

CONSERVATION EDUCATION AND TRAINING

Papers presented

at the

CONFERENCE ON CONSERVATION OF NATURE AND NATURAL RESOURCES IN TROPICAL SOUTH-EAST ASIA

held at

Bangkok, Thailand, 29 November - 4 December, 1965.



International Union
for Conservation of Nature and Natural Resources
Morges, Switzerland
1968

INTERNATIONAL UNION FOR CONSERVATION OF NATURE AND NATURAL RESOURCES

COMMISSION ON EDUCATION

C O N S E R V A T I O N E D U C A T I O N A N D

T R A I N I N G

Papers presented
at the
CONFERENCE ON CONSERVATION OF NATURE AND NATURAL
RESOURCES IN TROPICAL SOUTH-EAST ASIA

held at

Bangkok, Thailand, 29 November - 4 December, 1965

M O R G E S , S W I T Z E R L A N D

1 9 6 8

The International Union for Conservation of Nature and Natural Resources (IUCN) was founded in 1948 and has its headquarters in Morges, Switzerland; it is an independent international body whose membership comprises states, irrespective of their political and social systems, government departments and private institutions as well as international organisations. It represents those who are concerned at man's modification of the natural environment through the rapidity of urban and industrial development and the excessive exploitation of the earth's natural resources, upon which rest the foundations of his survival. IUCN's main purpose is to promote or support action which will ensure the perpetuation of wild nature and natural resources on a world-wide basis, not only for their intrinsic cultural or scientific values but also for the long-term economic and social welfare of mankind.

This objective can be achieved through active conservation programmes for the wise use of natural resources in areas where the flora and fauna are of particular importance and where the landscape is especially beautiful or striking, or of historical, cultural or scientific significance. IUCN believes that its aims can be achieved most effectively by international effort in cooperation with other international agencies such as UNESCO and FAO.

The World Wildlife Fund (WWF) is an international charitable foundation for saving the world's wildlife and wild places. It was established in 1961 under Swiss law and shares joint headquarters with the International Union for Conservation of Nature and Natural Resources (IUCN). Its aim is to support the conservation of nature in all its forms (landscape, soil, water, flora and fauna) by raising funds and allocating them to projects, by publicity, and the education of the general public and young people in particular. For all these activities it takes scientific and technical advice from IUCN.

Although WWF may occasionally conduct its own field operations, it tries as much as possible to work through competent specialists or local organisations.

Among WWF projects financial support for IUCN and for the International Council for Bird Preservation (ICBP) have highest priority, in order to enable these bodies to build up the vital scientific and technical basis for world conservation and specific projects. Other projects cover a very wide range from education, ecological studies and surveys, to the establishment and management of areas as national parks and reserves and emergency programmes for the safeguarding of animal and plant species threatened with extinction.

WWF's fund-raising and publicity activities are mainly carried out by National Appeals in a number of countries, and its international governing body is made up of prominent personalities in many fields.

THE COMMISSION ON EDUCATION

The Commission on Education is one of the Commissions of the International Union for Conservation of Nature and Natural Resources.

The members of the Commission for 1963 - 1966 were :

<u>Chairman</u>	:	L.K. Shaposhnikov	U.S.S.R.
<u>Vice-Chairman</u>	:	J. Vesely	Czechoslovakia
<u>Secretary</u>	:	J. Goudswaard	Netherlands
<u>Members</u>	:	D.S. Davis	U.K.
		E.P. Dottrens	Switzerland
		L.E. Esping	Sweden
		F. Lense	Germany
		J.A. Livingston	Canada
		R.G. Miller	U.S.A.
		T. Pritchard	U.K.
		N. Söyrinki	Finland

TABLE OF CONTENTS

	Page
Technical Session III : Conservation Education and Training	8
Summary of Papers and Discussion of Technical Session III Conservation Education and Training by Dr. S.M. Cendana	9
General Resolution and Specific Recommendations of the Conservation Education Workshop	13
Part 1 : Education in Schools	16
The Time Lag in Teaching Biology by Prof. J.L. Harrison .	16
Project of Introducing the Idea of Conservation in Vietnamese Schools by Dr. Phung Trung Ngan	21
Conservation Education in Curriculum Improvement Projects in the Philippines by Dr. Dolores F. Hernandez	23
What is the Status of World Conservation Education ? by Dr. Richard Gordon Miller	34
Report on Conservation Education and Training in Thailand by Mr. Chamnian Sa-Nguanpuag	37
Problems of High School Biology Teaching in Indonesia by Mr. Sampurno Kadarsan and Prof. Otto Soemarwoto	39
Part 2: Training in conservation	41
Training Asian Students in Resource Management by Dr. Robert L.Rudd	41
Specialist Wildlife Training from the Standpoint of an Asian Trainee by Mr. Mohamad Khan	
Education and Goals in Wildlife Conservation by Dr. Raymond F. Dasmann	47
Conservation Training Needs in Tropical South East Asia by Mr. G.S. de Silva	50
Conservation Training in Parks and Recreation Management in the Philippines by Mr. Edilberto Z. Cajucom	54
Middle Grade Conservation Training in Africa by Mr. E.A. Quist-Arcton	58
Training for Effective Careers in Conservation in Thailand by Mr. Vallobh Naraballobh	61
Training for Effective Careers in Conservation in Indonesia by Mr. I. Made Taman	67
The Role of Agricultural Extension in Conservation Education by Dr. C.W. Chang	69

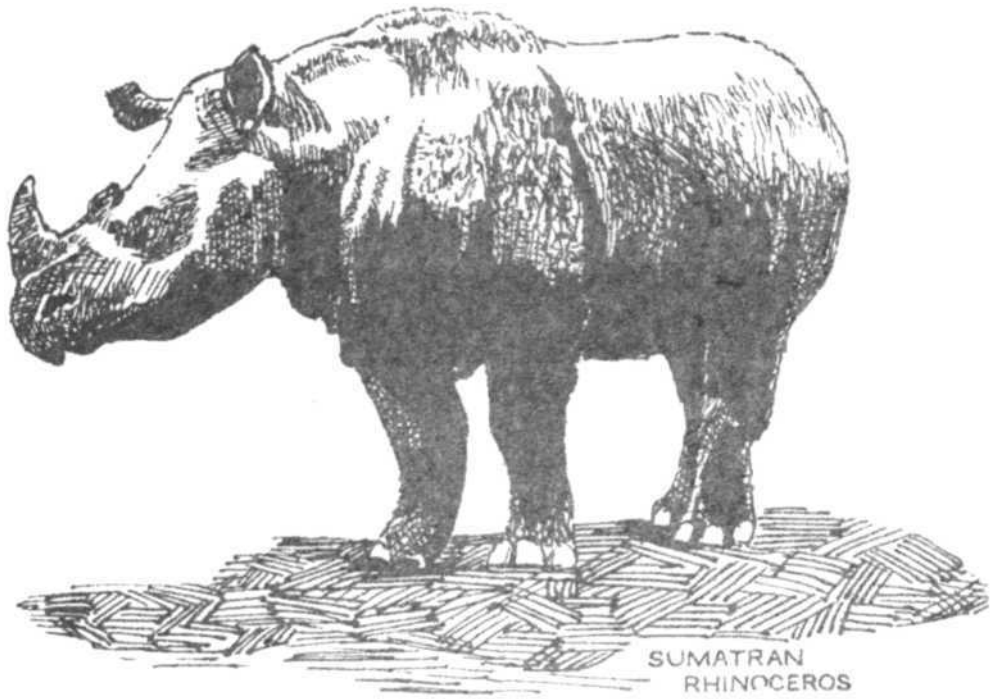
	<u>Page</u>
Part 3 : Public Education	71
Elements of an Effective Nationwide Conservation Education Programme by Dr. J. Goudswaard	71
The contribution of Interpretive Programmes in National Parks to Popular Conservation Programmes by Dr. George C. Ruhle	73
Education and Publicity for Resource Conservation in Sabah by Mr. E.J.H. Berwick	77
Contribution of a Nature Society to Public Conservation Education by Mr. Wong Yew Kwan	79
Some Notes on Campaigns and Propaganda on Behalf of Conservation by Mr. R.S.R. Fitter	81
The Australian Conservation Foundation by Mr. Francis N. Ratcliffe	84
The Role of Zoological Gardens in Creating Public Awareness of Wildlife Conservation by Mr. I. Made Taman	87
A Background Report to the Series of Nature Study and Conservation Programmes Produced by the Schools Broad- casting Service and the Sarawak Museum by Mr. Alan Moore and Mr. Michael Fogden	89

TECHNICAL SESSION III

CONSERVATION EDUCATION
AND TRAINING

Following the Summary of Session III and the Resolutions of the Conservation Education Workshop, the papers in this Session have been grouped into three major sections :

1. Education in schools
2. Training in conservation
3. Public education



Summary of Papers and Discussion of Technical Session III Conservation Education and Training

by
SUMMARIZER OF SESSION III
DR. S.M. CENDAÑA
College, Laguna, Philippines

It was agreed that the conservation of nature and natural resources is desirable and is a necessary way of living. The present concern is how to encourage people to appreciate nature and to believe in conservation so that they can help in the conservation of natural resources.

Three possible avenues have been considered:

1. through the education in school,
2. through training in conservation, and
3. through public education.

1. EDUCATION IN SCHOOLS

Dr. Ngan of the University of Saigon, Vietnam, and Prof. J. L. Harrison of the University of Singapore pointed out that the difficulties encountered in enforcing conservation regulations spring mainly from inadequate understanding of the problem by the people.

Prof. Harrison explained the general unsuitability of overseas textbooks, but pointed out that the preparation of local texts must be preceded by detailed work on the description of local species.

Dr. Hernandez of the Philippines pointed to three levels of instruction at which knowledge about nature and conservation might be imparted, namely,

1. elementary schools, where the pupils are taught about animals and plant life;
2. secondary schools, where courses in biology are given, and
3. universities, where courses are taught in zoology, botany, chemistry, ecology, genetics and other subjects at undergraduate and graduate levels.

Dr. Miller from the U.S. discussed the role that IUCN, through its Commission on Education, has played and is playing in the worldwide education movement in nature conservation.

Mr. Chamnian pointed to the following difficulties with conservation education in Thailand:

1. lack of adequately-trained and experienced teachers.

2. lack of suitable textbooks oriented to local materials and conditions, and
3. lack of materials for demonstration.

Mr. Kadarsan and Prof. Soemarwoto pointed to these same difficulties in Indonesia, and suggested the following remedies:

- (a) the production of new textbooks that are oriented toward local materials and conditions,
- (b) the up-grading of training courses for teachers in biology, and
- (c) the writing of articles in biological journals in a more popular style.

Mr. Kadarsan reported progress in Indonesia in producing graduate biologists. Prior to 1955 there were none, but now (1965) there are 100. However, few young people could see the purpose of biological studies and the best students were not being attracted to them.

During the discussion, a Thai representative reminded the group that early educators and pioneers were able to teach without textbooks and teaching aids - making imaginative use of the materials at hand.

Mr. Alfred of the National Museum in Singapore underscored the urgent need for textbooks in South East Asian biology, and recommended a resolution to modify syllabi with the intention of increasing conservation content and insuring local treatment.

Mr. Thane Riney of FAO suggested that the professors (and scientists) in South East Asian countries, beginning with those present at the Conference, pool their resources and information. He cited the example of biologists in East and Central Africa who had taken steps to systematically share the burden of producing basic materials on species common to the countries concerned. This would be a means of developing substantial information for the use of all.

Mrs. Brooks (USA) suggested that South East Asian countries might request Peace Corps volunteers who have been trained in conservation to assist in teaching and developing conservation education materials.

Other suggestions were made to encourage students to explore the world of biology on their own.

It was further recommended that Boy Scout programs be integrated in one way or another with school programs.

2. TRAINING IN CONSERVATION

Dr. Rudd suggested that Asian workers in conservation be given in-service training in the United States for a period of at least four months - preferably one year. This should include institutional affiliation, internal travel and the observation of public agencies in operation.

Mr. Kann, a Game Department administrative officer in Malaya, recounted his year's experiences as a Fulbright scholar in wildlife training in the United States and Canada. He felt the technical training equipped him to make more competent decisions in his work.

Dr. Dasmann of the U.S. A. pointed out three values of wildlife resources:

1. direct commercial products,

2. recreational and aesthetic values that enrich people's lives, and
3. scientific values.

He also distinguished two groups of nature conservation workers:

- (a) wildlife scientists and administrators and
- (b) technicians in wildlife protection.

He proposed that the scientists and administrators should have graduate training at university level; the technicians have training at technical schools below university level.

Mr. de Silva pointed to the lack of adequately-trained teachers in biology as the special source of difficulty in Sabah.

Mr. Cajucom emphasized the critical need for training in parks and recreation management in the Philippines and made proposals for an initial conservation education program for the College of Forestry at the University of the Philippines.

Mr. Quist-Arcton of FAO (formerly of the Ghana Forest Service) reviewed the need for, and methods of achieving middle-grade conservation training in Africa. For the more responsible positions in Wildlife conservation, English-speaking students are trained in the College of African Wildlife Management. Another medium-grade school has been planned for the training of French-speaking game wardens in West Africa. He directed attention to the established, though perhaps rudimentary, concepts of conservation already embodied in the life and customs of peasant communities, and said that they should not be thoughtlessly dismissed in attempts to introduce foreign ideas.

Mr. Vallobh described the curriculum of the Department of Conservation at Kasetsart University in Thailand.

Mr. Made Taman reported on progress from 1961 to 1965 in training conservation workers in the Directorate of Forestry in Indonesia.

Dr. Chang pointed out that 'education, whether formal or informal, aims at bringing about desirable change in behavior,' which may be in

1. knowledge (or things people ought to know),
2. skills and/or
3. attitude.

He describes an effective extension method that has been successfully used in Pakistan and Taiwan, which uses

- (a) mass contacts (through the radio, posters, exhibits, leaflets and circular letters),
- (b) group contacts (through study hours, demonstrations, meetings and group discussions, and
- (c) individual contacts (through visits, result demonstrations, office calls and personal letters.

In the discussion, Mr. Alfred of Singapore directed attention to the training of officials, especially wardens. He asked if UNESCO had considered such activities. Mr. Coolidge brought up the idea of a 'floating faculty' which could circulate from country to country and provide training.

Mr. Daley complimented Mr. Quist-Arcton on his relation of conservation to the people. He also pointed out that we must do more than just create

biologists and foresters, we need to assure that men of influence, such as bankers, receive a certain amount of conservation education, and that foresters also be encouraged to enter into fields other than forestry in which they can serve very usefully.

3. PUBLIC EDUCATION

Dr. Goudswaard of the Netherlands, emphasized the basic importance of having young people understand nature in order to appreciate and conserve nature. He suggested that the schools, through courses in biology and ecology, be made use of, and the out-of-school youth organizations be utilized as bridgeways, so to speak, to conservation.

Dr. Ruhle described the Interpretive Service of the U.S. National Parks, which makes use of well-trained workers, who conduct walk talks, deliver lectures, write popular leaflets and popular journal articles, and put up museums in order to put conservation ideas across to the park visitors.

Mr. Berwick pointed out that legislation alone will not conserve natural resources - the co-operation of the people is necessary to realize the objective. An aggressive and persistent mass propaganda is necessary. In Sabah, mass education in nature conservation suffers from:

1. language difficulty (there are many),
2. dispersed responsibility, and
3. lack of adequate funds.

Dr. Wong informed us that in Malaysia, different techniques are used for different kinds of people - indoor and outdoor programs for the youth; posters for the rural folks; while the leaders (people of influence) are approached to join the Malayan Nature Society.

Mr. Fitter from U. K. added that personal contact with people of influence is a very important and essential ingredient to a successful campaign in conservation education.

Dr. Ratcliffe pointed out that private organizations can do much in helping educate the people. The Australian Conservation Foundation, a private institution, has been very helpful in promoting understanding about nature and nature conservation. It co-operates and supplements, rather than competes, with government agencies engaged in the same line of work.

Mr. Made Taman presented the "animal garden" approach. In Indonesia, several zoos are maintained in different parts of the country.

Messrs. Moore and Fogden described the nature study and conservation program to be broadcast to the secondary schools in Sarawak, Malaysia.

During the discussion, Mr. de Silva mentioned that films, posters, photographic displays and lectures have been satisfactorily used in reaching and educating people in Sabah.

Mr. Buncio of the Philippines said that the Philippines' Park and Wildlife Office has been giving lectures in the schools as well as in the parks.

General Resolution and Specific Recommendations of the Conservation Education Workshop

The productive discussions of the morning Technical Session, were continued into the afternoon Conservation Education Workshop. The main focal points of discussion were brought together in the form of the following general resolution of the Workshop, and four specific recommendations.

General Resolution of the Workshop on Conservation Education

1. The Conference is conscious of the importance of environmental education at all levels as a sound basis for economic development and the conservation, restoration and enrichment of natural resources in South East Asia.
2. It is also conscious that progress is being made on different aspects of these educational problems in the countries of South East Asia and aware of the importance of exchange of ideas and information between countries within this region and with those in other parts of the world.
3. The Conference is also aware that urgent attention should be given to formulating policies and discussing machinery to consolidate and expand the initiatives already taken to promote education about the environment and conservation in South East Asia.
4. The Conference welcomes the interest shown in education in South East Asia by the Commission on Education of IUCN and by other international agencies particularly UNESCO and FAO but recognized that, although the technical and other assistance available from these sources have already been and will continue to be, invaluable in promoting such education, the initiative for expansion will have to be taken by the individual countries in the region working in co-operation with each other
5. The Conference agrees that the objectives in education about the environment and conservation should be classified into three main groups namely those concerned with:
 - (a) Formal education in the schools:
 - (b) Formal education in institutions of higher education, and vocational training in conservation and the other land-linked professions; and
 - (c) Education of the public, involving information and extension services and propaganda.
6. In the light of the resolutions given above the Conference draws special attention to the following:
 - (a) There is a severe shortage of text-books, demonstration materials and educational aids which are relevant to the local environment.

- (b) Lack of experience in problems in the field related to environmental management and conservation is widespread to all educational levels and especially amongst children, students and teachers, and urgent attention should be given to providing facilities out of doors for excursions and other field studies, by establishing strategically located field education centers, educational nature reserves and the teaching sites, and by promoting more effective use of existing facilities.
 - (c) The Conference urges that consideration should be given urgently to (a) and (b) above but that those responsible for this should pay special attention to appraising local requirements carefully before adapting any materials or techniques used in other parts of the world which are considered of relevance to local needs.
7. In relation to the three main groups of educational problems referred to in 5 above the Conference urges that:
- (a) That syllabuses and teaching methods should be examined urgently and revised as necessary as soon as possible and that UNESCO in particular should stimulate this assessment and revision.
 - (b) That consideration should be given to the value of adopting an ecological approach in the teaching of biology; attempts should be made to discover how to prepare the way for developing the ecological approach, with particular emphasis being placed on field studies.
 - (c) That out of school activities, such as out-of-doors programs in conservation by Scout groups, should be promoted.
 - (d) That voluntary societies engaged in natural history, conservation and related activities should play an increasing role in extending environmental education activities for children.
 - (e) That for higher education and training
 1. the objectives should be clearly defined but with special emphasis on
 - (a) the training of student teachers who should be given a sound foundation in the environmental sciences (especially geology, geography and ecology) and in conservation,
 - (b) the training of students who will later be engaged in resource management.
 2. Steps should be taken to improve the training of teachers as a matter of urgency; immediate improvement could be effected by means of workshops composed of mixed teams of teachers, scientists and conservationists.
 3. Effort should be made to improve the professional status of biologists and particularly to employ a large number of ecologists in all parts of the region.
 - (f) That for Public Education
 1. A study should be made of the pattern of public attitudes toward conservation; the organization of and techniques used in, education of the general public, and particularly

of farmers and others in rural areas, should be carefully examined in the light of the cultural and racial background of the peoples concerned.

2. In connection with (1) above, conservationists should seek as much advice as possible from local educationalists and others so that methods of directing educational activities are used to provide the maximum benefit in relation to the manpower available for this purpose.
3. The voluntary societies should be regarded as a most important medium for public education, with special reference to:
 - (a) Those in policy making positions with government and administrations;
 - (b) Educational institutions; and
 - (c) The public at large.

Specific Recommendations of the Conservation Education Workshop

1. IUCN Commission on Education should be urged to play a leading part in promoting investigations of regional education problems so as to obtain more detailed knowledge of requirement, and to provide as many educational aids as possible, in collaboration with the national and international organizations. In particular, IUCN should be conscious of its role in co-ordinating the experience and knowledge gained from relevant education programs undertaken by the organizations in the region notably FAO and UNESCO.
2. A committee on education in South East Asia, comparable in certain respects to the North West Europe Committee on Education of IUCN, should be established in the Region immediately which should obtain further information on educational requirements, provide guidance about future development and ensure co-ordination between the activities of the main organizations concerned, particularly IUCN, FAO and UNESCO. This committee should also pay regard to the position in other tropical regions by establishing liaison with African and other countries and in this connection act in a specialist advisory role to the Commission on Education of IUCN.
3. A crash training program for those engaged in the management and conservation of natural resources should be established. It is suggested that this might take the form of a travelling team of international experts, working on a regional basis, supported by UNESCO, FAO, IUCN and other appropriate international agencies. This team of experts should co-ordinate closely with local experts and organizations and should visit each country for a period of time appropriate for the solution of the problems under study.
4. UNESCO should be asked for aid to produce those educational materials that are required urgently.

Part 1

Education in Schools

The Time Lag in Teaching Biology

by

PROF. J. L. HARRISON

Department of Zoology, University of Singapore

SUMMARY

Sound biological knowledge is an essential foundation for public opinion in conservation. The author points out some of the difficulties of introducing biology training to the schools of a developing country so that these difficulties may be foreseen and overcome. He notes the lack of:

1. good text books on tropical biology,
2. easily available knowledge for the non-specialist,
3. good teachers.

He concludes that 'after twenty years in Singapore we are just beginning to catch up with ourselves in biology teaching'.

INTRODUCTION

Successful conservation depends finally on the pressure of public opinion, and public opinion needs education, particularly in biology. The basic knowledge and understanding of biology must come from the teaching in schools and universities. In this paper I want to point out some of the difficulties of introducing biological training to the schools of a developing country not with the object of discouraging such training, but so that the difficulties may be foreseen and dealt with in good time. I shall confine my remarks to my own subject, Zoology, the teaching of which in Singapore and Malaya, has a history of about twenty years. Botany has a similar history.

We are all familiar with the story of a school, preferably far far away, somewhere in Africa perhaps, which decided to train its students to take the Overseas School Certificate in Biology. The syllabus demanded the practical dissection of a frog, which the English textbook called *Rana temporaria*. Accordingly a biology supply house in Britain was asked to send a supply of preserved *R. temporaria* for dissection. They duly arrived and were dissected. Meanwhile the teacher in charge complained that the noise of the bullfrogs in the school pond distracted his pupils from giving full attention to his account of the English frog.

Apocryphal, no doubt, but by no means far-fetched. Something not unlike that is going on every day. Even in my own department in Singapore I am still using *Obelia geniculata* as an example of a Hydrozoan Coelenterate for first-year students, although *Obelia* does not occur in Singapore waters. I shall explain why later. Stories of this sort, however, do draw attention to a real difficulty in biological teaching. Singapore has passed through this phase, and her experiences may be of value to this conference.

ZOOLOGY IN MALAYSIA

Singapore and Malaya have wisely associated themselves with the system of public examinations represented by the Cambridge Overseas School Certificate, which provides an objective standard of learning unaffected by irrelevant local pressures, enabling the candidate to compare himself with the best anywhere else in the world.

Our teaching of Zoology follows the 'type' system (i.e. a number of different animals are studied in great detail, each being considered an example of a group, and being used as a framework on which to hang lessons and as a standard to which comparisons can be made) introduced by T. H. Huxley a century ago. The system needs good teachers - good zoologists - if it is not to degenerate into a blind learning of textbook accounts of a number of apparently unrelated animals, unfamiliar in the student's own environment.

NEED FOR TEXTS

Good science teaching also needs good books, and here we meet our first real difficulty. For chemistry and physics it does not really matter where the books are written, but with biological sciences, it does matter a great deal that in one country trees lose their leaves in winter, frogs lay eggs in streams, and lizards are seen in bright sunlight on heaths; while in another, trees keep their leaves all year, frogs stick their eggs onto tree trunks, and lizards are to be seen on the ceiling at night.

At an elementary level, with a good teacher who knows what he is doing, this alone presents no great difficulty. Some years ago surprise was expressed by the examiners that a question on guano, thought of by the examiners as the accumulated droppings of sea-birds on desert islands, was universally answered by Malayan students who talked about the accumulated droppings of bats in limestone caves. In this case the examiners learned something new to them; but it would have been only too easy for the students to have dished up some quotation from a standard work which the examiners would have accepted without even knowing that it was an inappropriate answer for Malayan conditions. Only too often do we meet the attitude that students are studying for an examination; in an examination what the book says will be marked as right; so why worry about the truth - it is what the book says that matters.

This worship of the book is regrettable. We combat it by giving our students references which contradict one another, by disagreeing with the book, and with one another, and by making them observe for themselves; but it is a long slow battle and it wins over only the better students. We must, I fear, accept reliance on the book as one of the facts of life, and we must try to get the books right.

Unfortunately this means rewriting them completely. It is no mere hack-work of translating and adapting them. The broad outlines may be perfectly satisfactory. It is the details, the apparently trivial statement, which needs checking and often altering; and this checking must be done by people who know their subject, notice that I say 'people', not a 'person'. Such people are hard to find and need years of training. But apart from knowledge, there is another difficulty. In our first-year classes we dissect a dogfish or small shark. We have no completely reliable dissection guides, not so much because they have never been written, but because the class of some 180 students is dissecting not one species but six. The diversity of tropical species is such that I cannot guarantee to find 180 specimens of the same species!

One could sum up the difficulties vis-a-vis books by saying:

1. We are dealing with students who, by tradition, believe what the textbook says; so we need reliable books.
2. Our demand for books is too small to make it worth publishing our own in competition with those of vast circulation: so we need to adapt.
3. Writing new books or adapting standard works for local use demands a detailed knowledge which few possess, and which indeed may not exist.
4. Profusion of tropical species makes it less easy to make exact statements about specimens or conditions usually found.

Part of our problems are economic, and although they need to be discussed, they will not be discussed here. The remainder of our problems are those of the existence of knowledge and the availability of men and women to disseminate it.

KNOWLEDGE

We start with a background of knowledge fundamentally different from that in which the standard textbooks were written. There are more species of animals and we do not know them as well. For example, my colleague, Miss L. Cheng commenced some studies in 1963 on the biology of the Gerridae or Water Skaters, conspicuous insects which run on the surface of every pool and stream. There were only 18 species known from Malaya. Now in 1965 she has produced a massive study which, among other things, records 41 species (Cheng, 1965). We do not know the names of species because many have never been named. We do not know their life histories, because zoologists have had to spend so much of their time naming them.

This perhaps, sounds a little more despondent than the truth justifies. Quite a lot is known about many of our animals, but then we come to the second part - the availability of this knowledge. For many groups the knowledge is locked up in comparatively obscure papers. This does not worry the specialist, but it does worry the ecologist who has to have a nodding acquaintance with many groups. This state of affairs is being slowly remedied as can be seen in the list of books given at the end of this paper. We are catching up but we still have a long way to go.

These books help to fill in the background for our students. The teacher is still left to find suitable 'types'. This was the first concern of Professor R.D. Purchon, in 1949, when the Zoology Department in Singapore was founded. He and his colleagues selected a number of local animals, and prepared summaries of what was known about them, investigated obscure points, and worked out dissection guides and so on. A book of instructions for first-year students was published (Purchon 1957). That book is now out of date because the process has continued. Thus now, in 1965, out of 25 species used as 'types' in the first year course, 12 are local, 6 are cultured (e.g. *Amoeba*, Guinea Pigs), 5 are cosmopolitan parasites, and 2 are imported. Of the 12 local species; 5 are sufficiently like the corresponding species used in standard text books for only minor adaptations to be necessary; 2 have been recently monographed as teaching types in India, and the remaining 5 have been studied here in Singapore. Two of these were studied by members of the academic staff, and three others formed the subject of M.Sc. or Ph.D. theses of students in the department.

MAN POWER

You will observe that we rely on student theses for much of our new information. If we want to know more about local animals we must train people to find out about them and train them to train others. We consider that every school teaching pre-university biology (or zoology and botany) should have at least one teacher with an honors degree in a biological subject, and yet the total number of honors graduates in all biological subjects since the foundation of the University of Singapore has only been 106. The actual number of graduates in biological sciences is shown in Table 1. Since 1960, 181 students have also graduated from Nanyang University in biology, not however at honors standard. These graduates serve not only Singapore with a population of a little under 2 million, but also the whole of Malaysia, with a population of a further 8 million.

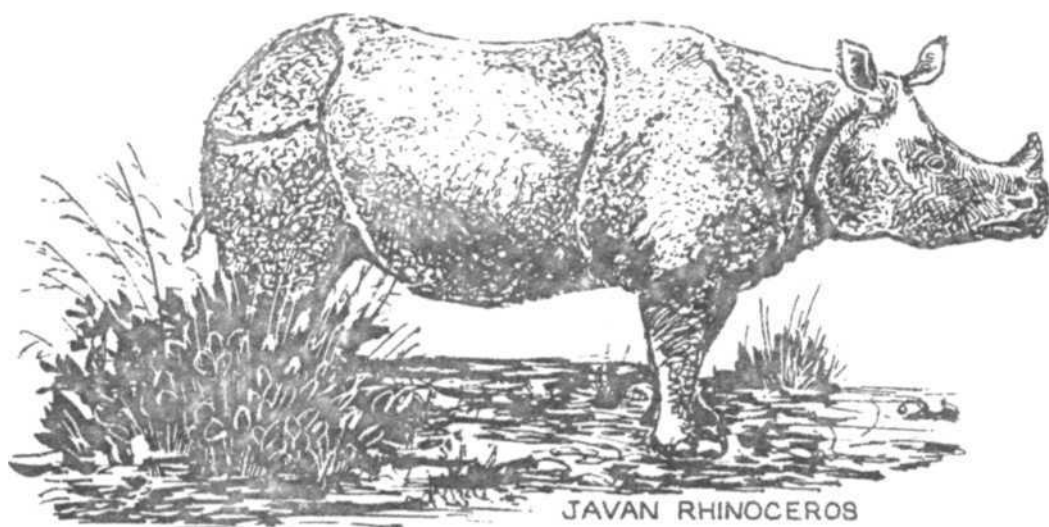
What of the teachers who are not Singapore honors graduates? The fact that a man was born and schooled in Singapore before he went to Harvard or to Oxford does not make the animals any the less strange. He has learned his zoology on a different fauna and in many respects he has to start all over again. In biology, at least, if we want good teachers we have to train them ourselves on the job.

My conclusion is that we are now, after 20 years, just beginning to catch up with ourselves in biology teaching.

One last note. I have provocatively headed this section, 'Man Power¹'. It is not true. A good half of our zoologists are women! It is noteworthy that, in a country where women are only now achieving full emancipation, a large proportion of its best students in biology are women.

LITERATURE CITED

- Boulenger, G.A. 1912. A vertebrate fauna of the Malayan Peninsula - Reptilia and Batricha. Taylor and Francis, London.
- Cheng, L. 1965. Studies on the taxonomy and biology of the Malayan Gerridae. Thesis for M.Sc. University of Singapore.
- Chuang, S.H. 1961. On Malayan Shores. Muwu Shosa, Singapore.
- Corbet, A. S. and H.M. Pendlebury. 1934, revised 1956. The Butterflies of the Malay Peninsula. Oliver and Boyd, Edinburgh.
- Glenister, A.G. 1951. The Birds of the Malay Peninsula, Singapore & Penang. Oxford Univ. Press, London.
- Johnson, D.S. 1964. An introduction to the Natural History of Singapore. Rayirath, Kuala Lumpur.
- Madoc, G.C. 1947. An introduction to Malayan Birds. *Malay Nat. J* 2; 3 & 4 (second edition 1957).
- Robinson, H. C. and F.N. Chasen. 1927-39. The Birds of the Malay Peninsula, Vols. I-IV., Whittlerly, London.
- Tweedie, M.W. F. 1953. The snakes of Malaya. Govt. Printer, Singapore.
- and J.L. Harrison, 1954. Malayan Animal Life. Longmans, London.



JAVAN RHINOCEROS

TABLE 1
GRADUATES IN BIOLOGICAL SUBJECTS, SINGAPORE

Year	B.Sc. (Hon.) ¹ all Biology Subjects	Zoology only	B.Sc. Pass University of Singapore ² all subjects	incl. Zoology	Nanyang Univ. Biology
1952	2	2	(7)	0	-
1953	0	0	(23)	7	-
1954	2	0	(18)	7	-
1955	3	0	(38)	8	-
1956	7	3	(25)	4	-
1957	2	0	(25)	5	-
1958	5	4	(34)	9	-
1959	11	6	(39)	13	-
1960	8	5	(61)	16	11
1961	11	8	(26)	3	8
1962	4	3	(53)	13	33
1963	14	5	(70)	11	39
1964	22	7	(77)	10	47
1965	15	6	(110)	27	43
Total	106	49		133	181

Note ¹ B.Sc. (Honors) is a second degree (after B.Sc. Pass) so that these students have already appeared under that column (at either University).

At the University of Singapore the Pass degree is a general one which may or may not include biological subjects. In the next column is shown those taking Zoology, they may have taken other biological subjects as well.

Project of introducing the Idea of Conservation in Vietnamese Schools¹

by

DR. PHUNG TRUNG NGAN

Department of Botany, University of Saigon, Saigon, Vietnam

SUMMARY

In Vietnam there is little public enthusiasm for conservation. The author discusses different ways this concept might be introduced into the teaching program from the elementary to the university level. At the secondary and university levels students should be shown concrete examples of recent happenings in Vietnam that illustrate the consequences of uncontrolled and excessive exploitation.

There should be a thorough revision of the teaching of conservation. It would be desirable to create a new committee in the General Directorate of Schools to consider the problem.

INTRODUCTION

In Vietnam the official authorities and a certain Class of intellectuals are well-informed about conservation but the general public is uninterested in the protection of natural resources.

Numerous laws and decrees have been signed without any positive results whatsoever which proves that effective action can only be accomplished if the public is convinced of the real importance of the problem. It would therefore seem necessary to intensify instruction and propaganda taking into account the local possibilities and conditions for protection and conservation.

TEACHING CONSERVATION

There are two aspects of the problem; on the one hand the introduction of this idea into the teaching program, and on the other the education of the general public with regard to conservation. In this paper we shall deal with the first.

In teaching conservation to children one must learn from the techniques employed in other Countries. A project could be formulated along the following general lines;

1. In primary grades special courses on conservation are not needed, but the idea can be worked into the ordinary program of the school so that the child learns to love and respect the things that surround him and to beautify the environment in which he lives. Excursions to botanical gardens would be an important help. It would be desirable for every school to have its trees, its flowers, its own garden and its little hen-house to be kept and tended by the pupils themselves.
2. In secondary education the idea of conservation can be incorporated directly into the program of natural sciences from the upper third to the final year. The morphological and biological studies of animal and vegetable classes can stress the ecology of these living beings and the necessity of protecting them. The harmful consequences of erosion and of pollution of water and air could be studied and explanations given of the laws and decrees regarding nature conservation.

To be effective the lessons should be illustrated with concrete examples in Vietnam chosen from recent events such as the degeneration of dense forest into low brush or

bare savanna in the Hanoi region since 1955 due to the excessive breaking of new ground by refugees. The aim is to make the pupils understand the facts and principles involved in the protection and utilization of the natural resources of the country and to show them the woeful consequences of an excessive and uncontrolled exploitation.

Extra-curricular work should also be done by the students. We should encourage the organization of tree-festivals or bird-protection days. With the help of regional forest services the students could aid in reforestation and other work projects. This would make them aware henceforth of the seriousness of the problem in question. Guided excursions and museum visits would also contribute to awakening in the students a love of nature and the wish to protect the natural resources of their country.

3. On the university level, in the near future, chairs in Protection of Nature should be created in the Faculties of Science and in the Agricultural Colleges. There should be laboratories specializing in different aspects of conservation in Vietnam. At present a compulsory course in protection of nature should be started in the Teachers' Training College and in the Faculty of Pedagogy. In order to form a corps of instructors capable of inculcating the idea of conservation at all levels of teaching.

CONCLUSION

While some aspects of nature conservation have been touched upon at the secondary and university levels, the hours devoted to this have been insufficient and the program inadequate. The crucial point is a revision of the teaching of conservation. It would be desirable to create within the General Directorate of Schools a committee of three to five members who could study the problem, edit books, and furnish the necessary teaching aids.

Conservation Education in Curriculum Improvement Projects in the Philippines

by

DR. DOLORES F. HERNANDEZ
*Director, Science Teaching Center, University of the Philippines,
Quezon City, Philippines*

SUMMARY

This paper describes aspects of elementary and secondary school curriculum improvement projects in the Philippines which provide opportunities for the inclusion of ecological principles basic to the understanding of conservation practices.

The first section describes the Biological Sciences Curriculum Study (BSCS) Adaptation Project in the Philippines, and the second section describes the current curriculum improvement projects of the Science Teaching Center, a new project of the University of the Philippines. The annexes include a tentative manuscript for a teacher's guide and a list of major biological themes for biology in Philippine High Schools.

INTRODUCTION

From the educational point of view, conservation education is preventative, and to be effective it must be given to all citizens because conservation efforts succeed only to the degree that they are concerted, sustained, and co-operative. Perhaps the conceptual bases and special terminology are best learned in college, but only a small percentage of the population goes on to higher education. For a wider dissemination of knowledge of basic conservation practices it is best to concentrate on the secondary and elementary levels.

This paper describes those aspects of curriculum improvement projects which provide opportunities for the inclusion in the elementary and secondary schools of ecological principles basic to the understanding of conservation practices.

THE BIOLOGICAL SCIENCES CURRICULUM STUDY (BSCS) ADAPTATION PROJECT IN THE PHILIPPINES

1. Why an adaptation?

Late in 1961 a group of Philippine biologists and educators was organized to consider the possibility of using modified BSCS materials in Philippine schools by adapting them to the Philippine biota. It was decided to adapt rather than to develop a new book because it was cheaper in terms of time and money. Furthermore, since for most of those involved this would be an initial experience in a curriculum improvement project of an interdisciplinary nature, adaptation work would be an excellent first step.

It was decided to select the green version, which stresses ecology, for a variety of reasons, chief among them the year-round availability of flora and fauna close at hand and the opportunity this approach afforded for close work with the natural environment which would develop a greater enjoyment of and appreciation for nature among the people. The choice of an ecological approach did present certain problems as ecology is a new field of specialization and there were few local studies available. However, it was felt that a satisfactory beginning could be made and future revisions might incorporate local studies as they became available.

2. Objectives of the Project and the Adapted Materials

The Adaptation Project had besides the major objective of adapting the green version to suit local conditions, the purpose of training a corps of ten teachers in the use of the new materials.

The work was done over a span of three years. The first year was devoted mainly to the training of teachers and improving their biological background and adapting the laboratory manuals and teacher's guide. The second year the manuals and guide were tried out in ten public schools and two University of the Philippines high schools. The third year was devoted to revising the text, manual, and teacher's guide based on the feedback from the previous year. The ten teachers helped lead regional workshops in the use of the new materials.

The adapted course is designed to present the high school student with the biological problems he will face as a citizen, including those concerned with conservation, food production, health, reproduction, race and heredity. The laboratory work provides rich opportunities for experiences relevant to conservation including many field trips. Some exercises involve discussion and analyses of data bearing on biological principles basic to conservation. The exercise on the Kaingin system - a shifting agricultural practice - in the Philippines leads the student to analyze from an ecological viewpoint the changes which take place in a region where the Kaingin system is used.

The course is designed to develop techniques of inquiry in the students, competence in critical thinking and that humility essential to scientific investigation.

3. Acceptance of the adapted materials

The adapted materials are most successfully used by teachers who have been trained in their use. Over and above the ten teachers who were originally trained over eighty biology teachers have participated in summer institutes of six weeks duration organized for this purpose. In addition there have been regional workshops and seminars.

The adapted materials continue to be used in the school that participated in the 'experimental year', and some of the teachers who have been to the summer institutes use selected exercises from this material which they introduce into related units of their school's syllabus. However, the method by which the new materials were developed did not follow the regular procedure required by the Board of Textbooks. As a result it is not certain that official approval for their use in public schools as texts can be obtained; this does not apply to private schools.

CURRENT CURRICULUM IMPROVEMENT PROJECTS OF THE UNIVERSITY SCIENCE TEACHING CENTER

A new University of Philippines project, the Science Teaching Center, financed by the Ford Foundation, has for its major goal the development and production of curriculum materials in science for elementary and secondary schools. The materials are being produced through the joint efforts of scientists, educators, and practicing teachers.

1. Elementary School Level

The content of the first five grades emphasizes the study of living organisms through the first hand study of the physical and biological characteristics of their environment. Grade I deals with basic needs of living things; Grade II - meeting those needs; Grade III - growth and development; Grade IV - movement, and Grade V - life processes. In the sixth grade man and his relationship to the biotic and abiotic environment are studied and the idea of conservation and its significance is brought out. (see Annex A for a sample lesson).

2. Secondary School Level

The emphasis in the first year of high school is on earth science and this emphasis continues into the second year high school course. In the second half of the second year the course is devoted mainly to the study of the effects of the physical environment on living organisms. This part of the course also introduces the student to the study of biology which is usually continued at the third year level.

The High School Biology Committee of the Science Teaching Center is developing three volumes intended as supplementary teaching materials to be used with the BSCS adaptation previously mentioned. These include:

- (a) a volume on common plants of the Philippines,
- (b) one on common animals, and
- (c) a third on the gene concept.

Within the context of each section of the books the biological themes incorporated in the green version (see Annex B) are indicated or developed wherever possible. Furthermore it is intended that the idea of utilizing and conserving materials will be developed in the description of specific organisms included in each section when applicable.

CONCLUSIONS

These then, are the basic ideas relative to conservation that underlie the development of the biological portions of the projected curriculum materials. To produce materials which will help educate for conservation, however indirectly and modestly, and which at the same time takes account of sound pedagogy is no mean task, but it will certainly be rewarding. If such materials do not help in discovering scientific talent of a high order, they will at least provide students with reliable knowledge of the physical and biological world. It is the world in which they live, and the more they understand it, the better their chances of controlling its harsher forces and enhancing its life-sustaining aspects.

REFERENCES

- American Association of School Administrators 1951. Conservation Education in American Schools, 29th Yearbook, Washington, D. C.
- Munzer, Martha E. and Paul F. Brandwein 1960. Teaching Science Through Conservation. McGraw-Hill Book Co., New York.

Science Teaching Center

TENTATIVE MANUSCRIPT FOR TEACHER'S GUIDE

(All rights reserved - Copyright Pending)

ELEMENTARY SCIENCE VI

E. MAN AND HIS PHYSICAL ENVIRONMENT

3. THE LITHOSPHERE

Overview:

Soil is an important part of the environment of many organisms. Although considered non-living, the soil actually has both living and non-living components. It is a product of both physical and biological processes. Plants and animals as well as rocks contribute important components to it. There are different kinds of soils depending on the factors producing it - the climate, vegetation, parent rock, drainage, and age. This unit will acquaint the pupils with general characteristics of the soil, the processes by which it is produced, and the role it plays in the development of large vegetational areas like forests, grasslands and deserts. There will also be a study of the effects of man's activities on the lithosphere, both constructive and destructive.

LESSON 1

THE GENERAL CHARACTERISTICS OF SOIL AND HOW IT IS PRODUCED

Objective:

At the conclusion of this lesson, the child should be able to:

1. Describe the different layers of soil.
2. Explain how rocks are broken down into soil.
3. Explain the importance of organic matter (both living and dead) in soil.

Vocabulary:

Layers, humus, top soil, leaching, decompose, organic matter

Materials:

1. Two soil pits at least 30 cm deep.
2. Several magnifying glasses.
3. Two samples of top soil, one very rich in humus, one quite sandy.
4. A pit in a shady, damp spot about 30 cm deep.
5. Two large tin cans.
6. Two pails.

Originating the Problem

Unless one lives in a very flat area it is easy to see different kinds of soil within the community or a few kilometers away. Have the children bring in samples of different kinds of soil. See that they include several different kinds such as sandy, clay, gravelly, rich loam, etc.

Each child should describe his sample (whether light or dark, whether the texture is fine gravel, coarse sand, clay, etc.). He should also describe the place where he obtained it and what kind of plants grew there.

Make a chart on which is put the name of the child who brought the soil sample, the texture of the soil (sandy, clay, etc.) the color of the soil, the plant cover of the place from which it came, and a description of the place from which it came.

Take the class out to look at different types of soil in and around the school yard. Collect samples and add this information to the chart.

Procedure

1. Activity 1: Dig a soil pit in a grassy spot at least 30 cm. deep (or deeper if the digging is easy) and wide enough to allow observation. (Or take the class to a fresh excavation - along a ditch or a road project). Point out the different layers in the soil. (These are called horizons but this technical term need not be introduced). These layers are called the soil profile. Have the class make a diagram of the soil profile, describing each layer and measuring how deep it is. On the surface are grass stems mixed with litter (dried, undecayed leaves and twigs and perhaps animal matter). Material which was once living organisms (either plant or animal) is dark and has much partly decayed organic matter (such as leaves, roots, small animals) as well as living plants and animals. The decomposed organic matter is called humus. Ask the children if they think plants grow well where there is not this layer of top soil with much humus. The effect of this humus will be investigated in the next activity. Have the children dig out some of the top soil so that they can study it in more detail in order to see what it contains. Look for the various insects, larvae, and worms living in it. Study its constituents with the magnifying glass. Notice the pieces of partially decomposed organic matter.

Below this top dark layer is a lighter layer where much of the organic material has been washed away by water seeping down through the soil from the surface. How much of this has taken place depends on the rainfall and drainage. This process is called leaching. The washed off material usually accumulates in a lower layer (which is therefore darker). It gradually is chemically changed into inorganic material). As one goes lower there is less humus. Finally there is the parent material or rock from which the soil has been developed. These lower layers may not be seen easily if the excavation is not deep enough, but an eroded hill side or a road project should show these layers.

As the pupils observe the roots and small animals in the soil, ask them how these animals could breathe under the ground. Also how does water move down through the ground? Help them see that between the soil particles are spaces through which air and water move. Which would be better for growing plants, loose or tightly packed soil? (Loose). Why do farmers plow before planting? (To loosen up the soil so that air and water can get in more easily). How do some insects help in loosening up the soil? (Worms in burrowing for food loosen it up).

Repeat the digging of a soil pit in another spot where there is much less plant cover and the soil seems poorer. Construct the soil profile diagram and compare the appearance and thickness of the different layers. Discuss the relation between the plant cover and the depth of top soil layer.

2. Activity 2; Collect a sample of top soil that is very rich in humus (perhaps from the first soil pit) and another sample of top soil that is much more sandy (perhaps from the second soil pit). Put the samples into two large cans with holes punched in the bottom so that water can drain out. Place each can over a separate pail and pour the same measured amount of water into each sample. The amount of water should be enough to wet both samples thoroughly.

Have the children observe and record how rapidly the water drained through each sample, what amount of water was absorbed by each sample, and which sample had more matter washed out of it by the water (leached out). Why is humus in top soil vital to plant growth? (It enables the soil to hold the water longer, thus making it available to the plant between rains. It also supplies nutrients that plants need as well as making soil less sticky and tightly packed). Why will the soil become poorer for

plant growth if all the plants growing on a farm are harvested or eaten by animals? (If no plant material is left to rot and form new humus, leaching will remove the humus from the soil).

3. Activity 3; A discussion on the development of soil should follow after the pupils have recognized the general structure of the soil. How are the rocks broken into smaller bits? Climate acts upon the rock; the alternation of heat and cold, wind and water movement break large boulders and grind them into small bits. Is ground-up rock all there is to soil? If possible have some of the children break up some fairly weak rock, crushing it into fine pieces. Does this look like the top layer of the soil? (No) Is fine sand the same as soil? (No). In nature as the rock is broken up the minerals then that make up the rock material are dissolved by water and made available to plants. How do the plants help in the process of making soil? Find a plant which is growing on a large rock. Have the class look closely at where the roots grip and penetrate the rock. If necessary, point out to them the crumbled rock and soil around the roots. The roots give off acid which speeds the disintegration of the rock into fine pieces. Also the roots grow into the ground and take up water and minerals. These materials and the carbon dioxide from the air are combined by the plant to produce new organic materials by means of photosynthesis. Thus it grows. The plant, in turn, may be used as food by animals. When the plants and animals die their remains go back to the soil and serve as food to micro-organisms. These are the bacteria that change the litter of plant and animal matter to decomposed organic matter. It is the same process that we see when fruit spoils or meat rots. The children should be made to realize that these are the same type of organisms (bacteria) considered harmful when they attack humans or living animals (or cause spoilage in plant or animal matter we wish to use for food). They play a very important, constructive role when they convert dead plant and animal litter into useful humus which is a vital part of soil. It makes the organic matter available for new growth. Fungi and larger insects like earthworms and termites also play an important part in this. To study the decay and decomposition of plant matter dig a hole about 30 cm. deep in a shaded part of the school yard. A somewhat damp place would be best. Fill the pit 2/3 full of fresh leaves and grass (or other fairly soft plant matter). Cover with dirt and assign some children to water the pit daily so as to keep it damp. At the end of two and then four weeks remove the soil covering and inspect the plant matter. Try not to mix the soil with the plant matter in so doing. Have the children describe the changes and relate them to the humus they found in the top layer of the soil in Activity One.

Some plants produce and return to the soil much organic matter each year, while some return just a little. It is a slow process for plants to build up humus in the soil. Aside from the kind of parent rock, climate, and plants, the slope and drainage modify the kind of soil in a place. On mountain sides, the surface is easily washed off by rain if there are no plants to protect it. On flat land a swamp may develop if the drainage is poor. The plants that grow in these places also differ. Thus, swamp and well-drained areas may have different kinds of vegetations and soil structure even in a region where the climate and parent rock are the same. Have the class try to relate the kind of soil obtained in the samples collected in Originating The Problem with the vegetation of the area where they were collected. Was the top soil richer in humus where there was a thicker vegetation cover? Why? (More vegetation produces more humus). Why might the top soil be thicker and richer in a region poorly drained than one well drained? (Good drainage often means more leaching).

Appraisal:

Some questions that might be raised are:

1. What kinds of soil are best for growing most plants?
2. Why are chemical fertilizers needed in some soil?
3. Why do farmers sometimes mix manure with garden soil?
4. Why will rich soil not develop in a very dry place such as a desert?
5. Will rich soil develop faster in a tropical or a cold climate if the rainfall is the same? Why?

6. How do small animals like earthworms help in the development of the soil?
7. How do bacteria help in soil development?

LESSON 2

THE ROLE OF SOILS IN THE DEVELOPMENT OF VEGETATIONAL AREAS LIKE FORESTS, GRASSLANDS, AND DESERTS

Having learned the parts of a soil and a brief description of its development, the pupils should now be ready to learn that with different climatic conditions especially rainfall, the soils and the vegetation that develop are also different. Previous lessons on the atmosphere will give the student the necessary background for *the* understanding of the different climates at various altitudes, latitudes, and their favorable and adverse effects on plants, animals, land forms, etc.

Objective:

To learn the factors that bring about the development of forest, grassland, deserts.

Materials:

1. A diagram showing the relations of types of biomes to variations in temperature and precipitation. (The diagram is given below. For a definition of biome see Background Information.)
2. Several pictures of different biomes: a region of perpetual snow and ice; a tundra; an evergreen forest; a grassland; a forest; a desert.
3. Soil cover map of the Philippines.
4. Rainfall map of the Philippines.
5. A grass plant.
6. A cactus plant or any other succulent.
7. A woody shrub.

Vocabulary:

tundra
grassland
desert
forest
biome

Originating The Problem

Show the class some of the pictures of the different biomes without giving them any names. As what is the difference between two of them - perhaps a picture of a grassland and a forest. If they went to such a place would they expect to find different animals as well as different plants? Group the pictures into different types: ice covered, tundra, evergreen (coniferous) forest, grassland, forest, desert. Ask for the children's ideas on what to call each type. Do introduce the terms - grassland, forest, desert.

The names for the other ones are not important as long as they are reasonably descriptive. Explain that a region together with the kinds of plants and animals that live together in it is called a biome. Thus a forest, with all the trees, shrubs, and animals is one type of biome. The grassland is another. Get the children thinking about what it is that makes a place be a certain type of biome. Why is one region a grassland and another a forest? Tell them they are going to study this. Also have them discuss the kind of vegetation of places that they are familiar with.

Instructional Procedures

1. Activity 1; First discuss the desert since the relation between climate and type of plants is quite easy to see. Describe, using pictures as much as possible, the desert vegetation and the desert climate (See Background information).

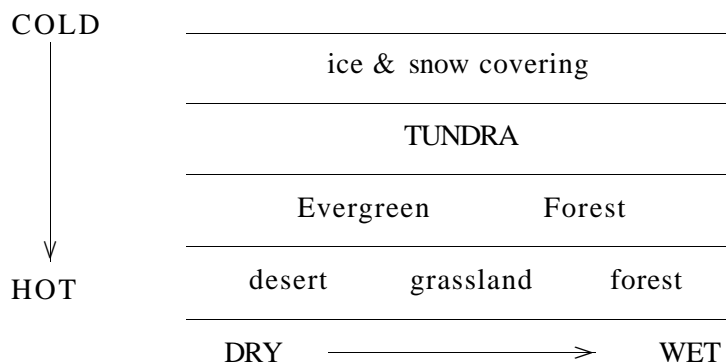
Show a cactus plant (or any other succulent) and ask the child to describe its peculiarities; no leaves (or very small deciduous ones) for most succulents; fleshy green stems with plenty of water storage tissues; thick spines for protection against browsing animals, and against water loss from large surface areas. Have the children discuss why they think this plant could more easily live in a desert than the plants they are familiar with in wetter climates. Why are plants in the desert so scattered? (Because each plant uses all the water in a relatively large area.) Why do some plants in the desert have very short life cycles - growing up, flowering, and dying out in just a few days or weeks? (So they can reproduce during the brief rainy periods). Why is desert soil so sandy and does not have much humus? (Because there is little vegetation to decompose and form humus.)

2. Activity 2; Show the class pictures of natural grassland and forests. (The forest land should be fairly level, not mountainous). Explain to the class that most of the Philippines is naturally forested and that the existing grass areas are due to cutting and burning of trees by man to clear land for crops. However, there are areas (the American prairie, the African veld, the American pampas, etc.) which have about the same temperature as the Philippines but which are naturally covered with grass and have few trees. Get their ideas why grass grows naturally in one place, but trees grow naturally in another.

Pull gently from previously watered, loose soil a grass plant taking care not to destroy the roots. Wash off the soil carefully and then ask the pupils to compare the roots and the shoot. Which has the greater bulk, the shoot or the root? Which has the greater surface area?

Compare also the root system and the shoot of a shrub (or an uprooted tree). The tree roots are larger and go deeper into the soil than the grass roots, but they are less extensive (less surface area on less bulk) in proportion to the size of the plant. If there was little rain which would do better in getting water, the grass or the tree? (In dry conditions the grasses have the advantage over the trees because grass roots, being more extensive, can quickly absorb the moisture seeping down through the upper layers of the soil after a light shower, before the water reaches the roots of the shrub or tree which are way below). If there is sufficient rain for both grass and tree which plant will do better in terms of getting the sunlight necessary for photosynthesis? (The trees will grow up and shade out the grass). Trees, however, grow slowly compared to grass. What would you expect to happen after a forest is burned over or the trees cut down? What would grow first? (Grass will grow first, then bushes. It will take many years for the trees to take over again, especially since trees do not reproduce or spread as fast as grass). The children should be able to give examples of this kind of man-made grassland. If the class is interested, the discussion can be continued into why in grasslands the soil has a large amount of humus; (grass, being short-lived returns a large amount of organic matter to the soil annually) while in forests there is much less humus (the larger precipitation causes excessive leaching of the soil).

3. Activity 3; Introduce the diagram which gives the relation between type of biome and variations in temperature and precipitation.



Have the class review what has already been discussed about desert, grassland, and forest relative to precipitation and relate it to the diagram. Since the arctic conditions are so completely outside of the students experiences, they will mainly have to be described by the teacher without much participation by the class. (See Background Information). The main point should be that even in the most inhospitable and extreme climate there are forms of life well adapted to those conditions.

Present the soil cover map and the rainfall map for the Philippines. Get the children to find what relations they can see between the two. Ask them what other things besides rainfall might determine whether a region is forest or grassland. (Rough mountains, sandy or poor soil, man's activities which remove trees, marshy areas).

Appraisal

1. Why are most of the big grasslands of the world far away from the oceans? (Near the ocean the rainfall is usually high which produces forests).
2. Show a picture of a land which is a mixture of grass and trees (not evergreen). Ask the children to describe what the climate is like. (Warm or hot with a medium rainfall).
3. Show a picture of a thick jungle (tropical rain forest). Ask them to describe what the climate is like. (Warm with a large amount of rain).
4. Why can't polar regions have vegetation like the tropics?
5. Why are the grasses in the open field healthier or greener than those growing (if there are any) under the trees?

Background Information

Biomes are the largest (worldwide) ecological units generally recognized; the tundra, coniferous forest, the temperate forest, the tropical forest, the grassland and the desert. They are named after the major climax vegetation that has maintained itself in the region over a long period of time. Since vegetation reflects the major features of climate and determines the nature of the habitat of animals, it provides a basis for ecological classification. The term 'biome', thus expresses the relationship between climate, vegetation and animal life.

The types of vegetation found in any given area are the result of the action of the environment upon the plants. They reflect closely the sum total of all the environmental factors like rainfall, temperature, light, mineral content of the soil and other physical factors, aside from human factors.

In the cold high latitudes the region of perpetual frost, the tundra and the coniferous forest occur. In warmer, mid- and low latitudes, the deserts, grasslands, and forests (and other intermediate forms) occur.

1. In region of perpetual frost the temperature is so low that the ground is covered with ice and snow at all times. No soil is visible. But life is not entirely absent. Mosses and lichens may be present on what seems at first to be bare rock.
2. Tundra is an arctic grassland. It is found where climatic conditions are extreme. The vegetation consists of mosses, lichens, grasses, sedges, and hardy low shrubs (not trees). With very low temperatures most of the time, the ground remains frozen except for the upper few inches during the brief summer. When the surface thaws out during this brief period, the water does not drain away but is absorbed by the spongy vegetation. Drainage is very poor. Bacterial action is very slow due to low temperature so there is an accumulation of undecayed vegetation.
3. Evergreen (coniferous) forests are found in regions where temperature is slightly higher than tundra conditions but fluctuates within a greater range. There is alternation of long severe winters and short cool summers, a marked seasonal contrast. Great temperature ranges are experienced. Rainfall is low and most of it comes during the short summer: the winters are dry and clear. When rainfall is light, fog satisfies the water requirements.

Soil development is slow because the land remains frozen for so long. Humus is not thoroughly mixed with the soil and remains as a highly acidic accumulation. The needle-leaved evergreen trees like the pines, firs, spruces, predominate. There may be a well-developed growth of short trees as well as mosses. In drier areas, the trees form a dense shade resulting in a poor development of shrubs and herbs.

4. Vegetation reaches its maximum development in the middle and low tropics latitudes where temperature and moisture conditions are favorable for plant growth. Depending on the amount of precipitation, an area will support any of the three forms of vegetation - forest, grassland, or desert.

There are different types of forests; tropical rains forest, deciduous forest, and thorn forest, depending on moisture conditions. Thorn forests contain small hardwood trees which are often twisted and thorny with small leaves which are shed during the dry season. Where there is greater precipitation with a definite dry season a deciduous forest develops. Part of the year the leaves are off the trees and the herb and shrub layers therefore develop at this time.

The tropical rain forests are found where rainfall may exceed 80 or 90 inches annually with no prolonged dry season. In most of the tropics the dry season is but a season of less rain. A tropical rain forest supports a variety of plant and animal life. While a coniferous forest might have only two or three kinds of trees per acre, a tropical rain forest may have a hundred or so.

Tropical forests supply a large amount of dead twigs and leaves but bacterial action is rapid due to high temperatures. With heavy rainfall which causes excessive leaching, humus accumulation is kept at a minimum on forest soils. Leaching occurs where there is precolation of water and is at a maximum in hot and rainy climates. (In cooler climates, bacterial action is not rapid, and with less rainfall as compared to the tropics, accumulation of humus is greater, as in grasslands). Thus tropical soils are not very fertile; they get worn out, i.e., lose fertility, after a few years use.

5. Natural grasslands occur in places with an annual rainfall of 10 to 30 inches. The following factors are characteristic of grassland areas:
 - (a) Relatively level surfaces; There is not much erosion and the soils show well-developed layers.
 - (b) Moderate rainfall; There is not much leaching and the soil is not heavily robbed of its soluble constituents.
 - (c) Large amount of humus; Grass, being short-lived, returns large amounts of organic matter to the soil annually. These areas, therefore, are rich in humus, retentive of moisture and very productive. Some of the most fertile soils of the world are found in grassland areas.
6. A desert region results when moisture is extremely deficient, the rainfall hardly exceeding 10 inches annually. Most of the time it is dry and hot. Air picks up its moisture while moving over the ocean. Deserts often occur behind mountains because the air loses its moisture when cooled in passing over the mountains. When rain does come to the desert regions it is usually sudden and intense, washing away the surface soil. The abundant sunlight causes rapid evaporation of the water. Also strong winds blow away fine soil particles due to poor vegetation cover. This leaves mainly the larger rocky material. The soil has no well developed rich upper layer.

The characteristics of desert vegetation are:

- (a) No complete cover; Although few parts of deserts are entirely barren; vegetation is scattered to reduce competition.
- (b) Low hardy shrubs and grasses between dunes where water seepage brings moisture near the surface.
- (c) Animals; Short life cycles to be able to reproduce during the short periods when rain occurs.

Perennials: Succulent plants with thick cuticles, roots that store water, thick barks, narrow or spine-like leaves so that they can withstand drought and reduce evaporation.

ANNEX B.

MAJOR BIOLOGICAL THEMES¹

1. There is a continual interaction between each organism and its environment; the environment affects the organism, and the organism affects the environment.
2. There is homeostasis throughout the biosphere; communities fluctuate, but the tendency is always toward balance - dynamic equilibrium.
3. There is a great diversity among living things, but it is possible to find patterns within this diversity.
4. Living things have changed through time and are changing today.
5. The structure of an organism can be understood only in relation to function; conversely the functioning of an organism is dependent on its structure.
6. Through the mechanisms of heredity, one generation is linked to the next; thus all living things of the present have a continuity with the organisms of the past.
7. What an organism does - its behavior - is a reflection of its heredity and its experience in its environment.
8. Biology - like any other science - is a process of seeking, an inquiry into the nature of the universe about us. It is always in a state of change, because as new knowledge is acquired, old concepts and theories must be reconstructed.
9. Our present understanding of life and of the biosphere is the result of long history of observation, experimentation, and thought; many men of many nations have contributed in many ways to the building of biology.

¹ Biology for Philippine High Schools; the Relationships of Living Things, pp. 564-565.

What is the Status of World Conservation Education?

by

DR. RICHARD GORDON MILLER

Member, IUCN Commission on Education; Foresta Institute, Carson City, Nevada

SUMMARY

Nature conservation has become a major subject in education because of the rapid rate of destruction of our natural environment. The IUCN, and particularly its Commission on Education, plays an outstanding role in the field of conservation education. Resource ministers and educators feel a special concern that the subject of wildlife conservation be taught more effectively in the schools. Other groups share this concern and the author points out some specific examples of what has been done, both in the school and university curricula and in the education of the public.

INTRODUCTION

Education was once a natural family function directed to preparing the young for life. It had to do directly with the environment. Gradually, however, it drew itself away until its main subject became the communication arts. But now a new worry arises, and we must come back to the living natural environment as a major subject in education, for the new worry is nothing less than the loss of our natural environment. The protection of the environment cannot be postponed despite the present and eternal pre-occupation with man's traditional problems of hunger, war, and poverty. It is important to go forward on both fronts at the same time. We cannot ignore or deny the hungry of today, but we must see their needs in relation to the productive earth of tomorrow. We must develop the education and training which will enable us to husband our living resources so that seed stocks will not be consumed and representatives of successful evolution in the diverse environments of our earth will not be destroyed.

CONSERVATION EDUCATION TODAY

For over 50 years in North America, in Europe, in Asia, and in the other continents, biologists have looked at the problem of, and initiated effort to improve and sustain nature conservation education. But today, suddenly, the technology of destruction has reached such proportions that the voices of education simply must galvanize their strength to match.

Outstanding among them is that of IUCN with its several commissions all devoted to rescuing and sustaining the structure of nature in its natural form. The IUCN's specific permanent Commission on Education seeks to compile what is being done throughout the world, to synthesize the information, and to interpret and make practical the example from one region for another. This year the Commission on Education produced the first compilation of abstracts of conservation teaching aids, textbooks and related articles. Forty-five books and leaflets are listed.

Many countries feel that the economics of resource use should be more clearly presented in the school curricula than they have been and that the needs of wildlife and wild habitats and wild vegetation should be taught to the child in the school. How, when, and what should be taught are questions that are still under discussion.

Without doubt the properly-trained teacher is the vital element but the teacher needs tools - textbooks, guides, aids - which are in short supply everywhere. Even more important, the teacher needs land reference areas near the school where the flora and fauna of a natural environment may be studied, their beauty admired, and their existence revered. A child's greatest need is a natural, easy exposure in a nature preserve to the friends of his environment, to their needs and requirements for living together, and his need to deal carefully with their mutual habitat.

Some groups are especially focused on conservation education; the Conservation Education Association, the National Science Teachers Association, the American Association of Biology Teachers, and the American Nature Study Society are professional groups pooling their interests and their questions for improving conservation education. Universities offer summer and regular training courses. Other individual and group efforts offer training, and some groups, such as Resources for the Future and the Conservation Foundation are specially concerned with establishing through research and study the basic facts on which education and legislation are eventually based. UNESCO and FAO produce particularly valuable resource information.

MEETING OF NORTHWEST EUROPEAN COMMITTEE

A Northwest European Committee of the IUCN Commission on Education meeting in Stockholm in September 1965, recommended that demand be made for environmental education in schools, in higher education, and in training for the land-linked professions. The Committee drew attention to several deficiencies which continue to persist and suggested that teachers be exposed to some training in using the resources of the countryside and especially the techniques of organizing and conducting field studies and of obtaining teaching materials. It noted the value of ecology in striking proper balance between the highly specialized aspects of biology and general field aspects of the earth's sciences. It called attention to the need for educational systems to provide a wider understanding of the natural environment as a contribution to liberal education and asked that regard be paid to the impact of urban and industrial projects and new agricultural techniques and to the impact of man himself in his search for recreation. Finally the Committee emphasized the importance of infusing into the activities of youth movements an appropriate knowledge of wise use and enjoyment of environment as well as a code of behavior for the countryside. A textbook is planned on the theme of environmental education in Northwest Europe.

OTHER MEASURES

Other steps that have been taken include the Mar del Plata Ministers' Conference in October, 1965, an outgrowth of the activities of the IUCN Latin American Committee on National Parks which discussed the conservation of renewable natural resources: increasing attention at the university level to an analysis of the environment as a whole; increasing the ecological approach in the curricula of those students who will be concerned with wildlife either as public servants or administrators; and the creation of such centers as the Study of Conservation Policy at George Washington University.

These events on the conservation front show a widening and vigorous interest in learning but they need to be pushed and more firmly established. In educating for the survival of man we need to know and teach the practical aspects of perpetuating the survival of the living forms which share with us our limited environment.

SOME RECENT SAMPLES OF TEACHING AIDS FOR CONSERVATION EDUCATION

Anon. Animal Tracks. Reprinted from Michigan Wildlife Six Sketches.

Conservation Education Association;

Conservation Quickie: Conservation Anagrams

Conservation Quickie: Nature Study Riddles

Conservation Quickie: Our Need for Water

Conservation Quickie: Toward Safer Hunting

Developing a Program for In-Service Training on Conservation Education for the Public Schools.

Selected References on Conservation Education for Teachers and Pupils.

Conservation Education Association;

Conservation Education at the Grass Roots... How Can We Do It Better? Montana College, Billings, Montana

Department of Public Instruction;

Conservation Tips: Christmas Tree Safety

Conservation Tips: Contours on the Land

Conservation Tips: The Living Chart

Evans and Tostlebe. Conservation Activities for South Dakota Schools.

Midwest-Beach Publ. Co., Sioux Falls. South Dakota.

Kentucky Department of Fish and Wildlife Resources.

Teaching Kentucky's Natural Resources Through Science. Frankfort, Kentucky.

National Audubon Society (1130 Fifth Avenue, New York City, N. Y.);

Manual of Outdoor Conservation Education for Nature Centers,

Outdoor Laboratories, Outdoor Education Classrooms,

Special Park and Forest Areas, Nature Preserves and Sanctuaries, Natural or Semi-Wild Areas, Camp Reservations.

Planning a Nature Center.

Shaner, Richard. Keeping the Forest Primeval. Reprinted from Petroleum Today. Committee on Public Affairs, American Petroleum Institute.

U.S. Department of Agriculture. Conservation of our Renewable Natural Resources, Suggestions for Science Fair Projects in Jr. and Sr. High Schools. (Washington, D.C).

U.S. Department of Agriculture, Soil Conservation Service. An Outline for Teaching Conservation in High Schools. PA-201.

U.S. Department of Agriculture, Soil Conservation Service, Education Section. An Outline for Teaching Conservation in Rural Elementary Schools.

U.S. Department of Health, Education and Welfare, Office of Education. Conservation Experiences for Children.

U.S. Department of Interior, Fish and Wildlife Service. Conservation Notes.

Wyoming Game and Fish Commission;

Our Big 'n' Wild Friends.

Our Feathered Friends.

Our Finny Friends.

Our Furry Friends.

Report on Conservation Education and Training in Thailand

by

MR. CHAMNIAN SA-NGUANPUAG

*Department of Humanity and Social Studies, College of Education. Bangsaen.
Cholburi, Thailand*

SUMMARY

This paper reports on:

1. public education in conservation from elementary through the high school level, and
2. conservation training in teachers' colleges, universities, and agricultural schools.

At the present time in Thailand there is a lack of adequately trained teachers and a lack of texts, and planned field activities of all grade levels.

PUBLIC SCHOOL EDUCATION IN CONSERVATION

Conservation, though limited in scope, has been part of our school curriculum for many years mostly through religious, science, and social studies courses. These emphasized conservation of temples and other religious places, taking care of animals and their habitats, and conservation of national forests.

In 1950 a small group of people in Thailand began to work to make conservation principles more widely known to the public. They tried to have a law passed to protect wildlife and wildlife habitats. Although their efforts met with little success they did form themselves into the Wildlife Association, the first conservation association in Thailand, and this association was able to introduce conservation education formally into the curriculum of the public school system in 1960.

At the early elementary level the student is taught about the natural resources of the country and particularly his own rural area. In grades five, six, and seven students learn about the conservation of natural resources; in the eight grade the conservation needs and problems of Thailand are taught; and in the ninth grade conservation programs in neighboring countries and general conservation principles are stressed.

In senior high school the courses cover conserving specific resources such as soil, water, forest, minerals, and wildlife, and the student is taught how to use such resources wisely.

Despite the fact that these courses have been introduced into the school system there is dissatisfaction with the present status of conservation education. Teachers are not well enough trained in the subject; there are only one or two texts available for all grades rather than one for each level; and there are few field trips or first-hand activities and observations. Although such education goes slowly at the present time there is hope for future success.

TRAINING FOR EFFECTIVE CAREERS IN CONSERVATION

The teaching of conservation centers around three types of institutions in Thailand:

1. teachers' training colleges:
2. universities; and
3. agricultural schools.

A one-term course in soil, wildlife, forest, mineral, and water conservation is required of all students in the teachers' training colleges. This is, however, a lecture course and the student has not opportunity to make field trips to stations or projects or places where conservation principles are put into action. Furthermore those who teach have had no direct experience in conservation.

There are several departments at Kasetsart University and one at Chulalongkorn University which give conservation courses, and the students who take these have opportunities to work in the field. The School of Forestry at Kasetsart University has been particularly notable in producing foresters for the country, and graduates of this university have been the leaders in pilot projects started by the government for soil and water conservation. The pilot projects have not been adopted eagerly by the people as a whole because they have been difficult to follow and understand, but when the directions are simplified it is hoped that more will be interested in this program.

It is unfortunate that many graduates of these universities who should be the leaders in the conservation movement chose to work in offices rather than in the field.

The third class of training, that given in special agricultural schools, emphasizes farming and efficient use of soils and fertilizers. The boys have enough time for field work and after their graduation they often work as helpers on the pilot projects. Because many of them stay and work in the rice stations throughout the country they are often most effective in setting a good example to the people of their region.

SUGGESTIONS

For several years I have been thinking about conservation education in Thailand, and I think if only a few of these suggestions could be worked out, it would improve our educational system.

1. Despite conservation education at almost every grade level in Thailand the teachers do not have adequate guides in teaching this subject.
2. Public schools in Thailand lack conservation textbooks at every level. The text itself should have activity guides for teachers and must stress more methods of conservation in each kind of natural resource.
3. There should be time in the class schedule for field trips.
4. How to conserve our natural resources should be added to the curriculum, the details of the course depending on the background and age of the students.
5. Teachers' training school should emphasize more conservation education and the students should have more actual practice than they do now.
6. The government ought to undertake a program of public conservation education through radio, television, newspapers, and magazines.

Problems of High School Biology Teaching in Indonesia

by

MR. SAMPURNO KADARSAN

Director, Museum Zoologicum Bogoriense, Bogor, Indonesia

and

PROF. OTTO SOEMARWOTO

Director, National Biological Institute, Bogor, Indonesia

SUMMARY

In Indonesia up to now biology has been a neglected science due to lack of understanding of the nature of biology and the role of biology in the development of the country. This is caused mainly by the unsatisfactory method of teaching biology in the high schools. The authors describe:

1. the problems involved,
2. the first major corrective step that has been taken, i.e. a two-week course for high school biology teachers at the National Biological Institute; and
3. future plans for ameliorating the situation.

INTRODUCTION

Strictly speaking the topic of high school biology teaching is out of place in a conference on nature conservation. However, after consultation with Dr. Lee M. Talbot it was agreed that such a discussion would benefit future plans and practices of nature conservation.

NEED FOR BIOLOGISTS

Indonesia is a very large country and many parts of it are still uninhabited. Despite this and because of increasing population, the opening up of new lands for cultivation, shifting agriculture, and smuggling, the protection of many kinds of animals, plants, and their habitats is already a problem. Immediate steps should be taken to protect our wildlife. In order that these may be effective they should be based on sound biological knowledge. However, for the most part we still lack this knowledge. In a large country such as ours there are less than a hundred biologists. Therefore if we want to safeguard our wildlife effectively, steps should be taken for the training of more biologists.

Biology is not attractive to our youngsters. They prefer to choose law or medicine - a fact which we think is not peculiar to Indonesia. Not only therefore is the number of prospective biological students small but the quality of those who do study biology often is poor. They are generally people who are forced to do so since they were not accepted in any other school, due to their inferior scholastic performance.

The main factors which influence the attitude of our young people towards biology are:

- (i) the higher social status of lawyers and medical doctors in comparison with biologists,
- (ii) lesser opportunity for biologists to make money, and
- (iii) lack of understanding of the nature of biology and as well as of the role of biology in the development of the country.

It is of course very difficult for us to change the two first mentioned factors, but it is well within our reach to remedy the third one. We trace it as mainly being caused by the unsatisfactory method of teaching of biology in the high schools. The problems involved are as follows :

1. Biology is taught as a set of facts to be memorized, not as a science.
2. Lack of demonstration material due partly to shortage of teaching aids and partly also to the ignorance of the teachers.
3. Shortage of modern textbooks. Those in use now were written before the war.
4. Theoretical lectures with little indication of the practical uses of biology.
5. Biology is regarded as of minor importance by education officials.

TEACHING BIOLOGY

From the discussion above it seems clear that the teaching of biology forms a bottle-neck in our efforts for the development of the biological sciences in our country. As a first step in correcting this a workshop for high school biology teachers was held at National Biological Institute last September (19-65). The workshop lasted for two weeks with 23 participants who were housed in the Botanical Garden thus ensuring that they were exposed maximally to the biological influence. The teaching staff was drawn from staff members of government institutes and colleges making a co-operative effort in which research scientists and teachers worked together.

The aim of the course was to teach the students to use nature as a laboratory. We concentrated our lectures on biological phenomena in the tropics and taught the students that teaching materials were abundant in their surroundings. Laboratory exercises were given, excursions organized, and recent developments in biology were introduced by means of lectures and films.

It is too soon to tell if the teaching of biology can be improved by this means but the results of the course seem heartening and the enthusiasms of the biology teachers has been aroused.

CONCLUSION

As a result of this first experience we plan to proceed as follows :

1. It seems justified to hold the course at least one a year in order to up-grade the high school biology teachers. Because the number of teachers is large and the facilities of the National Biological Institute are limited we will not try to up-grade all high school biology teachers, but rather serve as a nucleus to disseminate 'new findings and stimulate other institutions to take similar steps.
2. Produce better teaching aids.
3. Publication of a more popular scientific journal for teachers to keep abreast of new developments in biology.
4. A new textbook should be compiled as soon as possible, based perhaps on the American BSCS.

Part 2

Training in Conservation

Training Asian Students in Resource Management

by

DR. ROBERT L. RUDD

Department of Zoology, University of California, Davis, California, U.S.A.

SUMMARY

The author points out the obvious needs for and problems related to training in resource management in general and for Asian Trainees in particular. Trainees are likely to be already in government service and lack university training and both time and funds for lengthy programs of study. A minimum of 4 months and preferably 1 year is required for any comprehensive study period abroad. The author presents a 6 month to 1 year program consisting of 3 component parts: institutional affiliation, internal travel, and operation of public agencies. He discusses and outlines the important aspects to be covered within each of these component parts.

INTRODUCTION

At a time in earth's history when the pressures of human numbers challenge our abilities to sustain and to enhance wise utilization of natural resources, it becomes a truism to say that effective training in resource management is both good and desirable. No one can oppose the purpose. Yet even in technologically advanced countries resource training is not generally available in organized programs of study. Various expedients within university curricula and governmental agencies have been followed to satisfy the obvious need.

The need to train conservation and resource officers in Southeast Asia is equally obvious, but in this area too certain expediences are required. The major differences between candidates for intensive training in resource management in South East Asian countries and in the United States, for example, are two. First, in the United States there are far more students educated at the university level in curricula basically related to resource analysis. Hence, a sizable body of well-trained people adaptable to specialized resource training is available. Secondly, specialization in public agencies and the corollary awareness of the desirability of continued education within specialized capacities are a well established custom in governmental administration. These differences between the United States in this instance and most South East Asian countries render particular meaning to my belief that, initially at least, expediency is the rule in training Asian resource-oriented officers.

BACKGROUND OF TRAINEES

Asian candidates for specialized training are apt to be already in government service, lacking in university training (relevant at least to resource management), and lacking in both time and funds for lengthy programs of study. It may be assumed that such candidates are able, interested in the technical aspects of resource management, and have sufficient educational and practical experience to undertake further study. It may be further assumed that the governmental agencies concerned will grant sufficient leave time and make available such funds in support of the candidate as is possible. Very likely, however, funding under the control of various international organizations must be depended upon in good part if a period of training abroad is required.

PROGRAM OF STUDY

In my opinion four months is the minimal period required for any comprehensive study period abroad. Only a senior official with special problems requiring resolution in mind will profit by shorter stays. Preferably a study program should be at least one year. Where the site of study is to be depends on many factors. I shall discuss only a program adaptable to study in the United States and Canada. The program discussed below requires six months to a year for its execution. It has three major components; Institutional affiliation: internal travel: and operations of public agencies.

1. Institutional affiliation

The basic choice here is between an established college or university offering resource-related programs of study and public agencies already operating in resource management. There are advantages to each type of affiliation. Generally, affiliation with public agencies is a better choice for experienced candidates with only a short stay in mind. For longer periods university affiliation is preferable for it offers not only the contact with public agencies but several other advantages as well. A trainee might be expected to accomplish the following program at a university in six months to one year's time.

- (a) Attend formal lectures on the biology, geography of management of natural resources. Major universities all have relevant curricula; several universities and colleges in the United States and Canada have administratively separated resource programs.
- (b) Learn to use the facilities of a research library. It is imperative that a trainee know well the sources of published information upon which he will draw in the future.
- (c) Associate with other students and trainees. Informal association with others interested in resource problems is an invaluable source of information and judgment and it, of course, provides pleasurable social contacts. There are as well on many campuses local student or professional organizations that formalize these interests.
- (d) Prepare formal reports on progress. As a measure of the candidate's application and knowledge, a supervisor or sponsor might expect written reports on selected topics. Ordinarily these reports will concern specific topics of need or interest appropriate to the country of the trainee.
- (e) Prepare detailed research or organizational plans for specific operations in the home country. This last phase is the most significant and should be reserved for the last months of the candidate's stay. It constitutes a measure of the candidate's learning and a prediction of the likely effectiveness of the candidate upon return to his own country.

2. Internal travel

Normally a trainee will have a fixed base in his host country. It should not be expected, however, that the trainee remain only at his base whether university or governmental agency. Planning the candidate's program of study must include both time and funds for internal travel. The purposes of such travel are inspection visits, consultations, and attendance at professional meetings. The nature of visits will vary with the candidate's interests. They might include inspection of the operations of specific agencies, particularly of national or regional headquarters. Visits to special sites such as national parks, management areas, refuges, and research stations are certainly desirable. Consultations will normally be within agencies related to the candidate's direct responsibilities in his home country and will preferably devolve upon particular individuals professionally known for their specific abilities in the area of the candidate's interests. Attendance at national meetings (e.g., the North American Wildlife Conferences) has the value of contact with leaders in the resource field and of listening firsthand to reports on the current status of many resource problems. The value of personal contacts made at these meetings for the professional future of the candidate can not be minimized.

3. Operations of Public Agencies

Proper use of natural resources requires governmental regulation. In the United States and Canada a great many agencies of government are charged with the administration of resources. Since an Asian candidate for resource training very likely will return to government service, it is imperative that he understand the manifold aspects of resource administration in countries where it is highly developed. Needless to say, the candidate upon return to his own country will need to decide what aspects of administration and management are most suited to his own situation.

Rather than list specific agencies, let me outline the general categories of administration common to all such agencies. I need also to emphasize that the practical student, whether university or agency based, must consider the operations of public agencies as a prime interest of his studies.

- (a) Administration - the selection of personnel; the structuring of the agency; the relationship to other resource agencies.
- (b) Sources of support - the sources of funding and the manners by which funds are acquired and allocated.
- (c) Law enforcement - the legal basis of resource administration and the manners of enforcing regulations.
- (d) Education - the techniques of public education in conservation and the manner of 'in-service' training for specialists in governmental employment.
- (e) Research - the methods of management research; determining priority of research programs; the problems of policy-directed research.
- (f) Management in operation - the immediate problems and effectiveness of resource management programs in practice.

CONCLUSION

The foregoing program is demanding and only the best, self-disciplined candidates can expect to profit by it. Nor is the program the ideal! Yet I believe from my experience in South East Asia and in training Asian students in the United States it constitutes a reasonable approach to resource training at this time. We might expect a concerted effort to train many Asians in the methods of resource management to lead naturally to local educational programs particularly adapted to the individual countries of South East Asia.

Specialist Wildlife Training from the Standpoint of an Asian Trainee

by

MR. MOHAMAD KHAN

*Game Department, State of Perak, Malaysia; and Department of Zoology,
University of California, Davis, California, U.S.A.*

SUMMARY

The author, a trainee from a Malayan Game Department, highlights some of the important factors in his own overseas training program in the U. S. and Canada and gives a summary of what he has gained from the experience, including his conviction of the value of wildlife management and what it involves. He discusses various aspects of wildlife management and training that are particularly applicable to South East Asia in general and Malaya in particular - including the necessity of selecting interested and appropriate personnel to do wildlife work and presents suggestions and recommendations.

INTRODUCTION

As a member of the Perak Game Department I was exceedingly interested in the procedures for carrying out research on the larger mammals of Malaya in order to obtain quantitative data for use in making administrative decisions. The opportunity to study in the United States as a Fulbright exchange scholar made it possible to begin my technical studies.

It was decided that on the academic side I should spend as much time as possible studying in the library and working with departments and students engaged in research related to my desire for practical knowledge; second, that I should work in the field, in laboratories, offices, and with the staff of the State Fish and Game Department, National Park Service, and Zoos; third, that I should attend as many conferences on wildlife as possible.

OBSERVATIONS

A period of eight months has gone by and I have derived a good understanding of the following principles of wildlife management:

1. The welfare of birds and mammals depends on complete protection at the time of nesting and breeding and on a limited harvest of the annual crop so that the losses to a game population through hunting and natural destruction are offset by natural reproduction.
2. A combination of biological management, law enforcement, and the formation of game refuges and sanctuaries to provide breeding grounds to preserve rare or vanishing species is necessary to ensure the survival of wildlife.
3. Wildlife departments should be responsible for making surveys of game populations for effective management measures. These would indicate where population control was necessary or point out where refuges or other protection was needed.
4. Related departments such as fisheries and forestry should integrate their practices to develop and maintain game populations.
5. Biologists should be invited to participate in proposed timber sales or logging operations, and in planning for forest improvement so that an interspersion of plant species beneficial to game animals can be achieved.

6. Intensive management units should be established. Areas are needed where dense populations of important species can be established in order to provide breeding stock which could populate neighboring areas.
7. Administrative decisions should be based on the results of research findings recommended by the biologists.

CONFLICT BETWEEN WILDLIFE AND AGRICULTURE

It often appears that wildlife managers and agriculturalists are in direct conflict, the former interested only in land use as it pertains to game species and the agriculturalist wanting land only for his own direct purposes. However, co-operation for the benefit of both can be achieved in several ways. I will discuss only those methods I feel to be most effective in South East Asia.

In Malaya small plots of land scattered throughout the country have been given out to families for agricultural purposes. Many of these are in remote areas close to game herds which are often stranded in patches of forest. They then break out with consequent damage to crops and the resultant human demand to exterminate the herd. Had these plots been grouped together in one large development, crop deprecations by wildlife would have been easier and cheaper to control.

Prior to deciding that land should be put to agricultural use the government should consult with the wildlife manager to avoid such errors as clearing land for agriculture in places particularly attractive to game, as between natural salt licks, with the resultant wildlife deprecations.

TRAINING FOR WILDLIFE MANAGEMENT

I strongly feel that the correction of problems depends on experienced officers and that intensive training more speedily renders an officer capable of understanding the varied problems he faces. Basic problems remain the same whether in the United States or Malaya, and wider experience enables quicker identification of those problems unique to an area.

The study program for a trainee with limited time and/or education should be tailored to his abilities. He should be taught basic principles of wildlife management and suitable procedures for carrying out research on important aspects of wildlife.

Fully qualified wildlife management personnel should attend to more difficult biological problems such as disease, poisoning, parasites and things of similar nature. Expert big-game biologists would make excellent advisors in many of the South East Asian countries and each completed research project would be an important contribution.

In Malaysia at the present time a research division should be set up consisting of one big-game biologist with one or two assistants. Objectives should be to obtain quantitative data which could be used in making administrative decisions relative to control programs on the habits, populations dynamics, habitat relationships, and ecological relationships of animals. An annual report should be prepared to include research findings, a summation of management programs and a suggested program for the following year. Technical publications should be prepared on the completion of each project.

Wildlife officers should be carefully selected for their suitability for wildlife work. Many applicants for these positions have no aptitude for the work at all and apply upon leaving school simply because there is a vacancy. To overcome this, members of the wildlife department should sit in on the selection board. Scholarships and other grants for special training should be distributed on the basis of individual merit and not on status. Those returning from study abroad should be required to prepare a detailed report of their training and to pass on their newly gained knowledge to others in their fields of interest.

I have personally been fortunate in the way that my training was planned in the United States and Canada. It has given me a clear picture as well as practical knowledge of the problems in North America and I have been able to compare these with those of Malaya. There is no doubt in my mind that research is very urgently needed in Malaya in order to solve the pressing problems before us. Information thus obtained when applied within existing law enforcement practice would greatly help solve the immediate and pressing problems before us in Malaya.

Education and Goals in Wildlife Conservation

by

DR. RAYMOND F. DASMANN

*Division of Natural Resources, Humboldt State College, Arcata,
California, U.S.A.¹*

SUMMARY

The value of wildlife as a resource may be realized in several ways, recreational, economic, and scientific. In order for the government to discharge its obligation toward conservation of the wildlife resource it must rely on well-trained staff. The nature of wildlife training and the general scientific background required are discussed in this paper. A national wildlife conservation program needs to be developed in several stages starting with an initial survey, going through a phase of research and experimental management and having as a goal a continuum of land-use and wildlife conservation practices extending from remote wilderness to urban lands.

WILDLIFE VALUES

Wild animal life represents a natural resource of great value to any nation fortunate enough to possess a rich and varied animal fauna. If properly preserved and managed the wildlife of a nation can be of direct economic value as well as contributing to the enrichment of the aesthetic life and scientific knowledge of its people. A nation that allows its wildlife resource to be depleted or destroyed wastes its heritage and impoverishes the life of its people. Fortunately, however, wild animals, like all other living things, represent a renewable resource. With protection and care, depleted wildlife populations will recover and regain abundance. Mistakes of the past can therefore be corrected through present care. So long as the wild animal species remain, and the soil and vegetation of their habitats persists, there is hope for the future.

The value of a wildlife resource can be realized in many ways. In countries such as the United States the recreational and scientific values are paramount. Hunting, fishing, and vacationing in wild areas are all major recreational pursuits. Research on wild animals is a continuing endeavor which has contributed to knowledge of fundamental biology and ecology, and has been of great value to land-use and behavioral sciences.

Countries that possess an abundant and varied population of large, wild grazing mammals, can realize a direct economic benefit through careful exploitation of this resource. Game cropping of native wild mammals can yield more meat and other products than if the same area of land were used for imported domestic livestock. However, as in East Africa, countries with such large and varied game populations can often obtain even a greater income through the protection of these animals and their habitat for the benefit of tourists. The nations of tropical Asia have the opportunity to develop both national parks of great interest to visitors, and wildlife cropping areas from which direct economic returns can be realized, if they act to conserve and increase the varied populations of wild mammals that exist within their boundaries.

WILDLIFE EDUCATION

In most countries the conservation of wildlife is recognized as a proper function of government. In order for a government to discharge its obligation toward conservation of the wildlife resource it must employ people who are trained in wildlife biology and

¹ New position; Senior Associate, The Conservation Foundation, Washington, D.C.

management, including scientists, administrators, technicians, and law-enforcement officers. To provide this man-power it must develop universities and technical schools to provide the proper knowledge and training.

Wildlife scientists and administrators can best be trained at the post-graduate level in a university. Technicians including those involved with law-enforcement need not necessarily have a university background. A technical school such as the College of African Wildlife Management developed at Mweka in Tanzania can turn out capable technicians able to gather data in the field and to enforce wildlife protection regulations. Since it is important in the early development of wildlife conservation to train large numbers of field men as rapidly as possible it is usually necessary to forego the otherwise desirable background of a university education.

The question of how to provide the best wildlife education in college or university is one for which there is no generally acceptable formula, but there is nevertheless, a broad area of agreement. General training in botany, zoology, and chemistry is emphasized in all institutions. Building on these general sciences it is also agreed that the wildlife biologist should have a knowledge of plant taxonomy and identification, plant physiology, plant ecology and become thoroughly familiar with the local flora. Vegetation provides the habitat and the food upon which animals depend, and without the knowledge of how to conserve vegetation there can be no maintenance of wild animal populations. Further knowledge of the environment can be provided through training in geography, geology and soil science.

In zoology education must go beyond the general level to more detailed training in animal anatomy, physiology, genetics, and taxonomy. An essential part of animal ecology is education toward understanding the dynamics of populations and the factors limiting rates of increase. In the area of wildlife management the student is trained in techniques for managing the vegetation and natural environment in such a way as to produce or maintain an optimum abundance and variety of wild animals, and in the direct management of animal populations.

Since the success of wildlife conservation depends upon its acceptance by people it is also worthwhile for the wildlife scientist or manager to be trained in the social sciences which will enable him to fit a program of wildlife conservation into *the* economic and cultural framework of his society. Obviously the ideal individual who is both broadly and deeply educated in all of these areas is rare. However, the university-trained scientist or administrator should know how to enlist the aid of specialists with more concentrated training in each of these various fields.

WILDLIFE PRACTICES

The first job to be performed by any wildlife organization is a survey and inventory of the region involved to determine the distribution and abundance of wild animals, the status of their habitats, and the identification of any wilderness or natural areas that still exist. Preservation of these areas - in which a natural balance exists between wild animals, vegetation, and environment - for future study will prove invaluable to an understanding of the ecology of wild populations of plants and animals.

Following the survey, the first management steps can be taken which may involve initially only the passage and enforcement of regulations protecting wild animals and their natural environments. Where species are abundant these steps can include the limited cropping of some wild animals for the purpose of determining both biological information and economic values. Research should continue on the life history, behavior, and ecology of individual species and populations of animals. In this research it is important to begin to identify factors of the environment that might serve to limit the increase of wild animal populations.

The next phase in both research and management usually involves the experimental management of both habitat and species in efforts to determine how best to maintain a stable balance among species populations in these areas to be protected, or how best to obtain the highest productivity and yield in areas to be exploited for hunting or cropping.

From continuation of investigations and experimental management and integration of their results with land-use planning for a region, it is to be hoped that eventually a continuum of land use, vegetation management and wildlife conservation will be developed throughout a region extending from remote wilderness to urban lands. The development and maintenance of such a land-use and wildlife continuum representing an optimum balance between wild nature and human use can be regarded as the final goal of wildlife conservation.

Conservation Training Needs in Tropical South East Asia

by

MR.G.S. de SILVA

Game Warden, Office of Conservator of Forests, Sandakan, Sabah, Malaysia

SUMMARY

The public in Southeast Asia must be educated to understand and conserve their natural resources and to understand the complex ways in which nature works. A description is given of the ways in which public sentiment for conservation, particularly among the young, can be achieved. The training of full time government wildlife personnel is urged as well as the setting up of local wildlife training schools. The author gives specific suggestions for the curriculum of such a school. He also thinks experts from South East Asia might visit nearby countries to train needed personnel locally.

INTRODUCTION

Throughout the centuries man was, is and will be the greatest threat to nature. Before it is possible to make him co-operate in the preservation of nature, he must be educated and made to understand what nature is. Unfortunately in most South East Asian countries, conservation is merely a name to the public. To them an explanation is necessary, and it is imperative that they be informed that conservation not only means the caring for and the intelligent use of land, water, plant and animal life with the aid of scientific research, but that it also means attempting to understand the complex ways in which nature works. This knowledge has to be utilized to aid man to work with nature instead of against it. By unwisely tampering with his environment man has created problems such as soil erosion, dust bowis, water pollution, deforestation, creation and spread of pests, and losses of shade and scenery. In his foolishness he has caused the extinction of several species of birds and mammals, and Nature certainly extracts a heavy toll for his mistakes.

PUBLIC SENTIMENT

Without the aid and co-operation of the public, very little can be achieved in the field of wild life conservation. The creation of public sentiment among young and old is important and can be achieved in several ways.

The interest of young people can be aroused through films, posters, photographic and essay competitions, lectures illustrated with slides, junior zoological societies, zoological outings and junior warden's clubs and camps.

Boy Scout camp or camps of a similar nature are not suggested. The camps should be for youths 15 years and above; sponsored by adult zoological societies or other interested bodies, and run by responsible and qualified persons. Camps should be conducted for a set period in a pre-selected national park, sanctuary or some suitable area, where accommodation is available. Fees should be levied to cover food and transport costs. During the camping period campers should be given conducted tours to various plnces of interest like water holes, sale or mineral licks etc. Lectures in elementary forestry, tree identification, map reading, the study and identification of insects, birds, animals, and practical demonstrations in bird banding and taxidermy should be given. At the conclusion of the camp proficiency tests can be conducted and prizes awarded.

The interest of adults can be stimulated with the aid of films, public lectures with slides, photographic and poster competitions, zoological societies and conducted tours in national parks or sanctuaries.

The interest of people must always be maintained by some sort of activity. Wildlife propaganda must be launched with the aid of newspapers and other interested bodies like the Shell Company who have devoted a great deal of their time, energy and money on wildlife propaganda. Wildlife protection societies can be formed to stimulate public interest, and a magazine published regularly.

ZOOLOGISTS' CLUBS OR JUNIOR WARDENS CLUBS FOR YOUNG PEOPLE

These clubs should be for young people from 10 - 19 years of age. Qualified zoologists should provide lectures and arrange for discussions and brain trusts. Demonstrations should be given on animal care and animal photography. The club can run a weekly column in a newspaper and answer questions on wildlife. Field collecting trips and study courses should be encouraged.

A wildlife magazine - for young people is, I think, a necessity.

SCHOOLS

Educational institutions can and will play an important role and available opportunities should be harnessed and made to cater to conservation training needs. Students and trainees can be made enthusiastic through zoological or natural history societies, and lectures, preferably illustrated, can be given by qualified persons. If possible after consultation with educational authorities conservation training should be introduced into the regular curriculum. Activities like bird banding, outdoor observation of birds, animals and insects, wild life photography and taxidermy should be encouraged. Periodic visits to zoological parks and natural history museums would be beneficial.

TRAINING OF TEACHERS/LEADERS

An enthusiastic teacher is a good and capable leader. The training of school teachers must not be overlooked or neglected. Nature conservation lectures can be introduced into training schools for teachers by arrangement with the local education authority.

TRAINING OF FULL TIME PERSONNEL IN GOVERNMENT BODIES ENGAGED IN WILDLIFE CONSERVATION

In most South East Asian countries wildlife protection is undertaken by the Forest Department, usually through an understaffed game branch, lacking in experts and well-trained men. Although large tracts of land comprise national parks or sanctuaries in each State, the local authority is hard put to find interested men to join the service, and available men have little or no education. Why educated men are unattracted by the service is a matter which will not be discussed here. If national parks, sanctuaries and wildlife conservation measures are to succeed then something must be done to train available staff.

NEED FOR REGIONAL WILDLIFE TRAINING SCHOOL

It will not be practical or economical for each State to have its own wildlife training school. Furthermore, if selected men are sent for training abroad they will study problems which may perhaps prevail only in the country where they study, and will therefore be alien to South East Asia. On their return trainees will probably be baffled by the problems prevailing in their own countries. As various aspects of nature such as geography, climate, fauna, flora, political and financial aspects are more or less

common to almost all South East Asian countries, the establishment of a South East Asian Wildlife Training School is suggested in some country where the political situation is stable. Such a scheme would certainly have advantages such as:

1. The training program would be more applicable to conservation programs in South East Asian territories.
2. The cost of training will certainly be less than if undertaken in countries with completely different ecological problems and a higher cost of living.

CURRICULUM FOR PROPOSED WILDLIFE TRAINING SCHOOL

A curriculum for this school has to be formulated after deliberation, and the syllabus should cover subjects such as:

The duties and responsibilities of game officers to the public and the State;

Wildlife management, protection and control;

The establishment and maintenance of national parks, game and bird sanctuaries;

Prevention and detection of poaching, the collection of evidence and the questioning of witnesses;

Ethics involved in hunting, and the necessity to minimize suffering caused to animals;

The dangers of overstocking land, and the destruction that can be caused by it;

Control of animal populations - planning and carrying out shooting schemes;

Elephant driving techniques, methods of trapping birds, animals and taxidermy;

Game barriers such as electric fences;

The control of predators and diseases, the marking and release of animals, handling, caging and their transport;

The natural history of mammals, birds, reptiles, their habits, reproduction, survival and mortality rates;

Instruction should also be given in legal and court room procedure, government methods and organization, the care and maintenance of weapons, supervision of subordinates and the necessity for close liaison with other government departments.

As game officers have frequently to carry out constructional work without the aid of qualified men, this subject should not be overlooked. Trainees should be taught how to build huts and camps, make and repair roads, wells and small tanks.

The interpretation and drawing of maps and elementary surveying is necessary. The ability to draw a good sketch map and to use a compass are considered very important. The sighting and marking of boundary lines should be taught. Lectures in first aid, the use of specialized equipment and the use of radio communication should also be given.

These suggestions may tend to make the course predominantly academic but half the time should be spent in the field and every opportunity taken to make the course realistic.

ALTERNATE OF A 'TRAVELING FACULTY'

In connection with the South East Asian training school the most benevolent of governments sometimes encounter difficulties financial or otherwise, and may not be able to send their officers to training schools abroad, and at the same time lack facilities to set up proper training establishments within their own countries. It is, I think, reasonable to suggest that a scheme be drawn up whereby experts, from South East Asia could visit countries where the need for training exists and conduct training courses. A suitable syllabus covering a wide range of subjects should be drawn up after consultation with the heads of departments of the various states.

The panel of experts should comprise people from South East Asia, who would be in a better position to cater and appreciate the training needs and problems of South East Asia than for instance experts from outside who would only know the problems and difficulties which exist in their countries.

Conservation Training in Parks and Recreation Management in the Philippines

by

MR. EDILBERTO Z. CAJUCOM

College of Forestry, University of the Philippines, College Laguna, Philippines

SUMMARY

There is a critical need in the Philippines to offer training in parks and recreation management in particular and conservation education in general. Such education should be emphasized from the elementary level through the university.

Currently, the College of Forestry of the University of the Philippines is the best qualified institution to initiate conservation education in the country. Proposals for an initial program are described.

INTRODUCTION

The Philippines is pre-eminently an agricultural country with a newly developing economy and a rising standard of living. With increased mobility and decreased number of working hours, people have more leisure time to engage in varied outdoor recreational activities, but at the same time industrialization, technology, population increase, and overall economic advancement eat up large tracts of lands and will gradually push back the forest lands to the hinterlands. National parks and other nature reserves may be steadily sacrificed to the inevitable demands of progress.

A giant task of park development, rehabilitation, and reconstruction will have to be launched if the growing outdoor recreation needs of an expanding middle class are to be satisfied. Furthermore, if tourism is to increase its dollar earnings national parks and other unique natural features will have to be developed.

THE NEED FOR A CONSERVATION EDUCATION IN THE PHILIPPINES

Although the percentage of literacy in the Philippines is one of the highest in the world, it is considered to be one of the lowest in conservation education. Of all the public and private secondary schools, colleges, and universities in the Philippines not one offers a curriculum in natural resource conservation. The few students who go to agricultural and vocational schools are offered some subjects directly or indirectly geared towards conservation, but these programs are pitifully inadequate to take care of about six million students in the entire country.

In a country like the Philippines where the natural resources are being exploited at an alarming rate, conservation education will play a major role in the proper husbandry of these resources. Kaingins (illegitimately cleared areas), unregulated logging, timber smuggling and other forms of wasteful forest exploitation all aggravate the country's denudation problem. However, these activities can be minimized if not controlled, through conservation education.

Conservation indoctrination has to start from childhood and should be initiated in the schools from the elementary level through college, for these children in school now will be the future government leaders.

Nationwide curriculum revision in all public and private elementary and high schools is needed if the integration of the conservation concept to the present curricula is to be

accepted and fully implemented. This will require the concerted effort and interest of highly competent educators, planners and policy makers, law makers, and die-hard conservationists.

The various agencies responsible for the administration and management of the various outdoor recreational areas are with the exception of a few, staffed with men who lack training in conservation. National parks and reserves are poorly and inadequately designed and developed and extensive areas of land lie idle which could be utilized and developed for recreational purposes and tourist attractions. There is an urgent need for training in management and conservation if national parks and reserves are to be scientifically and realistically planned and managed.

ROLE OF THE UNIVERSITY OF THE PHILIPPINES COLLEGE OF FORESTRY IN INITIATING CONSERVATION EDUCATION IN THE PHILIPPINES

The only school in the Philippines which offers courses directly or indirectly geared to conservation is the College of Forestry, University of the Philippines. This is the only forestry school in the country and is among the better known ones in South East Asia drawing students from throughout the area. The greatest percentage of foreign students are from Thailand.

The faculty of the college is relatively young but highly competent, trained abroad largely in the United States and also to a limited extent in Australia and Germany. Three curricula are offered at present:

1. a two-year sub-professional Ranger Course;
2. a four-year undergraduate curricula in Forest Resources Management, and
3. a four-year undergraduate curricula in Wood Science and Technology.

It is in the Forest Resource Management curriculum where training in conservation fits it. Most of the courses offered deal with aspects of forestry where conservation is directly and indirectly emphasized. Watershed, range, recreation, and timber management are covered in basic terms.

Some of the other courses basic to conservation and management of the natural resources are offered at the adjacent sister institution, the College of Agriculture of the University of the Philippines.

At present there are two faculty members of the College of Forestry who have trained abroad directly along the line of conservation, one in watershed management and the other in parks and recreation management. The latter individual is not used advantageously by the College at present as a teacher but the training abroad has broadened his outlook, his critical analysis of problems and has helped him in the formulation and preparation of the conservation curriculum.

However, training abroad is expensive for a developing country and local training would be cheaper and more easily oriented to local conditions. The College of Forestry, University of the Philippines, would be in a position to train students scientifically with but a few additions to its present teaching staff.

To start a conservation curriculum with a major in parks and recreation management the following fields of specialization are deemed necessary in addition to those that the college already offers; (see Annex A).

1. Parks Planning and Design (this would need two additional people trained abroad).
2. Parks and Recreation Management.
3. Natural History Interpretation.
4. Natural Resource Economics.

The College of Forestry, as a pioneering institution in forestry and related fields should take the initiative in attracting more and better quality students to take up forestry or recreation management as a career. It should produce enough graduates to both fill the jobs with private lumber firms and to adequately and competently man the parks and reserves.

TECHNICAL ASSISTANCE AND FACULTY TRAINING PROGRAM SOUGHT

In terms of physical plant, the College of Forestry is capable of expanding its present program to initiate conservation education or training in the Philippines, but technical assistance and faculty training are needed to start. In view of the pressing needs of the country for trained conservationists to administer and manage the country's rapidly dwindling forest resources, the College has acted upon Dr. Lee Talbot's recommendation to the Philippine Government for 'expanded training in the management and conservation of natural resources'. A five-year training program calls for five foreign technicians serving two-year tours to advise in different fields of conservation. The program also calls for the training of at least five Filipino faculty members in various fields of specialization in conservation. This proposal is intended to be submitted to various international educational organization for possible technical and financial assistance.

If finally approved, this will be the first technical assistance granted purely for the promotion of conservation education in the country. The program's goal is not merely the training of forestry students who will major in conservation, but also in-service training for employees in related government offices and teachers in both public and private elementary and secondary schools who do not have training in conservation. Workshops or short courses are also planned to suit the specific and urgent needs of recreational agencies.

The success or failure of the initiation of conservation education in the Philippines rests with the handful of conservation-minded citizens who have the interest and energy to carry the work forward. Implementation of the above program would be a major step forward in a co-ordinated national recreation effort. The training in parks, and recreation management in particular as one phase of conservation, will greatly revitalize and staff the different agencies with conservation-oriented men.

The following courses with descriptions are recommended or proposed for teaching for students majoring in Parks and Recreation Management. These will be in addition to basic subjects offered by the U.P. College of Forestry.

1. Natural Resource Economics -
Economic principles, practices, and problems associated with the administration and management of public forestry resources.
2. Principles of Outdoor Recreation -
The beginning course in a series of recreational management courses. The importance of outdoor recreation from economics, social, and cultural standpoint will be emphasized. The tangible and intangible benefits or values derived from direct and indirect participation in outdoor recreational pursuits will be discussed.
3. Parks and Recreation -
A survey of park and recreation development around the world with emphasis on tourism will be expounded. Tourism activities and promotions in the Philippines will be covered.
4. Recreational Use of Wild Lands -
This is a basic study of the recreational use of forest and wild lands. The history of recreational interest in the outdoors, the administration, and management of varied recreational lands. Visitation to park and other recreational agencies will be conducted at the latter part of the course.
5. Parks Administration and Policy -
Park administration and personnel organization. Organization of park and recreation departments. Fundamentals of public park and recreation policy.
6. Parks Development and Management -
Field study of park construction and management practices. Construction and maintenance of structures and facilities used in recreation areas. Development and use of roads, trails, and interpretive facilities.
7. Graphics -
Lettering, orthographic and auxiliary projection, sectioning and dimensioning methods. Detailed working drawings and technical sketching.
8. Parks Planning and Design -
Plan and design of recreational areas and facilities based on modern park practices and standards. A person trained in landscape architecture will handle this.
9. Natural History Interpretation -
A detailed study of interpretation of park features and interpretive facilities on varied recreational lands. Emphasis will be made on museums, roadside, trail exhibits, self-guiding trails, park libraries, and related interpretive facilities.
10. Ecological Foundations of Resource Use -
Principles of general and human ecology applied to the administration and management of forestry resources.
These are courses basic to conservation with emphasis on parks and recreation management.

Middle Grade Conservation Training in Africa

by

MR. E.A. QUIST-ARCTON

Forestry Officer, Forestry and Forest Products Division F.A. O., Rome

SUMMARY

Africa is a continent of great natural resources. Some of these have been conserved through age-old practices and taboos and others have been squandered and misused. To prevent catastrophes from occurring more education and training is needed.

The author describes the assistance that has been given to African countries with special emphasis on that provided by FAO (for medium grade technicians) in the field of fisheries, wildlife, and forestry.

INTRODUCTION

Africa's natural resources reside in its lands, soils, vegetation, fauna, waters, seas, and in its human populations. From time immemorial, man's efforts have been directed towards carving a niche in the environment of these natural resources.

On the one hand techniques, however primitive they may be considered in terms of modern technology, have been evolved for utilizing part of this resource without jeopardizing it. A homely example is the common snail which sometimes forms the only 'meat' element in the diets of many Africans. It has long been the practice to beat the 'talking drums' to announce the advent of the snail collecting season. This harvesting coincides with the maturity of the snail - a very highly developed tenet of conservation of a natural resource.

The conservation concept of the harvesting of the maximum yield of the maximum potential is written large into the taboos and customs of African life and lore. On the other hand the list of abuses and misuse of the resources is likewise long. Consider for example, over-grazing of domestic animals, the virulence of annual 'bush' fires, overcutting of forest produce, 'shifting cultivation' on precarious watershed, etc. The lessons of conservation which have their foundations in ecology appear not to have been learned in the colonial era; even today, most African states in their bid to grow more food, are embarking on large scale mechanized agriculture without stopping to take a leaf from the experience of the United States in the creation of the Dust Bowls in the midwest. Resource conservation is only appreciated by states after the catastrophes induced by the negligence of their own citizens have occurred.

The recurrence of these catastrophes is bound to continue. Resolute national policies based ideally on the total evaluation of the ecology of the areas and the sociology of their peoples need to be enunciated. These should form the basis of national development plans in agriculture with sensible land-use programs. All this calls for training and education for the rural population, government executives, and planning, advisory and supervisory personnel at all levels.

EDUCATION IN CONSERVATION

In this decade of achieving political independence, almost all African states have rightly given high priority to education, formal and informal, drawing on the technical assistance provided by both bi- and multi-lateral inter-governmental bodies. Nor have the non-governmental bodies been passive in their efforts. For example, the IUCN, (under whose auspices we meet at this Conference) through its commissions has made governments aware of the problems that may confront them in the conservation of their natural wealth.

The United Nations and its specialized agencies have been in the forefront of assisting African states in the resolution of some of their problems in conservation and natural resource management. FAO in 1962 started a special program for education and training in Africa with the aim of assisting member-countries in the planning and development of a sound, properly integrated, and economic structure of education and training in the fields of food and agriculture. A number of seminars and training centers have been organized, fellowships for study have been granted to Africans; agricultural advisors have been posted to different parts of Africa.

To my mind the most important aspect of technical assistance is in the in-service training that is given on the job to the local counterparts of international expert personnel. This has caught on very well and is the more desirable as the countries cannot easily afford the withdrawal of personnel from the field in order to give them formal education in classrooms. Examples of efforts in three fields,

1. fishing,
2. wildlife, and
3. forestry are given below:

FISHERIES

In order to cope with training needs two seminars - one in Accra for English-speaking countries (1963) and one in Abidjan for French-speaking countries (1965) have been organized. A special FAO consultant has recently visited some West African countries to study existing training facilities and needs, and EPTA and Special Fund Fisheries Experts are giving training on the job to local personnel in marine and freshwater fisheries. This has helped to directly raise the level of operations of the fishermen and to instruct them so that the knowledge may be disseminated to other parts of the country.

WILDLIFE

With the spectacular increase in interest in African wildlife and the importance of revenue from national parks, game cropping schemes, and other ways of utilization there has been a corresponding need for trained medium grade game wardens. To fill this need - for English-speaking students - the College of African Wildlife Management at Mweka, Tanzania was established with bi-lateral aid. The school has a senior diploma course, two years, for game wardens, and a junior certificate course for game assistants lasting nine months. For French-speaking Africa the formation of a medium-grade school at Garoua in Cameroon is proposed with United Nations Special Fund aid. These schools will provide a nucleus of trained game wardens on whom it will be possible progressively to build more efficient management of animals in national parks and reserves and all marginal lands.

FORESTS

Twenty-three per cent of the total land area of Africa is in forest. For sustained yield management and preservation in perpetuity it is essential that there should be a continuous supply of highly trained and efficient foresters. It is essential to have an efficient professional university educated staff in a forest service, but such a staff cannot be effective unless it is supported by an adequate number of well-trained field executive technicians who can deal with all forestry operations of a technical nature, execute plans of operation, and train and supervise the labor force under their control. The training must be essentially practical with sufficient theory for a general background knowledge of vegetation and forestry.

Technical level forestry schools in fourteen African countries have a combined capacity of some 500 students.

The primary objective of these schools is to provide a supply of well trained technicians to fill government posts in the forestry service. A secondary objective is to provide technical training at a higher level to fit experienced rangers for the wider responsibilities of the post of forester. Other aims of the school include bringing in-service

rangers up-to-date through periodic refresher courses and through short extension courses given to other government officials to make the latter aware of the role of forestry in the national life.

FAO endeavors to give every possible assistance necessary for the improvement and development of forestry education and training in Africa in accordance with changing patterns and techniques in forestry.

CONCLUSION

The agricultural development problems of Africa are legion. To tackle them needs battalions of trained personnel, doing the rounds of the villages and rural areas, bringing the fruits of local research, or exotic research proved under local conditions to the farmers who must be intimately involved in all Governments' plans for raising agricultural productivity. The road to success is long and the battalions of agricultural instructors at the medium level must be given time to march. As their numbers must be large in order to make an indelible impression on the rural agricultural communities, it is heartening to see the high priority that Governments give towards providing this institutional framework for its agricultural development. They deserve well of assistance that can be provided from bilateral or multilateral sources.

Training for Effective Careers in Conservation in Thailand

by

MR. VALLOBH NARABALIOBH, M.S. F.
Head, Department of Conservation, Faculty of Forestry, Kasetsart University, Bangkok, Thailand

SUMMARY

This paper presents the curriculum of the Department of Conservation, College of Forestry,¹ Kasetsart University for the training of professional conservationists upon whom the preservation of Thailand's rich natural resources depend.

INTRODUCTION

Thailand has an extensive area of rich wildland that contains some of the kingdom's most valuable resources. Exploitation of the natural resources, especially forest and wildlife has been wasteful and inadequately controlled in the past, and it is indeed regrettable to state that national conservation programs (except forestry) have started only recently. Realizing the importance of utilizing these natural resources wisely with the least possible waste and the greatest permanent yield, the Government of Thailand has taken the responsibility for formulating and organizing conservation practices to maintain the country's resources.

As the success of this policy depends largely upon a well-trained professional staff, Kasetsart University considers it a pressing need to supply qualified professionals to undertake the heavy task. A conservation curriculum was offered in the College of Forestry in 1965 and the Department of Conservation was established soon afterwards. The writer would like to point out that since conservation education in Thailand has just begun and is not yet clearly defined, this paper lacks many important conclusions.

OBJECTIVES OF CONSERVATION CURRICULUM

The conservation curriculum has been set up with the following main objectives;

1. To give technical advice and assistance to students in line with the principles or organizational procedures and management methods and to guide the students' professional conduct towards the key role of conservation.
2. To furnish a comprehensive academic syllabus with reference to modern scientific and technological methods in accordance with conserving the country's natural resources.
3. To stimulate investigation on all facets of conservation and to establish a sound conservation research program, suitable to contemporary conditions.
4. To educate the public in conservation thus enlisting their support for the various conservation measures taken by the Government.
5. To collaborate closely with other governmental and public agencies concerned with natural resource conservation.

¹ Throughout this paper the term 'College of Forestry' has been substituted for the Thai usage 'Faculty of Forestry' since the former term is more readily understood in other parts of the world.

6. To prepare graduates for advanced regional training courses leading to a master's degree in conservation.

(There is a proposal for such a course at Kasetsart University to be open to students from all South East Asian countries.)

CURRICULUM OF DEPARTMENT OF CONSERVATION

A bachelor's degree in conservation is awarded upon the completion of the approved five-year undergraduate course. The first three years center on forest management; the last two on multiple-purposed forestry. The complete curriculum offered by the College of Forestry is given in Annex 1.

To strengthen the faculty and staff of the College of Forestry it is anticipated that promising instructors will be sent abroad to study and/or for educational tours to observe conservation technology in advanced and developing countries. Students majoring in conservation may find employment opportunities in education, government, and industry. Professional advancement and increased income will come with more detailed specialized knowledge in the subject. The role of conservation is becoming more widely understood by the Thai public; among the five major departments in the College of Forestry the Department of Conservation has about half of the total number of students.

EMPLOYMENT OPPORTUNITIES

Employment opportunity for students majoring in conservation may well include:

1. Educational employment - college teaching, extension service, public school teaching, etc.
2. Public employment - many governmental agencies need more and more conservationists.
3. Industrial employment - conservationists are needed to plan sound utilization of the resources used in industry to avoid shortage and disappearance of raw materials.
4. Professional advancement - in developing a detailed specialized knowledge in conservation, one may get better employment opportunities and increased income.

COMPLETE CURRICULUM IN CONSERVATION NOW BEING OFFERED AT FACULTY OF FORESTRY KASETSART UNIVERSITY

FIRST YEAR

First Semester

		Cr.	Lect.	Lab.
Eng. 111	Elementary English	2	1	3
Chem. 111	General Chemistry	4	3	8
Math. 113	General Mathematics	2	2	-
Soc. 111	Principles of Sociology	2	2	-
For. Mgt. 111	Introduction to Forestry	3	3	-
For. Engr. 111	Geometrical Drawing	2	1	3
Hyg. 111	Principles of Hygienes	1	1	-
Phys. Ed. 111		1	1	-
		<hr/>	<hr/>	<hr/>
		17	14	9

Second Semester

		Cr.	Lect.	Lab.
Eng. 112	Elementary English	2	1	3
Chem. 112	General Chemistry	4	3	3
Math. 114	General Mathematics	2	2	-
Hum. 111	Social Developments	2	2	-
For. Mgt. 112	Forest Mensuration	3	3	-
For. Engr. 112	Surveying	3	1	6
Bot. 112	General Botany	3	2	3
Phys. Ed. 112		1	1	-
		<hr/>	<hr/>	<hr/>
		20	15	15

Note: At the end of the first semester, the orientation tour to observe forest types is required for 15 days (no credit)

SUMMER CAMP

(9 weeks)

During April to June

		Cr.	Hrs.
For. Biol. 111	Ecology	2	10
For. Biol. 112	Dendrology	2	10
For. Engr. 201	Forest Surveys	2	10
		<hr/>	<hr/>
		6	30

SECOND YEAR

First Semester

		Cr.	Lect.	Lab.
Eng. 201	Reading and Writing	2	1	3
Chem. 201	Organic Chemistry	3	2	3
Zool. 111	General Zoology	3	2	3
Soc. 201	Rural Sociology	3	3	-
Silv. 111	Foundation of Silviculture	3	3	-
Phys. 114	Principles of Physics	3	2	3
Soils 111	Elementary Soil Sciences	3	2	3
Phys. Ed. 201		1	1	-
		<hr/>	<hr/>	<hr/>
		21	16	15

Second Semester

		Cr.	Lect.	Lab.
Eng. 202	Reading and Writing	2	1	3
Chem. 202	Organic Chemistry	3	2	3
Zool. 112	General Zoology	3	2	3
Soc. 221	Thai Society	3	3	-
Silv. 201	Practice of Silviculture	3	2	3
Phys. 115	Principles of Physics	3	2	3
Phys. Ed. 202		1	1	-
		<hr/>	<hr/>	<hr/>
		18	13	15

SUMMER CAMP

(9 weeks)

During April to June

		Cr.	Hrs
For. Biol. 201	Field Dendrology	2	10
Silv. 202	Forestation	2	10
For. Mgt. 201	Forest Mensuration	2	10
		<hr/>	<hr/>
		6	30

THIRD YEAR

First Semester

		Cr.	Lect.	Lab.
Eng. 220	Speech Laboratory	2	1	2
For. Prod. 111	Wood Identification	3	2	3
For. Engr. 301	General Construction	3	2	3
For. Mgt. 301	Forest Laws	3	3	-
For. Biol. 301	Forest Entomology	3	2	3
For. Biol. 302	Forest Pathology	3	2	3
Econ. 113	Elementary Economic Principles	3	3	-
		<hr/>	<hr/>	<hr/>
		20	15	14

Second Semester

		Cr.	Lect.	Lab.
Eng. 250	Report Writing	2	1	2
For. Prod. 112	Introduction to Forest Products	3	3	-
For. Prod. 302	Wood Properties	3	2	3
For. Mgt. 302	Principles of Forest Management	4	3	3
For. Mgt. 303	Forest Rules and Regulations	2	2	-
Silv. 301	Forest Protection	3	3	-
Cons. 111	Principles of Conservation	3	3	-
		<hr/>	<hr/>	<hr/>
		20	17	8

Summer Training: As suggested by the Department

FOURTH YEAR

First Semester

		Cr.	Lect.	Lab.
Stat. 403	General Statistics	3	3	-
Soc. 400	Introduction to Public Administration	3	3	-
Electives		11	-	-
		<hr/>	<hr/>	<hr/>
		17	6	-

Second Semester

		Cr.	Lect.	Lab.
Stat. 410	Research Methodology	3	3	-
For. Mgt. 402	Forest Economics	3	3	-
Electives		12	-	-
		<hr/>	<hr/>	<hr/>
		18	6	-

Summer Training: As suggested by the Department

Field Trips; As suggested and conducted by the Department

FIFTH YEAR

First Semester

		Cr.	Lect.	Lab.
For. Mgt. 597	Seminar	1	1	-
Electives		14	-	-
		<hr/>	<hr/>	<hr/>
		15	1	-

Second Semester

		Cr.	Lect.	Lab.
For. Mgt. 598	Seminar	1	1	-
Bus. 301	Business Organization and Management	3	3	-
For. Mgt. 503	Forest Policy	3	3	-
Electives		8		-
		<hr/>	<hr/>	<hr/>
		15	7	-

PRESCRIBED ELECTIVES FOR CONSERVATION-MAJOR STUDENTS

Cons. 401	Conservation of Land and Water Resources	3 credits
Cons. 402	Forest Land Management	3 credits
Cons. 403	Forest Hydrology	2 credits
Cons. 404	Forest Influences	3 credits
Cons. 501	Forest Recreation	2 credits
Cons. 502	Wildlife Management	2 credits
Cons. 503	Watershed Management	3 credits
Cons. 504	Range Management	3 credits
Cons. 506	Special Problems in Conservation	1-3 credits
Cons. 597-598	Seminar in Conservation	2 credits
Cons. 599	Thesis	6 credits

Training for Effective Careers in Conservation in Indonesia

by

MR. I. MADE TAMAN

*Head, Division of Nature Conservation and Wildlife Management,
Directorate of Forestry. Bogor, Indonesia*

SUMMARY

For effective conservation of wildlife Indonesia's greatest need is for more trained scientific and technical workers. The author gives a list of what has been accomplished from 1961 to date (1965).

The problem of nature conservation in Indonesia must be approached with other problems in mind - such as increasing population, and industrialization, urban growth, tourism, etc. The Division of Nature Conservation and Wildlife Management, Directorate of Forestry, needs the following if it is to carry out its task of conserving our natural resources:

1. Central and local organizations attached to the Division.
2. Scientific and technical workers.
3. Adequate financing and equipment.

A lack of scientific and technical workers is the most serious shortage.

Indonesia is a country with more than 110 nature reserves and to adequately staff them many rangers and wardens are needed. Biologists are also needed in the headquarters offices.

To meet this shortage the following steps have been taken since 1961:

1. A special course in wildlife management was given in the forestry police school in Salatiga from 1961 through 1963. (There were about 40 candidates a year.)
2. In 1963 a special course in nature conservation was established in the forest school at Bogor starting with the second form.
3. Starting in 1964 a curriculum in nature conservation was introduced in the Academy of Agriculture in Tjiawi (Bogor).
4. Since 1964, 50 graduate students in the Academy of Architecture and Landscaping in Djakarta are taking a course in nature conservation.
5. This year (1965) the College of Biology at the 'Pedjadjaran' University has accepted nature conservation in its curriculum.

It is clear then that each year more candidates are interested in the knowledge of nature conservation and wildlife preservation. We hope soon that there will no longer be a shortage of personnel.

The Institute of Forest Education has been responsible since 1964 for the education and training of technicians. Due to the lack of funds and equipment this Institute has not yet been able to function. It is hoped that in 1966 the Forest Academy with four departments can be opened at Bogor. Assistance in the form of lecturers and equipment is needed from the IUCN. The Directorate of Forestry hopes that in four or five years it will have the necessary experts as well as high and medium grade technicians for its conservation program (see Annex 1).

HIGH AND MIDDLE RANKING FOREST OFFICERS IN CHARGE WITH NATURE CONSERVATION

	High r.	Middle r.	Expert
1. Technicians needed			
(a) Head Office	10	20	4
(b) Sections (Provinces)	36	36	12
(c) Sub. sections (Regencies)	-	72	-
Total	46	128	16
2. Present staff level			
Head office and Sections	6	40	2
3. Staff deficit	40	88	14

The Role of Agricultural in Extension Conservation Education

by

DR. C.W. CHANG

*Consultant in Agricultural Extension, F.A.O. Regional Office for Asia
and the Far East, Bangkok, Thailand*

SUMMARY

A brief discussion is given of the meaning of agricultural extension and of extension teaching methods used. Examples from East Pakistan and Taiwan are cited as illustrations of the group approach that has been found to be very effective. Agricultural extension, as a process of informal education, has a vital role to play in conservation education.

INTRODUCTION

Agricultural extension may be defined as an informal education for farm people so that their knowledge and skills are increased and so that they may acquire new points of view. Unless the people themselves develop and change physical and economic accomplishments are sterile.

In South East Asian countries agricultural extension is administered by a Ministry of Agriculture through its extension services.

TEACHING METHODS USED

In South East Asia the overwhelming majority of the people live in rural areas and have received little education. The question is how to reach these people with agricultural extension.

All useful teaching methods are employed and these may be grouped as follows:

1. Mass contacts; radio, press, posters, etc.
2. Group contacts; study tours, method demonstrations, meetings, discussion groups.
3. Individual contacts; farm and home visits, result demonstrations, office calls, personal letters.

Of these methods, demonstration is considered the most effective if it is well planned and satisfactorily carried out. An interesting example may be cited from Taiwan: Trying to improve tea production the Government selected 200 farmers to try out four improved farm practices, pruning, fertilizing, spraying and plucking. The government provided free supplies to the farmers. The first year there was an average increase in tea leaf production of 43.5 per cent; the second year, 49.9 per cent; and the third, 80.61 per cent. After three years the demonstration was discontinued. Over 5,000 farmers who wanted to adopt these improved practices registered with the government and applied for loans.

Once the farmer's confidence is gained other extension activities can be easily introduced. Group approach and local leadership development should receive increasing attention in Asian countries with their teeming rural populations. Two examples utilizing the group approach are given below;

THE COMILLA APPROACH

Developed by an academy for rural development in Comilla, East Pakistan, over a period of six or seven years, this is a system of continuous education to train villagers in co-operative efforts so that they can become more efficient producers and better citizens.

The experiment was first carried out in one thana with an area of 100 sq. miles and a population of 150, 000. In this area about 130 village co-operatives have been organized and federated in a Central Co-operative Association with its head office at the Thana Training Center. This Association is to provide;

1. credit,
2. production requisites such as seeds and fertilizers,
3. farm machinery services, and
4. marketing facilities to the co-operative.

The Thana Training Center provides training for the officers of the village co-operatives so that they can discharge their duties satisfactorily. Each week about 600 come to the Center for training and this goes on continuously. This experiment has been so successful that it has been extended to other thanas and there is now a plan to extend it on a province-wide basis with the assistance of the International Bank for Reconstruction and Development (IBRD).

THE TAIWAN APPROACH

The farmers' associations in Taiwan are now in advanced stage of development and have become active partners with the government in the increase of food and agricultural production and the betterment of rural life. They are organized on three levels: one Provincial Farmers' Association, 22 county and city associations and 324 township associations. Each of the latter has an average of 2, 400 members and serves its members by providing agricultural advisory, credit, production supply, marketing, and processing services. The whole process of election and performance of duties by the elected officers constitutes a most effective way of developing local leadership.

CONCLUSION

Agricultural extension has a vital role to play in the field of conservation. Although the extension services in many South East Asian countries are still in the early stage of development, they are nevertheless the single government organization that has officers stationed at the village level to assist the farming population in the use of land and water resources for increasing agricultural production and improving rural life. The framework is there. What is required is to provide the village level extension workers with:

1. additional training in some fundamentals of conservation, and
2. assistance by conservation specialists at a higher level.

Part 3: Public Education

Elements of an Effective Nationwide Conservation Education Program

by

DR. J. GOUDSWAARD

Secretary, IUCN Education Commission, Rotterdam, Netherlands

SUMMARY

An appreciation of nature and conservation on the part of the public can best be brought about by educating the children, beginning at the elementary level, in these subjects. The author describes the different methods by which this education may be brought about, in and out of school.

INTRODUCTION

Nature education should start with children if the public is to have a better understanding of nature and nature conservation. Children should have their interest in biology, conservation, and ecology aroused not through dry books, but by alert teachers who have an eye for nature close at hand. Studying biology is more than learning the dental formulae of the animate. The instruction given by teachers during elementary education is the pivot on which everything revolves. In turn teachers' training colleges must provide more conservation training in their curriculum with a program aimed at promoting understanding of the importance of the country's natural resources and their conservation.

It is gratifying to see that in some cases special conservation courses - fortnightly lectures or special excursions organized by different specialists - were appreciated by *the* students in training colleges even though those courses were given after the regular school hours.

ELEMENTARY EDUCATION

A few methods of improving instruction at the elementary level are given below:

1. Instructive gardens. Those offer small landscapes containing as many samples of natural vegetation as the circumstances permit in order that young people can learn to distinguish and know the various types of vegetation. The curator should be able to give explanations to the children, and simple exhibitions can be arranged.
2. School working gardens. These complement the instructive gardens. They show the children both wild and cultivated vegetables and flowers and teach them how to cultivate these plants. They also provide illustrative material for biology and drawing lessons.
3. Annual tree planting day. The children, accompanied by their teachers, plant trees in the public parks and this is the future responsible for those trees and for the park as a whole. Nature conservation and the effects of erosion can be introduced into the studies of the children if the latter take part in reforestation projects.

SECONDARY AND UNIVERSITY LEVELS

At the secondary school level biology already has a permanent, if too limited, place in the curriculum. It should be taught by specialists who are well versed in their subject. The institution of 'working weeks' and special projects might draw attention to the questions of management and conservation of natural resources.

So that university students may have a proper appreciation of ecology and conservation, emphasis will be on a working period at a Biological Research Station. This is important not only for biologists but also for the agriculturalist and the forestry expert.

OUT-OF-SCHOOL EDUCATION

For education out of school youth organizations are of great significance. Leaders of these organizations, such as the Boy Scouts, can be trained at field study centers in one or two week courses conducted by the staff and invited specialists. These courses are usually for 6th form pupils and university undergraduates specializing in biology, geography, and geology, but special courses could be arranged for youth leaders.

Other organizations and institutions, such as the university extension classes, all have the same object, i. e. to enrich the knowledge of man, to bring man nearer to the treasures of his culture, and to stimulate his concept of responsibility in relation to nature.

PUBLIC EDUCATION

What good can be accomplished by the founding of national parks, taking active conservation measures, attempting to pass legislation for the protection of rare animals if the basic idea of nature conservation has not entered the mind of the public?

Very often nature societies have no time beyond their tasks in the field of direct conservation. In such cases a special Institute for Nature Conservation Education could be promoted:

1. to arouse and promote interest in nature and scenery and to convince the public of the need to make proper use of nature and scenic beauty; and
2. to prevent and counter the destruction of nature and scenic beauty by the action of others.

These aims can be realized by organizing nature walks, issuing leaflets, appointing nature wardens and having nature guides trained and available. Nature trails enjoy an increasing popularity with all groups; everyone participates and thus the contact with nature is more intense and valuable.

Young people in their spare time or on their holidays might give voluntary help in the management of nature reserves and other biologically important sites. Typical tasks include cleaning scrub and undergrowth, making footpaths, and digging and planting vegetation on the banks of ponds.

School broadcasting can provide a program of natural sciences, especially focused on nature conservation. Not only school children but adults will listen. Other audio-visual methods can be of importance in enlarging the knowledge of man in the field of nature conservation.

With these examples of conservation methods I have tried to give an idea of what has been achieved up to the present, without pretending to draft a complete report on what could be done and what is going on in this field.

The Contribution of Interpretive Programs in National Parks to Popular Conservation Programs

by

DR. GEORGE C. RUHLE

Division of International Affairs, National Park Service U.S. Department of the Interior, Washington, D.C, U.S.A.

SUMMARY

This paper traces the development of interpretive programs in United States National Parks. These began as a groping struggle to instill visitor appreciation of park features and evolved into a highly sophisticated organization exerting considerable influence on national and international levels of conservation education.

The history, methods, and objectives of four techniques of the Interpretive Service:

1. popular lectures,
2. guided field trips,
3. museums and special exhibits, and
4. self-guided trails

are described.

INTRODUCTION

The birth of the Yellowstone National Park idea 95 years ago is generally regarded as the beginning of the current concept of National Parks and Equivalent Reserves. This constituted a major step towards conservation of scenery and natural resources. Many hold as equally significant, in the dust-and-ashes history of public domain, the formulation of interpretive services in National Parks based on the presentation of conservation concepts within a natural setting.

Undergoing random but serious thought for a half-dozen years prior to 1920, naturalist, or interpretive services attained substantive materialization in Yellowstone and Yosemite National Parks in that year. A park naturalist was appointed to each; nature walks, talks, popular periodical leaflets, and a crude museum were established.

As the wisdom behind the movement became evident and as benefits have continued to accrue, the Interpretive Service has prospered, and public support behind its program has grown strong. The locally oriented unit within the park has become part of a nation-wide organization, whose influence and assistance now extends into the international field. At home it has become the pattern to be adapted by other outdoor agencies, both in and outside the Federal Government; abroad it extends information, technical assistance, and other co-operation both to 'old' and 'new' nations upon receiving their requests.

TRAINING

For training, the National Park Service has established two training centers

1. the Stephen T. Mather Center at Harper's Ferry, West Virginia, which specializes in interpretation and research, and

2. the Horace M. Albright Center at Grand Canyon National Park which emphasizes the administrative, protective, legal, and planning phases of conservation training.

In addition, many in-service schools, workshops, training, and refresher courses are conducted in which the Interpretive Service plays a major role. It reflects Naturalist Service methodology and employ naturalists as instructors and trainers. Participants in these programs include international trainees and observers, representatives from private conservation organizations and universities, and employees from other government agencies, federal, state, and municipal. Some of the early planners of the Military Information and Education Program had been rangers or naturalists in parks. Applications always far exceed the capacity of facilities; long waiting lists are the result.

TECHNIQUES

In addition to the concrete demonstration of the effectiveness of the Interpretive Service system in its stimulation of interest and enthusiasm, a most important contribution of the naturalist program to conservation education has been the development and refinement of methods and techniques employed in the satisfactory attainment of its goals. The means available to the Interpretive Service include popular lectures, guided field trips, museum and special exhibits, self-guiding trails, visual aids, popular literature, and similar devices. Attention will now be directed to the evolution of scope, methods, treatment, and objectives of the first four of these.

Popular lectures

It was early recognized that the word 'lecture' smacks of a stiffness and formality that are not in harmony with the casual atmosphere of the out-of-doors. The term has been largely replaced by the simpler word, 'talk'. Talks are regularly scheduled for camp-fire circles, auditoriums, hotel lobbies, and museums; they constitute an important part of the naturalist program. But, in addition, many more unscheduled talks are given - whenever and wherever time, place, and opportunity dictate.

This quality - effective speech - is a hallmark of the Interpretive Service. Great care is taken in adequate preparation and in looking after the physical comfort of the audience. The presentation must be orderly and coherent; the narration, colorful and dramatic; and the material used, germane to the subject. Long lectures are taboo in the parks, and speakers are cautioned to use plain language and to avoid talking down to the group. The use of slides or movies is avoided until the neophyte naturalist can demonstrate he can hold an audience by unassisted effective speech alone. Audience participation is encouraged, and except for times when personnel cannot reasonably be provided for an occasion, pre-recorded talks are avoided.

Field Trips

The field trip is regarded by some as the most effective of all tools for conservation education. On a trip the importance of individual contact with an astute leader, direct personalized experience with nature, and active participation by field party members in the outdoor venture, becomes evident.

The conduct of field trips has reached a high degree of refinement in the National Parks. Instead of old objectives, such as the compilation of a list of fifty birds encountered on a two-hour walk or a hike from here to there, the members learn intimate details about a few subjects (although the list of subjects that might, come under observation is endless). In place of the meaningless listing, 'robin, *Turdus migratorius*', the party learns the importance of observing, 'Where is the bird and what is it doing?'. They learn to recognize silhouette and habits. They learn the answers to key questions, 'How do you know it to be a robin?', 'When and where can I best look at it?'. 'How will I know it to be a robin when I see it again?'.
So it is with plants and flowers; where they grow, what they need for food, their ecological relationships, their growth, development, maturation, even the evolution of the species through the ages.

The effectiveness of direct experience, the use of the senses, questions and answers, and the encouragement of party members to share their knowledge and enthusiasm with others, are all key attributes of successful field trips. The efficient use of these techniques is demonstrated to field trip leaders and instructors of natural sciences and conservation, whether professional or amateur, who are encouraged to adapt them for their purposes. Many university professors and others, employed as naturalists on park staffs to become trained and skilled in park methods, use their attainments elsewhere and teach them to others in their respective fields.

Museums and Special Exhibits

At the turn of the century, museums in general could only by extenuation be described by the term derived from 'the place of the Muses' or 'a place for musing'. Rather, they bore the atmosphere of a morgue with endless collections of curiosities, of butterflies or geological 'rocks' or study specimens, ill prepared and mounted, or, often worst of all, of 'treasures' assembled by some influential sponsor who no longer wanted to be bothered with them. Aching feet, endless verbose labels, and fatigue were the images conjured up by the museum visit.

Much more revolutionary and exciting has been the development of the museum concept within the National Park Service. Starting with a simple tent, lit by sunlight or gasoline lanterns, in Glacier National Park in the nineteen thirties, museums have evolved and expanded in our Park Service so that they have become models for others outside that Service, as in the Bernice P. Bishop Museum in Hawaii.

The park is itself a museum. The building labelled thus should be like an alluring story book in colorful attractive format that tells the story of the particular park, historical monument, or wildlife area. The chapters are the various exhibits presented in systematic order; e. g., geological background may be followed by the treatment of the plants and animals of the region, then something of human history.

Many park visitors have limited time available; many will never be able to return for a second visit. This means that the impact of the museum must be instantaneous, overwhelming, and lasting. The contribution of every item in the exhibit is weighed before its acceptance as part of that exhibit. Only the most essential, impressive, and dramatic material is used and the labels and story are worked over to be as clear, concise, and emphatic as possible. Study is also given to all accessory attributes - lighting, ventilation, circulation of traffic, etc. - nothing is overlooked. But with all this the ultimate test remains; how much has a visitor gained and what has he retained after he has walked out of the door?

Self-Guiding Trails

In parks, self-guiding trails have grown from mere labelling of features to a facility that gives significant information with the names noted only indirectly. Take for example this label in Glacier National Park 'These tent-caterpillar larvae are blind. They retrace their way back to the web by following silken threads, spun while feeding'. That particular label was the spark for a news release by a national press agency that travelled around the globe.

The scheme of using a particular trail to develop a particular theme was instituted in the parks; 'Follow this trail and read the story of glaciers that fashioned this wonderland for you and me'. "This trail tells you how life is determined and influenced by its environment. This is the story of a sphagnum bog'.

The development of better techniques has also been a contribution; the use of guide leaflets with key numbers along the trail; devices for adapting use of the trail to changing seasons and conditions; production of better and more durable labels that blend into the surroundings while still being plainly visible and legible.

CONCLUSION

The contributions of the Interpretive Service of the United States National Park Service to the cause of popular, public conservation education are many. Among the most important, the following loom big; demonstration of the importance of taking conservation

education outdoors; development of reverence for life and the wonders of creation; development of a sense of responsibility towards nature and natural resources; development and sophistication of methods employed; the use of conservation education and popular naturalist activities as administrative tools; the development of a spirit of teamwork between instructor and pupil, between park and park visitor.

Education and Publicity for Resource Conservation in Sabah

by

MR. E.J.H. BERWICK

Curator, Sabah Museum¹ Jesselton, Sabah, Malaysia

SUMMARY

A short review is given of the production of literature and leaflets on nature and general conservation in Sabah.

INTRODUCTION

Resource conservation is not merely a matter of legislation and the running of national parks, but to be successful it must have the backing of the people behind it. This means that a long-term and widespread propaganda campaign is required to influence not only the leaders in a community but also the general mass of the population. In the understandable desire of the underdeveloped countries to catch up quickly, this is often relegated to the background for many reasons.

Firstly, there are language difficulties; in Sabah for instance Radio Malaysia, Sabah, broadcasts in six languages at present, English, Malay, Kadazan, Chinese, Murut and Indonesian; and any posters or leaflets prepared for the Kinabalu National Park to be effective should also be in several languages. Secondly, resource conservation rarely has one master and it is often spread between several ministries and departments and co-ordination is difficult. Thirdly, its long-term importance is often underrated and adequate funds are not available. For these reasons the propaganda campaign is casually run by amateurs in their spare time, rather than by people who by their training are qualified to do so.

CONSERVATION IN SABAH

In Sabah this has been especially the case. North Borneo must have been one of the places in South East Asia which suffered most severely during the Second World War. Not only were nearly all the towns pattern-bombed but in many coastal areas 16 per cent of the male population lost their lives. In the years following, emphasis had to be placed on reconstruction, and what little money and manpower was available was needed for schools, hospitals and administration.

By the middle of the 1950's one could start to look forwards rather than backwards and by 1960 it was possible to start a Sabah Society which had the following objectives;

1. To stimulate a wider interest in and knowledge of the history, natural history and geography of Sabah and the cultures and customs of its peoples.
2. To encourage and assist the recording of knowledge of the history, natural history and geography of Sabah and the preservation of examples of the cultures and customs of its peoples.

Although the number of members was not great, the first journal was issued in 1961 and in the past five years seven journals in all have been produced.

¹ New title and address; Secretary General, IUCN, 1110 Morges, Switzerland.

In addition, in 1963 the Borneo Literature Bureau, in association with Longmans Green, produced three sets of colored wall-charts, a set of six of the Birds of Borneo, a set of three of the Butterflies of Borneo, and a set of four of the Wild Flowers of Borneo. In 1964 the same Bureau issued a series of seven charts with black and white drawings of fish common to Sarawak and Sabah, prepared in association with the Agricultural Departments of Sarawak and Sabah.

At the same time steps were being taken to form National Parks; the National Parks Ordinance was passed in 1962, and the Kinabalu National Park of 275 square miles was gazetted in February, 1964. Mountain huts for the convenience of climbers were erected by the end of 1964. In early 1965 a series of information leaflets was produced to act as a basis for something more ambitious which it is hoped will be issued early in 1966.

In 1964, the Sabah Society published a pocket sized booklet, 'An Introduction to the Mammals of Sabah' by Professor J. L. Harrison, mainly aimed at arousing the interest of school children and it is now hoped to continue the series with booklets on the birds, insects, flowers and trees of Sabah. Also in 1965 the Sabah Museum was opened, admittedly in temporary quarters, and on a very amateur basis, but this also arouses interest and curiosity, among both adults and children.

In Sabah a start has been made but there is a long way to go, especially in the production of vernacular leaflets.

Contribution of a Nature Society to Public Conservation Education

by

MR. WONG YEW KWAN

*President, Malayan Nature Society; Deputy Chief Research Officer,
Forest Research Institute, Kapong, Malaya, Malaysia*

SUMMARY

A nature society hoping to instill conservation consciousness amongst the people in a developing country must adopt different approaches for people with different social, economic, and educational backgrounds. With this in mind the author discusses the different approaches to;

1. the planners, administrators, and politicians;
2. the student--; and
3. the rural people,

and gives instances of what the Malayan Nature Society has done in this respect.

INTRODUCTION

I am starting off with the assumption that 'people who know and value natural resources will not destroy them' (Gilliland 1961) and the substance of this paper is to examine the possible ways of making people know and what a nature society can do in this respect.

The key to solving the problem is to know who the people are. In a developing country the standard of education and literacy is tremendously varied. At one extreme are the highly educational and at the other, are the illiterate. Any nature society which hopes to be successful in its approaches must bear in mind such vastly different social and educational circumstances.

THE ADMINISTRATORS, THE PLANNERS, AND THE POLITICIANS

It is extremely important to win the support of this group for they are the people who make the final decisions. A nature society must try to win these people as members and to appeal to them on aesthetic, scientific, recreational, and economic grounds rather than through the use of technical jargon.

The nature society can also make its presence felt by offering help to the planners and administrators in solving their problems. To cite an actual example, the Malayan Nature Society recently heard of a scheme to convert an area of reserved forest into a bird sanctuary complete with a walking aviary as a tourist attraction. The Society offered its help and it was enthusiastically received. It has been consulted at every stage of planning, and a member of the Committee of the Society sits on the Planning Committee. In serving this Committee the Society not only imparts principles of conservation to the planners, but also serves conservation in a practical way making sure that there is the minimum of disturbance to the eco-system.

To the educated group in general the nature society can act as an informer pointing out the endangered species, the threatened national monuments or the bad agricultural or other land-use practices through films, radio, and television. The Malayan Nature Society has in the past few years taken an active part in the preservation of special habitats through direct negotiation with the State Governments or various Government

Departments. Due to the efforts of the Society the State Government of Selangor is backing the preservation of Batu Caves -- a unique limestone massif just five miles from Kuala Lumpur - on the grounds of its tourist potentials and scientific values; and the Trengganu State Government is similarly backing the conservation of the Giant Leathery Turtle. The Forest Department has, on the advice of the Society, agreed to leave a three chain wide strip surrounding the quartz ridges with their specialized vegetation (Wyatt-Smith 1959). For the conservation of Batu Caves a special film was made with the co-operation of the Malayan film unit to inform the public of the fauna and unique formation within the caves.

THE STUDENTS

The students represent the greatest single hope of any nation for conservation. Unfortunately, speaking for Malaya in any case, a drive on nature conservation has not started until recently. Perhaps the destruction of natural habitats and natural resources was not seen or felt until the rapid development of the post-war period. There is certainly an urgent need to include the subject of conservation in formal teachings in secondary schools and institutions of higher learning. A nature society can perhaps help in the formulation of courses in these institutions and also take part in giving lectures.

The Malayan Nature Society is organizing special indoor and outdoor meetings for school children to kindle interest in natural history. The success of these depends on local branches of the society in various localities or the availability of members to travel about and give talks. Perhaps if such talks can be oriented to cover certain aspects of the curriculum there may be more success.

THE RURAL FOLK

It is to this group of people who live largely at a subsistence level that it is most difficult to appeal. Protected animals are killed for food and large areas of forest are illegally felled for cultivation because the people do not know or understand. The final solution rests more perhaps with social and economic uplift which will lead to education.

Nevertheless the Malayan Nature Society is trying by simple posters to teach these people not to disturb or destroy threatened animals. It is hoped to distribute these posters to rural schools, community halls, and the village headman's office.

These are only a few cursory ideas based on what the Malayan Nature Society is doing. I am sure there are many more which members of the Conference will mention and discuss.

LITERATURE CITED

- Gilliland, H.B. 1961. Conservation and Education. *Malayan Nature J.* 21st anniversary special issue. P. 26.
- Wyatt-Smith, J. 1959. Nature Reserves. *Malayan Nature J.* 14 (1);40.

Some Notes on Campaigns and Propaganda on Behalf of Conservation

by

MR. R.S.R. FITTER

Hon. Secretary, The Fauna Preservation Society. London, England

SUMMARY

The author presents the problems of putting conservation across both to the general public and to specialized groups. The two main aspects of conservation propaganda dealt with are;

1. its content, and
2. the media used to spread it.

Under *the content*, the specific and the more general definitions of conservation are discussed, and six concrete points of conservation are presented. Under *the media*, the major means for spreading propaganda are presented.

INTRODUCTION

These notes are confined to problems of putting conservation across, both to the general public and to specialized groups, and do not cover fund-raising on behalf of conservation. Important advice on this specialized field of conservation propaganda will be found in the first report of the World Wildlife Fund, recently published in England under the title of 'The Launching of the New Ark'.

The two main aspects of conservation propaganda dealt with here are therefore,

1. its content, and
2. the media used to spread it abroad.

Both will, of course, vary with the nature of the audience addressed, whether it consists of the general public, school children, university students or members of specialized groups who may or may not start with an initial interest in conservation.

THE CONTENT OF CONSERVATION PROPAGANDA

Conservation is a term to which various meanings have been attached, so it is desirable to make clear at the outset of any particular campaign or other initiative exactly what is meant by conservation. In these notes conservation will be taken in the broadest sense of the maintenance and management of wildlife resources or, to use the words of President Kennedy 'the wise use of our natural environment. . .the prevention of waste and despoilment while preserving, improving and renewing the quality and usefulness of all our resources'.

However, conservation also has a quite specific and quantitative meaning: in the terms used by Fraser Darling, the maximization of the energy flow through any given biotope. This is not an easy concept to get across to lay audiences, which tend to recoil from it as 'scientific jargon'. Indeed, except in the broadest terms that amount almost to a truism, the general idea of conservation seems much harder to get across to non-scientific audiences than some of its specific aspects. Some concrete points that can be projected are;

1. Conservation is not just sentimentalism, but a question of good housekeeping with the natural resources on which mankind, and each nation individually, depends for its future welfare. The economic arguments for conservation are as powerful as the scientific, aesthetic and moral ones, and more readily understood. Properly farmed wildlife may be a valuable food resource, e.g. whales, seals, with other products such as oil and fur thrown in: as a tourist attraction wildlife, both animals and plant, may be a vital revenue earner, as e.g. in East Africa. In some areas natural forests or grasslands may be more productive than the land would be under cultivation; in others the preservation of forest is vital to preserve water resources and soil, e.g. on watersheds.
2. The danger of extinction of rare animal and plant species; this is an aspect of the problem that appeals especially to the imagination of audiences which are uninitiated about conservation. It should not, however, be overstressed, or it may provoke the criticism that this is putting animals before humans. The scientific and economic arguments for preserving rare species must be presented alongside the moral and aesthetic ones.
3. The threat to rare and vanishing habitats: it is becoming increasingly understood even by lay audiences, that you cannot conserve animals and plants without conserving the whole biotope.
4. The general destruction of biotopes with their associated animals and plants, which can become rare in an alarmingly short time.
5. The overharvesting of animal and plant populations, and the consequent waste of valuable food and other resources, the classic instances being the extinction of the passenger pigeon, the near extinction of the American bison and the current excessive drain on the Antarctic whale stocks.
6. The widespread and increasing pollution of the environment by pesticides, oil spillage, sewage disposal and similar agents.
7. The positive aspects of conservation, by successful management, on a renewable basis, both of animal populations such as the Pribilof fur seal and various ungulates on farms in southern Africa, and of plant communities, such as well managed natural forests in various parts of the world.
8. The consequences of too successful protection of a single species, so that it either starts to destroy its own habitat, as the hippo and elephant have done in various parts of East Africa, or the white rhino might do in Natal if the authorities did not disperse the surplus population: or become so numerous as to threaten human economic interests, as the grey seal has been accused of doing on the east coast of Great Britain. Sometimes even a decreasing species, such as the Ceylon elephant, may be regarded as an economic threat. Conservation therefore implies management and control.

MEDIA FOR CONSERVATION PROPAGANDA

1. Personal contact with people in positions of influence, e.g. by special mission, such as those of Ambassador Crowe and Lord Soulbury to the Far East and Ceylon respectively on behalf of the World Wildlife Fund, or by special letter from another influential person.
2. Lectures, illustrated by posters, slides or films;
 - (a) in schools or to other audiences of young people
 - (b) to specialized audiences, either of those already interested in conservation or consisting of specialists in other subjects.
 - (c) to general audiences.
3. Broadcasting and TV
 - (a) straight talks are mainly for use for making already fairly well informed opinion better informed.

- (b) films or feature programs on TV: those can be a very powerful means of bringing conservation problems to the attention of the general public, e.g. very many more people have become aware of the Galapagos Islands and their problems as a result of programs in Peter Scott's 'Look' series on TV than ever did so as a result of reading Darwin's *Origin of Species*.

4. Written and Pictorial Material

- (a) pamphlets and leaflets may be of value in drawing attention to a specific, fairly limited problem.
- (b) books are important background material and for influencing people in positions of importance, but only the exceptional one such as Joy Adamson's 'Elsa' makes a mass impact.
- (c) Articles, especially illustrated articles, in magazines are chiefly useful in creating a background of informed opinion.
- (d) Newspapers. It is most important to keep up a steady flow of news including photographs about conservation, and this can be facilitated if one central organization in each country makes itself responsible for the supply of such news. Articles, letters to editor, and inspired editorials are also of value.

The Australian Conservation Foundation

by

MR. FRANCIS N. RATCLIFFE

*Honorary Secretary, The Australian Conservation Foundation, Assistant
Chief, Division of Entomology, C.S.I.R.O., Canberra City, Australia*

SUMMARY

This paper describes the Australian Conservation Foundation presenting its background, organization, and objectives. It details the Foundation's program with particular regard to various forms of public education in conservation.

INTRODUCTION

The Australian Conservation Foundation is a private body that has been established to promote the understanding and practice of conservation throughout Australia and its territories. The suggestion of H.R. H. The Duke of Edinburgh in 1963 that Australia should become a contributing member of the World Wildlife Fund put the spotlight on our lack of any national organization capable of co-operating with an international effort of this kind or of speaking for Australian conservationists as a whole.

The Foundation is being incorporated as a non-profit making association and will have an office and secretariat in Canberra. It has a Governing Council made up of businessmen, professors, government leaders etc. which will be replaced in due course by one elected by Ordinary Members. The Constitution provides for four classes of membership: Ordinary Member; Associate Member; Life Member; and Benefactor Member. In addition various groups that want to be associated with the Foundation can become Member Bodies, nominating a representative who has the same rights as an Ordinary Member.

THE AUSTRALIAN SITUATION

Australia is one of many countries to have reached a stage in its development where conservation demands recognition as a practical policy as much a concern of the nation as a whole as the paramount responsibilities of the country's defense or the education of its youth. This also can be said about conservation - its principles, and the effects of its neglect, will be more and more important to each succeeding generation. In Australia there are a number of government departments or special services concerned with conservation, but our country differs from others having a federal political structure in that in Australia, conservation has been regarded as almost exclusively a State responsibility. The weakness of support, at the national level, for conservation in Australia was very much in the minds of those who sponsored the establishment of the Conservation Foundation. They felt that if a national interest could be roused, support for intensified government effort would be forthcoming - and not only that, but financial support from public appeals for urgent projects which caught the popular imagination.

THE NEED FOR EDUCATION

In framing its program, the Australian Conservation Foundation has been mindful of the experience of similar bodies in other countries which have often started off with rather specialized objectives and then found themselves having to pay more and more attention to education. - education in the broadest sense. The Foundation realized

from the start that education would be one of its most important activities, and that behind educating people in the nature of conservation problems lay the simple need to get them interested in the sort of things with which the problems deal.

One of the main functions of the Foundation will always be the collection of facts for presentation to the public and governments in the hope of stimulating some desired line of action, and winning popular support for that action. It will also set itself up as a reference center for information on conservation problems and achievements, both in Australia and overseas. It is hoped also that the Foundation will be accepted as a suitable body to represent Australia at international conferences on conservation, something which no Commonwealth department or other private body could appropriately do at present.

THE PROGRAM OF THE FOUNDATION

It will take a little time for the Foundation to become geared for effective action, but it has been decided that the following should be included in the initial program of activities over the next year or two. Some projects will be handled by the Foundation's staff; for others, help will have to be called in; and one or two will necessitate a special appeal for funds.

1. Survey of Australia's National Parks and Reserves. The proposed survey is intended to lead to the publication of a popular book explaining what our national parks and reserves contain and wherein lies their special interest and value to the community, and suggesting ways in which they might be improved to meet future needs and the demands of our rapidly increasing population.
2. Booklet on the A.B.C. of Conservation. From an understanding of what happens when man interferes with natural systems certain basic principles of conservation have been developed which guide workers on practical problems whether they relate to forests or grazing land, water catchments or wild animal populations. A well-illustrated booklet explaining these principles in simple language should help ordinary people to start thinking sensibly about conservation.
3. Field Studies Centers. Starting in Britain some fifteen years ago the Field Studies Centers, as they are called, have been outstandingly successful in interesting and educating people in the outdoor aspects of geology, botany, zoology, geography, and allied sciences. They supplement the work of educational institutions and stimulate or renew the interest of city dwellers. This success story from Britain provides a lead which is clearly worth following up.
4. Cape Barren Goose (*Circopsis noraehollandiae*). This is an Australian endemic and one of the world's rare birds with no close relative. Its breeding is restricted to certain islands between Bass Strait and Southwestern Australia, and the most important of these should be set aside as a sanctuary. To achieve this, money will have to be raised.
5. Field Guide for Bird Identification. No one with a feeling for the bush can fail to have some interest in birds. Unlike the native mammals, which are mostly nocturnal and avoid mankind, birds are accommodating and parade themselves in their fascinating variety. Australia badly needs a well-illustrated pocket-sized guide to bird identification, and the Foundation proposes to sponsor the preparation of such a book.

CONCLUSION

There are signs everywhere that thoughtful Australians are becoming more and more concerned with conservation – some perhaps only in rather limited aspects, but some now seeing clearly that its various facets are parts of the one big problem of the wise use of our natural resources for the long-term benefit of the community as a whole.

The Foundation is setting out to discover where assistance and action are most needed, and how they can best be given and stimulated. It must complement, not compete with other bodies already active in the conservation field. The Australian Conservation Foundation believes that it can meet an important need; but in a country of three million square miles it can only be effective, and justify the confidence of the public, if it can command adequate resources and the time of first-class men.

The Role of Zoological Gardens in Creating Public Awareness of Wildlife Conservation

by

MR. I. MADE TAMAN

*Head. Division of Nature Conservation and Wildlife, Directorate of Forestry,
Bogor, Indonesia*

SUMMARY

Zoos, formerly used chiefly by children, have drawn increasing public attention and support. In addition to their recreational values, zoological gardens through their exhibits dramatize among other things threatened species; they also give students a chance to observe animals at first-hand. The Government of Indonesia should support the zoos in their program for wildlife conservation.

Formerly, zoological gardens in Indonesia were considered as recreation areas only for children. No attention was paid to them by the government. But, gradually through the many accomplishments of the zoos, such as breeding animals in captivity, the interest and appreciation of the public was awakened.

The Division of Nature Conservation and Wildlife Management, Directorate of Forestry, is responsible for natural resources in Indonesia including the supervision of zoos, gardens, and parks. In Indonesia we have about ten zoos of varying sizes, the largest and best one being the Surabaya Zoo in East Java. This zoo, one of the few modern ones in Asia, has been especially successful in the breeding of siamangs (*Hylobates syndactylus*) and proboscis monkeys (*Sasalis tarralus*).

In a country such as Indonesia with its rich fauna it is important to draw the attention of the public to this resource. The best way to accomplish this is the establishment of good zoos near the large cities.

Many students in high schools and universities visit the zoos to get first-hand knowledge of the animals and rare species.

Since many attempts to breed animals in zoos are successful the zoological parks in Indonesia play an important part in the preservation of animals, increasing the animal population and avoiding unnecessary capture in the forest. The government should support this work by giving grants to those zoos which are active in this movement.

Displays of threatened species giving information about their origin, food, habits, habitat, and reason for protection, indirectly prevent the slaughter and persecution of the species in the wild.

Through zoological gardens people learn to appreciate wild animals for their usefulness to science and mankind. Furthermore students are thus attracted to the field of zoology which in turn increases the number of wildlife experts who can prevent illegal hunting and aid in wildlife preservation.

In addition to the general objectives above the Zoological Gardens in Indonesia have certain specific objectives;

1. To prevent illegal trade in animals through the legal exchange of animals with institutions at home and abroad.
2. To purchase animals from dealers and to take care of them in the zoos.
3. To report to the government those individuals who are in illegal possession of protected animals.

4. To collect funds for expeditions and research on rare fauna and their habitats; to enlarge the collections in the zoos for visitors at home and from abroad (tourism).
5. To make observations regarding the diseases of animals in the zoos.
6. To enrich the museum - as a part of the zoo - with exhibits for the education of the public. It is very important to show the public the most threatened species.
7. To provide, through the botanical garden, a green belt for the protection of birds in large cities such Djakarta, Bandung, and Surabaya.

Considering the above points the government of Indonesia should give full support to the zoo officials to encourage them and enable them to accomplish their aims. Zoo directors in Indonesia and abroad should co-operate in the exchange of information for the benefit of wildlife conservation. In this way and in creating public awareness zoological gardens will help in the preservation of the fauna of the world.

A Background Report to the Series of Nature Study and Conservation Programs Produced by the Schools Broadcasting Service and the Sarawak Museum

by

MR. ALAN MOORE

Schools Broadcasting Officer, Sarawak, Kuching, Sarawak, Malaysia

and

MR. MICHAEL FOGDEN

Sarawak Museum. Kuching. Sarawak. Malaysia

SUMMARY

A brief description is given of a nature study and conservation program to be broadcast to the secondary schools in Sarawak. This is planned and produced jointly by the Schools Broadcasting Service and the Sarawak Museum. Color slides based on local materials will be shown simultaneously with the broadcast.

INTRODUCTION

During 1965-66 a series of Nature Study and Conservation programs to be broadcast to Secondary Schools in Sarawak is being planned and produced jointly by the Schools Broadcasting Service and the Sarawak Museum. To preface this brief report on the series it should be pointed out that in Sarawak, Malaysia, programs produced by the Schools Broadcasting Service are used in all schools throughout the country, both primary and secondary. Broadcasts to secondary schools began experimentally in 1964 and have provided successful support programs for the first three years of secondary education. The programs are devised to follow the syllabuses as closely as possible.

NATURE STUDY SERIES

However, this new Nature Study series, along with its counterpart in history, breaks new ground for Sarawak in being in sound and vision; the broadcast lessons are illustrated in the schools by color slides shown simultaneously with the broadcast. The use of photographs in this way serves to illustrate points in a broadcast lesson and provides our teachers, often young and inexperienced, with a valuable prop to their teaching. The photographs can be shown to the students again and again after the broadcast is over, thus reinforcing the content of the program and assisting the teacher in his extension or development of the topic. It is also planned that eventually schools will be provided with tape recordings of the programs so enabling them to be seen and heard, complete, as often as desired.

The series is regarded as a valuable extension to the existing science syllabus taught in the schools, but probably the most important aspect of the series is that it will serve to create an interest in the natural history of the country. All the photographs and animals seen in the series are from in and around Kuching, the capital. All can be found by observant teachers and students in the near vicinity of their schools and homes throughout the country.

The subject matter of this series of Nature Study programs concerns the animal in relation to its environment and, in particular, the ways in which it is adapted to live

in its environment. A knowledge of the ecology of plants and animals is absolutely fundamental to a proper understanding of the reasons for the need for conservation.

The introductory program, which was seen and heard at the conference, introduces the concept of adaptation, - the idea that animals are adapted to their environment and that there are good reasons for the form, color and behavior of animals, no matter how strange and inexplicable these might appear to be at first sight. Later programs deal simply with evolution and natural selection, and also consider in more detail some of the adaptive themes introduced in the first program, notably those dealing with adaptive coloration which are perhaps the most striking and easily understandable of adaptations.

A later program introduces the idea of food chains or food webs and emphasizes the disastrous results which can accompany the disruption of these chains or webs by indiscriminate and unplanned eradication of pests by non-biological methods. Another program deals with those animals, such as snakes, spiders and scorpions, which are normally killed on sight. Their essential role in the general scheme of things, and the considerable good that most of them do, is emphasized. The final program is a summary linking the lessons already learned to the idea of the need for conservation of all natural resource's for economic as well as scientific, ethical and aesthetical reasons.

For these plans to mature, enthusiasm, technical skills, and money are needed. Schools Broadcasting has a limited budget and an enthusiastic staff with ideas, but the venture could never have got off the ground without the help of the Sarawak Museum. Thanks are due to the Curator of the Sarawak Museum, Mr. Tom Harrison, who has shown great interest in the project and kindly gave permission for Museum staff to script the programs and take the photographs.

WILDLIFE ASSOCIATION FOR THE SECONDARY SCHOOLS

Plans for the formation of a wildlife association for the secondary schools are also being formulated. When the series is under way it is hoped that the science masters will encourage their students to form school societies and so bring together young people who will collect, identify, record and study aspects of plant and animal life in their own areas. It is hoped that the Association, with its headquarters at the Sarawak Teachers' Center, Kuching, will be able to produce a bulletin containing the reports, observations and photographs received from the school societies.