmental management and conservation,

f. basic science (at Certificate level), and

g. community based (user group) management.

Some further concerns and issues about the curriculum are that:

h. it should be recognized by international education institutions, at least at the SAARC country level,

i. it should not concentrate or specialize too early, as the IOF is still trying to provide a basic forestry education to its students,

j. it should meet the Nepalese people's aspirations for higher education in NRM and conservation,

k. it should be noted that many theoretical concepts from books are not entirely suitable and applicable to Nepal's new natural resource management needs,

l. it should generate entreprenurial attitudes instead of a singular civil service-oriented expectation,

m. it should put a greater emphasize (than currently) on social science oriented course work and practical field experience in communities,

n. it should provide knowledge about the government's changing policy, acts, development goals and socio-economic status of the Nepalese people, and

o. it should prepare students for new and expanded roles in research and planning for extension and technical assistance to community based NRM (roles in place of older standard practices of protection forestry).

(2) Needs to Consider at the Certificate Level:

a. practical concepts and theory about people-oriented conservation and management,

b. development of right attitude concerning the linkage between natural resources and people; i.e. between the biophysical and the social sciences,

c. considerations for shrubland management, in addition to natural forest management skills,

d. synthesis of soil conservation, agroforestry, environmental management, forest conservation and wildlife management techniques, and

e. strong emphasis on practical work; i.e. more field-oriented experience must be emphasized.

Note that the National Council for Technical Education and Vocational Training (CTEVT) is not likely to train forestry technicians in the near future; therefore, the technical training responsibility falls mostly on the IOF.

(3) NGO Views and Needs:

a. NGOs need graduates who can do both forestry and agriculture work,

b. they want to see more interaction between the IOF and NGO operations and projects, and

c. graduates coming to work for NGOs need knowledge of problem identification under diverse socio-economic conditions.

(4) Overall Views About IOF Graduates:

a. most recent graduates have been eager to learn new skills to better equip themselves in field work implementation,

b. BSc Forestry graduates having science background are comparatively better motivated for quality work than graduates coming with only a forestry Certificate. However, they need more practical work. And,

c. generally, the quality of students coming out of the Certificate program has improved in recent years.

(5) Some Weaknesses Observed:

a. most of the IOF graduates lack sufficient practical experience to take up fieldwork responsibilities on the job.

(6) Coordination Needed:

a. closer coordination is sought between the IOF and the MFSC Training Wing, especially in curriculum design, interchange of specialists, and reduction of redundancies and overlap (between pre-service/in-service training),

b. better coordination involving IOF research at the NRM implementation level is sought,

c. better coordination and dissemination of research work and results are sought among all organizations involved in NRM, and

d. closer coordination is needed with NGOs involved in NRM and conservation is sought.

(7) Some Thoughts on the Future Vision of the IOF:

a. academic degree programs in forestry, rural development, environmental conservation and management, land use planning and park management are needed,

b. the IOF should generate forest environment conservation technology from research work,

c. consider the potential for nature-based or adventure tourism, as a market for ecologically trained forestry graduates,

d. consider specialized training in social sciences, which may lead to special job opportunities for forestry graduates,

e. agroforestry/farm forestry, community development/rural development need special attention,

f. closer contact with field implementation officers should be encouraged to improve teaching quality.

g. the IOF should meet long term aspirations of the Nepali people for higher education in NRM and rural development, and

h. more research is needed to meet the practical NRM and community forestry needs of government departments, programs, NGOs and donor agencies.

Table 1. List of Policy-Makers and Others Consulted by the Task Force, Kathmandu, 7-21 January, 1990:

* Ministry of Education

- Under-Secretary, National Education Commission, Mr. Lohani
- Secretary, National Education Commission, Dr. C.L. Gajurel
- Principal Adviser to the Executive Director, Council on Technical Education and Vocational Training
- Deputy Director of Technical Education, Mr. R.B. Tamrakar
- Deputy Exec. Director (and former Director for Technical Education), Mr. K.N. Shrestha

* Ministry of Tourism

- Joint Secretary, Ministry of Tourism, Mr. Jhalendra Pradhan

* Tribhuvan University

- Curriculum Development Center representative, Dr. R. Rongong

* Ministry of Forests and Soil Conservation

- Additional Secretary, Mr. B.P. Kayastha
- Chief, Training Wing, Mr. L.B. Tuladhar
- Training Officer, Mr. N. Rajbhandari
- Director-General, Mr. I.S. Thapa
- Forest Management Officer, Department of Forests, Mr. M.K. Bajracharya
- Director, Department of National Parks and Wildlife, Mr. B.N. Uprety
- Wildlife Officer, Mr. S. Bajimaya

- Chief, Bagmati Watershed Management Project, Mr. Keshab M. Shakya
- Agroforester, Bagmati Watershed Management Project, Mr. M. Upadhyaya
- Agricultural Engineer, Bagmati Watershed Management Project, Mr. G. Poudel

* Projects and Non-Governmental Organizations (NGOs)

- Nepal-Australia Forestry Project (NAFP) and NAFP District Forest Officers:

  NAFP Team Leader, Dr. D. Gilmour
  NAFP Forester, Mr. A. Ingles
  NAFP Extension Officer, Mr. H. Singh
  Kabre Palanchok District Forest Officer, Mr. M.R. Maharjan
  Sindhu Palchok District Forest Officer, Mr. K. Bhattarai

* Other

- CARE/Nepal, Forestry Sector Adviser, Mr. G. Adhikari
- United Mission to Nepal, Forestry Adviser, Mr. T. Gross

Table 2. Forest Officers who Participated in the Regional Master Plan Workshop for Forestry Sector, Held in Pokhara, Septembeer 1989, Consulted by the Curriculum Task Force

- Department of Forests, Director-General, Mr. I.S. Thapa
- Western Region Director of Forests, Mr. G.R. Pandey
- Central Region Director of Forests, Mr. K.B. Karki
- Argakanchi District Forest Officer, Mr. R.D. Yadav
- Baglung District Forest Officer, Mr. R.N. Jaiswal
- Bhaktapur District Forest Officer, Mr. P. Budhathoki
- Gorkha District Forest Officer, Mr. N.R. Baral
- Kaski District Forest Officer, Mr. R.P. Paudel
- Kathmandu District Forest Officer, Mr. D. Upadhyaya
- Lamjung District Forest Officer, Mr. G.S. Timila
- Parbat District Forest Officer, Mr. B.R. Bhandari
- Mustang District Forest Officer, Mr. Shaha
- Myagdi District Forest Officer, Mr. M.L. Kuswaha
- Ramechap District Forest Officer, Mr. R.B. Raut
- Syangja District Forest Officer, Mr. K. Woli
- Tanahu District Forest Officer, Mr. R. Baral

Some Useful References

Wm. R., Jr. 1989.
into its Social Ecological Context: A Framework for Asking Questions. Seminar Paper presented at the Institute of Forestry, Pokhara Campus, Nepal, December 31, 1989. 14pp.

Clausi, Robert (ed.). 1989. Proceedings of the Workshop on Social Science for Asian Forestry Curricula. Washington DC: Winrock International and Yale University, for USAID.

Sleiner, K.C. and T.W. Bowersox. 1987. Setting Educational Objectives for Forestry Curricula: What Should Forestry Graduates Know? Journal of Forestry. Pp. 38-40.

IOF/CTF. 1990. Report of the IOF Forestry Curriculum Task Force 1990 Policy Meetings in Kathmandu, January. 13pp.

Messerschmidt, Donald A. 1987. Working Paper on Social Science Curriculum for the Institute of Forestry, Nepal. Unpublished consultant report to the IOF and USAID.

QUESTIONNAIRE INFORMATION FROM IOF GRADUATES (BSc & Certificate) FOR FUTURE CURRICULUM DEVELOPMENT

Shanker Pd. Lakhey and Chintamani Lal Das*

Introduction

This paper discusses the findings from IOF graduate rangers and forest officers. Fifty responses were received. The data are as follows:

1. Number of Respondents by Agency

Employing Organization	- Level of Education - Certificate (PCL)		Diploma (BSc)	
	Male	Female	Male	Female
Dept. Forestry	7	2	10	1
Dept. Soil & Water Conserv.	3	0	1	0
Dept. Wildlife	6	0	3	0
Community Forestry Div.	1	5	0	0
CARE	2	1	0	0
RDC	2	1	0	0
IOF	1	0	2	0
IDRC	1	0	0	0
NAFP	0	1	0	0
	23	10	16	1

* Members of IOF Curriculum Task Force, Institute of Forestry.

(·icate Level

- monitoring, supervision and planning
- teaching and training
- extension activities
- wildlife conservation
- law and administration
- research and data collection
- forest protection
- survey, demarcation and development works
- forest utilization
- nursery and plantation works
- soil conservation work

Diploma (BSc.) Level

- soil and community forestry program
- forest management plan
- silvicultural operation works
- forest law and administration work
- forest protection
- experimental design and research work
- nursery plantation
- survey and demarcation
- extension and motivation works
- financial planning
- utilization
- training co-ordination
- soil conservation
- supervision and report writing
- wildlife conservation

3. Major Issues Faced by Forester in Nepal

- increasing population and improper land use and cultivation practices
- illicit felling problems leading to deforestation
- lack of Resource Management Plan
- fuelwood problem in relation to the socio-economic condition of the people
- increase forest areas for local needs
- political pressure
- defective forest policy
- lack of education
- soil conservation due to adverse geophysical condition
- wildlife conservation
- women's participation
- lack of technicians
- centralized power by higher authorities
- research on wildlife biology and habitat improvement
- park and recreational planning and management
- community forestry programs

23	25	2

6. IOF's Curriculum, Adequate or Not

	Certificate	Diploma (BSc)
'Yes'	13	9
'No'	18	10

7. Minor Improvements If 'Yes'

- equipment facilities
- practical works in mensuration, silviculture, statistics and computer training

8. What Improvements Needed if 'No'

- subjects must be related to forestry
- practicals field-oriented
- course on silviculture, wildlife, mathematics and mensuration must be increased
- elective courses on soil and water conservation
- general forestry and wildlife must be included for Certificate level.
- course content are not given uniform weightage

9. Obstacles for Improvements

- field exercises
- lack of knowledge about problems faced by forester in HMG
- practical classes conducted are inadequate
- teaching media should be in English for talking with foreigners, especially in National Park and Tourism section
- administrative problems as regards to teachers, examination and field works.

10. Opportunities for Improvements

- qualified teacher needed
- course should be more field oriented
- more emphasis on:
  agriculture and range management courses must be replaced by agroforestry courses, and include science courses for Certificate level also

be
- [illegible] eld orientation on community forestry and experimental designs
- physical training and diploma students also

12. General Education Courses Topic or Skill

- sociology and extension work
- monitoring and accounts for Diploma students
- practical implication on forest law and administration
- field orientation for 2-3 months for BSc students as in Certificate level, rather than observational tours only
- courses in swimming, shooting, horse riding and driving to be included (1 week)

13. IOF Academic Environment

- discipline and co-ordination between students and teachers is needed
- regular training for teacher is needed for better teaching
- teachers should be research oriented without disturbing the academic calendar
- Certificate courses to be run at Hetauda and Diploma at Pokhara
- intake of students for BSc classes should be reduced
- regular meetings between teachers, administrative staff and students should be conducted
- political activities should be restricted in the campus area
- develop physical facilities
- the Dean should be a forester and senior most in line

14. Recommendations

(1) Courses on silviculture, wildlife, mathematics, mensuration: forest management and law and administration should be more practical and field oriented.

(2) Elective courses on soil and water conservation, forest management and wildlife conservation are essential for Certificate level.

(3) Better physical facilities should be provided.

(4) New courses such as agroforestry/community forestry, rural sociology, management plan and extension works should be included as per todays need in the field of forestry.

the media should be English.

(6) Regular meeting between teachers, administrative staff and students should be conducted for better understanding among them.

(7) Regular training is needed for teachers to improve teaching quality.

COMMENTS AND RECOMMENDATIONS BY STUDENTS OF THE IOF

Student Representatives*

(Ed.Note: The following comments were compiled by student representatives and offered to the workshop in association with reports on research by the IOF Curriculum Development Task Force.)

Comments

(1) The comparison made that the forest officers (IOF products) are inferior to AIFC products in relation to field work and field experience. Who is responsible?

- the department
- the institute
- the curriculum

(2) General science courses should be included in ISc (Certificate) levelto provide basic, scientific knowledge and to provide chance to the students who seek the opportunities of improving further qualification in different universities of different countries.

- all the text books are in English
- there is shortage of technical terms in Nepali language
- to make it easy to interpret views with different workers working in different communities
- to let them be recognized by the universities and organizations in other countries etc.

(3) Priority should be given to community forestry and other basic requirements that support the study of forestry e.g. ecology, hydrology, etc., even at Certificate level.

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* Mr. I.M. Bhandari (BSc/2nd Year), Mr. D. Poudyal (BSc/2nd Year), Miss R.B. Joshi (BSc), Miss U. Aryal (BSc), Miss R. Shrestha (BSc, NAFP Ranger), Mr. G. Poudyal (Certificate/1st Year) and R.P. Poudyal (Certificate/1st Year)

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_ be veo in
program related to natural resources conservation and management because:

- more practical knowledge & skills can be gained only
- some financial support should be provided to the students to make their study better and easy

(5) There must be a constant relationship between the IOF, the Ministry of Forestry and the Ministry of Education; e.g. in relation to enrolling Diploma (BSc) students from the Certificate (ranger) stream. The Institute requires the students to have at least one year experience after Certificate program is finished, but the Department forces the recruits (students) to serve the government at least 5 years.

(6) The curriculum should be according to what knowledge and skills the department requires and what the graduates of other countries have.

(7) Time-to-time seminars should be held to let the students know about the results of recent research.

(8) For the students from the BSc-General Science stream, the capsule course (prerequisite forestry course) should be made academic.

(9) There is always repetition in practical classes at Certificate and Diploma (BSc) levels. Practical classes are not scientific. Practical class should be done in the related field but not in class. The marks of the practical classes and theory classes should be allocated according to the load the students have to bear during their labor period.

(10) In BSc/3rd year, agroforestry should be taught instead of agriculture.

(11) In Certificate/2nd year harvesting & logging, work practice and forestry utilization can be dealt with in a single topic, and other necessary matter should be included.

(12) The scope of the study of forest management should be elaborated and made advanced in both Certificate and BSc levels, according to the ability of students to grasp it.

(13) In Certificate level, sociology and extension course cannot fulfill the present requirement in community program so should be extended.

(14) Regarding the necessity of basic science course in Certificate level, and also the necessity of not avoiding the existing courses: the Certificate course should be of 3 years, the first year for basic science and basic mathematics instruction and second and third years for other existing forestry courses.

(15) Students should be provided with qualified teachers to be taught (for BSc level, at least MSc-qualified).

(16) Three months computer course should be made academic in BSc level, to adjust the students according to the world wide developing technology.

(17) Friendly exchange of students and trainees should be made at least within SAARC level countries.

(18) Students should be provided at least with adequate text books from the library and also with the journal based on recent research.

(19) Female students should be equipped with the responsibilities and disciplines related to field of their involvement that is desired by the IOF and the department.

(20) The curriculum should be designed such that students, after their study, can become good members in the practice field that they have to take.

(21) The universities of different countries have confirmed the qualification for MSc (Forestry) degree to be at least 6 academic years after students appear for SLC. But the students of this IOF in the BSc program, coming from the Certificate (ranger) stream, only consume 5 academic years after SLC and they have been deprived from taking the degree (MSc in Forestry) in the universities. So to make them qualified to compete, one additional year academic course should be designed. Perhaps the course could be BSc-Honours, to make specialization in a particular subject matter related to forestry and wildlife management, and soil and water conservation management.

REVIEWING THE CURRICULUM FROM THE DEPARTMENTAL ANGLE

M. Haque*

Summary

Curriculum development is a continuous process. Knowledge is increasing. Requirements are changing. Foresters have to be more versatile. A changing scenario has been emphasized. New skills are required. With these changes, the styling of course work will need to be given a new look and a new approach.

Introduction

Conditions in this developing country are changing fast. Land is limited. Population is growing. New pressures on forest lands are getting pronounced. Development processes often tend to ignore the indirect benefits from the forests. In this scenario of changing conditions, forest officers have to be aware of several important facts.

Concepts to be Understood

(1) Gone are the days when forest officers' word was respected.

(2) Forest officers can no longer live in isolation.

(3) You can no longer ignore the people. In fact, increasing interaction with them is required. Establishment of effective communication with people is an absolute necessity. People's participation in forestry activities is needed.

(4) More and more motivation skills are required to be brought into play.

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(5) ams the of benefits that will flow to the people for satisfaction of their basic needs of food, clothing and shelter.

(6) Forest officers must fulfill the day-to-day needs of the people for fuelwood, fodder, small timber and other forest product.

(7) A legal definition of forests will no longer be sufficient. Foresters have to realize the people's perceptions and the administrative views. Open areas (defined as forests by forest legislation) will no longer be accepted as forests. Inter-sectoral views have to be appreciated.

(8) A holistic approach is required to understand the pressures on the forests from various developmental plans and programs. Inter-departmental cohesion has to be attempted.

(9) Forest officers must not feel shy about criticisms or adverse 'feed-back' received from outside forestry sources. In fact these should be encouraged.

(10) Extension work in areas outside the national forests will be more and more important, for its is necessary to reduce people's dependency on forests for fuel, fodder, etc.

(11) Forest officers must plan, implement, monitor and evaluate all the forestry program/activities.

(12) Forest officers must keep on looking to new ideas/ techniques to help improve the quality of life, especially of the surrounding population.

Changing Role of DFO's and Rangers

(1) At present, the District Forest Officers (DFOs) are not able to devote as much time to the proper scientific management of the forests as they should, because protection problems (checking encroachment, deforestation and/or illicit fellings) consume most of their time. He/she has to devise methods to resist the pressures.

(2) The DFO has to go outside the confines of the forests and devote more time to extension work.

(3) The DFO has to provide the lead in developing tree wealth on private lands, vacant compounds and village common land.

(4) The DFO has to concern himself with developing the quality of life of the people in the surrounding villages by innovative approaches, which may not strictly fall within his technical forestry expertise.

New Skills Required

(1) The most important requirement is therefore to inculcate in the young entrants a sense of ever learning habit. They must remain alive to changing situations; must remain keen to understand local dialects, local customs and local sensitivities.

(2) They must acquire the art of communicating with the people; they must possess greater negotiating skills.

(3) They must be aware of different leadership styles and be conscious to choose one to fit a given situation.

(4) They must learn to involve local leaders while developing forestry plans and programs.

(5) They must learn to assess (in a quantitative or realistic way) people's attitudes.

(6) They must have some basic knowledge of other disciplines - horticulture, processing of minor forest products (MFP), setting up of the cottage industries based on nonwood forest products, etc.

(7) They must learn how to resolve conflicts.

(8) They should be familiar with methods to quantify 'risk' (hazards).

(9) They must learn to develop proper harvesting techniques for different crops in farm forestry/agroforestry with different cash crops and non-wood forest products.

(10) They must have some idea about developing markets or how markets function.

(11) They must develop a keen ability to sense future requirements.

(12) Effective monitoring and evaluation of work done should form a part of their approach.

(1) Curriculum requires continuous periodic identification of needs and changes in job descriptions.

(2) In fact, faculty members ought to be attached (for short durations) with projects and district forest officers, to see and realistically assess the skills required to deal with real time situations. This will better equip them to train students and innovate the curricula.

(3) While community forestry requires emphasis, one must not forget that the extent of natural forests is quite appreciable and they must not be neglected. Hence, curriculum should aim at attaining a balance between community forestry and management of existing natural forests.

(4) Increasing the duration of forestry courses does not appear to be an inviting proposition. Instead there should be a 'core' course. University authorities should develop short courses (7 days to 6 weeks) in important management aspects for various categories of in-service personnel. Not all students go to work in the same department or in same settings. Hence there should be a close liaison and coordination with the line agency/corporation project preparation cells to determine the nature of courses required.

(5) One must remember that university will be producing manpower continuously but, after a time, the departmental requirements will get saturated and the Institute must have on-going programs to sustain itself. The IOF must explore the possibility of enrolling foreign students and offering short courses in community forestry/agro-forestry/research methodology/teaching techniques etc., on a national, sub-regional and regional basis.

(6) Wood energy development planning and management including harvesting, transportation, marketing, sales and distribution etc. must be included in curriculum.

(7) The elements of social sciences should be integrated in the curriculum.

(1) The foregoing discussion leaves pointers to the directions in which research is required. Fundamental research and research in applied fields must also be harmonized.

(2) Student efforts (in thesis research) should be directed more in the field of social sciences, development of cottage industries, development of agroforestry techniques, income generating activities and the like - i.e. studies which can be concluded in a short time.

(3) Time devoted by faculty members in research activities should also be evaluated in such a way that the overall teaching and research activities fulfill the minimum prescribed norms of work of the teaching staff.

Major Changes Likely to Take Place in the Next Twenty Years

(1) Increasing demands will force foresters to concentrate on increasing productivity of the forests and better utilization of all degraded areas and marginal land.

(2) For forests on the periphery, new approaches will have to be developed. Integration of horticulture, cash crops, minor forest products or introduction of other species of economic value will have to be made a reality so that benefits can flow to the people. These direct benefits will inculcate in villagers a sense of well-being without destruction of the forests.

(3) The new Forest Policy of 1989 aims to develop a comprehensive framework for the development of the forestry sector and the Master Plan for the Forestry Sector (MPFS) has provided the basis for long term development. The recommended priorities, however, may change because of the recent change in the political system, which may, in turn, require some adjustment in the curriculum.

COMMUNITY FORESTRY DEVELOPMENT IN NEPAL

Tara N. Bhattarai*

What is Community Forestry?

The Context

In many parts of the world, particularly in the developing countries, the rapid increase in human and livestock population has exerted heavy pressure on the remaining national forests to expand farmland as well as to open new area for livestock grazing. Since the majority of the population in these countries depend on subsistence farming for their livelihood and there is no other easy alternative available for employment and income generation, the rate of forest depletion has been compounded. In addition to this, whatever efforts the governments in these countries have made to control population growth to a desirable level, it has not been effective due to high rate of illiteracy and absolute poverty of the majority of the population.

The result has been land hunger and further devastation of the remaining forests to produce additional food grains to feed the extra mouths and to supply basic forest products to keep rural farming systems going. Most of the remaining forests have been severely depleted both in quality and quantity beyond repairable limits. The effects have been accelerated soil erosion, loss of soil productivity, downstream flooding and unpredictable climatic changes, not to mention environmental degradation. A majority of the countries have been trapped within the vicious circle of rapid population growth, land hunger and the associated problems of forest depletion, which cannot be easily broken. Therefore the philosophy of 'community forestry' has emerged to overcome the problem of meeting basic needs in rural communities and to control the widespread loss of trees and forest cover in the developing world.

By the late 1970s, a number of the major international aid agencies become convinced of the urgent need to support rural communities as a way of responding to the impending crisis of tree depletion throughout the developing world. In 1978, the

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world [illegible], in a [illegible] on the [illegible], endorsed the need to promote forestry as a means of providing for the broader needs of rural people, particularly the poor, and shifted its emphasis in forestry funding towards community development. The World Forestry Congress, held in Indonesia in 1978, also supported the promotion of community forestry with its theme 'Forestry for the People.' The U.N. Food and Agriculture Organization promoted this new concept of community forestry through its program of 'Forestry for Local Community Development.' Thus, the decade of the 1970s brought a major change in forestry programs with their main thrust on community development.

Numerous forestry development program with different labels started functioning during the 1980s and 1990s in the South Asia region. The most popular ones are the 'Social Forestry Programs' of India and Pakistan and the 'Community Forestry Program' of Nepal, Bangladesh and Sri Lanka.

Definition and Concept

There is no rigid definition of 'community forestry.' The terms: social forestry, agroforestry, community forestry and even the practice of tree growing in private land or farm forestry have been regularly used as synonyms for 'community forestry.' Many tend to interpret community forestry as a new practice applied to forestry development aiming at the expansion of forest cover, better protection and management of existing forests and the encouragement of active and continued participation of beneficiaries for the sustainable development of forestry in developing countries. However, many others try to distinguish these different practices with clear meanings and objectives. Many have developed specific lines of approach during implementation to meet the requirements of different contexts and program objectives. In practice, therefore, there may be a mix of different possibilities within the broad package of a community forestry development program. Stevens (1988) presents the following excerpts from various reports on what community forest management is:

* Community forestry has been viewed primarily as a strategy of expanding forest areas on marginal and submarginal lands with the involvement of local communities. Its primary aim is to satisfy rural needs.

* The fundamental concept of community forestry means the mobilization of the rural people.

It to the of occupants and communities dependent on forest lands for their livelihood and at the same time help develop and conserve the forest resources.

* Community forestry, the modified forest for optimal benefits to the local people, is one alternative to improve, both government land and nearby farmer forest land.

* The term community forestry encompasses many forestry and tree planting practices outside the classical/traditional forestry practice. It is an alternate forestry practice with the duel function of (1) improving the livelihood and welfare of rural people, and (2) conserving natural forest ecosystems and their large store house of natural forest wealth and genetic resources.

* Community forestry includes any situation which intimately involves local people in a forestry activity... The activities encompassed by community forestry are potentially compatible with all types of land ownership.

The community and private forestry program of the Master Plan for the Forestry Sector (MPFS) in Nepal aims to meet the demand for fuelwood, timber and fodder through the active participation of individuals and communities in developing and managing forest resources. Reduction of demand for forest products by cutting down wastage, and increasing production by proper management and protection of forests have been the main considerations in designing the program to meet the people's needs for the main forest products.

Historical Perspective

Prior to 1951 (2007 VS), when Nepal was placed behind the dark curtain, the population of the kingdom was estimated to be less than three quarters of a million. A large proportion of this population was concentrated mostly in the middle hill region, the Mahabharat Range and the inner valleys south of the high mountains. The very fertile lands of the country, the Terai and the Doon valleys in the plains, were scarcely populated with only small nuclear towns along the southern border with India, due to the high incidence of the deadly disease Malaria. Isolated patches of settlements existed in the high mountain zone only along the major trade route to Tibet and at places of religious importance in the North.

Since the growth of population was naturally controlled by high infant mortality, short life expectancy and out migration,

of forest to basic rural need for subsistence was not a major problem and the general condition of the country was still fair without visible negative impact on the environment. Forests were still in abundance and people did not have to spent a long time to collect firewood, litter, timber, fodder and other minor forest products of great significance to rural subsistence. The sources of water were in plenty and the problem of soil erosion and flooding was minimal. The natural process of recycling biological products into the essential elements of plant nutrition was very active and supported the life system. Thus the mountain environment in the country was in greater harmony with the biological processes and the linkage between food, livestock and forest production system was strongly maintained.

During the decade of the 1950s, the government launched a national program of malaria eradication, which was successful in controlling the disease and added a new dimension in the national development policy - the policy of clearing forests for agricultural development. Planned resettlement schemes were initiated by the government, first in the Chitwan Valley under the Rapti Dun Development Program and later in many other parts of the Terai and Inner Terai. The Nepal Resettlement Company and the Department of Resettlement were especially established to implement this policy.

Large scale migration of people from the hills to the Terai became common up to the decade of 1960s, when the swarm of hill migrants could no more be absorbed within the planned resettlement schemes. Those who could not be settled legally opted for widespread squatting, encroaching and illicit clearing of forests in the plains. The Department of Forests during this period introduced a new protection system with the provision of armed forest guards, the effectiveness of which has been (and still is) an open question. The problem of forest encroachment and squatting is still unresolved to date. Although many high level commissions were set up during last two decades, they have been virtually ineffective.

In 1957 (2013 VS), the government promulgated the Forest Nationalization Act. Although the spirit of this act was to take away large tracts of privately owned forests (given as birta by the families of the former Rana rulers), in the interest of the poor and of society at large, its effects have been mixed. On the one hand, large privately owned tracts of forests in the plains were converted into national forests, which was a positive outcome. On the other hand, the small patches of forests privately protected by land owners, and collectively managed natural forests adjoining to the villages, were adversely affected. Since then, local people, out of dissatisfaction and uncertainty about the future benefits of these forests, got

This situation, associated with the nonexistence of forestry administration to take up management responsibility immediately after nationalization of private forests in many remote middle hill districts further exacerbated the problem of deforestation. Such instances, wherever they prevailed, created ill feeling with the people; the motto became "everybody's forest is nobody's responsibility."

Nevertheless, in some remote middle hill districts, isolated cases of traditional forest management practices by local user groups still prevail in some national forests adjoining villages, despite the nationalization of all private forests some four decades ago. Furthermore, the cadastral survey, which registered the privately owned agricultural land under individual ownership, did not include the small patches of private forests and encouraged wide-spread clearing of such forests just before the survey team reached the area. The forestry service did not provide any alternative arrangement to individuals to retain their private ownership title on such lands, and so forced individuals to clear them to hold the ownership title.

The decades of 1960s and 1970s introduced many new legal provisions in the forestry sector. The Forest Act of 1961 (2018 VS), the Forest Protection (Special Arrangement) Act of 1967 (2024 VS) and the National Parks and WildLife Conservation Act of 1972 (2029 VS) were promulgated during this period. The main thrust of both the Forest Act of 1961 (2018 VS) and the Forest Protection (Special Arrangement) Act of 1964 (2024 VS) was as to empower the Nepal Forest Service with the legal authority to practice effective protection of the national forests. Similar legal provisions were made under the National Parks and Wildlife Conservation Act of 1969 (2029 VS) to govern the national parks and wild life reserves.

During the same period, many supporting rules and regulations, formulated under the provision of the acts, were implemented by the forestry sector with the decision of the (then) governments. Many of them are still operational with simple amendments from time to time, which tried to build the power of foresters to tighten their grip for strict forest protection. Foresters responsible for the districts in the territorial organization and in parks and reserves, have also been provided with the authority of the judiciary to ensure tighter protection. The overall effects on the national forests in the same period, however, has been further depletion, devastation, and destruction and a trend to perpetuate the problem of forest encroachment and squatting. The judiciary power entrusted to the forestry community, let alone the acts and

and the forestry personnel and the residents of local rural communities whose very subsistence depends upon sound forestry practices in the mountainous ecosystem of Nepal.

By mid-1970, the population of the country had reached about 13 million. Similarly the livestock population had expanded. High level special-powered commissions were set up to try to resolve the problem of forest depletion. In absence of attractive alternatives, however, the people were forced to take the law into their own hands. They were supported by ad hoc decisions of the politicians of the time, whose interests were to gain cheap popularity and to look for simple temporary solutions instead of resolving the issue permanently. The problems of wide spread forest encroachment still persists.

During this period, the concept of people's participation was already accepted as the only means of community development by the international development community, the World Bank, FAO, ADB, and many other bilateral and multilateral agencies. The alarming depletion of Nepal's forest resources became a matter of urgent concern to these agencies. As forests play an important and indispensable role in the livelihood of the overwhelmingly rural people of Nepal, because of their role in reducing downstream flooding and soil erosion in addition to other direct benefits such as firewood, timber, fodder, litter and herbal medicines, these donor agencies encouraged pilot efforts in many parts of the country under different initiatives. The most significant one was the achievement of the Chautara Forest Division in Sindhu Palchowk District east of Kathmandu. Also encouraged by the successes achieved in neighboring Gujarat and other places in India, Nepal decided to embark upon an ambitious program of community forestry with the loan assistance of the World Bank and the technical assistance grant from the multilateral UNDP and FAO, and various bilateral donor agencies.

Most of the forestry legislation promulgated prior to the adoption of the new forestry sector policy in 1989 (2046 VS), under the Master Plan for the Forestry Sector, were to resolve the problems of protection. Nevertheless the Forest Act of 2018 VS had provisions for participatory forestry practices under the category of Panchayat Forests. The practice of participatory forestry, however, did not start in a planned way until 1979 (2037 VS). The first major project, the Community Forestry Development Project (CFDP), covering some 29 hill districts to implement the national program, was initiated only in 1979 (2037 VS).

The Decentralization Act of 1982 (2039 VS) was designed to generate local cooperation and participation in development planning and project implementation. The main thrust of this act

has been to the of the in meeting the basic rural needs of the people to the people themselves, and to vary the contribution of the government according to the size of local resources generated. The strategy has been to mobilize the local resources of the people, primarily voluntary labour for local/village/panchayat/district level development, and the government to provide a financial contribution just sufficient to meet the capital costs of development projects which local communities cannot support and which is also beyond the capacity of the district resources.

Other development projects, which are either too big and cannot be implemented as district development projects, or in which the benefits spread beyond the boundaries of a single district and are important for many, have been implemented as central projects directly financed by the government. The effects of decentralized planning and implementation, however, have been insignificant due to vested short-term personal interests of local and district level panchayat workers.

National Forests and Community Needs

In the decades of the 1960s and 1970s, efforts were made to introduce scientific forest management systems based on the principles of sustained yield of forest products. The main objective of management of the Terai forests, prior to this period, was to generate government revenue from the export of saw logs and lumber and, to some extent, to produce industrial raw materials to keep local forest-based industries running. During the period of the First World War, when the demand for wood for railway sleepers in British India was high, an English forester, Mr. J.V. Collier, was deputed to Nepal to arrange the supply of about 200,000 broad-gauge sal wood (Shorea robusta) sleepers. These were a present to India from the government of Nepal. Collier worked in the country for about five years and, in addition to the supply of sleepers, he initiated selective cutting of mature and overmature sal trees in the Terai forests of Nepal to generate additional revenue from the sales of timber to India. Special narrow gauze railway lines were extended into the forests of Nepal exclusively to transport sawlogs and sleepers to India.

This exercise led to a large-scale creaming operation in the virgin forests of Nepal. But the rulers then did not mind, because of the opportunity it provided to realize additional revenues. Revenues were very high and acted as an attractive incentive to continue forest harvesting. Many other forestry advisors from India, such as E.M. Smithies and P.D. Ratauri, provided their services to Nepal to initiate scientific forest management during the decade of 1940s and 1950s. In the decade of 1960s, the forest service in Nepal had a British Chief Conservator of Forests.

The main outcome of these activities was the expansion of forestry institutions without a positive contribution to scientific management of the national forests. The creaming operations still continued in the accessible forests. In the 1960s, the government placed a high priority on the preparation and implementation of forest management plans. Many forest management plans and working plans were drawn up with the assistance of the USAID and Indian Aid Missions. Unfortunately, this period overlapped with the implementation of the new national development policy supporting forest clearing for the expansion of agricultural land and resettlement schemes in the Terai. The forest plans prepared with external assistance could not be implemented, since there was ambiguity and overlap in the forest areas classified as productive forests by the forest plans and the areas chosen for resettlement.

Foresters in the country kept themselves busy fighting with the people to stop squatting and forest encroachment, a battle which the foresters could never win, even with the creation of additional protection forces of armed forest guards supported by strong police and legal authorities. Therefore, even the primary aim of protection and conservation of the national forests in the Terai was lost, not to mention the objective of sustained production of forest products. The national forests in the hills were still not considered of significance in terms of their potential for income generation; they were not governed by the forestry organization and they were put under the jurisdiction of the district administration for protection purposes.

Thus, during this period, the object of sustaining local supplies of forest products to meet community needs was far from realized. People had to find their own way to satisfy basic needs of fuelwood, leaf litter and fodder from nearby national forests and other sources. The only product of the forest that people were reluctant to collect without official permit from the responsible authority, was construction timber. They feared that they would be accused of forest offense, which used to be considered a severe curse due to the severity of the penalty involved. Until the 1970s, annual issues of <u>her ghar sangha purgi</u> (legal permits) at concessionary rates, for firewood and local construction timber for domestic use, were easily available to the rural people even in the Terai districts.

However, due to forest depletion and the growing demand for forest products in the urban markets within the country, both the export of wood to India as well as the issuance of permits to local people were banned. The practice of fuelwood collection from dead wood on a headload basis and the collection of fodder is, however, still prevailing in forests adjoining villages. As the available national forests have been pushed farther away towards

the north along the Bhabar belt in many of the Terai districts, and as conditions of adjoining forests in many of the middle hill districts have been severely depleted, local people have been directly and adversely affected by the shortage of basic forest products, loss in soil productivity on farms and general deterioration of the physical environment. This critical situation has forced the government to think out a new policy and strategies to increase production of basic forest products, to check further depletion in the national forests and to develop a community forestry program.

Community Forestry Policy and Strategy

The framework for a comprehensive community forestry program was established by new regulations - the Panchayat Forest Rules of 1978 (2035 VS) and the Panchayat Protection Forest Rules of 1978, both under the provision of the Forest Act of 1961 (2018 VS). (With the recent change in the political system in the country in 1990, from the party-less Panchayat System of government to a Multi-party Democratic System, there have been some minor amendments in the terminology previously used in these rules. 'Community Plantations' and 'Community Forests' are the new substitutions for 'Panchayat Forests' and 'Panchayat Protected Forests,' respectively.) These two rules, the first legal basis to implement the provisions of the Forest Act of 1961 governing the community forests, opened a new dimension in the forestry sector in Nepal.

The Forestry Sector Policy of 1989, prepared as a part of the forestry master planning exercise, provides a comprehensive framework for the systematic development of the entire forestry sector. This new policy emphasizes the key areas of:

(a) production and utilization of forest products,

(b) conservation of ecosystems and genetic resources,

(c) social aspects of land use,

(d) role of the private sector, and

(e) the classification of forests and protected areas.

These areas were identified considering the sustainable long term development of the sector, on the basis of the principal development imperatives:

(a) the satisfaction of basic needs,

(b) the sustainable utilization of forest resources,

(c) participation in decision-making and sharing of benefits, and

(d) socio-economic growth.

According to the new policy:

> forests near villages will be managed with people's participation. The primary task of the government field staff will be to assist and advise people in their efforts to manage and utilize the forests on a sustained-yield basis. The present uncontrolled use of forest products will be gradually eliminated by promoting the establishment of permanent users groups as managers of the forest resource. The traditional right to collect fuelwood and fodder, free of charge, will be regulated by people's own decisions and management plans (Forestry Sector Policy, 1989).

This new policy, governing community forestry development, will be implemented under the principles of the government's decentralization policy. Existing forests will be classified into different categories for conservation and management purposes, depending upon their ownership status. The new conservation and management classification includes:

- National Forests,
- Community Forests,
- Private Forests,
- Leasehold Forests, and
- Religious Forests.

The new classification for the protected areas are:

- Conservation Areas, and
- Protected Areas.

A mix of strategies has been selected to translate the new policy into administrative and management actions because of the complexity of the forestry sector.

The strategies for production and utilization include:

- reduction of consumption,
- increased production of fuelwood, timber, and fodder,
- effective harvesting and distribution, and
- improved pasture and livestock management.

The strategies for conservation of ecosystems and genetic resources include:

- legal and institutional improvements, and
- public education and extension in nature conservation and forestry.

The strategies for social sustainability are:

- adherence too the decentralization policy, by entrusting protection, management and utilization of forests to users, and
- by providing a livelihood to poor and landless people in forestry-related activities

Strategies to promote private involvement in forestry development include:

- resource base consolidation, and
- industrial development.

The strategies for policy implementation include:

- directing the human resources of the Ministry of Forest and Soil Conservation to priority areas,
- improvement of the policy, legal and institutional framework,
- training of sufficient, motivated and competent manpower;
- prioritizing the development programs and determined observance of the priorities, and
- activation of people's and non-governmental organizations' participation.

The Master Plan for the Forestry Sector has identified six primary programs to implement the new forestry sector policy of which the priority program is community and private forestry development.

Community Forestry development Programs

There have been a number of ongoing forestry development projects in Nepal with the primary objective of community development. Some of these are integrated with the larger rural development projects, and the others are commonly recognised as community forestry development projects. Many bilateral and international agencies have been providing financial and/or technical assistance in the development of the community forestry program in Nepal. Some of the important agencies are:

THE Bank,
- UN Development Program (UNDP),
- UN Food and Agriculture Organization (FAO) (associated with other agencies, such as the Swedish International Development Authority, or SIDA),
- Australian International Development Assistance Bureau (AIDAB),
- US Agency for International Development (USAID),
- Overseas Development Administration (ODA) of the UK,
- German Technical Assistance (GTZ),
- Canadian International Development Agency,
- Swiss Development Cooperation/Nepal, and
- many other agencies including some national and international NGOs.

Recently, FINNIDA (the Finnish Development Agency) has come forward to assist in the implementation of the three important supportive programs of the forestry sector master plan:

- forest resources information system development,
- human resources development, and
- monitoring and evaluation system development.

Similarly, the Asian Development Bank (ADB), which provides funding for FINNIDA-executed assistance through the Master Plan Project, has been processing the single largest program loan agreement (about US$ 40 million) in the forestry sector to meet the external assistance gap during the period 1990-1995 for the implementation of the Forestry Master Plan. All of these have a direct bearing on the community forestry development program.

Scope of Community Forestry

Community Forestry in Nepal

The concept of community forestry development in Nepal has emerged the response to the problem of deforestation and forest depletion. Past efforts of the government to protect the forests have been ineffective, even after the nationalization of private forests and promulgation of quite strong legislation to govern the national forests.

The National Forestry Plan of 1976 (2033 VS) recognized the critical forestry situation in the country. It laid down the objectives for forest management:

- the restoration of the balance of nature,
- economic mobilization,
- the practice of scientific management,
- the development of technology, and
- the promotion of public cooperation.

The birth of community forestry development legislation is the outcome of its implementation. The importance of local people's participation in protection and management of forests was recognized as 'a must' for the long term sustainability of forestry development programs. Within this legal framework, many donor agencies offered generous assistance to implement community forestry development program in different parts of Nepal. Most of the projects involved in this program, however, tried to push the achievement of physical targets as the key parameter in which to judge success. The basic principles of encouraging the active participation of local people and heeding their needs and desire was neglected, and the program targets were achieved with full payment of labor. The only significant factor in this approach has been that there had been no need for barbed wire fences to protect new plantations, which used to be an essential part of afforestation programs in the past. Also, local people agreed to forego their grazing rights during the initial period of plantation establishment on common lands.

This lesson of the past has redirected the original approach of program implementation towards local institution-building, greater self-reliance, a freer hand in forest management and less subsidy for the sustainable development of this program. Currently, the active involvement of the traditional 'user groups' in the protection and management of the forests they have been using to satisfy their basic products, has been made mandatory for community forestry development. Thus, in Nepal, the practical definition of community forestry development has changed.

In this regard, Gronow and Shrestha state that:

> Community forestry development in Nepal is a process which enables communities or more exactly forest user groups to direct the establishment and sustained management of their local forests for their own benefit. The essence of this process is the real transfer of control over the forests, from the government represented by the Department of Forest... to all the actual users of the local forest (1990:1).

They further argue that "Community forestry is not synonymous with village-level reforestation directed by government departments or projects. In such activities the people's role is passive" (1990:1). And, they follow the statement of Rahman that "Participation is considered to be an active process meaning that... the group in question takes initiatives or asserts its autonomy to do so" (Rahman 1981:3)

The basic feature of the community forestry program in Nepal embraces the policy of enhancing production and reducing consumption of forest products. Therefore, all the ongoing projects under various donor assistance have included the components of reforestation, management of natural forests, seedling distribution for private planting and energy conservation through dissemination of improved wood burning stoves.

Traditional Forestry Versus Community Forestry

The emphasis of forest management in the past had been, primarily, on developing the forest based industries which solely depended on the state-owned natural forests. Although reforestation and plantations were carried out to meet the growing demand for forest products, these schemes were always geared towards satisfying the needs of the urban and industrial sectors which could afford to buy such products. The local poor people, whose daily life directly depended on the availability of basic forest products, were never considered as the primary or in many cases, even the potential beneficiaries of forest management in the past. This group of society, always left out by the commercial forestry development program, was merely treated as local concessionaires in the forest working plan documents. As a result, they normally got the left-over products after commercial harvesting by the timber contractors. Although they relied heavily on forests for their subsistence, their needs were fulfilled as long as the natural forests contained such products.

Today, many forest products of traditional value and importance have been lost from the natural forests and the suffering of local poor has increased in their absence, since they have neither the access nor the cash to supplement them with other alternatives.

The aim of community forestry has been primarily to include this group of 'left-outs' of commercial forestry development and enhance their lives through forestry development. Therefore, as stated by FAO, true community forestry development must reflect the needs, problems and aspirations of local people as seen through their eyes. Its strategy will vary according to community and place, and must aim at satisfying social needs rather than commercial needs.

Characteristics of the Nepali Community Forestry Program

Land Ownership

Community forests are usually established on degraded national forests or scrub lands, and on community wastelands or common grazing grounds adjoining villages. In all such cases,

the legal ownership of land rests with the state or the community at large, and the program is exclusively designed to meet the community needs.

If one includes other types of tree planting practices under the broad title 'community forestry,' then the definition will be different and may extend its coverage beyond the boundary of national forests. It may then cover different types of lands - public, private and community owned lands. However, the majority of community forests raised with the intention of producing basic forest products for local communities, which involve more than one farm family in deciding land use change and run as a collective undertaking in the interest of all its members or the participating members of the local community, and which also recognizes the joint rights of all who participate in future benefits, are generally found to be established on public lands. Such lands may or may not have been legally registered as the land owned by the public or the community.

There are two types of community forests in Nepal:

- Community Plantations (previously 'Panchayat Forests'), and

- Community Forests (previously 'Panchayat Protected Forests').

Community plantations are established either on degraded national forest land or on community grazing grounds under collective ownership. The legal ownership of community plantations does not get transferred to the name of the participating community, and they will be only allowed to share the products when the crop matures. Community forests, on the other hand, are small patches of degraded national forests adjoining to villages which are entrusted to the local community for their protection and management; in this case the legal ownership of the land still remains with the government and the participating community will be allowed to harvest forest products under the prescriptions of an approved plan, jointly developed and agreed upon by the concerned forestry officials and the local user groups. In no case is the ownership of the land transferred to the people.

Even after one decade of initiation of the community forestry program in Nepal, the issue of the identification of potential land for community forestry is still pending.

Objective

The Master Plan for the Forestry Sector has formulated twelve programs, six primary and six supportive programs, to meet its long-term and medium-term objectives. The aim of the community and private forestry development program, which is the most important priority program out of the six primary development programs of the plan, is to solicit the active participation of individual people and communities in developing and managing the forest resources of the country to meet their basic needs.

The lengthy process and formalities involved in designating national forest lands in the name of local user groups as community forests have been very slow; the program has been successful primarily in establishing new plantations in waste lands or scrub lands.

Management System

As the traditional forest management system has not succeeded in catering to the forest product needs of the majority of rural people, a new system based on active participation of the target group or the 'left-out' group in all stages of development, starting from planning to plan implementation and benefit sharing, has been long awaited and should evolve to match the conditions of local forest resources and the needs of local rural community.

The Department of Forests, which had to remain in a supporting position to provide the technical know-how and financial assistance absolutely necessary to initiate the community forestry activity in the early period of development where the local socioeconomic condition of the people justified such an undertaking, has been the main actor so far. In addition, the basic information necessary to go to the people about community forestry programs with a clear message of what community forestry management systems are about, and what likely support and services are available from the government if they decide to participate in the program, has not been forthcoming.

Progress made so far under the Community Forestry Development Program in Nepal has been the subject of considerable discussion. The achievement of physical targets in terms of nursery establishment, numbers of seedling produced and distributed, and areas of plantation of trees in scrub land and waste lands for its future transfer as community plantations, have been quite satisfactory in many places. The contribution from local communities in such activities, however, has been not more than a temporary sacrifice of open grazing rights, and even

the protection cost have been met from the government budget. This has left open the question of sustainability of the program after external funding ends.

The handing over of patches of national forests to traditional user groups, together with its management responsibility and forest products utilization rights to the users, has been very slow. In many cases, newly established community plantations created with the total investment cost from the government, are still awaiting mutually acceptable management plans for their protection and future utilization. Only very rarely have the people participated in planning decisions for the establishment of nurseries and plantations or management of natural forests. Many of the plantations established under the community forestry program have not even included the tree species preferred by the so-called 'participating communities,' due to various reasons.

The hard work of people implementing the community forestry program in Sindhu Palchowk, Kabhre Palanchowk and Dhankuta districts, the former under AIDAB assistance and the latter under ODA assistance, is worth acknowledging, since they have been able to establish user groups to take on the management responsibility of adjoining forests in the interest of traditional users. The progress so far has been encouraging, which may provide a good demonstration to others.

Utilization and Income Generation

The practice of community forestry, if applied with trust and mutual agreement between the program implementers and the potential beneficiaries, will increase production of basic forest products for local consumption and may also open new possibilities for commercialization of surplus products leading to income generation.

The Nepali model of community forestry, since it has the provision for 'handing over' patches of national forests to participating communities for their protection and management, provides better opportunities for market-oriented utilization and income generation, provided the participating communities are assured of deriving benefits from the community forests. So far, the visible benefit realized by communities does not include more than hand-harvesting of ground grass during the initial year of plantation establishment, and that too at the cost of foregone benefits of open grazing. The level of income generation has been limited to the amount paid for labor in plantation establishment and enrichment planting in natural forests.

There has been no significant progress with the preparation and implementation of community forest management plans in many

of the districts. Some ongoing community forestry projects, however, are actively undertaking the exercise of management plan preparation as a high priority. They will provide a legal basis for controlled harvesting of matured trees from the handed-over natural forests.

Benefits and Beneficiaries

The key to success of community forestry lies in persuading local people that the program is in their interests and the expected future benefits from such an undertaking are purely theirs. In Nepal, the recent amendment of rules governing community forestry has allowed participating communities or local user groups to realize the full amount of forest products harvested from community forests, some of which they might even sell to generate cash income. The condition imposed to such cash income, however, restricts spending any portion of the income on non-forestry activities. The new possibility created after the amendment to the rules is that it identifies traditional users of a particular forest block as the user group for that forest, and provides a legal basis to identify them for the purpose of handing over forests and/or public lands for community forestry development. Such user groups are the primary beneficiary of community forests entrusted to them.

Institutions

The Department of Forest is the only institution responsible for the implementation of community forestry programs in Nepal. A few national and some international NGOs, however, also have become involved in the implementation of this program, but they all have to follow the standard procedures for community and private forestry development of the Master Plan for the Forestry Sector.

Truly, the Department of Forest can not fully perceive the needs and priorities of the people, and the program designed by them cannot reflect the minds of the majority who are going to be affected by the program in future. Therefore, as far as possible, all community forestry programs should be designed and implemented by the people themselves at the local level. However in the majority of cases, due to various reasons, local people neither realize the problems associated with their poverty nor are they capable of presenting their programs for community forestry to the responsible government agencies. In such a situation the role of NGOs becomes vital to act as a catalyst between the government and the people.

Although a large section of any rural community may be aware of the problems associated with deforestation, many others can not easily perceive them without proper information. The role of extension services becomes vital in communicating useful information from government agencies to local communities. The message could include information about simple preventive measures to check soil erosion, where to go for seedling of fodder trees, the measures which the locals could initiate on their own, the possibilities of outside assistance available to tackle larger problems, etc. Short study tours or field visits by local elites or progressive farmers of successful community programs of similar nature have served as effective ways for transferring knowledge and disseminating information to rural people through their demonstration effects.

Motivation/Incentives

This section will briefly cover both the employees of the forest department, i.e. those who are the implementers in true sense, and the beneficiaries of community forestry programs, while dealing with the topics of incentive and motivation.

There is no provision of direct incentives, financial or otherwise, to the staff of forest department who are assigned to implement the community forestry program. Lower level technical personnel, who have to spend much of their time in villages and who live, discuss, plan, work, etc., with the people under harsh living conditions (compared with colleagues in the same organization), do not get any additional incentive for the hard job they do for community forestry. The only visible incentive has been in the form of study tour opportunities for a limited number, mostly within the country. The professionals, on the other hand, may get opportunities to participate in similar programs overseas, and some others may even find opportunities for higher studies abroad.

The beneficiaries or the user groups, who participate in the program, have to wait for a long time before obtaining any visible benefits from their hard work. Some participating user groups, however, may get in-country observation tour opportunities. There has been no provision for other types of direst incentives to the beneficiaries. Gronow and Shrestha (1990), based upon their long association with community forestry program in Nepal, stress the need for equal and secured rights on the resources to all members of user groups, as well as the strong commitment and support of program implementers as the prerequisites of people's participation.

The above information should be sufficient to explain the level of motivation regarding both the beneficiaries as well as the staff of executing agency.

Role of Women and Children

Although most of the project documents designed to support community forestry development in Nepal state the hardship faced by women and children due to forest depletion, many of them do not propose any specific actions exclusively to improve the conditions of these two target groups; they simply recommend a package program. Some projects, however, do stress the importance of seedling production by children and have a set target for school nurseries. Similarly, some projects have initiated sideline activities for women to provide opportunities for income generation while implementing community forestry programs. Therefore, it may not be wrong to conclude that these two target groups have not received enough support from or the attention of ongoing projects to overcome their problems.

Sustainability

The issue of sustainability of community forestry programs in Nepal still remains to be considered. There has been no difficulty in drawing the attention of donors to support this program, and a huge amount of external assistance has been forthcoming for community development. The most important concern of the majority of the aid agencies, however, has been the question of what will happen to the project after outside support ceases.

The issue of sustainability becomes more crucial if one tries to analyze the primary objectives of the community forestry development program. The main objective is generally to satisfy the basic needs of the rural poor through the practice of community forestry. It always takes much time and effort, however, to increase the production from degraded forests, which is the land potentially available for community forestry programs. The Nepali model of community forestry, which also includes the possibility of handing over patches of national forest as community forests, provides an opportunity to produce surplus forest products and may generate cash income to supplement the costs of future activities after project support ceases. The level of investment required to sustain the activities in the future and the amount of forest products likely to be available on a sustained basis will determine the continuity of the program after the life of the projects. So far, due to delays in implementation of the management plans in community forests, local user groups have not been able to realize any return from their participation.

Government Employees

The Department of Forests, under the Ministry of Forests and Soil Conservation, has been the publicly identified executive agency for community forestry development program in Nepal. In addition, the Department of Soil Conservation and Watershed Management (DSCWM, of the same ministry) has also been partly involved in this program through its activity of conservation plantation in priority watersheds. the DSCWM follows the general implementation approach of community forestry programs. The King Mahendra Trust for Nature Conservation, a national NGO of Nepal, has been entrusted with the implementation of the Annapurna Conservation Area Project, a nature conservation program which identifies community development as a prerequisite for action.

The Department of Forests is the single largest organization of the Ministry, employing professional foresters and forestry technicians. It has 5 regional directorates, 75 district offices, 222 range offices and 888 beats in its territorial structure. The majority of these professionals and sub-professionals have the basic training required to qualify them to enter in the forestry service in conventional forestry. Many of the professionals have also acquired specialized training in specialized aspects of traditional forestry, but only a few have been able to take opportunities for advanced studies in the field of community forestry. Therefore, it would not be unfair to conclude that a majority of the forestry professionals in Nepal only possess limited knowledge in community forestry from their work experience, and even lack the basic knowledge of sociology, anthropology, community development, extension and communication methods and like subjects which are relevant to community forestry.

Forestry staff with conventional forestry training, with its greater emphasis on protection and conservation, are not going to be enough to carry out the new role of a community forester who has to maintain close liaison with local people. Furthermore, the role that traditional foresters have been playing in the protection and conservation of national forests also includes the job of policing, and while discharging this function they are frequently blamed for abuse of power. Many people would not even hesitate to call the forest service a corrupt institution. Although no specific reasons are given, there have been a large number of job terminations among senior foresters during the last two decades. To change this image of the forest service in the eyes of the people, everyone in this service must change his own attitude first. The other two important areas which directly affect community forestry are monitoring, evaluation and forestry research, which will be discussed in the following sections.

ere is a need for forestry staff to change their attitude and acquire new knowledges, there is also a need for the people to understand the philosophy, objectives and their own roles in community forestry, and change their attitude accordingly. The role that forestry extension can play in disseminating information at the local level need not be explained in this paper. Any development program, however, which intends to mobilize the local poor cannot function without a strong extension package. The people, who are the potential beneficiaries of any rural development program (including forestry development), must be told what is available, where it is available, how it is going to be available, for whom it is available and with what cost to the target group. This is what forestry extension has to cover in a broad sense. When the local people know these details, they will start thinking: "is that what we really need?" and if the answer is yes, then they will give a positive response and participate.

To those who decide to participate in the program, there might be a need for more knowledge about the implementation side of the program. After the process of mass education, some of them may even be willing to take on the job training in this new field, before they start any local activities. Once they decide to participate, then the program should identify the key elements relating to attitude and bring in methods to change their present attitudes concerning natural forest management.

Institute of Forestry

The Institute of Forestry is the only academic institution providing basic forestry education in Nepal. During the last ten years, it has expanded its capacity to produce a sufficient number of BSc Forestry and Forestry Certificate holders for the Nepal forestry service. In the same period it has also revised its forestry curricula to include essential subjects in support of the community forestry program.

Due to the continuous problem of attracting and retaining the required number of motivated teaching staff in the forestry discipline, the IOF has not been successful in developing the faculty. This problem is likely to continue as long as there is a big gap to fill in the government forest service, which is considered socially a more prestigious position in Nepali society. In such a situation there can be no easy solution for the Institute, unless it can offer some other form of direct incentives to attract new members. It is a pity to loose those members of the Institute who were sent abroad for basic/specialized forestry education on university fellowships.

Forestry. Under such a si
to visualize the new outlook required by a forestry teacher in the Institute.

Although there has been considerable improvement in the forestry curricula of the Institute in the recent past, numerous dissatisfactions have been expressed by many of the employers about the standard of education in the Institute, and more particularly about the course content at the certificate level. The skill of land survey in mountainous area, the detailed work and cost estimation of common forestry activities, the basic knowledge in extension and communication methods, the principles and approaches of community development and many other day-to-day job-related kinds of knowledge have been specifically mentioned as not being fully covered by the Institute. To supplement these shortfalls, the MFSC Training Division is developing additional tailor-made courses for in-service/reorientation training. In future, if the Institute could cover these areas as well in their regular training courses, there will be no need for additional time and resources to be spent on the part of the Ministry.

Research Needs and Priorities

Ongoing research in technical aspects of forestry can also cater to the needs of community forestry to a great extent. There will be need, however, for specific research related to community forestry, covering aspects of local perception, priority products, needs, attitudes, leadership patterns, traditional resources management systems, etc., basically in a local social context. In addition, since the general technical area of forestry has not been fully known in Nepal, due to the infancy stage of forestry research, during the early stages of community forestry development it will be also necessary to carry out some applied research in technical forestry as well.

Similarly, the staff responsible for forestry research have the capabilities to cover the biological aspects of forestry, but many of them lack the basic knowledge of social science research which should also be enhanced through further study opportunities. The role of multipurpose tree species in relation to rural farming system has been highlighted on many different occasions. This is specifically true as far as agroforestry and private tree planting schemes are concerned. Community forestry research, however, is expected to be more complicated by the fact that it has to deal with local people in complex social settings, and the land available for community forestry in the majority of cases will be degraded sites of low productivity. Therefore, the technical aspects of forestry research matching these types of lands has to be further studied, in addition to the socio-economic aspect of production.

Monitoring and Evaluation

If program implementers want to maintain strong control over the program, they need to know what has been achieved and what more needs to be done during the life of a project or a periodic development plan. Without an established system of regular information flow, supported by periodic observations to verify reported achievements, no manager can make appropriate decisions to resolve problems associated with field implementation.

Besides providing regular information feedback on physical inputs and outputs of a project, monitoring and evaluation should also present indepth analytical reports on critical areas of these projects, such as: major constraints and issues, work quality, validity of concept, approach and objectives, recommended future actions for improvement, etc. However, institutionalization of a standard monitoring and evaluation (M&E) system for community forestry development program has been rather an uphill task in Nepal, although it could serve as an indispensable tool for management.

While many attempts have been made by the different departments of the Ministry and many M&E systems have been developed for specific program in the forestry sector, their implementation has been ineffective. One can easily guess the basic reasons for this - "Why should anybody commit oneself with a written report as long as it is not included as a must in their terms of reference?" Nobody gets penalized as long as they provide the standard trimester progress reports following the National Planning Commission Format. In addition, many of the M&E systems designed so far have been criticized for their difficulties in application within the limit of existing manpower and resources available to the districts. Many have suggested that they must be simplified to make them more workable. The M&E Division of the Ministry is currently working in this area.

References

Bhattarai, T.N. 1990. Community forestry and research initiatives in South Asia sub-region. RECOFTC Seminar Paper. Regional Community Forestry Training Center, Faculty of Forestry, Kasetsart University, Bangkok, Thailand.

Bhattarai, T.N. 1989. Status problems and prospects of forestry research in Nepal: a case study for the expert consultation of the Asia Pacific Network on Forestry Research. Regional Office for Asia and the Pacific, UN Food and Agriculture Organization, Bangkok, Thailand.

FAO. 1978. Forestry for Local Community Development. UN Food and Agriculture Organization, Rome, Italy.

Foley, J. and Barnard, G. 1984. Farm and community forestry. Earthscan Technical Report 3. International Institute for Environment and Development, London, UK.

FRIC/FSRO. 1987. Community Forestry Management Issue, Banko Jankari 1(4). Forest Research Information Center, Department of Forests, Kathmandu, Nepal.

Gronow, J. and Shrestha, N.K. 1990. From Policing to Participation: The Reorientation of Forest Department Field Staff in Nepal. Research Report Series 11. HMG Ministry of Agriculture-Winrock International, Policy Analysis in Agriculture and Related Resource Management.

MFSC. 1988. Executive summary. Master Plan for the Forestry Sector Nepal. Ministry of Forests and Soil Conservation, Kathmandu, Nepal.

MFSC. 1988. Forestry Sector Policy. Master Plan for the Forestry Sector Nepal. Ministry of Forests and Soil Conservation, Kathmandu, Nepal.

Rahman, M.A. 1981. Participation of the rural poor in development. Development 1:3-5.

Stevens, M.E. 1989. Community forestry: what is it?" RECOFTC Seminar Paper. Regional Community Forestry Training Center, Faculty of Forestry, Kasetsart University, Bangkok, Thailand.

SCIENCE EDUCATION AND THE CTEVT PROGRAM

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Historical Background

The growth of science and technology education in Nepal remained rudimentary until 1960. There were only two colleges offering science courses during that time. Trichandra College, established in 1918, offered intermediate level science courses since 1919 and bachelor level courses since 1947, and Public Science College, established in 1956, offered intermediate level courses. During the 1960s, eight more colleges started running intermediate level courses. Technical institutes were also established during the same period to offer intermediate level courses in engineering, medicine, agriculture and forestry. All these courses were affiliated to the newly established Tribhuvan University (established in 1960). Post graduate level programs were also started in physics, chemistry, zoology, botany and mathematics by the University. At the same time, bachelor level courses were also introduced at the Amrit Science College.

The National Education System Plan (NESP), introduced in 1971, was a significant milestone in the further development of science and technology education. Programs of all levels run by all science colleges were subsequently consolidated under the Institute of Science and those of other technical areas were organized under their respective institutes. The new institutes set up under the University were the following:

- Institute of Science
- Institute of Engineering
- Institute of Medicine
- Institute of Agriculture and Animal Science
- Institute of Forestry
- Institute of Applied Science and Technology

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Science and Technology, after four years of its existence, was reorganized into a Research Centre for Applied Science and Technology (RECAST). The training component of the institute was brought under the Institute of Science as a campus on science and technology. Technical institutes at that time were offering courses below certificate level only.

During the 1980s, all the technical institutes also started bachelor degree courses. (Six new private science colleges were established during the same decade.) Tribhuvan University also added science programs in more campuses bringing the total number of science colleges to twenty-six, and the total enrollment in science and technology campuses to around 15,000 by 1990.

Analysis of the Science Courses Given at Different Levels and by Different Agencies

The educational system of Nepal offers science courses in the following programs:

- science at the school level
- science given by the Institute of science
- science courses in the technical institutes
- science courses in the CTEVT run technical schools.

Science at the School Level

Science and mathematics are taught as two of the seven subjects in the school system from grade 4 to grade 10. A closer look at the curriculum reveals that these subjects are primarily designed to provide a foundation for tertiary level education. The major weaknesses of school level mathematics and science education have been the lack of back up experimental experiences. The shortages of qualified teachers and funds to set up laboratories appear to be the main constraints. This has made learning of these subjects for the children very unattractive and unscientific. Additionally, students are not learning the contents which are of practical importance to their everyday lives. Hence the students choosing non-science subjects for further education and the students not completing SLC, are not benefiting much from the existing courses. For example, issues of energy, environment, sanitation, population explosion and employable skills development, etc., all of which are of great importance to present day children, have received little coverage or attention by the science and mathematics courses of the school system.

Courses Given at the Institute of Science

There are three major objectives of science courses given at the tertiary level in the Institute of Science, namely:

(1) to offer foundation courses for producing scientist and technologists of higher levels,

(2) to back up the vocational courses in science related fields such as computer science, electronics, etc., and

(3) to back up the technician level courses which could help preparing people for analytical and extension works.

The quality of course content given at different levels were kept as close as possible to the standards of universities in India. The intermediate level courses were designed to provide a good foundation for both higher level science education and higher level technical education. The courses at the of Bachelor level also had similar objectives. The master level courses were designed to meet the requirements of research scientists and teachers.

The courses given by the Institute of Science are also being heavily criticized these days. The deplorable conditions of the laboratories and over crowding of the classes as expressed by the teachers, particularly, have made the experimental aspects extremely weak. The theoretical courses also are not being revised on time to keep them up to date. Factual information still dominates the courses. The postgraduate level courses do not seem to demand any research experience. Courses on new subjects like bio-technology, environmental science, electronics, computer science, analytical chemistry, biochemistry, etc., have not yet been begun.

Science Courses in the Technical Institutes

Prior to the National Education System Plan, degree level technical courses were not available in the country. Therefore, this level manpower had to be trained in institutions of neighboring countries. The institutions of those countries generally asked for students with a stronger foundation in science and mathematics. The students with ISc and BSc backgrounds were easily accepted.

Later, when the bachelor level courses were offered in our own institutes, provisions were made to allow both science and technology graduates of Proficiency Certificate Level to enroll in degree level programs. This was done with a view to improve the supply of middle level technical manpower in the country. It was assumed that with this arrangement the glamour for technician courses would increase.

Soon after the implementation of this scheme, it was noticed that students completing the two year Certificate level courses were deficient both in basic science and technical skills. They did not have strong enough basic science component to support the further learning of technology sufficiently. Subsequently, the Institutes of Engineering and Medicine extended the duration of the courses to three years to facilitate the inclusion of more basic and applied sciences in the syllabus. All institutes realized that students from the Institute of Science were more suitable for their degree level courses than their own Certificate program graduates.

Courses Given at the Institute of Forestry

A closer look at the courses given by the Institute of Forestry indicates that the courses are generally forest resource management biased. The counterpart AIFC course given by the Dehra Dun Institute in India was primarily built upon a BSc foundation and had, itself, a strong science element in it. The BSc Forestry course offered by Institute of Forestry, on the contrary, is primarily built on the Certificate of Forestry course which does not have sufficient basic science in it. In both the Certificate and BSc level courses, physics and mathematics appear very inadequate. Even the contents of chemistry, chemical technology and biology courses appear quite inadequate. If the graduates of this Institute have to take up any research activities or analytical works they would very much be handicapped because courses on experimental techniques based on modern instruments are lacking in these courses. Therefore, it can be concluded that the courses have a distinct shift from forestry as a science to forestry as a management.

It is not wrong to assume that the forestry sector in our country has faced more problems relating to management. One could argue that the issues relating to the conservation of soil and water, protection of environment and wildlife or conservation of forestry and pasture land are more management-related problems. But at the same time, for the growth of forest based industries, for the exploration and utilization of medicinal plants, rosin and turpentine, oil seeds, etc., for the selection, adaptation, and propagation of suitable varieties of plants, the role of science and scientific research comes in very predominantly. The emphasis on management alone would certainly be a lop-sided development. I would therefore like to give make a suggestion for your serious consideration on this aspect.

Science Courses in the CTEVT Run Technical Schools

The Council for Technical Education and Vocational Training (CTEVT) is a newly created national body which includes in its programs courses of the following three types:

(1) Technician level: courses in engineering related trades and secretarial science,

(2) Junior Technician Level: courses in agriculture, livestock, medicine, construction and other engineering trades, and

(3) Junior Craftsmen Level: training in mechanics, carpentry and carpet weaving.

These courses are mostly given to school dropouts of both urban and rural areas. The science and mathematics courses given in the technical schools are more of AN applied nature. The approximate weightage to these subjects in the curriculum is 15 percent. The details are shown in Tables 1, 2 and 3, below. The lower level program, however, has very little science and mathematics contents.

Council for Technical Education and Vocational Training (CTEVT)

CTEVT has recently been constituted as the topmost policy formulation body for technical education and vocational training in the country, under the chairmanship of the Minister of Education and Culture. The Council has a high level representation from the Ministry of Industry, Ministry of Labor and Social Welfare and the Ministry of Education and Culture, also from the National Planning Commission, the Public Service Commission, the Federation of Chambers of Commerce and Tribhuvan University.

The primary goal of CTEVT is to coordinate and lead in the training of basic and middle level skilled manpower to enable efficient development of the country.

To fulfill its primary goal, CTEVT has been given the following responsibilities:

- in coordination with the National Planning Commission, to project the technical manpower needs in harmony with the needs of national development plans and programs,

- to formulate policy and plan for the training of basic and middle level skilled manpower;

- to coordinate, standardize, recognize and certify technical education or vocational training programs run by public and private organizations;

- to classify skills, formulate skill standards and carry out testing and certification of skills;

- to establish and manage polytechnics;

- to establish and manage Satellite Training Centers;

- to arrange for the management of Apprenticeship Training Programs in major industrial areas;

- to train the technical instructors for technical education and vocational training programs.

The structure of the education system in Nepal and the structure of technical and vocational education are shown in Tables 4 and 5.

The details of the technical schools showing the trades duration of training entry requirements and enrollment capacities are shown in Table 6.

1st Year Course for Agriculture JTAs

Course Name	Hrs/Wk	Theory/ Practicals	Total Hrs/Yr.	Full Mark
(TECHNICAL SUBJECTS, 60% Pass Mark)				
General Agriculture	3	P	117	75
Agriculture Environment I	4	P	156	100
Forestry	2	P	78	50
Livestock Prod. & Mgmt. I	5	P	195	125
Animal Health I	5	P	195	125
Crop Production I	6	P	234	150
Horticulture Production	5	P	195	125
Technical Totals	30		1170	750
(ACADEMIC SUBJECTS, 40% Pass Mark)				
Applied English	2	T	78	50
Applied Nepali	2	T	78	50
Applied Mathematics	4	T	156	100
Applied Science	2	T	78	50
Academic Totals	10		390	150
COURSE TOTALS	40		1560	1000

2nd Year Course for Agricultural JTAs

Course Name	Hrs/wk	Theory/ Practicals	Total Hrs/Yr.	Full Mark
(TECHNICAL SUBJECTS, 60% Pass Mark)				
Crop Production II	9	P	351	225
Vegetable Production	8	P	312	200
Fruit Production	5	P	195	125
Farm Management	4	P	156	100
Marketing and Credit	2	P	78	50
Extension	8	P	312	200
Bee Keeping/Fish Production or Sericulture/ Farm Mechanization (any 2 as practicals)	4	P	156	100
COURSE TOTALS	40		1560	1000

Time Summary for Total Course

	First Year Hours	Second Year Hours	Total Hours	% Time
Technical Courses	1170	1560	2730	87.5%
Academic Courses	390	- -	390	12.5%
TOTALS	1560	1560	3120	100%

Applied Mathematics

This course provides basic mathematical skills and knowledge necessary for mastering the course objectives in the JTA training for both livestock and agriculture JTAs.

Course Objectives:

At the end of the training the student will be able to:

1. Add the following:
   - mixed multiple digit whole numbers
   - mixed decimal numbers
   - mixed fractions
2. Subtract the following:
   - mixed multiple digit whole numbers
   - mixed decimal numbers
   - mixed fractions
3. Multiply the following:
   - mixed multiple digit whole numbers
   - mixed decimal numbers
   - mixed fractions
4. Divide the following:
   - mixed multiple digit whole numbers
   - mixed decimal numbers
   - mixed fractions
5. Use the principle of moving decimal points when multiplying or dividing by 10, 100, 1000, etc.
6. Convert fractions to decimals
7. Convert decimals to fractions
8. Convert between metric and imperial measure
9. Read analog and digital clocks on 12 and 24 hour basis.
10. Measure and record lengths or distances.
11. Calculate averages.
12. Apply and interpret ratio and proportion
13. Determine the area of various shapes of land
14. Estimate distance by pacing (stepping off)
15. Estimate areas of irregular shaped land by dividing them into right-angled triangles and/or trapezoids
16. Weigh agricultural items by the metric system
17. Convert local weights to metric weights
18. Convert metric weights to local weights
19. Measure liquids using the metric system
20. Convert metric liquid volume measures to local measures
21. Convert local measures to metric liquid volume measures
22. Calculate volume of containers, pieces of wood, etc.
23. Calculate space requirements for a given number of livestock when space per unit is known

24. Calculate stocking rate for a given area of pasture when the livestock units for a species is given
25. Calculate percentages
26. Calculate gross income, expenditures, net income and percentage of profit
27. Calculate the difference in real profit amount and % profit amount when costs, harvest price, storage costs and off season price are given.
28. Make approximations and estimations, and assess the accuracy of results obtained be carrying out the exact calculation
29. Convert land area in sq. meters to hectare, ropani and bigha
30. Convert land area given in hectares, ropani or bigha into sq. meters
31. Read and use conversion tables.
32. Calculate the weight or volume of pesticide or fertilizer containing a given quantity or active ingredient or nutrient when the % of active ingredient or nutrient is given
33. Calculate the amount of fertilizer to apply to a given piece of land when the area of land is known or can be determined, the % of fertilizer nutrient is known and the rate of application per hectare for the nutrient is given
34. Calculate the amount of concentrated chemical to use for making a spray solution when the dilution is given, the rate of application per hectare or other unit is given and the total area is known or can be determined by measuring
35. Calculate the amount of medicine to give when the dosage for a given weight is known and the weight of the animal can be determined
36. Calculate amount of feed to be given to a certain number of animals when the amount for one is known
37. Calculate the amount of feed to be given to an animal when the energy value per unit or feed is given and the energy need for the animal is also given
38. Calculate the plant population for a hectare or other unit of measure when the number of plants in a given area is provided
39. Calculate the amount for a given area of land when the seed rate, rate of application of a chemical or fertilizer is given
40. Calculate the amount for any other volume, yet keep the same concentration when a given dilution rate per liter or 10 liters is provided
41. Interpret and present simple graphs, histograms, charts and maps, choosing an appropriate form for the information being illustrated
42. Calculate the yield per hectare when the yield of a plot of known size is given
43. Make calculations and estimations of perimeter, area and volume of right-angled figures, triangles, trapezoids, circles and cylinders
44. Make elementary algebraic substitutions, e.g. conversions between Centigrade and Fahrenheit; and livestock weighing formulas
45. Calculate the calving/lambing/kidding percentage when the number of young born and the number of breeding females is provided
46. Calculate costs per unit
47. Calculate energy value of ration when given a list of values and amounts of various types of food contained in the ration
48. Calculate the amount of seedlings needed for a given area of land when the spacing is given
49. Calculate the amount of top soil needed to fill a given number of plastic bags of a given size
50. Calculate harvesting losses in percentage when the field weight and weight at store are given.

Applied Science

This course provides basic science skills and knowledge necessary for mastering the course objectives in the JTA training for both livestock and agriculture JTAs.

Course Objectives:

At the end of the training the student will be able to:

1. Explain the difference between plants and animals
2. Name the important classes of animals associated with agriculture
3. Identify the parts of a microscope.
4. Use a microscope.
5. Describe the function of soil in relation to plants.
6. Describe the function of soil organisms.
7. Explain the biological process involved in the following:
   - compost making
   - silage making
   - curd making
8. Explain the conditions necessary for plant growth.
9. Give a broad description of an ecosystem and explain how the various components interact.
10. Describe and explain the water cycle.
11. Describe and explain the nitrogen cycle.
12. Describe and explain the carbon cycle.
13. Describe and explain the food chain.
14. Explain the importance of conserving natural resources and ways of doing so.
15. Describe the external and internal structure and function of the flowering plant, including the stem, leaf, root and flower.
16. Describe the various types of root systems and list agricultural plants with each type of root system.
17. Explain how the nature of the plant and type of root system affects cultural practices when caring for agricultural crops.
18. Describe the process of sexual reproduction in flowering plants, including pollination and fertilization.
19. Describe the process of asexual production in flowering plants, giving examples of different reproductive organs; tubers, corms, suckers, bulbs, grafts, buddings, layerings, nucellars.
20. Compare sexual and asexual reproduction as forms of reproduction in agriculture and explain when one might be better than the other.
21. Explain the following terms:
    - germination
    - photosynthesis
    - respiration
    - transpiration
22. Explain the difference between elements, compounds and mixtures, and name and give the symbol of these common elements: Hydrogen, Carbon, Nitrogen, Oxygen, Sodium, Magnesium, Potassium, Calcium, Phosphorus, Sulphur.

23. Explain acidity and alkalinity, and how the pH scale shows the degree of acidity or alkalinity.
24. Describe and give the function of each of the following systems of livestock and man:
    - skeletal
    - muscular
    - skin
    - digestive
    - circulatory
    - glandular
    - nervous
    - urinary
    - reproductive
25. Explain the female reproductive cycle in mammals.
26. Explain the production of sperm in the male.
27. Explain the primary sources of the following nutrients for human nutrition:
    - carbohydrates
    - fats
    - proteins (amino acids - general concept only)
    - minerals
    - vitamins
28. Explain the concept of a balanced diet or ration.
29. Explain the meanings of parasitism and pathology and give examples of each.
30. Explain the detrimental effects of parasitism.
31. Explain and give an example of a symbiotic relationship.
32. Briefly describe the characteristics and methods of reproduction of bacteria, fungi and viruses.
33. Describe the external structure of a typical insect.
34. Describe the life-cycle of the three insects with differing life cycles.
35. Define the term climate and explain how the various factors affect climate.
36. Explain the term weather and the components that make up weather.
37. Explain humidity.
38. Explain the process of preservation by drying.
39. Explain the process of preservation by pickling.
40. Explain the process of preservation by sterilization.
41. Explain the process of preservation using sugar.
42. Explain in-breeding and the problems related to it in agriculture production.
43. Explain cross-breed and the concept of hybrid vigor.
44. Draw a simple breeding line of plants and animals.

This course provides basic skills and knowledge in forestry as it relates to the farmer. Seed collection, simple seed treatments, nursery bed preparation and care, as well as the establishment of trees is covered. Basic skills in managing trees, particularly for fodder production is also taught. The course provides skills and knowledge related to bamboo production and use for agricultural purposes. Throughout the course a heavy emphasis is given to understanding the relationship between the forest, soil conservation, agriculture and livestock production.

Course Objectives:

At the end of the training the student will be able to:

1. Explain the relationship between the forest, soil and water, with particular reference to soil and water conservation.
2. Describe the inter-relationship between forest, agriculture production (agronomy and horticulture), livestock production, health and nutrition for the local area.
3. Explain forestry legislation as it relates to farmers or villagers, particularly forest leasing, private forests, panchayat protected forests and community forests.
4. Identify important local trees which are used for fodder, fuel, timber or have multipurpose use, as seedlings and mature trees.
5. Collect tree seeds and cuttings.
6. Develop and maintain a forest nursery, carrying out the following:
   a. Protect nursery area
   b. Prepare nursery bed
   c. Prepare soil in nursery bed
   d. Prepare soil tubes
   e. Prepare seeds for sowing (if necessary)
      - by scarification
      - by stratification
   f. Plant seeds
   g. Plant cuttings
   h. Water nursery bed
   i. Weed nursery bed
   j. Provide shade for nursery bed
7. Establish trees and hedges
   a. Select site for planting
   b. Layout site
   c. Prepare tree pits
   d. Plant tree seedlings

8. Maintain trees and hedges
   a. Fill gaps
   b. Train trees
   c. Prune trees
   d. Thin trees
   e. Protect trees from fire
   f. Protect trees from animals
   g. Protect trees from man
   h. Protect trees from pests and disease
   i. Protect trees from weeds
   j. Lop trees properly for fodder
9. Produce Bamboo:
   a. Identify bamboo species important to local area
   b. Select and make viable cuttings from bamboo
   c. Prepare nursery bed for bamboo
   d. Maintain bamboo in the nursery bed
      1) Plant bamboo cuttings
      2) Water bamboo cuttings
      3) Weed bamboo seedbed
      4) Provide shade for bamboo seedbed
   e. Transplant bamboo in the field
   f. Protect bamboo
   g. Carry out selective harvesting of bamboo
   h. Survey bamboo property
   i. Split and use bamboo for making agriculture equipment
12. Develop a yearly management calendar for the 5 most important trees of the local area.

<u>Optional</u> according to availability of natural forest:

Manage a natural forest: (including use for fodder, medicinal plants and other plants of economic importance).

   a. Identify fodder, medicinal and other plants of economic importance.
   b. Lop trees for fodder production
   c. Protect for the regeneration of seedlings
   d. Select trees for cutting and cut
   e. Harvest medicinal plants and fodder selectively
   f. Do enrichment planting

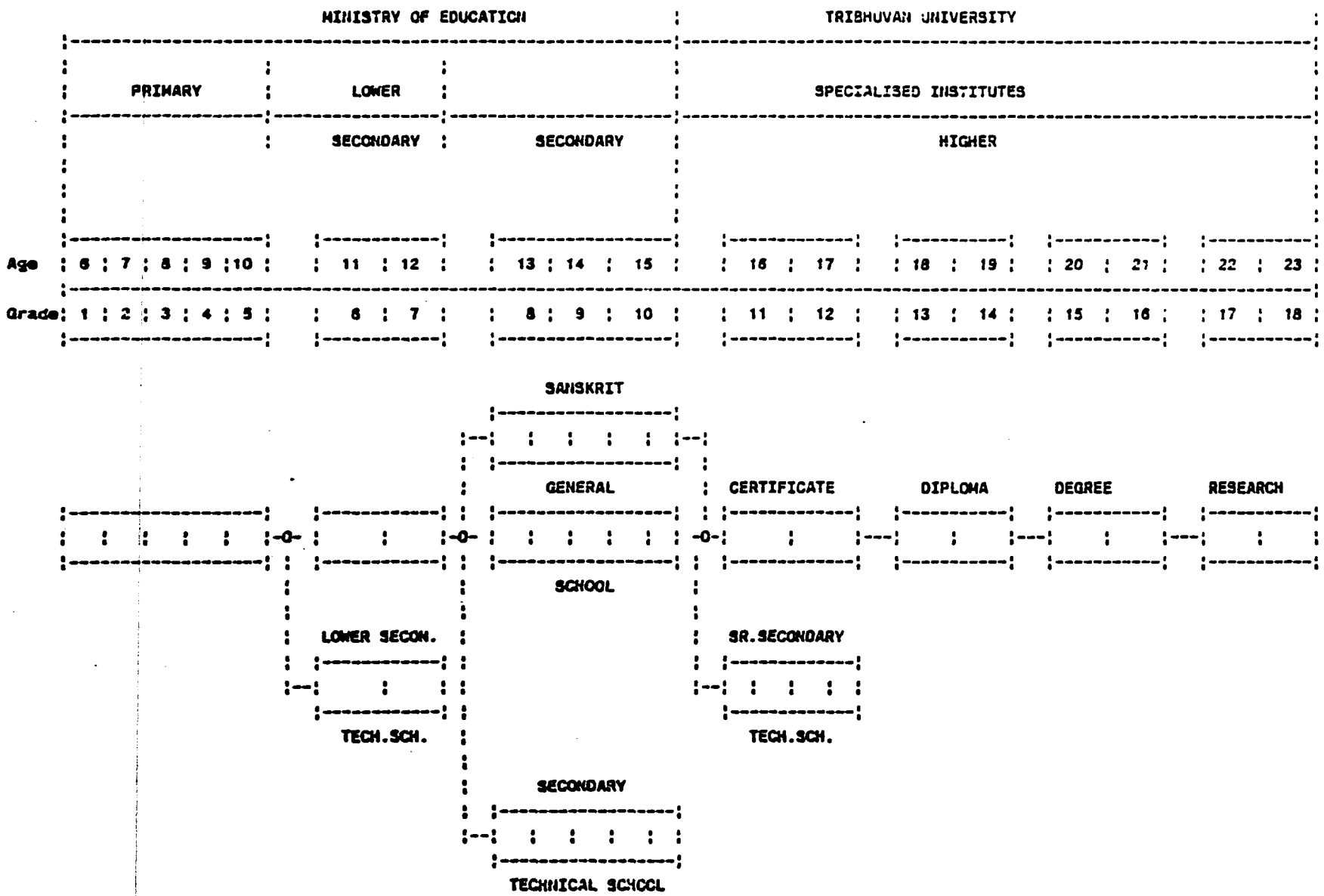
MINISTRY OF EDUCATION
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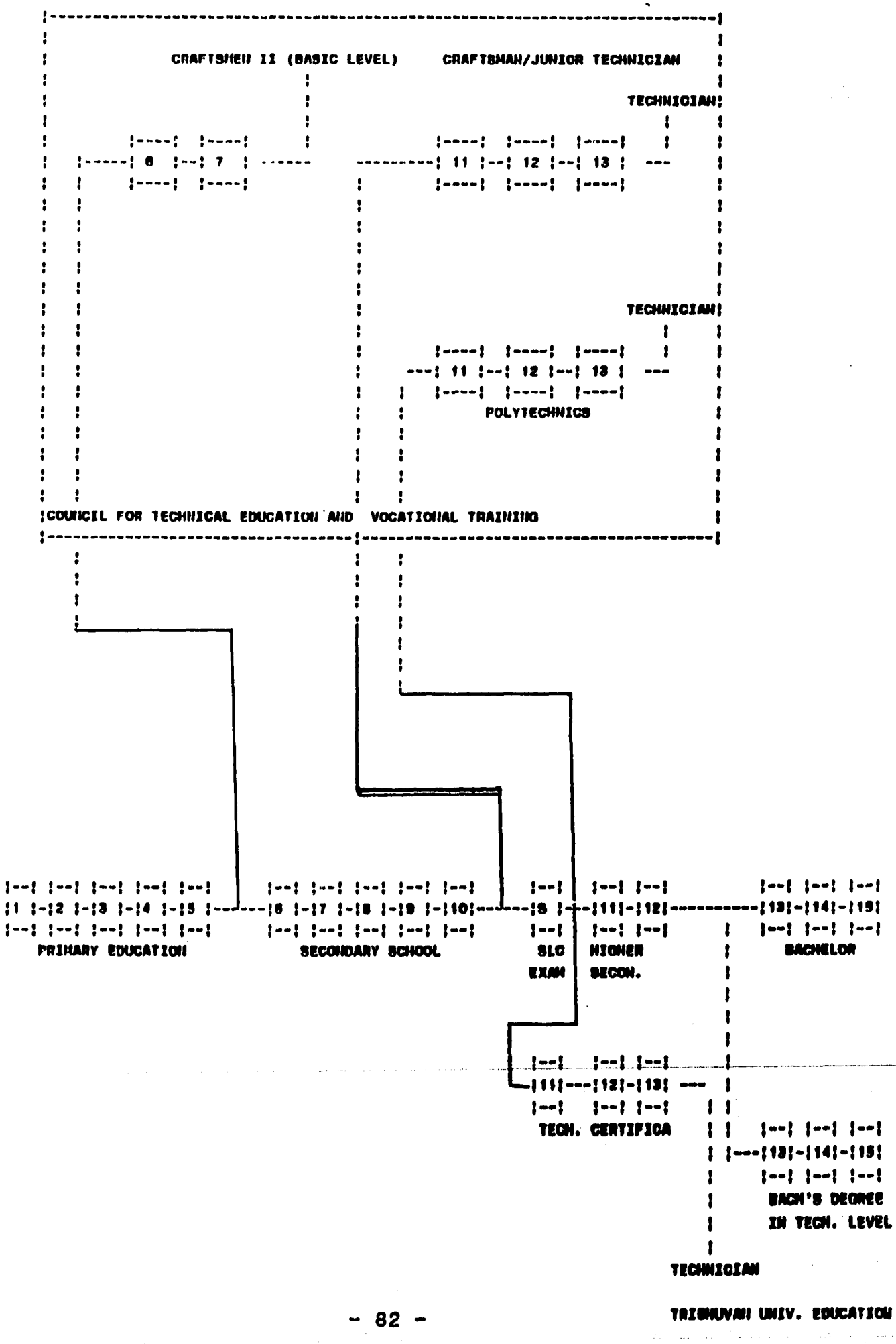
Table 5. Technical and Vocational Education Structure



Technical School Under the Council

S.N.	Institution	Courses Offered	Duration yr	Duration hr	Annual Intake Capacity	Entry Requirements (Grade Passed)	Types of Certificate	Level Recognition Class
1	Mechanical Training Centre Balaju	a) Gen. Mechanics	3	4800	24	Class 10	Tech. (STSLC)	Technician
		b) Electricity	3	4880	30	Class 10	Tech. (STSLC)	Technician
		c) Sanitary Fitter	3	4880	30	Class 10	Tech. (STSLC)	Technician
2	Lahan Tech. Sch. Lahan	a) Agriculture	3+1*	4320	30	Class 7	Craft (TSLC) I	Craftsman
		b) Construction	3+1*	4320	30	Class 7	Craft (TSLC) I	Craftsman
3	Jiri Tech.Sch. Jiri	a) Agriculture	3+1*	4320	25	Class 7	Craft (TSLC) I	Craftsman
		b) Construction	3+1*	4320	25	Class 7	Craft (TSLC) I	Craftsman
		c) Health (ANM)	3+1*	4320	15	Class 7	Craft (TSLC) I	Craftsman
4	Karnali Tech. Sch. Jumla	a) Agricuture	3+1*	4320	10	Class 7	Craft (TSLC) I	Craftsman
		b) Construction	3+1*	4320	17	Class 7	Craft (TSLC) I	Craftsman
		c) Health (ANM)	3+1*	4320	16	Class 7	Craft (TSLC) I	Craftsman
5	Dhankuta Techn. Sch. Uttarpani	a) Agriculture	3+1*	4320	30	Class 7	Craft (TSLC) I	Craftsman
6	Lalitpur Tech. Sch. Manbhawan	a) Wood Work	2	2880	16	Class 5 Passed	Craftsman II	Jr.Craftsman
		b) Metal Work	2	2880	16	Class 5 Passed	Craftsman II	Jr.Craftsman
		c) Leather Work	2	2880	8	Class 5 Passed	Craftsman II	Jr.Craftsman
		d)Secstl. Work	2+1*	2880	16	Class10Passed	Tech.(STSLC)	Technician
7	Kumbheswor Techn. Sch. Kumbheswor	a) Wood Work	2	2880	10	Class 5 Passed	Craftsman II	Jr.Craftsman
		b) Carpet Weaving	2	2880	20	Class 5 Passed	Craftsman II	Jr.Craftsman

8	Purwanchal Tech. Sch. Dharan	a) Mechanical:						
		I.Machine/Fitting	2.5	3000	12	Class 7 Passed	Craft (TSLC) I	Craftsman
		II.Auto-Mechanics	3	3600	12	Class 7 Passed	Craft (TSLC) I	Craftsman
		III.Refregeration	2.5	3000	8	Class 7 Passed	Craft (TSLC) I	Craftsman
		IV.Fabrctn/Welding	2.5	3000	12	Class 7 Passed	Craft (TSLC) I	Craftsman
		b) Electrical:						
		I.Domestic&Indust. Wiring/Mr Winding	2.5	3000	24	Class 7 Passed	Craft (TSLC) I	Craftsman
		c) Civil:						
		I. Plumber	2.5	3000	12	Class 7 Passed	Craft (TSLC) I	Craftsman
		II.Carpter/Joiner	2.5	3000	12	Class 7 Passed	Craft (TSLC) I	Craftsman
		III.Build.Plaster	2.5	3000	24	Class 7 Passed	Craft (TSLC) I	Craftsman
9	Sanothimi Tech. Sch. Sanothimi	a)General Fitter	1	1440	96	Class 7 Passed	Craftman II	Jr.Craftman
		b)Gen. Mechanics	3+1*	4320	16	Class 7 Passed	Craft.(TSLC) I	Craftsman
		c)Auto. Mechanics	3+1*	4320	18	Class 7 Passed	Craft.(TSLC) I	Craftsman
		d)Plumbing	2	2880	24	Class 7 Passed	Craftsman II	Jr.Craftsman
		e)Basic Tailoring	1	1440	36	Class 7 Passed	Craftsman II	Jr.Craftsman
		f)Adv. Tailoring	1	1440	18	Class 7 Passed	Craftsman II	Jr.Craftsman
		g)Agriculture	1	1440	12	Class 7 Passed	Craftsman II	Jr.Craftsman
		h)Draftmanship	1	1440	14	Class 7 Passed	Craftsman II	Jr.Craftsman
		i)Printing	2	2880	25	Class 7 Passed	Craftsman II	Jr.Craftsman

* Total Annual Intake Capacity (levelwise)

Technician Level	: 100
Junior Technician (Craftsmen)	: 463
Training (Junior Craftsmen)	: 270

HUMANITIES, SOCIAL SCIENCE AND COMMUNICATIONS

Ramawatar Yadav, PhD*

> There is a large and expanding group to whom English is merely a medium of factual inter-communication - both spoken and printed. These are the students in schools and colleges of science and technology.
>
> - Michael West

Introduction

This paper seeks to accomplish the following two purposes :

(1) to argue, in general terms, for a broad knowledge of social sciences and humanities for technical students and to point to the gulf of incomprehension that exists between technical students on the one hand and the students of liberal studies on the other.

(b) to delineate, in specific terms, the language skills that the graduates of technical institutes need to possess for smooth and effective and effortless inter-communication.

Before I go on to discuss the specific communication needs of technical students, I would like to begin by making a plea for humanizing technical education in general and the courses of study required for students of forestry in particular.

Of course, the need for a general awareness of human values among scientists and technicians has generally been felt and recognized widely ever since Lord Snow in his Rede Lecturer at Cambridge University in 1959, The Two Cultures, pointed attention to the two polar groups into which the intellectual life of Western society was increasingly being split. It follows that there is an urgent need for re-thinking about the pattern of technical education, and a need for a general awareness of humanities and social sciences in a curriculum for technical students.

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We live today in a world which is increasingly governed by science and technology and there is no doubt whatsoever that we cannot do without them. The enormous growth of technical and scientific education nontwithstanding, the general aim of education has been and continues to be the all-around integrated development of the human personality so as to produce full, rounded human beings who are aware of, and responsible to, the community in which they live. This large, general objective can only be attained in an atmosphere where technical students are made aware of social and economic developments as well as representations of life through poetry, drama and the fine arts.

It cannot be denied that the research carried out by scientists, engineers and other technicians and their findings and discoveries affect the lives of ordinary human beings, directly or indirectly. It is clear, therefore, that scientific studies and technical development must not be pursued in isolation, as if the large and complex society outside did not exist.

Above all, human beings all the world over urgently need to preserve their individuality, their basic humanness; they need to remain creative. They must first be themselves and they must feel that they can, in one way or another, blossom forth and contribute to the beauty, variety and joy of life as a whole.

Finally, there is the need for man's awareness of his relationship with Nature, for it is only through a living communion with Nature that man can fully realize himself.

I should particularly like to emphasize this need for the students of forestry, since they do need to live in Nature and might have a special opportunity to explore their vital and personal bond with Nature in a way that other technical students may not have.

In conclusion, one might say that man can no longer allow himself to be turned into a mere cog in the vast machinery of production and remain confined to a society which goes on producing and consuming in a blind cycle. Indeed one may justifiably argue for a new approach towards a fresh orientation of scientific and technical education for the world of the future. While most social studies like Psychology, Anthropology and Sociology today tend to follow a scientific approach, incorporating general tenets and canons of science and using scientific methods and techniques, the various sciences may be called upon to develop a 'sociological' approach. In other words, it may be necessary for the sciences to develop more closely along the lines on which our societies are developing in order to be more meaningful to the masses of human beings and the fulfillment they seek.

new to the growth of a more integral cultural system and help to replace the 'two cultures,' the scientific and the humanistic, that threaten our world.

Before I close this part of my paper, I would like to remind you that the humane approach to technical studies that I have pleaded for may really help you to serve the community you live in more fruitfully and creatively.

Communications Needs of Technical Students

And now on to the communication needs of technical students. We need to develop courses in English which will aid the non-English-speaking technical student to learn confidently and swiftly the language skills which will make his technical instruction and communication with his fellows and employers effortless and even joyful.

To teach the technical student English relevant to his studies, one must identify the kinds of situation with which he is likely to be confronted in his classes and in his textbooks. One must then look at the language commonly used in these situations and develop his mastery of the linguistic skills appropriate to them.

Teaching English to students of science and technical students cannot be justified for its own sake. It is not an end in itself. It is a means to an end - the end being mainly to enable them to understand textbooks on scientific disciplines written in English. Naturally, the teacher who either frames the English syllabus or organizes a language course for technical students owns a great responsibility. He should bear in mind the simple fact that the English course for science and technical students must deal with the salient aspects of scientific and technical language.

What, then, are the most distinguishing characteristics of technical English? What are the difficulties that the average English teacher is faced with while teaching technical English in Nepal?

The difficulties of language used in technical fields spring from the sense of separation and isolation from the use of language in everyday situations. Where there is a common use of language when we are at home, once language is used for restricted or specific purposes in which fewer people are interested, those unfamiliar and uninterested feel a barrier has been raised.

is the [illegible] ic of scientific and technical English. It is also the most obvious difficulty that may make an average English teacher feel at a loss; the English teacher may fear to trespass where he is not sure of his ground. Science texts use special words instead of common words: top becomes apex; bottom... base; edge... periphery; and flat... horizontal. Technical vocabulary also varies according to the technical field: molecule, crucible, flask, alkali, catalyst may be special to one field of study and velocity, heat, kinetic energy, calorimeter, condenser to another, and so on.

There are a number of word-building devices peculiar to technical English. These are illustrated below :

(a) the -ing form of the verb --

(i) words ending in -ing replacing a phrase with who, which or that: "Are these two totally different activities having little or no interconnection, as is often implied?"

(ii) words ending in -ing replacing a noun: 'Such activities as investigating the strength and uses of materials, extending the findings of pure mathematics to improve the sampling procedures used in agriculture or the social sciences, and developing the potentialities of atomic energy, are all examples of the work of the applied scientist or technologist.'

(iii) words ending in -ing functioning as adjectives: "These theories (hypotheses, models) become the working laws or principles of science."

(b) Prefixes --

A few important examples are given below:

anti-, meaning against: antitoxin, antibiotic
bio-, meaning life: biochemistry, biology
hypo-, meaning less than usual: hypothesis, hypotonic
macro-, meaning large, on a large scale: macromolecule, macrocycle
mega-, meaning a million: megawatt, megahertz
para-, meaning similar to: paratyphoid, paramagnetism
poly-, meaning many: polymorphous, polythene
proto-, meaning original, first: prototype, protoplasm
ultra-, meaning beyond: ultramicroscope, ultraviolet rays

-al: geometrical, aerial
-ant: resistant
-en: harden, widen
-ian: mathematician
-ify: stratify, classify
-ist: chemist
-ize: pasteurize, crystallize
-logy: geology, ecology

(d) Compounds --

Technical English makes a frequent use of specially formed compound nouns:

"population distribution study"

"x-ray diffraction crystal structure analysis"

Technical texts not only employ a specialized vocabulary; they also use special structures. For instance, the use of passive is more common in scientific texts than in literary texts. The simple reason is that science texts are more about things than about persons.

(e) Passive Voice --

"It was discovered that it was impossible to raise water more than about 35 feet."

(f) Imperatives -

'Take a flask. Fill it with water. Close the flask with a stopper.'

(g) Simple Present Tense -

The simple present tense is the form of the verb which is predominant in science texts. It appears to indicate permanent validity :

"Water freezes at 0 C."

"A growing plant contains at least 80 percent water."

Some words derived from Latin or Greek have irregular plurals:

datum	...data
fungus	...fungi
hypothesis	...hypotheses
nucleus	...nuclei
phenomenon	...phenomena

I would like to conclude this presentation with a word or two on the attitude of the English teacher towards the science texts. First, the English teacher is a bit fearful of entering fields other than his own. This element of fear and trepidation is exacerbated when he meets reluctant and resistant students in the classroom. Secondly, it would seem that we must overcome some trepidation and even distaste in the English teachers whose first love has been his own subject and for whom the very thought of vocational, utilitarian, cut and dried, scientific subject matter is opposed to all he sets out to do in his English classes. Yet we must remind him that not a few scientists have achieved styles of great distinction in writing about science. Science too offers a realm to challenge the imagination, and filled with wonder, great scientists like Bragg and Sherrington have written with beauty and lucidity on purely technical subjects. And, it is to such 'humane' scientists that I was alluding in the early part of my presentation.

NATURE TOURISM AND ENVIRONMENT

Ram Pradhan*

Introduction

Tourism, by all accounts, is a dominant sector as far as the earning of valuable foreign exchange for Nepal is concerned. In a country where employment opportunities beyond the agricultural sector and the capacity for earning foreign exchange is limited, tourism development holds the key to success of many a project implemented with the object of raising the living standards of the people. In 1975, the gross foreign exchange earnings from tourism amounted 11.5 million dollars, by 1985, the figure went up to 43.0 million dollars which amounted to 18.5 percent of that year's gross foreign exchange earnings of the country. Despite the 15-month long Indo-Nepal impasse over trade and transit that had an adverse impact on tourism, the sector still brought in revenue of over 68 million dollars last year.

It is estimated that between 1970 and 1986, Nepal attracted nearly two million tourists. In 1970, about 45,000 tourists visited Nepal. By 1986 the figure had increased to 223,000. In this 17-year period the number of tourists who came for trekking and mountaineering alon arose from 12,600 to 33,000.

The importance the government places on tourism is clearly reflected in the Seventh Five Year Plan (1985-90). The growth rate for each of the five years was set at 12.3 percent. With the growth in tourism it is assumed that the number of employed in the country also increased proportionately. The Eighth Five Year Plan (1990-95) also emphasizes on further development of this sector, but the historic change early this year has, as we all know, given birth to new pressures and new priorities. I think until the general elections are over and a new elected government takes office, it will not be wise to rush into any kind of conclusion in relation to not just the tourism sector, but all other vital sectors of the national economy.

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activities on the socio-economic fabric of upland villagers, there have also been detrimental effects on the local environment. For example, vegetation that has flourished for ages in areas lying between the tree-line and the snow-line, supporting most of the unique medicinal plants, are facing rapid destruction, thanks to the increased demand for fuelwood for cooking and heating purposes. Deforestation is not the only problem. Over-crowded campsites, careless handling of disposable waste and unhygienic conduct have all contributed to sanitation and health hazards. The much-awaited Tourism Development Master Plan does not take adequate account of the environmental issues. The other tourism-induced issue, perhaps the most crucial, is the problem of how to develop a feasible framework of interaction between the protected wild animals and the humans who subsist in the periphery of the national parks and wildlife reserves in different parts of the country.

Nature Tourism

To define nature tourism is not so easy, but broadly speaking nature tourism may be divided into:

Trekking	Wildlife Safari
White Water Rafting	Bird Watching
Wild Flower Trek	Anthropological Tour
Butterfly Trek	Cultural Tour
Geological Trek	Fishing
Rhododendron Trek	Hunting

The tourists from different countries have different preferences. I am told the Japanese are very fond of the Rhododendron Trek, while those from Europe and America are more into pure trekking and wildlife safaris, and hunting wherever feasible.

Usually, there are two types of tourists - the hard ones and the soft ones. The former travel on tight itineraries or are destination-oriented, as you will. They stay for a short period of time, are quite demanding, guided by others and do not care as much about the country's culture and environment. In other words, they like to see as much as they can, rather than to know as much as they should. But they do spend a lot of money. That is perhaps what we mean by quality tourism here in Nepal. The soft ones are they who stay longer, try to understand the socio-cultural fabric of the society, seem to take interest in the happenings around and are very seldom guided by a tour company. But they don't spend as much. Nepal is faced with the problem of which of the two types should she encourage for short as well as long-term benefit. A mixture, I submit, is advisable, but in a controlled fashion.

natural heritage, specially the forests where most the actions take place. Of the types I mentioned above, most of them at least, fall within the gambit of the forest in one way or another. In my view, therefore, foresters or whoever is involved in forest conservation and development indeed have by far the most important part to play in the sustenance and promotion of nature tourism in the country. Radically put, take the forests out, the days of nature tourism in Nepal are over. So, it is the foresters and their colleagues sweating in the jungles who make the difference between what Nepal gets and does not get in terms of 'nature tourists' and the resources and opportunities they generate for us within the country.

Let me once again get back to tourism as a whole. We have already discussed the importance of tourism in our national economy. In the 1940s and part of the 1950s our traditional arts and crafts were on the brink of disintegration. The craftsmen and artists had steadily taken to masonry, carpentry and other occupations because their traditional skills had been overwhelmed by the influx of the so-called 'development phobia.' It is the tourism that revived the arts and crafts of Nepal. The visitors showed interest in our products - woodcarvings, ornaments, carpets and other curio goods. Also, the very idea of nature conservation was popularized by the visitors, the soft-ones, who trekked to far flung areas, to the tarai, to the mountains and saw what damages were being done to the natural heritage of this wonderful country. They wrote about it, they discussed it in various international fora, and some of them even convinced their governments to do something about it.

Today, conservation is the 'in-thing' in Nepal as it is in other parts of the world. We know we cannot depend on agriculture alone and that industrial development has its limitations, the most pronounced being our geographical situation. The bottlenecks are just too many. Mining may be a good idea, but our mountains are too fragile. What then is the way out? We have no alternative but to develop tourism, but on a sustainable basis.

Environment

But while we go on developing tourism, we just cannot be indifferent to the problem of protecting our environment. In fact, both can be done at the same time. In a sense, conservation and tourism are two sides of the same coin. One should be made to supplement the other, and that is not so difficult provided we know how to strike the balance. I see a tremendous role for the foresters here. They can help, in a number of ways, in maintaining the equilibrium between soil and

in reducing the impact of the greenhouse effect etc., by preserving the vegetation at the required level.

The issues of environment in Nepal have caught up with the vision makers. The Directive Principles of the State Policies in the newly promulgated constitution clearly say that environment is a top priority. What it means is that nobody can now be oblivious to the environment and that it will be a subject that has to be borne in mind constantly by the state and the citizens alike. This, I believe, is the time that all of us who have been involved in the cause of environmental protection should act - individually and collectively - to generate an awareness among the people, and to build pressure on the industrialists to have environmental safeguards built into their factories and on the proponents of other kinds of development activities such as huge dams, giant hydel projects and highways.

At the grassroot level, though, we can perhaps start with four things, which I strongly believe are at the roots of our environmental problem.

Public Awareness

The foresters, as part of their work, could also act as the builders of environmental consciousness at the people's level. The need to protect soil, trees, etc. can be communicated to the people in as simple a language as possible. They could visit schools in the villages and tell the students why forest should be saved and nature as a whole should be loved and respected, not destroyed.

Population Control

Since the destruction of the forests has a direct relationship with the growth in population, it might be a good idea for the foresters to have some working knowledge of population control methodologies. During informal chats with people the foresters could discuss this aspect of 'nature preservation.'

Plantation of Trees

Foresters know forest ecology, but admittedly the knowledge has not been applied effectively. In tree plantation exercises, be it a community or a private or a state enterprise, care should be given to planting the right species at the right time. Who else but the foresters can tell the people about this?

Forests will never be safe as long as the people living in their periphery are poor. Both to reduce the people's dependence on the forest and to boost their self-esteem, alternative sources of income would have to be identified and put into practice. The foresters who know the situation will do well to help the local people start poverty alleviation projects wherever feasible.

Conclusion

Let me stop here with this observation - nature tourism can play a magnificent role in conservation and enhance the value of forests, wildlife, mountains and rivers, in addition to providing employment and revenue for the government as well as indirect benefits to the people. But here again, as so often in conservation, there is another fine balance: too much tourism will destroy the very nature the tourist come to see. Policy makers have to decide how to maximize the benefits from nature tourism while guaranteeing the interests of conservation for the future.

Keshab Man Shakya, PhD*

Introduction

In this paper, I discuss the following points:

(1) concepts about soil and water conservation every forester should know,

(2) should there be a separate soil and water conservation program or a concentration within forestry,

(3) important technical skills needed to work in soil and water conservation,

(4) look into the future on sustainable ecological cum economic development; the maintenance of soil productivity through soil and water conservation in Nepal's fragile environment,

(5) social and communication skills needed for soil and water conservation work,

(6) research needs, and

(7) environmental policy.

This paper addresses the educational needs of the professional (BSc) as well as the technician (Certificate) foresters, and responds to questions such as: "what and how much should a forestry student of the Institute gain knowledge and skills in the field of soil and water conservation?"

Concepts about Soil and Water Conservation

* Soil conservation holds the soil in place, maintains or improves its health and fertility, and increases its capacity for sustained production (Parson 1965).

* Water conservation intercepts the rain that falls upon the land, regulates its movement, and gains maximum benefit from it within the limits of replenishment (Parson 1965).

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* Chief, Bagmati Watershed Management Project, Department of Soil Conservation and Watershed Management.

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* [illegible] to the four authors (Schwab, Frevert, Barnes and Edminister 1960) soil and water conservation practices are considered to be those practices that provide for the management of water and soil in such a way as to insure the most effective use of each. These conservation practices involve the soil, the plant, and engineering phases, each of which is of the utmost importance. The soil phases of conservation require an inventory of the soil with which we are working, quantitative measurements of its physical characteristics, and information on soil response to various treatments. The plant phases bring to light questions of adequate, but not excessive, water for plant growth and optimum utilization of the plant as a means of preventing erosion and of increasing the rate of movement of water into and through the soil. The engineering approach to soil and water conservation problems involves the physical integration of soil, water and plants in the design of a coordinated water management system based upon the best physical information available.

* A watershed is made up of the natural resources in a basin, especially the water, soil and vegetative factors. The comprehensive development of a basin so as to make productive use of all its natural resources and also protect them is termed "Watershed Management" (Even 1977).

* The general objectives of the long-term development of the soil conservation and watershed management as outlined in the forestry sector master plan (MPSF 1988) are:

  - to contribute to meeting the people's basic needs for forest products and food products through the conservation and management of watershed resources.

  - to protect the land against degradation by soil erosion, floods, landslides, desertification and other effects of ecological imbalance.

The curriculum on soil and water conservation for the forestry sector should be developed according to the above definitive terms. Consideration should also be given to the present Nepalese context, where soil and water conservation is generally identified with the activities of the Department of Soil Conservation and Watershed Management, Ministry of Forestry and Soil Conservation.

Soil and Water Conservation is a complex concept and the concern of various professions. For foresters, an understanding of the role of forestry in checking soil erosion through forestry practices and application of conservation measures in the forest

practices which contribute to the conservation and productivity of agricultural lands through conservation farming. For engineers, it is conservation through engineering measures. For hydrologists, geologists, soil scientists, economists, social scientists and others, it is how their disciplines contribute to the cause of soil and water conservation. With the passage of time soil and water conservation has become of universal concern of all and the concepts of soil and water conservation activities have been changing and evolving depending upon the concerns felts by various professions.

Personnel of various professions who may be involved with the soil and water conservation activities should have an understanding of some basic concepts:

Erosion processes

Types of erosion - geologic and man made, wind erosion, water erosion - sheet erosion, rill erosion, gully erosion, landslides and stream bank erosion. The BSc level students should have a knowledge on universal soil loss equation, their theory, application and up-to-date research results.

Extent of Soil Erosion in Nepal and Its Impact on Natural Resources AVailability and Socio-economics

The BSc level students should have a knowledge on empirical analysis of the problem and the impact. Major concern should be placed on Nepalese hill subsistence agriculture and problems of soil erosion induced by development activities.

General Knowledge on Various Soil Conservation Measures: Biological and Mechanical

Among biological measures - agronomic practices (contour farming, tillage, mulching, crop rotation, strip cropping), agrostological practices (grasses for stabilization of slopes, bends, gullies, and landslides), tree plantation (species suitable for soil binding and eroded soils), and conservation farming (farming based upon the sustainable use of forests, livestock and agricultural crops). Among mechanical measures - terracing, water management (diversion channels, ponds), gully control, landslide control and stream bank protection.

Watershed hydrology and land use planning.

Soil and Water Conservation:
A Separate Program or a Concentration Within Forestry?

Soil and water conservation activities are of interdisciplinary nature. Along with foresters, there should be agriculturists, engineers, range scientists and others such as hydrologists, soil scientists, economists and social scientists in this field. It is important that specialists in the various aspects of conservation have an appreciation of one another's roles, as there are few problems that can be solved within the limits of any one field.

A separate program on soil and water conservation means producing graduates specifically trained for soil and water conservation. It will implicate in Nepalese government organisational set up that they are produced specifically to meet the needs of the Department of Soil Conservation and Watershed Management (DSCWM). This will limit the career opportunities in other departments and organizations. The graduates should have the flexibility in choosing a forester's career in such departments as Forests (DOF) or Wildlife and National Parks (DWNP) as well as in parastatal organisations such as the Nepal Timber Corporation (NTC), and others.

A soil and water conservation program as a concentration in forestry should produce foresters knowledgeable in soil and water conservation to the extent that they also meet the needs of the DSCWM in the capacity of a forester. The graduate will not only fulfill the needs of the DSCWM but also complement the DOF and DWNP with their ability to implement the respective activities with due consideration of soil and water conservation.

While developing a soil and water conservation program as a complement to forestry, the curriculum should focus more on the role of forests in soil and water conservation.

Important Technical Skills

Certificate level skills should include:

(a) identification of suitable tree and grass species, their nursery techniques, plantation and management, and their survey, design, estimation and implementation.

(b) gully, landslide and stream bank protection techniques (bioengineering methods using plants and local materials), and their survey, design, estimation and implementation.

BSc level skills should include:

(a) preparation of land use maps, land capability maps and erosion hazard maps,

(b) collection and analysis of data on soil erosion, meteorology and hydrology, and

(c) a project in the final year for the students taking the soil and water conservation major.

Social and Communication Skills

Conservation education is considered an important activity to create an awareness about the degradation of watershed environments. Field demonstrations, films, slide shows, flip charts, calendars, newsletters, posters and the like are popular. Certificate level foresters should know them, as they are the ones who will be working in the field with the local people. They should also be skilled in conducting group discussions, forming committees, taking local participants on study tours and getting local people's participation in planning and implementation of activities.

BSc level foresters should learn about general rural sociology and possess social and communication skills so that they can make the necessary judgments about applying suitable techniques of people's participation and develop education materials.

Social and communication skills should be taught separately (not as a part of soil and water conservation) both at Certificate and BSc level. However, the theme of the curriculum should be conservation education.

Research Needs

Although soil and water conservation programs have been conducted through a separate department for more than 15 years (the DSCWM was established in 1974), the research done in this field is insignificant. The Institute of Forestry should take a vital role in conducting research programs. The areas needing research at the Institute level are:

(a) measurement of soil erosion,

(b) watershed hydrology, and

(c) soil and water conservation characteristics of trees and grasses.

Soil and water conservation programs are generally directed towards improving the environment. A forester's ability to assess environmental impacts of various activities has become more important with the passage of time. BSc level foresters should have the knowledge and skills to participate in Environmental Impact Assessments (EIAs). They should be aware of the existing policies, laws and regulations on the natural resources of Nepal and abroad. Ecology and EIA, as subjects, should be taught separately.

References:

Even, T. 1977. The Integrated Watershed Approach for Development Project Formulation. Guidelines for Watershed Management. Rome: Food and Agriculture Organization of the United Nations.

MFSC. 1988. Soil Conservation and Watershed Management Plan. Master Plan for the Forestry Sector Nepal. Kathmandu: Ministry of Forests and Soil Conservation, Government of Nepal.

Parson, R.L., 1965. Conserving American Resources. Englewood Cliffs, NJ: Prentice-Hall.

Schwab, G.O., R.K. Frevert, K.K. Barnes and T.W. Edminister. 1960. London: John Wiley & Sons.

PARKS AREN'T TO PESTER PEOPLE AND RANGERS AREN'T POLICEMEN

Lhakpa Sherpa*

Origin of the Parks Concept

National parks were first created in 1872 in the United States of America. The idea gradually spread throughout the world. Presently more than 100 countries around the world have a parks system.

Parks and Reserves of Nepal

The Royal Chitwan National Park was established in 1970 as the first national park of Nepal. Over the last two decades, considerable progress has been made in terms of creating more parks and equivalent reserves, strengthening the supporting institutions and training manpower. Nepal now has eight national parks, two conservation areas, three wildlife Reserves and one hunting reserve. This includes the proposed Makalu-Barun National Park and Conservation Area. The total land area managed under these protected area categories is 12,000 sq km, or about 7 percent of the total land area of Nepal.

Functions of National Parks and Reserves

National Parks are created to preserve representative examples of a country's ecosystems in perpetuity for the purpose of conservation and the enjoyment of current and future generations. Some people argue that deriving enjoyment from natural areas is only for people of developed nations and that the Nepali people's concern is not that of nature recreation but where their next meal is to come from. There is a certain amount of truth in this but there is an equal degree of short sightedness in the logic.

We all know that Nepali people love to picnic. Picnic grounds are not to be found in the streets of Kathmandu or Pokhara. People picnic in the remnant open space of Swyambhunath, Balaju Water Gardens or in the Botanical Gardens of Godavari. Daily we also see people sitting in Ratna Park to get

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* Park Planning Specialist, Makalu-Barun Conservation Project

away from the crowded space of Asan Tole. This is an indication that even the poor seek open space and a natural environment for retreat.

The national parks and reserves of Nepal were not created just for wild animals and plants. They were not established to pester people and deprive them of opportunities. The parks and reserve systems of any country have a range of benefits which are real, but not always direct and simple to understand. Efforts must be made to identify and make use of the full range of functions and ensure that the Nepalese people - politicians, bureaucrats, the general public (young and old) and most importantly, the managers (present and future) - understand and appreciate the functions and benefits of the parks and reserves. The following are some of the more obvious functions of parks and reserves:

Conservation Function

Parks and reserves are plant and animal habitats protected from severe human disturbance. Many plant and animal species are intolerant of human impact and do not survive in the man-altered landscape. Human exploitation has a homogenizing effect on biological diversity; i.e. monoculture plantations and cornfields. Thus, parks and reserves are refuges for plants and animals and help maintain genetic diversity. Parks and reserves also conserve natural scenery which is highly valued for recreation by both the local people and tourists.

Symbolic Functions

Many nations around the world have a plant or animals as their national symbol. Examples are: the rhododendron for Nepal, the kangaroo for Australia, the maple leaf for Canada. Similarly, Nepalese rupees of all denominations have wild animals and mountain scenes from our parks. These are symbolic functions of national parks and reserves.

Economic Functions

National parks such as Chitwan, Sagarmatha, Langtang and Annapurna draw thousands of tourists each year. In the process of coming to see our national parks, visitors spend foreign currency on our airlines, hotels and travel and trekking agencies. They buy trekking permits, pay park entrance fees and purchase locally made handicrafts and souvenirs.

Parks and reserves can also be a local source of forest resources for the surrounding communities. Resources include the sustainable harvesting of grass, leaf litter, medicinal plants

and of for use. also create employment opportunities directly through the employment of park staff and workers, and through the travel and tourism sector.

Scientific Functions

Parks and reserves provide sites for research in the natural sciences. Such research can help develop better understanding of our environment and natural processes. The study of tigers and rhinoceros in Royal Chitwan National Park, snow leopards in Dolpo and Red Pandas in Langtang are some examples. Parks and reserves also protect a range of plants and animal species which are potential research subjects for the future.

Educational Functions

National parks are natural laboratories for school children to develop an early understanding and appreciation of nature. While we do not have to make everybody an environmentalist, we must give everybody an elementary understanding of their own environment and it's problems.

Environmental education is highly emphasized in many of our national policy documents, but environmental education within the four walls of the schools have limited effects. Children must be given the opportunity to see, smell and touch for themselves. National parks and reserves provide a place for comparison and demonstration. Parks and reserves provide research opportunities for university students from many parts of the world. They also provide a venue for giving interpretive services to tourist and local residents.

Social Functions

Providing places for natural recreation is one of the primary functions of the parks and reserves system. The recreational benefits provided by Nepal's parks and reserves system extend well beyond the Nepalese society. Every year, thousands of foreign visitors flock to our national parks and natural areas. Nepali people do not take advantage of our parks to the same extent. We tend to think that visiting natural areas is a purely Western activity.

Traditional forms of nature recreation include pilgrimages to religious sites, gardening and large group picnics - these days even these tend to have disco music. Most people view watching movies, television, drinking parties, et cetera, as forms of recreation. This type of entertainment has more of a disturbing and stimulant effect rather than the soothing, rejuvenation benefits that nature recreation brings. Better health usually results from more physical exercise. Nature

must be for both the young and old in our society. The life-styles and environments of people living in large cities are changing as our cities get more crowded and polluted. We are rapidly losing the open space available for young children and teen-agers to play and release their energy. They have nowhere close to home to enjoy the natural environment. Bringing up children in this kind of stuffy and restricted environment contributes to juvenile delinquency and a rising crime rate. Parks and reserves also provide places for the older generation to relax, recuperate and reflect on their lives. As Nepali people become more mobile, educated and increasingly more affluent, recreation pressure will increase.

Parks and Recreation Management

Parks and recreation management needs are not limited to national parks alone. Recreation pressure is high on the lands controlled by the Forest Department. The pressure is even higher on religious sites managed by guthi cooperatives, where thousands of pilgrims flock every day. All land management agencies have a responsibility to provide recreational opportunities for the public to the extent compatible with other land use objectives. Conflicts can occur between different land uses. To manage land resources for multiple use requires well trained managers.

Land managers, such as wardens, district forest controllers and rangers, have to get away from the policemen mentality. Their role is not just to enforce rules. In the past they have been the 'Lord of the Jungle.' This attitude is no longer effective or acceptable, especially in the changing political and social environment. Resource managers have to be responsible stewards of the land; they have to be able to manage their areas for multiple functions. This will require the peoples' partnership and support which can not be obtained by force. It requires good public relations, and managers have to understand the needs and aspirations of the people. This does not mean managers have to be able to provide everything that people demand, but they have to be able to convince, educate and involve the public in choosing the best management options.

Role of the Institute of Forestry

The IOF is the obvious training institution for land managers in Nepal. The Institute is relatively new, but within short period it has made remarkable progress. A training institute should not be concerned only with producing graduates but should also be interested in marketing it's product, which I am sure that the Institute has been making real efforts to do. The forestry sector alone may not be adequate to keep an institute functioning. Unemployed graduates are already becoming a problem. Balancing the demand with the supply of graduates and keeping the enrollment up to keep the Institute functioning will

be a major challenge. (The parks and recreation program of New Zealand has experienced similar problems; partly due to the specialized nature of the program.) The Institute must remain flexible and attuned to the needs of the employing agencies if its graduates are to find employment.

From my limited knowledge of the Institute's course content, it seems to have a strong forestry bias. The National Parks and Wildlife Department currently employees 34 officers and 69 rangers. For the department to make good use of IOF graduates, the graduates have to be exposed to all the functions of parks and recreation.

My recommendations to the Institute of Forestry are:

(1) make the course content broad and general and provide electives in the final year targeting a particular employment sector,

(2) contact existing and potential employers and find out their needs on a regular basis, then adjust the course content to suit the needs of the employing agencies,

(3) explore other potential employment opportunities, such as in the tourism sector to interpret and run 'eco-treks,' city parks, educational institutions, historical and cultural site management agencies and external aid projects,

(4) request clients to sponsor students for training; they can either come from existing qualified staff or young recruits bonded to work with the sponsoring agencies,

(5) courses should be broad and encompassing with a good grounding of basic science and management; the objective should be to create a 'Jack of all Trades' who can work with specialists,

(6) select students who clearly know what they would like to do when they graduate; encourage those with work experience if necessary,

(7) make practical training mandatory if students have no prior work experience in the field,

(8) rename the Institute (to better reflect its larger mandate and purpose), such as: the 'Institute of Forestry and Environmental Management' or the 'Institute of Natural Resources,' and

(9) conduct short refresher courses for junior and senior staff of the Ministry of Forest and Soil Conservation.

The Future

While it is unlikely that there will be many more new National Parks in Nepal, the demand for resources and recreation are certain to grow. This will mean that our managers will need to be adept at ensuring the balance between conservation and use. We will need more skilled managers to work with both visitors and local residents.

The biggest growth in recreational demand can be expected close to our urban areas and at religious sites. Providing skilled land and people managers for Nepal's unique cultural and physical environment provides us with a major challenge. I feel the Institute is the most appropriate organization to take up and meet that challenge in the years to come.

TRENDS IN FORESTRY EDUCATION IN THE ASIA-PACIFIC REGION

Niwat Raungpanit, PhD*

Introduction

Forests are one of the most important renewable resources. Forests performed and still perform the indispensable role of maintaining an ecological balance and a sustained supply of fuelwood, timber and other forest produce.

In the developing world today, millions of people live in or near forests and depend on those forests and trees for essential daily living material and services. They have few affordable substitutes, and their numbers are increasing rapidly while the forest resource base is decreasing.

Many countries in the Asia-Pacific region face common problems relating to their forest lands. Uncontrolled human activities, particularly slash-and-burn agriculture have resulted in the rapid and widespread degradation and disappearance of forest resources. Besides the shortage of wood, the real effects of forest destruction lie in its negative impact on agricultural production by creating intermittent floods and erosion. This adds a permanent burden to the national development programs.

Squatters on forest land have been accepted as a fact of life. The question is how to solve the problem with the least hardship to the people, as well as, allowing minimum destruction of the forest resources.

Changes in the Status of Forestry Education

Significant objectives of forest management will differ from country to country and from period to period within each country; therefore, the curricula must reflect these changing objectives.

* Dean, Faculty of Forestry, Kasetsart University, Bangkok, Thailand.

In many developing countries, changes which will need to be reflected in major changes in curricula are:

(1) the change from forestry based on the exploitation of natural forest to plantation forestry,

(2) the change from the emphasis on the productive role of forests to the protective role of forest (more emphasis on watershed, wildlife and recreation management), and

(3) the change from technical oriented forestry to people oriented forestry or forestry for local community development.

During the past decade, many developing countries have increasingly recognized the importance of forests and trees in helping to raise agricultural productivity, improve rural welfare, alleviate the effects of the energy crisis and preserve the environment.

Now, many forestry institutions in Asia-Pacific region are adjusting curricula to:

(1) give more emphasis to the role of forestry as an integral component of rural development,

(2) contribute to increases in agricultural productivity,

(3) improve rural incomes, and

(4) enhance the quality of life.

All of these changes require new knowledge, skills and reorientation of attitudes on the part of foresters and other forest workers. In other words, if the approach of 'using forestry for the people' is to succeed, a new type of forester is required. Unfortunately the corresponding changes in forestry education and training needed to support this change, have progressed slowly.

Curriculum Development

Curriculum development, in order to incorporate new knowledge needed by foresters to carry out their profession in a complex world characterized by interlocking environmental and socio-economic problems, is extremely important.

Most academic forestry programs, today, do not account for present economic, demographic, political, social, or government policy issues. Most of the forestry curricula tend to isolate foresters from people instead of integrating both into the development process.

New curricula should be multifaceted, with new approaches and linkages to other departments in the university, to job opportunities, to rural development learning and to the experiences of people who work in the field. At the same time, it is essential to identify the needs, the knowledge, skills, and attitudes of such a new type of forester.

To do this, university curricula must be changed. This may mean that social sciences and other related subjects may have to be more integrated into forestry programs. It may also mean that forestry should be taught to social scientists, even those who may not like to work in the forest.

Many existing curricula in the Asia-Pacific region reflect western viewpoints. Besides production and protection, the demands of Asian society also call for forestry practices that address the needs of rural people for tree crops, grasses, single trees or various combinations of trees with other components of the farming system. The demands require new education in which social science cannot be overemphasized. Curricula should integrate the social sciences with technical forestry courses to produce a new social forester who can efficiently operate in the complex socio-biophysical context of a forest and its surrounding society.

Professional foresters, generally, will not be able to design and implement forestry programs that gain the support and meet the needs of rural people unless they understand human behavior in the context of rural development. Therefore, forestry curricula should be adapted to include social sciences in general. At the present stage, integration of social science and forestry can be most effectively done in professional education and eventually can be adapted for technical level as well.

Forestry in Thailand is now increasingly confronted with the effects of raising population pressure. The need for developing new approaches that integrate the productive, protective and social roles of forests and the concept of forestry for local community development are accepted and considered very important.

Therefore, universities in the region should encourage models for curriculum development that create better, more integrated learning opportunities, and research programs, institutions, and countries should work to increase and promote a

the of existing curricula across the region have been observed and described as follows:

(1) In Malaysia, Thailand, and Indonesia, majors in forest management, forest resources, forest products, social forestry and wood science and technology are taught.

(2) In India and the Philippines, electives in social forestry, agroforestry, watershed management, and other forestry subjects are offered in the bachelor program, while specialization is done at the masters level.

(3) Masters degrees with specialization in forestry exist across the region, including those with a focus on agroforestry, social forestry and natural resource development.

(4) Some universities in India provide a PhD degree in agroforestry.

(5) Some universities are stressing more community and social development as well as resource development.

(6) Forestry courses are totally absent from social science programs.

(7) In general social science courses are at a minimum in bachelors level forestry programs.

The social science component in forestry curricula, however, must be based on the interests and needs in each country.

Measures Needed to Achieve Comparability of Forestry Education Standards

In order to achieve comparability of forestry education offered by the different institutions in the region, the following measures are needed:

(1) To organize periodic meetings on curriculum and faculty development.

(2) To compile a comprehensive data bank of existing forestry education curricula, so that the member institutions can compare, improve and monitor future curriculum developments.

(3) Initiating a process of multidisciplinary thinking, enhancing cumulative learning from experience of each institution.

(4) To retain the disciplinary base at the undergraduate level with a post graduate shift to multidisciplinary activity.

(5) Strengthening the network and improving an understanding of the curriculum design process.

(6) Encourage cooperation amcng institution in teaching and research by the sharing of knowledge and methods, teaching materials and teaching philosophies.

(7) Seeking funding support for implementing network activities, encourage more long-term approaches for education and research.

(8) Twining arrangement where appropriate, in order to establish and maintain an academic link for collaboration among institutions in the region on curriculum development, educational exchange, research and scientific meetings.

Forestry Faculty's Research and Development

According to IDRC, the major subjects of research, in the forestry sector in developing countries over the next few years will be:

(1) The contribution of forestry to rural development, including the productive and protective functions of trees and forests, with increased emphasis on research into farming systems that incorporate trees and watershed protection,

(2) The production and use of energy, developing ways of increasing the productivity of trees to generate the maximum biomass and energy yield per unit area in the shortest possible time, and conserving resources by more efficient use of woods,

(3) The conservation and management of tropical forests more effectively with special reference to their regeneration and enrichment, and

(4) The utilization and marketing of timber from secondary species and utilization of woody residues.

We have to admit that our knowledge of silviculture and management of tree species being raised in forestry projects and programs is rather inadequate. Especially, the forests of tomorrow, at least in most of the developing countries, are going

to be the small patches of afforested land - sometimes less than 0.5 ha in area at one place. To fill this gap, the following important items of research work are suggested as priority projects for immediate implementation:

(1) Identification of most suitable indigenous and exotic species for firewood, leaf fodder and for all other needs of the rural communities.

(2) Method and time of seed collection, storage of seed, viability and percent of germination.

(3) Nursery techniques and introduction of mycorrhiza.

(4) Planting techniques with proper spacing and thinning.

(5) Systematic field crop trials with special emphasis on agroforestry/crop/silvo-pastoral combinations.

(6) Improvement of technology for rural cottage industries

(7) Extension methodology to transfer technology from laboratory to the field.

(8) Development of cheaper afforestation techniques.

(9) Studies on the relative availability of cost of alternative fuels in rural areas.

The research on most of the items enumerated above will give us the necessary technical know-how for the successful raising of tomorrow's forest.

In conclusion, the status of forestry education in the Asia-Pacific region has been changing over the last two decades. The forestry curricula of many countries have been slowly adjusted. In the tropical world, the steady deterioration of forest resources is not so much a technical problem as it is an institutional, social and political problem. Concerned authorities and donor agencies must be reminded that development programs must be based on an accurate understanding of rural situations. Therefore, changing the attitudes of practicing foresters through training, research and education, and for the promotion of forestry network and academic linkages, are of primary importance to the forestry profession in the future.

* Curriculum development should be a continuous process.

* It must be based on social needs.

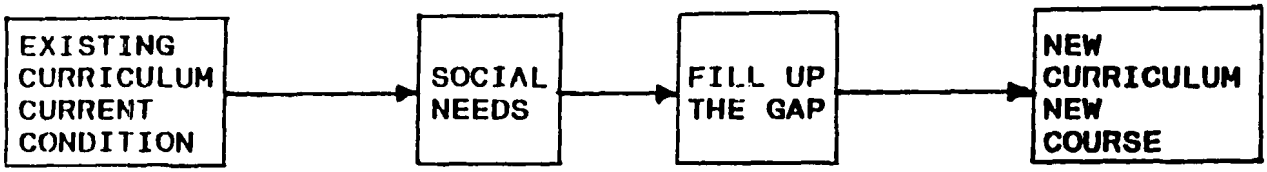
* Educational objectives should be changed according to the social changes and to changes in job requirements.

* A survey of training needs must be made.

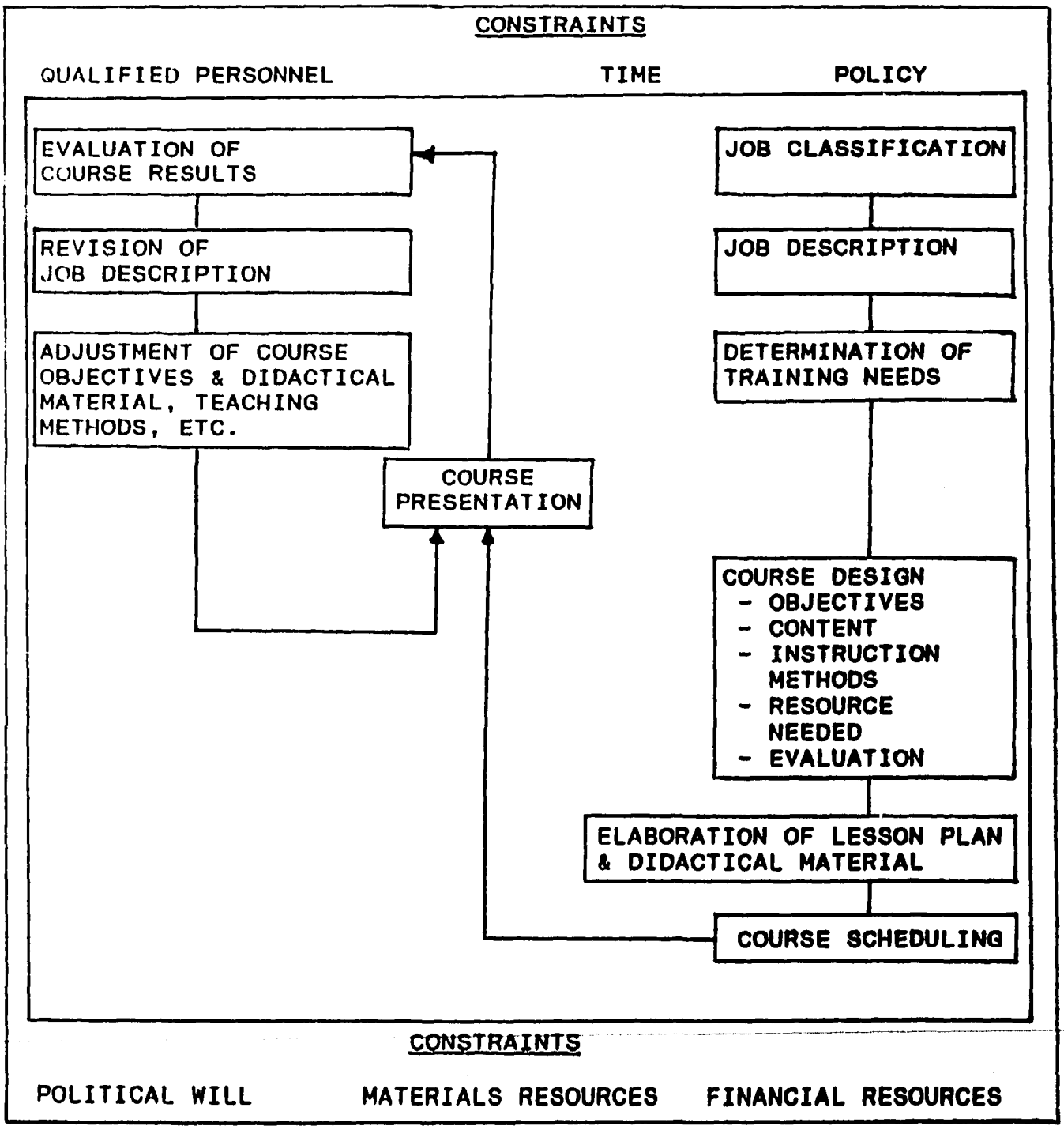
* Specified knowledge and skills required.

* Courses for developing such knowledge and skills.

* The difference between the actual knowledge and skills of the trainee and those necessary for an efficient work performance will become the basis on which training objectives are formulated.



Flow Chart for Consideration in Course Development



Curriculum for the Bachelor of Science in Forestry

Faculty of Forestry, Kasetsart University

1.	General Education	61	credits+
	Science and Mathematics	38	cr.
	Language	9	cr.
	Social Science	6	cr.
	Humanities	6	cr.
	Physical Education	2	cr.
2.	Field of Specialization	86	cr.
	Cores courses	26	cr. + 61 = 87
	Major Courses	60	cr.
	Required	46	cr.
	Selected	14	cr.
3.	Free Elective course	3	cr.

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1 credit = 15 hours lectures or 45 hours practicals
or a combination of both

Degree requirements 150 credits; 2.0 GPA.

FIELD PRACTICE

FOREST RESOURCE MAJOR	6+3 = 9 CREDITS	= 4.5 MONTHS
SOCIAL FORESTRY MAJOR	6+2 = 8 CREDITS	= 4.0 MONTHS
FOREST PRODUCTS MAJOR	6+0 = 6 CREDITS	= 3.0 MONTHS

Table 1. Proposed Curriculum for the Bachelor of Science in Forestry, Faculty of Forestry, Kasetsart University

1986

A List of Courses

(Total Minimum Requirement 150 credits)[1]

1. General Education 61 credits

1.1 Science and Mathematics 38 credits

Chemistry	111	General Chemistry	5 cr.
Chemistry	221	Organic Chemistry	5 cr.
Physics	117	Principles of Physics I	3 cr.
Physics	118	Principles of Physics II	3 cr.
Biology	111	Principles of Biology	3 cr.
Biology	112	Laboratory in Biology	2 cr.
Zoology	113	General Zoology	3 cr.
Botany	114	General Botany	3 cr.
Mathematics	111	Calculus I	4 cr.
Mathematics	112	Calculus II	4 cr.
Statistics	111	Principles of Statistics I	3 cr.

1.2 Language 9 credits.

English		9 cr.

1.3 Social Science 6 credits.

Sociology	111	Introduction to Sociology	3 cr.
Economics	181	Introduction to Economics	3 cr.

1.4 Humanities 6 credits.

Philosophy	102	General Philosophy	3 cr.
Philosophy	121	Introduction to Logic	3 cr.

1.5 Physical Education 2 credits.

Physical Ed.	111	Gen. Phys. Education	1 cr.
Physical Ed.	112	Gen. Phys. Education II	1 cr.

2. Field of Specialization 86 credits.

2.1 Core Courses 26 credits.

Forest Management	111	Intro. to Forestry	2 cr.
Forest Management	221	Field Forest Mens.	1 cr.
Forest Biology	111	Dendrology	2 cr.
Forest Biology	112	Field Dendrology I	1 cr.
Forest Biology	221	Forest Ecology	2 cr.
Forest Biology	222	Field Forest Ecol.	1 cr.
Forest Engineering	111	Tech.Drawing/For.	2 cr.
Forest Engineering	221	Forest Surveying I	3 cr.
Forest Engineering	222	Forest Survey.Pr.	1 cr.

(Table 1, continued-)

Conservation	111	Principles of Nat. Resource Conserv.	2 cr.
Conservation	112	Field Forestry	1 cr.
Forest Products	111	Anatomy & Identification of Wood	3 cr.
Silviculture	111	Silvics	2 cr.
Silviculture	221	Forest Plantation	2 cr.
Silviculture	222	Field Silvicult. I	1 cr.

Social Forestry Major

2.1 Major Courses 60 credits.

2.2.1 Required Major Courses 46 credits.

Social Science			21 cr.
Social Forestry			16 cr.
Other course			9 cr.
Sociology	211	Introduction to Rural Sociology	3 cr.
Sociology	441	Principles of Community Development	3 cr.
Anthropology	221	Introduction to Anthropology	3 cr.
Anthropology	312	Thai Society and Culture	3 cr.
Psychology	111	General Psychology	3 cr.
Business Administration	111	Principles of Management	3 cr.
COOP	111	Intro. to Coop. Science	3 cr.
Soils	111	Introduction to Soil Science	4 cr.
Social Forestry	311	Introduction to Social Forestry	3 cr.
Social Forestry	312	Field Social Forestry I	1 cr.
Social Forestry	313	Field Social Forestry II	1 cr.
Social Forestry	421	Prin. of Agroforestry	2 cr.
Social Forestry	431	Forestry Extension	3 cr.
Social Forestry	441	Economic Analysis of Social Forestry Projects	3 cr.

(Table 1, continued-)

Social Forestry	451	Small-Scale Forest Products Industry	3 cr.
Forest Engineering	331	Gen. Forest Engineering	2 cr.
Forest Management	331	Photogrammetry & Photo-interpretation	3 cr.

2.2.2 Selected Major Courses : Select from the following, not less than 14 credits.

Government	111	Intro. to Pol. Science	3 cr.
Psychology	451	Intro. to Social Psychology	3 cr.
Psychology	473	Human Relations	3 cr.
Marketing	111	Principles of Marketing	3 cr.
Mass Comm.	323	Propagation & Publ. Communication	3 cr.
Mass Comm.	324	Public Relations Techniques	3 cr.
Agric.Ext.	454	Public Speaking	3 cr.
Animal Sci.	111	Principles of Animal Husbandry	3 cr.
Aquacult.	201	General Aquaculture	3 cr.
Food Science Tech.	302	Prin.Plant Product Preservation	3 cr.
Forest Mgt.	414	Forest Law & Administration	3 cr.
Forest Mgt.	461	Publ.Rel. in Nat. Res. Mgmt.	3 cr.
Forest Prod.	321	Forest Products Utilization	2 cr.
Forest Prod.	421	Minor Forest Products	2 cr.
Forest Prod.	475	Tech. Energy Conver.from Wood	3 cr.
Conservation	341	Intro. to Outdoor Recreation	2 cr.
Conservation	451	Range Science	2 cr.
Soc.Forestry	422	Agric.Components of Soc.For.	3 cr.
Soc.Forestry	423	Applied Agroforestry	3 cr.

3. Free Elective Course 3 credits

and Specialized Courses Offered in the Social Forestry Major of the

I. Forestry Core Courses — Credits

Forest Management 111 Introduction to Forestry 2(2-0)
General forestry, history and development of the subject. Aims and objectives of forestry. Forestry and general land use, including the relationships between them.

Forest Management 221 Field Forest Mensuration 1(0-3)
Use of various instruments in the measurement of logs, converted timber and fuelwood; measurement of individual trees and forest stands. Volume measurement of stem and measurement of trees for compilation of volume tables. This course is offered during summer camp.

Forest Biology 111 Dendrology 2(1-3)
Systematic relationships and identification of tree species by leaves, flowers, fruits, twigs, distribution and economic significance of the trees of Thailand.

Forest Biology 112 Field Dendrology 1(0-3)
Major trees species representative of Thailand with practical experience in collecting, identifying, and preserving botanical materials. (Summer camp.)

William R. Burch, Jr., PhD*

I. Scientific forestry is a political science (as are other professions - such as health, engineering, education, theology, etc.)

A. Throughout the world, forestry and other natural resource professions are being challenged to transform themselves (e.g. in Switzerland, the United States and SE Asia). They are discovering their roots of professional action, as:

* art - from quick technical fixes to the art of creative adaptation to changing conditions, from absolute answers to the doubt, ambiguity and expiration of reality,

* authority - from custodial, top down hierarchy to listening and earning legitimacy, and

* accountability - toward clear lines of responsibility to actions rather than bureaucratic diffusion.

Institutions of higher learning are fragile and often endangered ecosystems.

Universities are a complex balance of paradox and resources. Some characteristics are:

* they are to accumulate the wisdom of our species and the nation, yet they must challenge that accumulated wisdom,

* their emphasis upon continuity is essentially conservative yet the production of new knowledge is essentially revolutionary,

* the energy and complete assurance of rightness by youthful students is to be directed and challenged by the caution and doubt of age,

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* Hixon Professor of Natural Resource Management and IOF Project Director, Yale University School of Forestry and Environmental Studies.

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* the sacred morality of a people is to be emphasized though it is to provide an equal secular challenge to such received wisdom, and

* the multiple specialized disciplines operate as minor feudal estates, yet must be united in the wholeness of the life of the mind.

B. Universities and institutes operate a complex system of sustainable production that:

* requires long duration,

* has maintenance costs far exceeding original capital investment, and

* has rapid cycles of the energy of ideas.

They must, furthermore, adapt to client needs and demands yet must remain consistent to job, career patterns of graduates and the necessary universals of responsive knowledge.

We should consider the 'smoke and mirrors' of the Nepal Master Plan for the Forestry Sector 'manpower' needs as an example of the responsiveness and the caution needed by institutions of higher learning. Consider that:

* human resource production is not like that of 'widgets'; you don't just start and stop production to meet the whims of market demands, you can't store a human on the shelf until you need them,

* there is a great 'front loading' and a long period of stagnation in the manpower demand,

* there is little consideration given to long term financial support and maintenance, and

* little attention is given to the salary and other resource needs of the trainers and their institutions.

C. We should consider regional lessons of the consequence of a large number of underemployed, overeducated, youthful elites in Bangladesh, Sri Lanka, India, the Philippines, et cetera.

III. There are new paradigms (although they are old in Asia) emerging for natural resource research, planning, management and education.

A. We should recognize that in Japan, Korea, Singapore, Hong Kong, Thailand and parts of India, industrialization is a universal organizational form. There is no special Asian karma that makes an Indian nuclear bomb somehow different than a Soviet or U.S. device.

B. Science, in its modern form, however, is a Western vision, although even in the West it falters when confronted by quantum mechanics in physics and global ecosystem patterns. To seek new explanations there is a move to more eastern patterns of thought and philosophy:

* from reductionist to holistic metaphors of explanation,

* from mechanistic to organic metaphors of understanding, and

* from metaphors of linear causality to those of relational connection.

C. For we in the natural resources trades, some of the responses are:

* from trees to ecosystem vision; e.g. in the Terai, with its high population growth, the forest is being rearranged from large continuous commercial forests to lines, patches, squares and clumps of multiple-use forest ecosystems,

* from tree to integrated systems that mimic the wisdom of the farmer, with crops-tree-animal systems being the focus of attention; e.g. in Bhutan, the new Natural Resources Training Institute is bringing diploma technicians from agriculture, forestry and animal husbandry together for joint and specialized training; have we made similar considerations in other parts of the world?,

* from specialist vision of environment to a peoples' vision of environment; e.g. in countries such as Costa Rica and Bhutan the environment is being used as a center for education at the primary and secondary school levels to teach pride in nation and literature, history, geography, et cetera; the result will be widespread environmental literacy - without which all our management plans and practices will ultimately fail, and

* and area s will become a larger and larger proportion of natural resource technical and professional activity; nature-based tourism will become another 'crop' that will not be managed in its present haphazard manner by eager entrepreneurs alone, but will become a systematic and sustainable effort like other products from wildland ecosystems with a mixture of professional resource management and economic opportunity; this will mean a more active rather than reactive role by technical and professional persons in the Forestry Department and with graduates from IOF entering the private sector as regularly as they enter government service (in 1988-89, forestry earned a total of $1,958,233 for Nepal, and tourism earned in 1987-88 a total of $64,079,000, a substantial part of which could be assigned to nature/wildland-based activities); clearly the sustainable income opportunities for natural resource technicians and professionals must be partly in the area of nature-based tourism.

Conclusion

The IOF is the future as this conference has made clear. The search for the 'new' forestry, the 'new' resource manager and the 'new' forms of education are uniquely gathered here at this young campus with this young faculty and this young democracy. We are exploring how research, education and public service can become more relevant for the natural resource technicians and professionals in the next century.

* they must be adaptive to the changed conditions in the political economy of the global ecosystem and responsive to the particularities of specific peoples and places; they must find the many varieties of the Nepali way,

* for the institutions of higher learning they must be assured of jobs and careers for their graduates, which means they must listen to the future with one ear and to the employers of the graduates with the other; for a people's most essential and ultimate natural resources are its young men and women - we must not waste such resources; they, like their institutions, are fragile and often endangered systems, and

* there is a need to return to the sacred and secular roots of Asian philosophy to build the new science for here and elsewhere that can grasp the new realities of physics and ecology, without losing the benefits of old style western science.

The opportunities are large. The challenges severe. Never have so few been expected to do so much, in such a short time, with so few resources. We expect this thin green line of youthful conservationists to transcend those who would draw brown lines in the desert sands of Arabia. It is the story of our species - forces of creation pushing uphill against the forces of destruction. This conference is one promissory note on the future triumph of creation. May there be many more such hopes.

BANQUET SPEECH:

REFLECTIONS ON NATURAL RESOURCES

Harka B. Gurung, PhD*

If you are planning for a year - sow rice;
For ten years - plant trees;
For a hundred years - educate people.
- A Chinese Proverb

Natural Resources

The progression of human civilization has been a continuous effort to be free from the shackles of nature. In the past, nature dominated man and his culture. Man's ingenuity with technological tools later enabled him to exploit and control nature. The human occupance of the earth, therefore has been visualized in the following broad sequence :

1. dominance of nature over man,
2. adaptation of man to nature,
3. balance between man and nature,
4. adaptation of nature to man, and
5. dominance of man over nature.

Extreme elevation and steep slopes ordain that in most of the Nepalese landscape, either nature dominates man (sequence 1) or man has to adapt to nature (sequence 2).

It might be appropriate here to deal briefly with the natural resources of Nepal and their utilization. These include soil, mineral, water and forest. Their use and exploitation is determined by the type of terrain. Of the total land surface of Nepal, 27.5 percent exceeds 3,000 m in elevation above sea level, including 5,000 sq km under permanent snow and ice. The remaining 72.5 percent of the land is climatically suitable for tropical, sub-tropical and warm temperate natural vegetation and cultivated crops.

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* Geographer, Consultant and former Government Minister

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Yet, there is another physical constraint - that of gradient or slope. 80 percent of the mountain region, 52 percent of the hill region and 68 percent of the inner Terai region have steep to very steep slope. In other words, 58.8 percent of Nepal's land has a dominant slope exceeding 20 degrees; therefore the compulsion for terrace construction - sloping for dry crops and flat for irrigated crops.

Soil

The varieties of soil in Nepal are derived from different rock formations that are closely juxtaposed due to geological compression. The primary regional types are granite, gneiss and limestone in the mountain, and clastic and carbonate rocks in the middle hills and the Siwaliks bordering the inner Terai. The soils found in Nepal have been grouped into 16 associations according to the dominance of sand, silt or clay within each unit and their geographical provenance.

Soil in the basic land resource for agriculture. There are four sources of data on agricultural land use as follows :

Source	Methodology	Terminology	Area in hectares
1.Ministry of Agriculture (Agricultural Statistics of Nepal)	Estimation	area under crops	2,480,058
2.Central Bureau of Statistics (National Sample Census, Agriculture)	Sample Crop	area under holding	2,463,717
3.LRMP: Land Resource Mapping Project (Economic Report)	Photo-Interpretation	net cultivated land	2,645,886
4.Survey Department (Cadastral Survey)	Triangular Survey	registered land	2,766,297 for 57 districts

It is also necessary to clarify that according to the Land Resource Mapping Project (LRMP), total agricultural land of the country was 3.9 million ha, or 26.8 percent of Nepal's total area. Of this, 2.9 million ha was said to be cultivated, 2.6 million ha net cultivated and about 1 million ha non-cultivated.

Minerals

Nepal includes three major geologic units:

(1) the Sub-Himalayan Siwalik Zone south of the main boundary fault is composed of sedimentary rocks and known minerals are limestone of various grade, gas and lignite,

(2) the Lower Himalayan Zone includes meta-sedimentary and crystalline zones with a showing of both metallic and non-metallic minerals, and

(3) the High Himalaya Zone, north of the main central thrust, is composed of gneiss and Tibetan sedimentary rocks and minerals include lead, zinc, rock salt and gas leakages.

Exposures of metallic minerals in the country include copper, iron, lead, zinc, cobalt, beryl and gold placer. Those in the non-metallic category are limestone, mica, talc, marble, magnesite, graphite, pyrite, dolomite and phosphorite. The known hydro-carbons are lignite, natural gas and numerous thermal springs (tatopani).

Nature place-names associated with mines (khani), mints (taksar) and smelter slag dumps at numerous hill locations indicate extensive mining activity in the past. The old mine workings, mostly of iron and copper, were of shallow depth and relied entirely on hardwood charcoal for smelting. The traditional mines declined due to a combination of three factors - availability of cheaper imports, exhaustion of accessible ore and depletion of charcoal sources due to deforestation. New mining activities include limestone extraction for cement and agro-industrial lime, magnesite, lead and zinc.

Water

Nepal has abundant water resources with a surface drainage network of numerous large and small rivers whose total length exceeds 45,000 km. It is estimated that the three major river systems, the Karnali, Gandaki and Kosi, carry average annual discharges of 4,290 cu m per second. The total hydro-power potential of the country is estimated at about 83 million kw. The estimated technical potential is estimated at 16.6 million kw; the economic potential at 7.4 million kw.

Water resources in Nepal are virtually in a natural state and total withdrawals for all human uses is estimated to be less than one percent of the average annual run-off. Currently, the

total hydropower generation does not exceed 236,000 kw, which is 1.04 percent of the economic potential. Nepal has the lowest level of hydro-power consumption in the SAARC region. Of the total energy consumption, 96 percent is from traditional sources, most of it (72%) in the form of fuelwood.

Fuelwood

Nepal's forests have been classified into 35 types, including 10 tropical/sub-tropical, 11 temperate/alpine broadleafed, 8 temperate/alpine conifer and 6 minor temperate/alpine associations. The wide variety is mainly due to vertical zonation and east-west climatic variation. The LRMP estimates that Nepal has 6.3 million ha designated as forest land. Of this, 34.9 percent is in the the hills, 32.3 percent in the mountains, 23.4 percent in the inner Terai and 9.4 percent in Terai region. About 11 percent of forested land is under shrub. The remaining forest land, 5.4 million ha, has a varying range of crown density. Only 15.3 percent of forest land has a high of crown cover (70%+); 58.6 percent has a medium density crown cover (40-60%), and 26.1 percent is classified low density crown cover (10-40%).

Forest land has been much reduced by clearance for cropland. Forests are also exploited for fuelwood, fodder and timber. According to LRMP estimates, forests supply a total of 14.2 million tons of dry weight product per year. Of this, 40 percent is fuelwood, 39 percent fodder and compost and 21 percent timber. Estimates of forest depletion are 382,000 ha during 1964-1978 (LRMP) and 80,000 ha during 1979-86 (MPFS). Most of the forest area lost was in the tropical Terai plain with high agricultural potential.

Forest Management

Afforestation remains the core activity in the forestry sector. The Master Plan for the Forestry Sector (MPFS) perpetuates this traditional approach. First, the population projected to 2010/2011 AD in the MPFS is on the conservative side. Second, the plan is too sectoral, without any consideration given to land use conflict. For the plan period, 1985/86 to 2010/11 AD, increase in farmland is projected to be only by 2.5 percent. This is a loss of 76,900 ha of forest land in the next 25 years as against 80,000 hectares lost during the seven previous years (1979-86).

Into which occupation sector will the additional population go? Given that longitudinal data show that population engaged in the primary sector was 93.5 percent in 1952/54 increasing to 91.1 percent in 1981, there is no prospect of a significant shift in occupational pattern.

Forest management should take into consideration some broader aspects. The basic causative factors for deforestation in Nepal may be identified as over-population and poverty. The national plan should incorporate three aspects:

(1) land use policy; it would be unrealistic and impossible to try to preserve forests everywhere.

(2) the development of alternative in energy sources to fuelwood.

(3) improvement of the economy; the degree of success in forest management will depend on improvement of the economy; poor people cannot sustain rich forest since they thrive on it; the implication is enhancing income so that households can afford energy alternative to fuelwood.

A Practical Proposition

The workshop has already dealt with parks/recreation and nature-based-tourism/environment in separate sessions. Let me combine the two as a management proposal.

During 1988/89, the total revenue from entrance and camping fees from 10 parks and reserves was NRs 4.6 million. This does not include royalty from developers within the park. Of this revenue, NRs 2.0 million was from Chitwan National Park and NRs 1.4 million was from Sagarmatha National Park. Yet, when the Khumbu trail and bridges were devastated by a glacial dam burst a few years ago, we had to wait for Sir Edmund Hillary to repair them. Since all the park revenues had gone to the central exchequer, there was no investment in developing facilities and cleaning of pollution materials in the area.

Let me extend the theme further. In 1988, the total revenue from tourism user charges was R 15.6 million from the following sources:

Source	NRs	%	Recipient
1. Mountaineering Royalty	4,615,106	29.5	HMG
2. National Park Entrance Fee	4,606,623	29.4	HMG
3. Trek Permit Fees	4,852,680	31.1	HMG
4. Trek Peak Fees	1,548,220	9.9	NMA
TOTAL	15,622,629	100.0	

Of the total charges from tourism, NRs 14.1 million or 90 percent went to the central exchequer (HMG) and the remaining 10 percent went to the Nepal Mountaineering Association (NMA) as fees of the 18 peaks for trekking groups. The same year, 1988, a major decision was made with the initiative of King Mahendra Trust for Nature Conservation (KMTNC) that all trek fees for the area north of Pokhara would go to the Annapurna Conservation Area Project (ACAP). Here is a case of too much pendulum: most tourism revenues to HMG for other areas and all such revenue to the local area for ACAP.

My proposition is the Buddhist Middle Path - i.e. user charges for a particular tourist destination should be split between government and the area of the revenue source. HMG needs the money because it is short of resources and the partial income will be an incentive for promoting tourism and providing basic infrastructure. The destination area needs resources to subsidize kerosene or develop energy alternatives to fuelwood and regular disposal of garbage that will generate local employment. There is also an economic logic. The more crowded a destination, the more environmental pollution problems exist and also the more user fee revenue is available to pay for mitigation.

If my proposition of sharing tourism user charges between HMG and the destination areas had been in place, for 1988 alone HMG would have received NRs 7.8 million and the other half would be distributed as NRs 2.8 million for the Khumbu (Sagarmatha), NRs 2.5 million for Annapurna area (ACAP), NRs 0.9 million for Langtang and NRs 1.6 million for other destinations. Use of this money in the destinations would directly contribute to cleaning and maintaining of the environment as well as generate local employment.

The Great Debate

I will conclude with a poetic debate - not a dialogue - between a conservationist and a technologist. This was composed by Kenneth Boulding and quoted by Sol Tax during the International Symposium on 'Man's Role in Changing the Face of the Earth' held at Chicago in 1955:

A Conservationist's Lament

The world is finite, resources are scarce,
Things are bad and will be worse.
Coal is burned and gas exploded,
Forests cut and soils eroded.
Wells are dry and air's polluted,
Dust is blowing, trees uprooted.
Oil is going, cres depleted,
Drains receive what is excreted.
Land is sinking, seas are rising,
Man is far too enterprising.
Fire will range with Man to fan it,
Soon we'll have a plundered planet.
People breed like fertile rabbits,
People have disgusting habits.

Moral: The evolutionary plan,
went astray by evolving man.

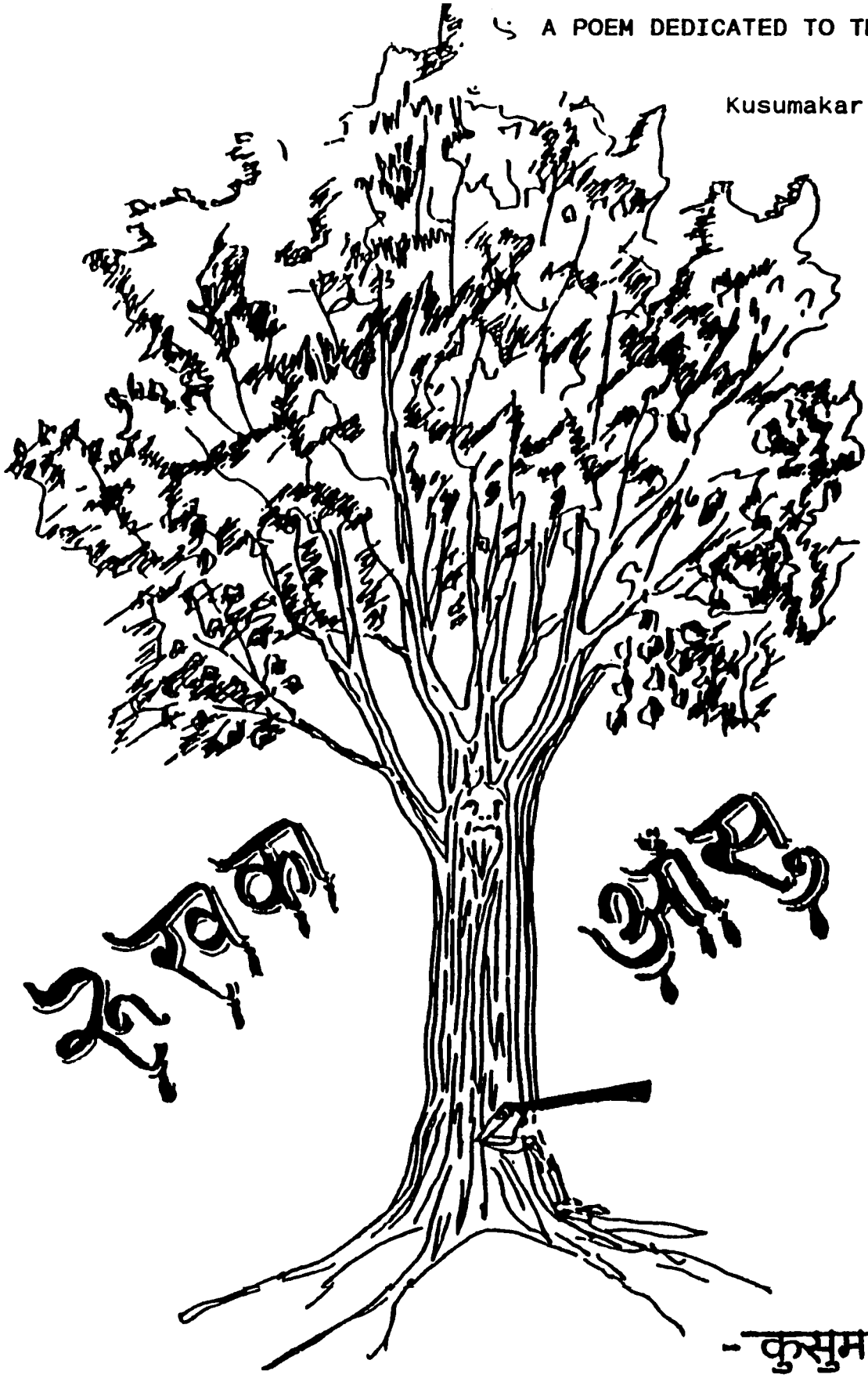
The Technologist's Reply

Man's potential is quite terrific,
You can't go back to the Neolithic.
The cream is there for us to skim it,
Knowledge is power, and the sky's the limit.
Every mouth has hands to fed it,
Food is found when people need it.
All we need is found in granite,
Once we have the man to plan it.
Yeast and algae give us meat,
Soil is almost obsolete.
Men can grow to pastures greener,
Till all the earth is Pasadena.

Moral: Man's a nuisance, Man's a crackpot,
But only Man can hit the jackpot.

A POEM DEDICATED TO THE FOREST

Kusumakar Neupane*



* Assistant Lecturer of Nepali, Institute of Forestry, Nepal.
English translation by B.P. Subedi.

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रूखका आँसु

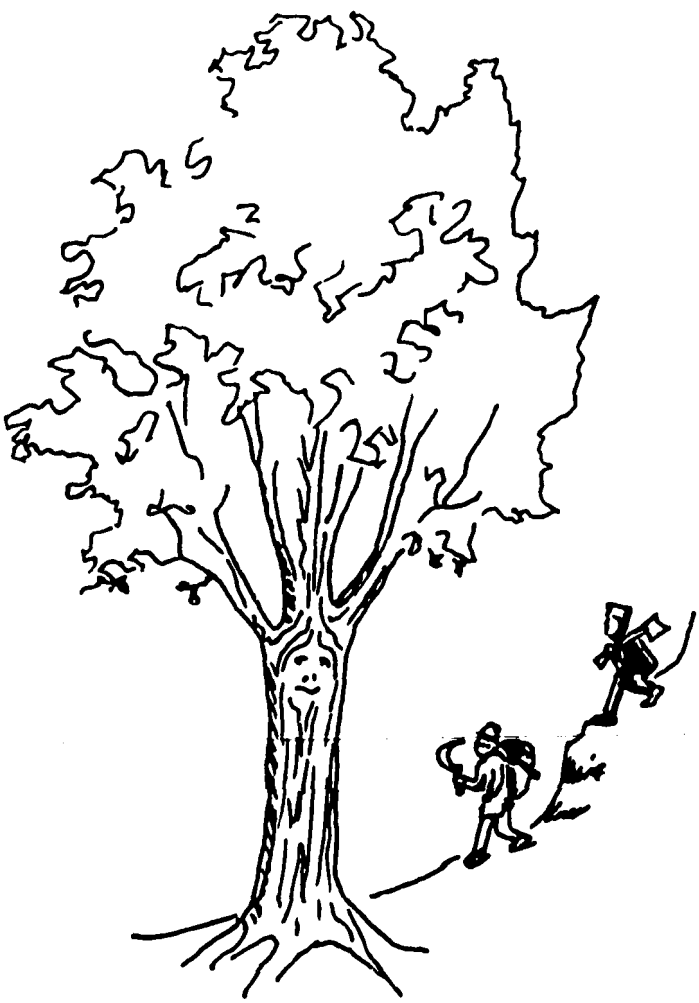
कुसुमाकार न्यौपाने
(सहायक प्राध्यापक)

थोपा १

म एक्लो वनको छेउ, जन्तुले लान सक्दछन्।
सानो छु पौंध काट्नेले निमोठी लान सक्दछन्।।
मौका ती जन्तुले मेरो पात लुक्न रुचाउने।
रिदएमा बस्यो नौनी, हैनन् कोही बचाउने।।

थोपा-२

धौंसको निहुँ पारेर मेरो गर्दन काट्दछ ।
पैसाको मोहमा उसले अर्काको प्राण साट्दछ ।।
भाग्यले ठूलो मै आएँ, अरूको डर हैन वयै ।
मलाई "जड हो" भन्ने मान्छेको भर हैन वयै ।।



थोपा-३

लौ हेर, हेर त्यो पापी, हातमा बन्चरो लिंदै ।
'बेच्छु' भन्दछ यो जिउ, पैसाको मन्त्र सम्झिंदै ।।
को आयो नजिकै? आँसी लिएर, डाली काटन ।
निर्दोषी म ठिंटो रूख, चाहन्न जुनी साटन ।।

थोपा-४

ए मान्छे! तिमीले आजै मेरो प्राण लिने भए ।
मेरो कर्तव्य मन्दैछु, बोल्ने मौका दिने भए ।।
पृथिवीको म पाले हुँ, म झरको उनी हुन्दछिन् ।
डरले पृथिवीमाता पाताललिर पुग्दछिन् ।।

थोपा-५

नटिप्दयौ कलीला पात, फन् आँसु छल्कताउँछन् ।
नकाट मुटुमा मेरो, सिर्जना सल्कताउँछन् ।।
तप्तप् रगतको धारा आँसु चित्कार गर्दछ ।
वन, मान्छे अनि प्राणी सारा संसार मर्दछ ।।

थोपा-६

मान्छेको हितका निम्ति, आगो मै जल्न सक्दछु ।
गर्मी भयो भने, मीठो हावा मै चल्न सक्दछु ।।
मेरो आडमा नकाटे हे, म छायो हुन सक्दछु ।
छाया, माया, दया मागे, म साह्रै रून सक्दछु ।।

थोपा-७

मेरो यो आडमा पन्छी आएर गुँड पर्दछ ।
पातमा पुतली आई फुरफुरुनाच गर्दछ ।।
छाया मुनि खुशिसाथ जन्तुले घाँस चर्दछ ।
अनि म मत्त मै तिम्रो खेतमा फर्नु पर्दछ ।।

थोपा-८

अन्नवाली सपारेर तिम्रो पेट म पाल्दछु ।
रोग, भैला कर्ते आए सौसिट सुख फाल्दछु ।।
नाङ्गो आडमा मए नानी लुगा मै ध्वाप्प ढाक्दछु ।
वास बन्ने मेरो आडमा "सरेराम" म भाक्दछु ।।

थोपा-९

तिमी पुस्तक पानामा वन रुपाण गर्दछौ ।
म सिपालु मनी मेरो चित्रमात्रै बनाउँछौ ।।
नबुझ्नेहरू बुझ्दैनन् बुझ्नेको चाल मात्र छ ।
छोटा, छोटा हुँदै जान्छन् , बढ्नेको कालमात्र छ

थोपा-१०

म रून्छु, पृथिवी रून्छन्, रून्छ आकाश थर्थर्।
चिसो हावा गयो टाढाबाटो मात्र छ हर्हर्।।
ताती रगतको भैल, पानी पानी भइसक्यो ।
हरेराम! हरेराम! मेरो प्राण गइसक्यो ।।

'The Tears of a Tree'

First Drop

While I, being alone in the forest,
can be eaten by animals;
Being small one,
can be cut by grass cutters.
But there is hardly any one to disclose
the intrinsic worth of my life.

Second Drop

Fortunately, now I have grown.
But I am still not free from the eyes of greedy men,
and they destroy me.

Third Drop

Therefore, man is coming with axe and sickle
to finish my life for the purpose of making money.

Fourth Drop

If you have decided to take my life,
first listen to me please.
I want to tell my obligation.
The earth cannot survive without her guard,
and she will become a desert in my absence.

Fifth Drop

When you snatch off my parts,
I will be weeping alone.
But when you destroy my whole body,
my tears with blood will kill all the creation
of the world, including animals, forest and you,
yourself.

Sixth Drop

I contribute much for the benefit of humans.
I can be used as a fire
I can be blown as a wind.
I can provide shade in the hot sun.
But, if you become cruel,
I can provide nothing but tears.

Seventh Drop

I give shelter to birds,
a dancing place for butterflies,
food and shelter for animals.
And I serve you by providing compost
to produce more food crops.

Eighth Drop

I promise you, growing as a crop
I quench your hunger.
Being a medicine,
I cure your illness.
Being a cloth,
I protect you from cold.
Believe me, I can be a house to live in.

Ninth Drop

Wise man,
you praise and protect me only on pages in books.
But all others who would understand me,
are still unaware of my value.
There is none to protect my little seedlings,
but many to cut and destroy the larger ones.

Tenth Drop

I weep now,
and the earth weeps with my tears,
and in the scarcity of water the sky weeps too.
If it continues,
this beautiful world will be converted into ash of fire.
Despite my every endeavor,
man does not fully comprehend,
and, Alas!, takes my life.

DISCUSSION GROUP SUMMARIES

(Ed.Note: Following each topical session, participants joined pre-assigned Discussion Groups. There were four groups: A & B - Proficiency Certificate Level, C & D - BSc Diploma level. The following Summaries are from those discussions. The Workshop Recommendations based on them are given on pp.3-4.)

INSTRUCTIONS FOR DISCUSSION GROUP INITIATORS

1. Each discussion group should quickly elect a group leader and a recorder.

The Recorder will work with the large flip charts provided each group to record major points and ideas discussed. This is a job of writing a word or two to capture a concept, not to transcribe an entire discussion. After a piece of paper is filled in, it is taped on the wall so that everyone can see how the discussions are progressing.

The Group Leader will keep the discussion going and is responsible for involving all group members in the discussion.

The Recorder and the Group Leader are responsible for preparing concise summaries of their group's deliberations for the reporting sessions (plenary session) on Day 3. The Group Leader will give the report.

2. Discussion Groups should strictly focus their attention on curriculum development for the IOF and the needs of our graduates. Relating to the topic being discussed, they should define the skills, concepts, methods and knowledge that the IOF graduate should possess to do the job in the field.

For each skill, method, concept or knowledge listed, the group should give a specific example or reason why it is needed.

Work for specifics not generalizations. (For example, don't tell us that the graduate should understand surveying, but rather that he or she should have a specific surveying skill or concept and why... One specific might be that the graduate should have the skill to do sketch maps - a part of surveying - and then give the reason why that skill is necessary.)

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3. Be sure the group sticks to the assigned level of education. Two groups are discussing Ranger (Certificate) level and two groups are discussing the BSc level.

4. At the end of each session, have the group prioritize the top most important skills and concepts.

GROUP A: PROFICIENCY CERTIFICATE LEVEL

Employees of Certificate Holders:

Dept. of Forests (DOF)
Dept. of Soil Conservation & Watershed Management (DSCWM)
Dept. of National Parks & Wildlife Conservation (DNPWC)
Dept. of Forest and Plant Research (DFPR)

Other: Non-Governmental Organizations (NGOs)
Projects
Private Sector

Skills Needed

Administrative/Managerial & Government Procedures
Technical
Social
Policy/Planning

The Role of the MFSC Training Division and the IOF

MFSC: Pre- and In-Service Training Should Cover:

* Administrative Arrangements for Departments (procedures, rules, regulations)

* Administrative Arrangements Relevant to NGOs, etc.

* Orientation in Service

* Government Policy

IOF Training Should Cover:

* Technical Skills
* Social Skills
* Policy/Planning Procedures

The Technical Skills Include:
(For DOF)

Nursery Management
Plantation Management
National Forest Management
Harvesting
Natural/Economic/Social Hazards
Monitoring
Construction - Buildings, Roads, Demarcation
Protection
Surveying/Engineering
Mensuration
Computing

(For the Dept. of Soil Conservation & Watershed Management)

Survey/Design/Establishment & Implementation of Soil Conservation Works - for example:

Gully Control
Landslide, Erosion Control
Stream Bank Stabilization
Environmental Studies (Impact Assessments, or EIAs)
Bioengineering Methods

(For the Dept of National Parks and Wildlife Conservation)

Technical Communication Skills - for example:

Slide Projection	Exhibits
Photography	Landscape Designs

Social Skills

Knowledge of people in society (Applied Anthropology)

Extension (2-way communication)
Building Rapport
Collecting Information
Identification of Interest and User Groups
Arranging Meetings/Forming Committees
Negotiating
Conflict Resolution
Teaching/Training

Curriculum Statement

Objectives should be stated as Educational Outcomes:

For example, in Community Forestry students should be able to:

* explain the government's policy of handing over forests for management by user groups,

* go to a village, identify the user groups for a particular patch of forest,

* carry out a rapid assessment of the area and conditions of the forest, and record the results, and

* facilitate the development of an Operational Plan by the user group.

Other Issues

* Education in a Changing Environment

* Emphasis on Problem Solving

* Integration of Technical and Social Components

* Training Should be Built Around Field Experience and Field Practice

* Need for Exchange Between Faculty and Field Practitioners:

  Faculty Internships in the Districts
  Visiting DFOs at the Institute
  Special Training Courses

* Teaching Medium Should be English

* Certificate Course should be 3-Years Duration, with First Year of General Science

* Flexible Approach to Curriculum because of Uncertain Future

* Curriculum Committee Should be On-Going

* Teaching Materials should be Improved

* * * * *

General Observations on Certificate Level Education

* Rangers are field implementers, their education must be job oriented.

* Students must do (practice) the various techniques that they will performing in their activities on the job.

Means of Increasing the Practical Training Component of the Student's Educational Experience

* Develop field practice sites on or near campus.

* Increase the frequency of short tours to project sites near campus to allow the students to work on various activities.

* Conduct study tours to observe the effect of a particular management practice or activity over time.

* Arrange for student internships at project sites.

* Provide opportunities for faculty to go to district forest offices to work with and observe the activities of that office.

* Bring field foresters to the Institute to teach specific courses in which they have an expertise.

Skill and Concept Areas that Need Strengthening in the Certificate Program

Technical:

mensuration
basic forest surveying
equipment maintenance
map making and reading
wood conservation and utilization
soil science
wildlife management

Managerial

monitoring
reporting
planning (targets)
scheduling work
finance
evaluation

Social

communications
formal and informal surveys
group dynamics
leading discussions
village protocol
office protocol
rapid appraisal methods
conflict resolution
negotiating

General

de-emphasize English speaking, emphasize English writing

de-emphasize Nepali literature, emphasize Nepali communications (speech)

add a third year to the Certificate program in order to give students a basic science background

Specific Course Change Recommendations

1. Include accounts in the Law and Administration course

2. Change Timber Utilization to Forest Utilization

3. Reduce the marks on First Aid from 50 to 25 marks

4. Add survival skills to Physical Education.

5. Add a course in community forestry that would include
   writing of management plans
   demarcation
   inventory
   implementation of community forestry guidelines

6. Change Harvesting and Logging to Forest Operations and add Work Practice to this course (100 marks)

7. Eliminate Forest Engineering.

8. Change Agriculture and Rural Sociology to Agroforestry

9. Add a course in Forest Soils.

10. Redefine the Soil and Water Conservation course based on the recommendations of K.M. Shakya's paper

11. Change Introduction to Biology and Plant Identification to Forest Biology

12. Change Renewable Natural Resource Conservation to Forest Management (RNR) which will include nursery techniques as well as plantation techniques

13. Increase the marks on Silviculture from 50 to 75

14. Change Introduction to Extension Work in RNR to Community Forestry and Extension Techniques

15. Change mathematics and calculation to Forest Mensuration

16. Formulate a Task Force to oversee ongoing curriculum needs

* * * * *

Technical Components:

Knowledge/Concepts

* Farming Systems Components and Dynamics, Soil Fertility Maintenance.

* Agroforestry Definitions, Scope Systems, Local Systems, Farm Forestry - Specific Trees Maintenance. Fodder/Fuelwood trees.

* Forest/Tree Utilization: Minor forest produce used in Rural Economy their collection, Utilization and Protection, e.g. Lokta, Bamboo; Wood energy concepts of efficiency, alternate appropriate, adoptable technologies.

* Resource Management: Inter-relationships of man-environment, farmer-forests, Biodiversity, Conservation Philosophy, Recreation in nature.

* Electives in Ornithology, Geology, Dendrology and other special subjects for special job opportunities in Nature Tourism, Social Forestry, Research etc.

* Range Management Definitions, Grazing Resources of Nepal, Development of Rangeland, Grazing animals, Effects and Management Methods, Shifting Cultivation (SWIDDEN), Agroecosystem Concept, High Altitude Fodder Trees/Grasses and Management, Trans-Himalayan Plantation Technology.

* Soil/Water Conservation: Erosion Processes, Types, Applications, Universal Soil Loss Theory and Up-to-Date Field Application, Extent of Soil Erosion in Nepal and Effects on Ecology/Socio-economy, Soil Conservation Methods both Biological and Mechanical Details/Types.

* NOTE: the aforesaid deserve special attention in addition to other core concepts already being taught at BSc.

Skill/Methods

* Research Skills, Statistics, Experimental design, Sampling, Regression Analysis

* Mapping, Map Interpretation, Erosion Hazard Mapping Land-Use Mapping, Watershed Data Collection Methods

* Environmental Impact Analysis Methods

* Soil Conservation Methods by Agronomic, Agrostological, Silvicultural, Farming/Cropping, Terracing, Mechanical Methods

* Identification/Interpretation of Trees, Birds, Rocks, Nature

Human/Social Components in Diploma Training

Knowledge/Concepts

* Social Forestry Definitions, History, Types, including Community Forestry Definition and Development in Nepal. Lessons, problems in Community Forestry, participatory management and 'Social Forestry'

* Sociology Theory of Group Dynamics in Village Organizations, Social Adoptability of Technology, Social Process of Innovation/Adaptation, Principles of Participatory Approach, Problems Scope of Women's Participation in Forestry, Indigenous Knowledge Systems

* Communications: Concepts/Principles, Tools/Types, Extension Principles, Social Sensitivities, Social Perceptions Relating to Communications.

Skills/Methods

* Communications Skills: Communicating with villagers, being sensitive to local Protocol, Dialects, Sensitivities, Professional Communication in Nepali/English to Subordinates, Peers and Superiors by Writing-one-to-one, one-to-group, promoting Learning, Listening Skills, Nature Interpretation, Audio-visuals, Conservation Education

* Social Skills: Conflict Resolution at village level multi-disciplinary Levels, Consensus Building, Promoting Participatory Approach in management, Research, Identification, Motivation/Management of User Groups, Process of Joint Decision Making

* Research Skills: RRA, "RAPPORT" Methods, Social Research Plan Preparation

Managerial Components in Diploma Level Training

Knowledge/Concepts

* Forest Law/Administration/Policy/Current History. Organizational Politics of Ministry/NGO's/Forestry Institutions. Principles of Accomplishing Goals through Institution Rules/Regulations relating to Forests/ Environment

Skills/Methods

* Monitoring/Evaluation of Personal/Professional Goals. Staff Management Work Planning

* Technical Writing Skills in English, Nepali, Local Dialects to communication with both Rural people and Professionals

* Computer use especially for Natural Science/Social Science/Management Research/Planning. Problem Solving, Multi-disciplinary Thinking, Analysis through Project Work, Group Work, Workshops

* * * * *

General Observation on BSc level Education

* Students entering the BSc course from the certificate stream need more natural sciences.

* Students entering the BSc course from the BSc stream need more social sciences.

* All training needs to focus more on practical skills.

* Training should be designed to meet the needs of the employers/users.

* Training must meet the requirements of T.U. and CTEVT.

* Educate to meet the basic needs of forest products, protect the land, conserve ecosystems and contribute toward economic growth.

* Graduates should be equipped with the proper knowledge, skills, attitude and capability for increased efficiency and performance.

* Graduates should be prepared to act as organizers, motivators, advisors, trainers, extensionists, facilitators and managers.

* The standard of education should be such that it is recognized by other forestry training institutions.

Major Areas of Emphasis in the BSc Program

* Natural resource management (forest, watershed, wildlife)

* Natural resource assessment

* Soil and water conservation

* Forestry extension

* Parks management and nature conservation

* Research

and Areas Needed in the BSc Program

Natural Resource Management

* Technical skills/concepts
    - resource assessment
    - computer skills
    - graphic illustration
    - rapid rural assessment
    - dendrology
    - general ecology
    - systems studies
    - biometrics
    - tree improvement
    - nursery work
    - management
    - plan preparation
    - shrub management

* Management/Administrative Skills
    - program budgeting
    - planning/implementation
    - monitoring/evaluation skills
    - land ownership and tenure issues
    - transfer skills (legislative)
    - inter-department coordination

* Social Skills
    - group planning
    - participatory approach
    - communications
    - feedback skills

Natural Resource Assessment

* Technical Skills
    - surveying with field exercises in:
        - plane table, compass, chain, theadolite
        - leveling, air photo interpretation
    - topographic mapping and interpretation
    - sampling techniques
    - yield and volume estimation
    - data analysis
    - volume estimation

* Management/Administrative Skills
    - organization of survey and mapping work
    - establishing team work
    - providing leadership skills
    - supervision and control
    - budgeting
    - report writing
    - environmental impact assessment
    - reporting

* Social Skills
    - demand assessment of forest products by user types
    - socio-economic status assessment
    - ethnographic studies

Soil and

* Technical Skills
    identification of degraded spots, causes and mapping
    understanding geology and soils
    soil erosion
    identification of different types of soil degradation
    design and construction of check dams
    other soil conservation structures

* Management/Administrative and Social Skills
    group working skills with other agencies and farmers
    designing co-operatives, agronomic, agroforestry, and other bio-social techniques to conserve soils.
    development and implementation of conservation education programs

Forestry Extension

* Technical Management/Administrative and Social Skills
    drawing up an extension program
    determining priorities
    motivating indigenous and exogenous resources
    implementing extension programs
    evaluation and monitoring
    preparation of extension manuals
    use of audio-visual and print extension methods
    extending the model package to other areas
    receiving guidance, feedback
    extension experience, on the job training and learning

Nature Conservation and Park Management

* Technical Skills
    communication skills (learning)
    habitat evaluation
    carrying capacity assessment
    ecosystem analysis and management
    animal population management (wild and domestic)
    writing and implementing resource management plans
    preventing ecological and environmental problems
    tourist management and regulation

* Management/Administrative Skills
    establishing a public relations program
    resource sharing techniques

* Social Skills
    group working skills
    feedback skills

Research

* Technical
    identification of proper research problems
    designing appropriate research plans
    writing research papers
    research information dissemination
    data analysis
    computer techniques
    interpretation and application of research results

* Management/Administrative Skills
    data collection and management techniques
    implementing research works as per the research design
    research supervision
    co-operation in research works

ANNEXES

A - THE INSTITUTE OF FORESTRY

B - WORKSHOP PROGRAM

C - LIST OF PARTICIPANTS

D - CURRENT IOF COURSE LIST

E - ACRONYMS & ABBREVIATIONS

ANNEX-A: THE INSTITUTE OF FORESTRY

History

The Institute of Forestry (IOF) is Nepal's only institution for advanced training in forestry and natural resources management. It is one of five technical institutes in the Tribhuvan University system. The IOF produces virtually all rangers and foresters for government and private sector work. Under the new Forestry Master Plan (1989) the IOF is expected to increase the number of graduates and update curriculum and research to best address Nepal's orientation to Community Forestry.

Facilities

There are two campuses, one each at Pokhara (in the Western Development Region) and at Hetauda (in the Central Development Region). Training was first conducted in Kathmandu in 1947. The Hetauda Campus was opened in 1956 and was called the Nepal Forestry Institute (in the Ministry of Forests). It joined Tribhuvan University as the Institute of Forestry (IOF) in 1972. The central Pokhara Campus was opened in 1986. In addition, the IOF maintains several research forests and conducts research and training at a social forestry demonstration site. The IOF is administered from Pokhara by a Dean and three Assistant Deans. The Current Dean is I.C. Dutta, PhD.

Faculty

There are 61 faculty (Pokhara 39, Hetauda 22), some of whom are away on deputation or for advanced training. Faculty degrees include: 21 BSc, 39 MSc and 1 PhD. Faculty ranks include Deputy Instructor, Instructor, Assistant Lecturer, Lecturer and Readers. There are currently no Professors. There are six Instruction Committees:

* Basic Sciences & Humanities
* Forest Biology & Silviculture
* Forest Management
* Forest Utilization & Engineering
* Soil Conservation & Watershed Management
* Wildlife Management

The IOF hosts the USAID-funded IOF Project (see below), a Visiting Scholar Program (funded by ITTO), several American Peace Corps Volunteers and occasional international researchers.

Degree Programs and Students

The IOF offers two degrees:

(1) Certificate, or PCL (Proficiency Certificate Level), and

(2) Diploma, or BSc (Bachelor of Science).

The PCL is awarded after completion of a 2-year Ranger Program (both campuses). This program accepts students who have passed their School Leaving Certificate (SLC, after Class Ten) with a score above 50%. There are currently 225 PCL students enrolled at each campus. The total is 450.

The 3-year BSc Program is offered at Pokhara. Seventy-five percent of the students come with at least one year of government service and the PCL. Twenty-five percent come with BSc Basic Science degrees. At the IOF they major in Forestry (the majority), Wildlife or Soil Conservation. Third year BSc students prepare a Senior Thesis based on original research with faculty supervision. Currently there are 110 BSc students enrolled. Forty graduate per year.

Certificate and degree study is conducted on campus in classrooms and laboratories, and in the field in research forests, at demonstration sites and on projects. Ten percent of the student seats are reserved for females, five percent for remote areas students and two percent for Tharu ethnic students.

Graduate Employment

Most PCL and BSc graduates enter Nepal government service in the Departments of Forests, Soil Conservation and Watershed Management, Wildlife and National Parks, or the Nepal Timber Corporation. PCL holders join as rangers or community forestry assistants (CFAs), posted throughout the 75 districts of Nepal. BSc graduates enter as forest officers in district level forest offices, or join central divisional offices (e.g., Research, Training, Community Forestry). Some join donor agency or NGO project staff, or the private sector, or work as naturalists in the tourism sector.

Curriculum Development and Research

A primary goal of the IOF is to become a 'Center of Excellence' in community forestry research and training. Nepal is well known as an international leader in forestry development

involving user groups for resource management at the local level. The Forestry Master Plan projects forty-six percent expenditure and activitity devoted to community forestry implementation nation wide. This mandate redefines the traditional role of the forester from a protector and manager to technical assistant to communities and users.

The IOF's training and research activities are beginning to reflect this significant redirection in forestry. Traditional forestry remains the backbone of the IOF mandate, but stronger links between the biophysical and social sciences are now emphasized, especially in social forestry, forest planning and management, human resource management, silviculture, ecology and other subjects. New curricula are being designed to more fully emphasize community forestry training and research.

Memoranda of Understanding (MOUs), grants and contracts for support to training and research have been initiated with several regional and international organizations. The IOF Project assists in facilitating institutional linkages.

The IOF Project

Since the early 1980s, USAID has assisted in the professional development of the IOF. To manage this relationship, a small 5-year project was begun in 1989 with Yale University School of Forestry and Environmental Studies (Yale F&ES) as prime contractor, and International Resources Group, Ltd. (IRG) as sub-contractor. There are two advisers: Chief of Party (Dr. Miahcel A. Rechlin, PhD, a forester) and Social Forestry/Research Adviser (Dr. Donals A. Messerschmidt, PhD, an anthropologist).

The IOF Project shares the Institute's goals and aspirations, and works closely with the administration, faculty, staff and students at both campuses to achieve them. The project provides long-term professional international training for faculty (MSc and PhD levels) and short-term national and regional training for faculty and staff. Advisers assist in curriculum development, library improvement, research skills and other professional skills enhancement and the cultivation of professional links with national and international colleagues and organizations.

NATIONAL FORESTRY CURRICULUM DEVELOPMENT WORKSHOP

Institute of Forestry

Pokhara, Nepal

November 29-30 and December 1, 1990

PROGRAM

* November 29

9:00-10:30	REGISTRATION	
10:30-11:30	OPENING SESSION	
	Welcoming Address	Dr. I.C. Dutta, Dean Institute of Forestry
	Conference Objectives	Dr. Mike Rechlin Sr. Adviser, IOF Project
11:30-12:15	KEYNOTE ADDRESS:	
	Historical Development of the Institute of Forestry	
		Mr. B.P. Kayastha Additional Secretary, Ministry of Forests & Soil Conservation
12:15-14:00	LUNCH	
14:00-17:00	SESSION #1: CURRICULUM RESEARCH AT THE IOF	
	Policy Interviews	Mr. C. Upadhyaya, for the IOF Curriculum Task Force
	Survey of Graduates	Mr. S.P. Lakhe and Mr. C.L. Das, for the IOF Curriculum Task Force

- Break-Out Group Discussions -

8:30-11:00 SESSION #2: FORESTRY EDUCATION

Reviewing the Curriculum from the Departmental Angle

Mr. M. Haque
Forestry Adviser,
Ministry of Forests &
Soil Conservation

Community Forestry Development in Nepal

Mr. Tara N. Bhattarai
Chief, Monitoring &
Evaluation Division,
Ministry of Forests &
Soil Conservation

- Break-Out Group Discussions -

11:30-12:30 SESSION #3: GENERAL EDUCATION

Science Education and the CTEVT Program

Dr. S.R. Sharma
Director, Council for
Technical Education &
Vocational Training,
Ministry of Education

Humanities, Social Science and Communications

Dr. Ramawatar Yadav
Director, Curriculum
Development Center,
Tribhuvan University

12:30-13:30 LUNCH

- Break-Out Group Discussion -

15:00-17:00 SESSION #4: ENVIRONMENT

Nature Tourism and Environment

Mr. Ram Pradhan
Journalist,
RSS News Service

Dr. Keshab Man Shakya
Director, Bagmati Watershed Management Project, Department of Soil Conservation & Watershed Management

Parks Aren't to Pester People and Rangers Aren't Policemen

Mr. Lhakpa Sherpa
Park Planning Specialist, Makalu-Barun Conservation Project, Woodlands Mountain Institute

- Break-Out Group Discussions -

18:30-20:00 CONFERENCE BANQUET (Tragopan Hotel, Pokhara)

Poem Dedicated to the Forest: Tears of a Tree

Mr. Kusumakar Neupane
Institute of Forestry

Banquet Address: Reflections on Natural Resources

Dr. Harka B. Gurung
Geographer, Consultant and Former Government Minister

* December 1

9:00-11:00 REPORTS OF THE DISCUSSION GROUPS

11:00-11:30 TEA BREAK

11:30-12:30 FORMULATION OF WORKSHOP RECOMMENDATIONS

12:30-13:30 CLOSING SESSION

Trends in Forestry Education in the Asia-Pacific Region

Dr. Niwat Raungpanit
Dean, Faculty of Forestry, Kasetsart University, Bangkok, Thailand

Dr. William R. Burch, Jr.
IOF Project Director, and
Hixon Professor of Social
Forestry, Yale University
School of Forestry &
Environmental Studies

ANNEX-C: LIST OF WORKSHOP PARTICIPANTS

No.	Name	Organization	Address
1.	Adhikari, S.	IOF faculty	Hetauda campus
2.	Aryal, U.	IOF student	Pokhara campus
3.	Awasthi, K.	IOF faculty	Pokhara campus
4.	Baidya, B.G.	Rapti Development Project & New ERA	P.O. Box 2888 Kathmandu
5.	Balla, M.K.	IOF faculty	Pokhara campus
6.	Barger, B.	American Peace Corps Volunteer	Kusma, Parbat District
7.	Bendz, M.	Chief Technical Advisor, Community Forestry Development Project	Kathmandu
8.	Bhandari, I.M.	IOF student	Pokhara campus
9.	Bhatta, D.D.	Terai Community Forestry Development Project	Hetauda
10.	Bhatta, B.R.	International Center for Integrated Mountain Development (ICIMOD)	Kathmandu
11.	Bhattarai, T.N.	Ministry of Forestry & Soil Conservation	Kathmandu
12.	Burch, W.	Yale University, School of Forestry & Environmental Studies	New Haven, Connecticut, USA
13.	Calnan, R.	Associate Director, American Peace Corps	Kathmandu
14.	Chitrakar, K.	Director, Community Forestry Development Division	Kathmandu
15.	Choudhary, S.	IOF faculty	Hetauda campus
16.	Das, A.K.	IOF faculty	Pokhara campus
17.	Das, C.L.	IOF faculty	Hetauda campus
18.	Dhungel, S.K.	District Forest Officer	Makwanpur
19.	Dutta, I.C.	Dean, IOF	Pokhara campus
20.	Evans, P.T.	Associate Professional Officer, Terai Community Forestry Development Project	Hetauda
21.	Fisher, K.	Rural Development Center	Pokhara

23.	Gilmour, D.A.	Team leader, Nepal Australia Forestry Project	Kathmandu
24.	Haque, M.S.	IOF faculty	Hetauda campus
25.	Haque, M.	Forestry Advisor	MOFSC, Kathmandu
26.	Hill, D.	Fulbright Scholar, U.S. Education Foundation	c/o IOF, Pokhara
27.	Indu, I.P.	IOF faculty	Pokhara campus
28.	Jain, N.	Researcher	c/o Annapurna Conservation Area Project, Ghandruk, Kaski District
29.	Joshi, M.D.	Regional Watershed Project	Kathmandu
30.	Joshi, A.L.	District Forest Officer	Sindhu Palchok
31.	Joshi, R.	IOF student	Pokhara campus
32.	Joshi, S.B.	IOF faculty	Pokhara campus
33.	Kannenberg, U.	German Volunteer Service	Kathmandu
34.	Karki, N.B.	National News Agency (RSS)	Pokhara
35.	Karki, M.	IOF faculty	Pokhara
36.	Kayastha, B.P.	Additional Secretary	MOFSC, Kathmandu
37.	Lakhey, S.P.	IOF faculty	Hetauda campus
38.	Leisure, B.	American Peace Corps Volunteer, IOF	Pokhara campus
39.	Lowenstein, L.	World Bank	Washington, DC
40.	Lyytikainen, K.	Forestry Sector Institutional Strengthening Program, Component #2	Training Division MOFSC, Kathmandu
41.	Mallik, A.k.	IOF faculty	Pokhara campus
42.	Mathema, G.R.B.	Training Division	MOFSC, Kathmandu
43.	Mathur, R.B.	IOF faculty (retired)	Patna, India
44.	Mehta, J.N.	IOF faculty	Pokhara campus
45.	Messerschmidt, D.	IOFP Advisor	Pokhara
46.	Mierow, D.	Annapurna Conservation Area Project Museum, Prithvi Narayan Campus	Pokhara
47.	Mishra, S.C.	Advisor, Tribhuvan University	Kathmandu
48.	Morrison, R.B.	Anthropologist, Social Science Division	P.O. Box 10,000 Athabasca University Athabasca, Alberta, Canada

50.	Neupane, S.S.	Ranger, Nepal Australia Forestry Project	Sindhupalchok
51.	Pandey, B.R.	MOFSC	Kathmandu
52.	Paudyal, D.	IOF student	Pokhara campus
53.	Philips, M.	Team Leader, Forest Research Project-2	Kathmandu
54.	Pierce, T.	Supervising Project Officer, Agriculture & Rural Development Division, USAID/N	Kathmandu
55.	Pokharel, R.K.	IOF faculty	Pokhara campus
56.	Pokharel, P.	Ranger, Nepal Australia Forestry Project	Kabhre Palanchowk
57.	Poudyal, G.	IOF student	Pokhara campus
58.	Poudyal, K.C.	Lumle Agriculture Center	Kaski District
59.	Poudyal, R.P.	IOF student	Pokhara campus
60.	Pradhan, P.N.	Campus Chief, IOF	Hetauda campus
61.	Pradhan, R.	National News Agency (RSS)	Kathmandu
62.	Prajapati, K.P.	Deputy Director General Department of Forest & Plant Research	MOFSC, Kathmandu
63.	Ragsdale, T.	Consultant, U.N. Development Program	New York, NY.
64.	Rai, N.K.	Winrock International	Kathmandu
65.	Rana, D.S.	Public Relations, Annapurna Conservation Area Project	Ghandruk, Kaski
66.	Raungapanit, N.	Dean of Forestry, Kasetsart University	Bangkok, Thailand
67.	Rechlin, M.	Senior Advisor, IOFP	Pokhara
68.	Regmi, N.	Project Officer, Agriculture & Rural Development Division, USAID/N	Kathmandu
69.	Richard, C.	Peace Corps Volunteer	IOF, Pokhara
70.	Rubin, E.	Distance Education Centre, Athabasca University	P.O.Box 10,000 Athabasca, Alberta, Canada
71.	Severinghaus, J.	World Neighbors	Kathmandu
72.	Shakya, K.M.	Chief, Bagmati Watershed Project	Kathmandu
73.	Sharma. M.	IOF faculty	Pokhara campus
74.	Sharma, S.R.	Director, Center for Technical Education & Vocational Training	Kathmandu
75.	Sharma, K.P.	IOF faculty	Hetauda campus

		Barun Conservation Project	Kathmandu
77.	Shrestha, K.	Consultant, Kosi Hills Development Project	Kathmandu
78.	Shrestha, R.	Ranger, Nepal Australia Forestry Project	Sindhu Palchowk
79.	Singh, A.	IOF faculty	Hetauda campus
80.	Suwal, P.N.	Additional Secretary, Supportive Functions	MOFSC, Kathmandu
81.	Tamang, D.	Winrock International	Kathmandu
82.	Thapa, D.	Coppice Reforestation Project	Kathmandu
83.	Trivedi, R.C.	IOF faculty	Hetauda campus
84.	Tuladhar, A.R.	IOF faculty	Pokhara campus
85.	Upadhyaya, B.	Forestry Officer, Agriculture & Rural Development Division, USAID/N	Kathmandu
86.	Upadhyaya, C.P.	IOF faculty	Pokhara campus
87.	Upadhyaya, G.K.	Phewa Watershed Project	Pokhara
88.	Veijalainen, P.	Forestry Sector Institutional Strengthening Program, Component #2	Training Division MOFSC, Kathmandu
89.	Wagley, M.	Department of Soil Conservation & Watershed Management	MOFSC, Kathmandu
90.	Yadav, R.	Director, Curriculum Develoment Center, Tribhuvan University	Kathmandu

Proficiency Certificate Level (PCL)
(Ranger)

First Year

English (100 marks)
- Read and write scientific text
- Read and write paragraphs
- Study skills
- Vocabulary
- Structure of technical English
- Spoken English

Introduction to Natural Resource Management In Nepal (50 marks)
- Nepal, general characteristics
- Meteorological aspects
- Ecology and ecosystem
- Interaction of man and environment
- Agencies concerned with NR management

Introduction to Biology and Plant Identification (50 marks)
- Introduction
- Morphology
- Histology
- Physiology
- Ecology
- Taxonomy
- Fungi, insects, birds, mammals
- Introductory zoology

R.N.R. Conservation (100 marks)
- High forests, manmade forests, introduction to management practices, importance of artificial regeneration
- Seed production, collection and storage
- Nursery work
- Planting site appraisal
- Species choice for afforestation
- Planting trees and cover crops
- Tending operations

Silviculture (50 marks)
- Introduction
- Locality factors
- Classification of forests by distribution
- Classification on basis of climax
- Classification by management objectives
- Silviculture of selected species
- Social forestry

Forest Engineering (25 marks)
- Alignment of roads
- Forest roads
- Road drainage
- Bridge
- Knots and timber joints
- Site selection for building
- Building materials
- Lintels and arches
- Doors and windows

Surveying and Engineering (50 marks)
- Fundamental concepts
- Chain survey
- Compass survey
- Plane table survey
- Leveling
- Morters
- Masonry
- Plaster
- Roofing
- Whitewashing
- Smokeless fireplaces
- Septic tanks and closets

Soil and Water conservation (50 marks)
- Introduction to Hydrology
- Soil erosion
- Erosion and evil consequences
- Control of erosion
- Soil conservation Engineering
- Rehabilitation of badly eroded areas

Nepali (100 marks)
- Grammar
- Vocabulary
- Comprehension
- Reading
- Writing paragraphs and essays

Elementary mensuration

Second Year

Law and Administration related to RNR (50 marks)
- Law
- Rules and Regulations

Wildlife Conservation (50 marks)
- Introduction and Definitions
- Recognition and description of selected wildlife species
- Population and distribution
- Wildlife conservation techniques
- National parks and wildlife reserves

Agriculture and Rural Sociology (50 marks)
- Major crops of Nepal
- Elementary horticulture
- Special farming systems
- Animals of economic and domestic importance
- Rural sociology
- Rural economics
- Migration

Harvesting and Logging (50 marks)
- Harvesting
- Grading
- Storage
- Protection of timber
- Transportation
- Roading programmes

Basic Forest Protection (50 marks)
- Factors causing damage to trees and plants
- Biotic agencies of importance in Nurseries & Forests
- Control measures
- Damage due to man and domestic animals
- Forest fires

Techniques of Supervision, Monitoring & Evaluation (25 marks)
- Responsibilities of supervisor
- Qualities of a good supervisor
- Art of giving orders
- Selection and training

Simple accounts, Recording and Stocktaking (25 marks)
- Principals of book keeping and accounts
- Budget
- New Government accounting system
- Inventory accounting system
- Financial rules of HMG

Timber Utilization and Intermediate Technology (50 marks)
- Introduction
- Wood structure
- Fibre structure
- Moisture in wood
- Density in wood
- Strength in wood
- Wood as a fuel
- Charcoal production
- Seasoning
- Fungal and insect attack
- Plywood manufacture
- Sawmilling
- Resin tapping
- Katha and Cutch production
- Trees and grass as fodder
- Other minor forest products
- Fuel wood corporation
- Forest products development board
- Timber corporation of Nepal
- Function and development organizations

Work Practice (50 marks)
- Simple method study
- correct and incorrect position
- safe work practices
- hand tools used in RNR conservation
- design and construction of tools
- maintenance and storage of tools

First Aid, Health and Hygiene (50 marks)
- human anatomy and physiology
- first aid
- minor wounds, burns, fractures, bites, poisoning
- common medicines
- principal of building construction

Physical Training (50 marks)
- physical training exercises

Nepal Parichaya (50 marks)
- Geographic location
- Political history
- Social life
- Economic aspects
- Foreign policy

Language & literature, Arts

Compulsory English (100 marks)
- Oral practice
- Reading text
- Listening Text
- Writing practice
- Language practice
- Interpreting practice

Algebra, Trigonometry and Introductory Calculus (150 marks)
- First paper, Algebra and Trigonometry
- Second paper, co-ordinate geometry and introductory calculus

Introductory Botany (100 marks)
- Lower organisims
- Gymnosperms
- Taxonomy and economic botany
- Genetics, breeding and evolution
- Anatomy & embryology; Physiology

Introductory Zoology (100 marks)
- Characteristics and classification
- Habitat and organization of organ system
- Life history of cockroach, housefly, frog, rabbit
- Animal cell
- Physiology of growth, nutrition, respiration
- Phylogeny of horse, elephant, and man
- Origin of species and speciation
- Adaptation of animals

Introductory Chemistry (150 marks)
- Introduction to chemistry
- Matter - basic concepts
- Structure of atom
- Periodic classification of elements
- Chemical reactions
- Gaseous state of matter
- Air and Water composition and structure
- Solutions and colloids
- Acids, bases and salts
- Electrolyte and tonisation
- Metal non-metal and metalloids
- Nuclear chemistry
- Hydrocarbons
- Alkyl halides; Alcohols
- Aldehydes & keytones; Acid
- Biochemistry

Introductory physics (100 marks)
- Mechanics
- Fluid mechanics
- Properties of materials
- Solid friction
- Viscosity
- Surface tension
- Heat
- Kinetic theory and gases
- Change of state
- Calorimetry
- Combustion
- Heat transfer
- Convection
- Applied optica
- Thermometry
- Reflection; Refraction
- Optical instruments
- Polarization
- Electricity & magnetism
- Current electricity

chniques
Statistical nature of hydrologic variables
Meteorological factors affecting Hydrologic cycle
Precipitation
Climate of the Himalayan region
Evaporation and evapotransporation
Infiltration and infiltration capacity
Run-off and stream flow
Engineering applications of hydrology
Ground water table and its affects on afforestation
Man's influence on the hydrologic cycle
Ground water and soil moisture

Introduction to Soil Science and Geology (100 marks)

Geology

Introduction, definitions, origin of earth
Plate tectonics, geologic time, minerals
Rocks, igneous, sedimentary, metamorphic
Geologic processes, erosion and deposition,
Glaciation, mountains, deserts, oceans,
Processes of rock weathering

Soils

The soil system, soil properties, soil organic matter, soil microbial systems, soil pH
Soil plant relationships, manuring and fertilization, soil classification and soil survey, soil interpretation, forest soils, tropical soils, soil morphology

Human Resource Management (50 marks)

Sociological approach in resource management
Social nimalorganization
Social institutions
Application of social principles
Extension
Interdisciplinary approach
How to organize a meeting
Communication
Motivation

Surveying, Mapping and Draftsmanship (50 marks)

Introduction to surveying and mapping
Surveying mathematics, measurements and errors
Drafting; Measuring horizontal distance
Measuring vertical distance; Traversing
Plane table surveying; Area and volume determinations
Aerial surveying and Photogrametry
Topographic surveying and mapping
Field methods of obtaining topographic data
Preparation of topographic maps; Angular measurements

HMG new accounting system
Inventory accounting system
Government auditing
Financial rules of HMG
Official procedures
Process and rules of Forest Agreement and contract

Resource Economics and its Implications in Renewable Natural Resources (100 marks)

Introduction and the scope of resource economics
Private production - the firm in the market economy
Multiple product production
Management planning for the firm
Consumption of forest products
Markets for forest products
Non-market allocation of natural resources

Ecology (50 marks)

Introduction - concepts
Plant variability and diversity
Life history of forest trees
Animal populations
Autecology with emphasis on forest environment
Synecology: structure, development functions and distribution of plant communities
Concepts of competition and survival
Succession
Disturbance effects
Analysis of ecosystems
Aquatic ecosystems
Phytogeography

Animal Physiology (marks 50) W

Nutrition
Vitamins
Enzymes
Metabolism
Respiration
Excretion and osmoreguiaton
Circulation
Muscle
Nervous system
Sense organs
Reproduction

Types of erosion
Rainfall and its relationships to erosion
Infiltration and surface run-off
Erodibility of soil
Wind erosion
Gully erosion
Universal soil loss equation
Principals of control measures
Design of mechanical protection works
Land management
Erosion control in forests and pastures

Forest Mensuration (50 marks) F&W
Introduction
Measurement for wood product production
Measurement of form
Volume tables
Grading forest products
Forest inventory
Application of sampling in forestry
Aerial photographs in forest inventory sampling
Tree growth predictions
Operations research methods
Measuring non-wood forest products

Introductory Statistics (50 marks)
Introduction to statistical methods
Descriptive statistics
Probability
Probability distributions
Sampling
Confidence interval and hypothesis testing
Analysis of variance
Linear regression

Plant Physiology (50 marks) F&S
Introduction
Plant cell
Plant nutrition
Absorption of minerals
Translocation
Water loss
Photosynthesis
Respiration
Nitrogen metabolism
Plant growth and development

F - Forestry Option
S - Soil Conservation Option
W - Wildlife Option

ction
Artificial regeneration
Forest tree improvement
Intermediate tests
Natural regeneration
Formulation of silvicultural systems
Social/community forestry
Silvicultural systems applicable to important timber types of Nepal

Forest Engineering (50 marks) F&W
Roads and trails
Road drainage
Structural engineering principals
Bridges
Buildings

Harvesting, Logging and Utilization of Forest Products (100 mark) F
Harvesting and logging
felling & bucking, skidding & pre-hauling, loading and unloading, cable yarding, sale and disposal of forest products, storing & grading logs, debarking hauling and transportation
Utilization
Structure of wood, defects in wood, physical and mechanical properties, forest based industries wood seasoning, wood preservation, and energy

Remote Sensing (50 marks)
Introduction to remote sensing
Fundamentals of photography
Aerial photography
Basic photogrametry
Airphoto interpretation for geologic and soil evaluation
Air photo interpretation for forestry and wildlife applications
Other applications of airphoto
Satellite imagery

Soils, Genesis, Morphology and Classification (50 marks) S
Bedrock and soil parent material
Rock weathering processes
Factors of soil formation
Processes of soil genesis
Soil morphology
Soil classification
Soil Taxonomy
The soil landscape
Soil survey; Soil survey interpretations

(50 marks)
Introduction
Protection against man made damages
Protection against forest fires
Protection against grazing
Protection against insect damages
Life history and control of important forest insects
Evaluation monitoring and management
Protection against injuries by plants
Forest pathology
Protection against damage by diseases
Diseases of trees
Micorhizae
Factors causing damage to trees and plants

Soil Fertility and Plant Nutrition (50 marks) S
Theory of crop production
Plant growth requirements
Mechanisms of mineral transport
Organic mineral interactions
Biological factors of Plant nutrition
Weathering and nutrient release
Nutrient cycle
Manuring
Major and minor mineral nutrients
Acidity and alkalinity
Chemical fertilization
Soil management and nutrition

Irrigation and Drainage (50 marks) S
Introduction
Basic soil water relationships
Consumptive use of water
Evaluation of land for irrigation
Irrigation systems
Irrigation scheduling
Water transport facilities
Water resource for irrigation
Drainage systems

Watershed Management (100 marks) S
The watershed as a management unit
The climate of the watershed
Watershed geology and topography
Soils of the watershed
Inventorying the watershed
Land use patterns in the watershed
Management practices in the watershed
Social and cultural considerations in watershed management
Legal and economic constraints
Planning the watershed management program

Habitat Improvement for Wildlife Conservation (50 marks) W
- Introduction
- Forest range management and evaluation
- Habitat analysis and evaluation
- Vegetative analysis
- Habitat manipulating practices
- Concepts of optimamality in wildlife conservation

Wildlife Management Techniques (50 marks) W
- Measurement of wildlife populations
- Radio telemetry
- Techniques of deer aging
- Identification of sex and age of deer
- Marking and tagging wild animals
- Capturing wild animals
- Trapping wild animals

Wildlife Biology (50 marks)
- Introduction and definitions
- Brief introduction to wildlife in Nepal
- Some ecological ideas
- Wildlife habitat
- Biotic succession and wildlife
- Successional classification of wildlife
- Introduction to wildlife populations
- Reproduction
- Mortality
- Wildlife territory and movement path
- Wildlife values
- Wildlife as a natural resource

National Park Administration and Management (75 marks) W
- What is a park
- Categories of protected Adopted by IUCN
- Objectives of National Park Management
- National Park management policies
- Recreation area development management activities
- Additional management policies
- Park planning and wild benefits analysis
- National parks and wildlife reserves of Nepal
- Administrative, legislative and portective options of National Parks and wildlife conservation
- Non-governmental organizations and their role in ensuring effective conservation program

Ornithology and Mamology (50 marks) W
- Ornithology - Introduction, systematics of birds, sensory organs, behavior, flock

Statistical Methods & Experimental Design (50 marks)
- Review of statistical concepts
- Introduction
- Completely randomized block design
- Multiple comparisons
- Randomized complete block design
- Latin square design
- Factorial analysis
- Analysis of covariance
- Miscellaneous
- Analysis of contents

Forest Management (100 marks) F
- The scope of forest management
- Models for predicting future forest output
- Capital budgeting: long term investment planning
- Biological maximization goals
- Risk analysis
- Cost/Benefit analysis and public sector management
- Social environment of forestry
- Case studies in forest management planning

Agriculture and Range Management (75 marks) F&S
- Agriculture
  - Introduction
  - Agricultural and national development
  - Constraints for agricultural development in Nepal
  - Crop agriculture in Nepal
  - Animal agriculture in Nepal
  - Farming systems in Nepal
  - Agricultural extension programs
  - Agricultural research program
  - National agricultural development strategies
  - Agriculture forestry integration
  - Requirements for a sound Ag. Dev. program
- Range management
  - Introduction
  - Grazing animal and ecological factors
  - Range inventory and evaluation
  - Range improvement
  - Management of vegetation
  - Management of grazing animals
  - Forest grazing management
  - Comprehensive forest resource management

- Mamology
  - Characteristics of mammals, distribution and classification, definitions

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AIFC	Associate of Indian Forest College
BSc	Bachelor of Science degree
CARE	CARE International, an NGO
CTEVT	Council on Technical Education & Vocational Training, of the Ministry of Education
DFPR	Department of Forest & Plant Research (MOFSC)
DOF	Department of Forests (MOFSC)
DNPWC	Department of National Parks & Wildlife Conservation (MOFSC)
DSCWM	Department of Soil Conservation & Watershed Management (MOFSC)
ha	Hectare, unit of land measurement
IDRC	International Develoment Research Council, Canada
IOF	Institute of Forestry, Tribhuvan University
IOF/P	Institute of Forestry Project (IOF/YALE/IRG/USAID)
IRG	International Resources Group, Ltd.
MFSC or MOFSC	Ministry of Forests & Soil Conservation
MOEC	Ministry of Education & Culture
MSc	Master of Science degree
NAFP	Nepal-Australia Forestry Project
NGO	Non-Governmental Organization
NR	Natural Resources
NRM	Natural Resources Management
NRs	Nepali Rupees (c. NRs 30 = US$1)
PCL	Proficiency Certificate Level degree
RDC	Rural Development Center, Pokhara
SAARC	South Asian Association for Regional Cooperation
SLC	School Leaving Certificate (after completion of Class Ten)
USAID	U.S. Agency for International Development
Yale F&ES	Yale University, School of Forestry Environmental Studies