

Report : Recent Development and Future Prospect of Agricultural Education and Training in Asia and Pacific—Activities of AAACU

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1. Introduction

The reportor has had an opportunity of attending two meetings recently organized by AAACU and other associated institutions. One was Regional Round Table on Strategies for Agricultural Education and Training in Asia and Pacific organized jointly with the SEAMEO Regional Center for Graduate Study and Research in Agriculture, the Food and Agriculture Organization of the United Nations, and Kasetsart University at FAO Regional Office for Asia and the Pacific in Bangkok, Thailand from 6 to 10 August 1990. The reportor participated in this meeting representing Japan as nominated by AAACU. The other is 8th Conference of AAACU which was organized by Nagoya University at Nagoya from 1 to 4 October 1990, where Drs. G. Fuse, A. Kawai, and S. Ouchi also participated.

Both meetings referred to the issues having direct implication to agricultural education and training in Asian regions, and it is worthwhile to understand the prevailing situation in the region with regard to agricultural education and training strategies. The information obtained through the discussion is useful to formulate necessary improvements on such strategies as well as delineate more appropriate strategies and approach.

Given below are highlights of the two meetings :

2. Regional Round Table on Strategies for Agricultural Education and Training in Asia and Pacific

2.1 Objectives

The specific objectives of the round table are as follows : (a) to determine the extent to which agricultural education and training at the university and intermediate levels in Asia and the Pacific is effectively backed up by national policy guidelines which ensure that agricultural education programmes and institutions are integrated in both the system of education of the country and the national agricultural and rural development efforts ; (b) to examine the current status of agricultural education and training in the region, with special attention to institutional systems and objectives, the relevance of the existing formal teaching programmes and non-formal training sessions, available resources (staff, facilities, and finance), and institutional management ; (c) to consider emerging policies and strategies at national level with a view to the future and with emphasis on the need for appropriate institutional objectives, outputs and management as guiding context in figuring out new job profiles, new teaching programmes, new subject areas and new inter-linkages between formal and non-formal forms of teaching and learning ; (d) to

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consider the increasingly prominent regional dimension of agricultural education and training so as to identify opportunities for cooperation, complementarity and mutual support among the institutions concerned in the region, and appropriate respective mechanisms for realizing such opportunities; and (e) to formulate measures for the effective integration of agricultural education programmes and institutions in the educational system of the country and the national agricultural and rural development efforts, and to suggest priorities for such measures as appropriate.

2.2 Date

The Round Table took place on 6-10 August 1990 in five sessions at the FAO Regional Office for Asia and the Pacific in Bangkok, Thailand with a total of 36 resource persons, participants and observers from 15 countries in Asia and the Pacific and three regional and international organizations.

It took off with the Opening Session and proceeded thereafter with a session for presentation of keynote paper and country reports, session for presentation of invited papers, a discussion session and a concluding session, respectively.

2.3 Japanese Country Paper

The reportor's presentation is summarized as below :

Initially, agricultural universities in Japan had two major aims, namely to conduct basic and applied research in the traditionally important fields of agricultural sciences, and to train students on the basis of the research findings. The rapid change in societies and food and agricultural situations of the country, as listed below, necessitated an adjustment in the functions of the universities to meet the changing demands of the society.

- Japanese consumers prefer food commodities that are more diversified, tasty, nutritious and easy to cook.
- Rice production has become excessive and non-rice crops are to be introduced in paddy fields.
- Food processing, marketing and food shop industries play significant role in Japanese economy.
- Environmental conservation, landscape consideration, recreation opportunities and human amenity become an integral part of rural development.
- New technological development is taking place in the field of biotechnology, electronics and materials.

The need for a distinctly innovative faculty of agriculture and agricultural university is now receiving national attention. Reorganization of agricultural faculties to promote an integrated approach toward research and education, reflecting the ever changing social needs and demand is also in order. In many universities, the number of departments and courses has been reduced in order to give flexibility in conducting research and education without being confined by the narrow scope of specialization. It is common to see the replacement of the word "agriculture" by "biological resources and/or production."

The salient points brought out during the subsequent discussion were :

- Agricultural universities in Japan are under the Ministry of Education.
- Approximately 80% of the funding support for agricultural research in Japan is provided by the government and 20% by the private sector.
- Agricultural extension in Japan is the responsibility of the Ministry of Agriculture. Practically every agricultural extension worker in Japan is a holder of a bachelor's degree in agriculture with additional pre-service and in-service training at the various research stations of the Ministry of Agriculture.
- The educational system in Japan is the same as that in the U.S.

- There has been a very close linkage between agricultural universities and Ministry of Agriculture in Japan in terms so far of research, but very little linkage in terms of instruction and extension.
- Food safety is of primary concern nationwide in Japan nowadays. This is the reason for the campaign for the so-called "agriculture by nature."
- Approximately 80% of the agriculture graduates in Japan land a job in the food sector, the remaining 20% being employed in the nonagriculture sectors such as banks, transportation companies, industrial establishments, etc.

2.4 Discussion Highlights

This sector contains the salient points pertaining to future scenarios, national policy and strategy priorities, regional policy and strategy priorities, and future role of regional, international, bilateral and donor agencies in agricultural education and training as agreed upon by the participants during the Discussion Session.

a. *Scenarios for future development*

The agricultural sector will remain important in most countries in Asia and the Pacific, although there will be variations in terms of importance of agricultural contributions to the gross domestic product of each country. Nevertheless, the agricultural sector and enterprises will be subjected to changes as science and technology advances. Environmental protection and preservation will override concerns for higher agricultural productivity through the use of toxic chemicals. The use of mechanization for efficiency versus displacement of labour will be debated as population growth keeps increasing.

Employment of agricultural graduates in non-agricultural sectors will be a common phenomenon and the mismatch of manpower planning and manpower development will continue to plague countries in the region. The agricultural sector will play a vital complementary role to the manufacturing sector and perhaps, off-farm employment opportunity will increase as agricultural and rural development progresses. Moreover, the number of the rural poor and the landless will continue to increase and burden the economics of the countries in the region. These are some of the possible scenarios of agriculture in the future. What then should be the roles of agricultural education and training institutions in meeting the demands of the future?

b. *Priorities for national agricultural education policies and strategies.*

1. To review and revise the philosophy and concept of agricultural education and training at the various levels of education (elementary, secondary, vocational-technical schools, colleges and universities) to meet the changing demands of society.
2. To plan the establishment and/or the strengthening of agricultural and training institutions in line with manpower demands, and to check their proliferation, where appropriate, and classify them according to excellence and relevance in disciplinary or program offerings through a legislation.
3. To establish a statutory body to formulate, review and revise policies, curricular programmes, and accreditation across schools, colleges, and universities in a country and to check proliferation of the same programmes.
4. To conduct a review and development of curriculum by :
 - (a) revamping of agricultural education curricula to balance the requirements for science and technology and rural development in the light of changing socio-economic conditions and gender roles ;
 - (b) experimenting curricular innovations, which may avoid the traditional curricular-building process, by putting together subjects or courses into an integrated one in order to promote

- interdisciplinary and holistic approach in teaching, research and extension ;
- (c) evolving entrepreneurs and management-oriented courses through seminars and offering of special topics as special problems in curricular programmes ; and
 - (d) integrating the concepts and principles of ecosystem and farming systems development in the curriculum.
5. To institute career guidance, counseling and job placement services in schools, colleges and universities to provide assistance to entering students in making occupational decisions.
 6. To identify and retrain teachers relative to the changing demands in science and technology and rural development.
 7. To model approaches and strategies in non-formal education through the extension unit of agricultural institutions.
 8. To grant greater institutional and fiscal autonomy to colleges and universities through legislation and to require accountability as a result of this autonomy.
 9. To establish and strengthen the linkage between the Ministry of Agriculture, Ministry of Education/University Affairs, institutions of higher learning, the private sector and other relevant agencies.
 10. To set up a clear mandate in agricultural institutions of higher learning with respect to instruction, research and extension.
 11. To promote the recognition of agricultural education as a technical profession.
- c. *Priorities for regional agricultural education policies and strategies.*
1. To select a school/college/university to pilot innovative curricular programmes through AAACU and other appropriate mechanisms with funding assistance from international, regional and bilateral agencies such as FAO, UNESCO, UNDP, JICA, USAID, SEARCA, etc.
 2. To field experts or specialists from advanced schools/colleges/universities to agricultural education institutions needing technical assistance through AAACU and other appropriate mechanisms with the assistance of regional, international, and bilateral agencies.
 3. To promote regional cooperative research projects with the participation of researchers in the region through technical assistance of relevant regional, international, and bilateral agencies.
 4. To exchange teaching and research personnel and students between and among colleges and universities in the region and formalize the undertaking through AAACU with funding assistance from relevant regional, international, and bilateral agencies.
 5. To develop criteria of excellence and conduct an inventory of excellent programmes in the region by an appropriate mechanism with funding assistance from relevant regional, international, and bilateral agencies.
 6. To exchange curricular and other relevant information and upgrade vocational-technical schools in the region through the assistance of relevant regional, international, and bilateral agencies.
 7. To provide assistance to vocational-technical institutions in the region in terms of high-level training through the assistance of relevant regional, international, and bilateral agencies.
- d. *Future role and contribution of regional, international, bilateral, and donor agencies in agricultural education and training :*
1. To provide technical assistance to vocational-technical schools, agricultural colleges and universities for piloting or experimenting curricular models and for the establishment and operation of action programmes in rural development within a specific time frame.
 2. To provide technical assistance to regional associations of agricultural schools, colleges and universities in the conduct of workshops and seminars relevant to curricular innovation,

nonformal education, women in development and other pertinent human concerns.

3. To provide technical assistance to associations of agricultural schools, colleges and universities at the regional and interregional levels in the development and exchange of instructional and other related materials that are useful in teaching and in agricultural and rural development activities.
4. To backstop the development of agricultural and training institutions and vocational technical schools needing assistance with experts selected from member institutions of the AAACU.
5. To focus technical assistance and exchange of teaching and research personnel on key regional colleges and universities and selected vocational technical schools.
6. To organize regional technical consultations in the areas of teaching, research, and extension education in agricultural and rural development.
7. To provide access to and facilitate the distribution of information materials between and among AAACU member institutions.
8. To facilitate cooperation and coordination of the transfer of technology within and among interested institutions.

2.5 Conclusion

Agricultural education in Asia and the Pacific presents a scenario of differing stages of development in diverse cultural settings and geographic locations. On this account, the setting of priorities oftentimes entails problems intractable to solve within a brief span of time. It is for this reason that in priority setting and in understanding its concomitant problems, the distinctive features of the various agricultural education systems of countries in this region need to be carefully considered.

Bhutan and Papua New Guinea are at that stage where agricultural education is a recent development. But while these countries grapple with the problems of underdevelopment, they are already encountering difficulties in attracting students to enroll in agricultural schools. Even Japan and South Korea, the most advanced countries in the region, are also beset with the same problem notwithstanding a decreasing farm population and agricultural investment rate.

By and large, the decreasing trend in enrollment of students in agricultural institutions and vocational-technical schools and the very low employment opportunities of agriculture graduates can also be observed in India, Bangladesh, Sri Lanka, the Philippines, Myanmar, Indonesia, Guam, and in the newly-industrializing countries of Thailand and Malaysia.

There are other serious problems confronting these countries and whose solutions are seemingly elusive. The proliferation of agricultural education institutions and vocational-technical schools, duplication of curricular programmes, the erosion of institutional and fiscal autonomy in some countries, cultural adjustments to changing gender roles, budgetary limitations, inadequate facilities and equipment, perceived irrelevance of curricular programmes vis-a-vis the pursuit of rural development, poor recognition of agricultural graduates and an increasing women farming labor in some countries, student attrition, and poorly-trained teachers are burgeoning problems in agricultural education institutions and vocational technical schools which must be staved off if quality education should be fostered and maintained.

On the whole, the resolution of these varied and burdensome problems would require the relative ingenuity and resourcefulness of the leaders and faculty of individual agricultural education institutions and vocational technical schools and the political will of those who hold the reins of government. Only then can the agricultural education system possibly meet the formidable challenge of the advances of modern science and technology in a rapidly changing world.

2.6 Recommendations

The fast pace of the changing world in modern times very often requires the revision of beliefs

and practices pervading social institutions. Agricultural education is one of these institutions which is greatly affected by ubiquitousness of change. It must re-examine its philosophy concepts, structures, strategies and emphases to make adjustments to the changing pattern of agriculture activities and enterprises. In this vein, the following recommendations are, hereby, put forward :

- a . National association of agricultural colleges and universities must take up measures by involving relevant line agencies in reviewing and revising the philosophy, concepts, mandates and practices of agricultural education and training. Committee or task forces need to be set up to work out plans to accomplish the task of reviewing and revising these requirements in agricultural education.
- b . There is an urgent need for rationalization of existing vocational technical schools and agricultural education and training institutions to curb their further proliferation and for upgrading of institutional capabilities. With this approach, resources can be put to effective and efficient use thereby improving the quality of education.
- c . Agricultural education and training institutions, including vocational technical agricultural schools, must take the initiative in revising curricular programmes which take into account present and future socio-economic conditions and the gender roles in agricultural and rural development. National associations of agricultural colleges and universities can be tapped to lend assistance in this endeavor. Given the national and regional prestige of these associations, they can appeal for financial grants from regional and international agencies to support this educational effort.
- d . Some AAACU-member institutions and vocational technical schools, in collaboration with relevant agencies, could pilot curricular innovations by integrating concepts and principles and conducting field demonstrations in farmers' fields with respect to farming system and ecological conservation. This can enhance interdisciplinary teaching and development of desirable work habits in research and extension.
- e . Regular in-service training for teachers and agricultural extension agents to be conducted by agricultural education and training institutions, including vocational technical schools, to improve knowledge and competency to cope with the advances in science and technology and to respond to requirements of rural development must be conducted.
- f . For agricultural education institutions to be able to carry out its internal governance effectively and efficiently, institutional and fiscal autonomy becomes a critical prerequisite. In effect, agricultural education institutions must develop models of autonomy and accountability which must be submitted to the National Government for review and consideration. And if approved, a selected agricultural education institution shall implement the model.
- g . To ensure the relevance of curricular programmes, agricultural education institutions must establish formal linkages with the Ministry of Agriculture and other relevant agencies, including the private sector.
- h . Agricultural education institutions, including vocational and technical schools, may request technical and financial assistance from international, regional and bilateral agencies to support the following : (a) piloting of curricular innovations, (b) fielding of experts or specialists ; (c) cooperative research projects ; (d) exchange of teachers, researchers, and students ; (e) information exchange and institutional development ; (f) training of vocational technical schools ; and, (g) regional seminars, workshops, consultations and study tours.

3. 8th Biennial Convention of AAACU

3.1 Objectives, Date, Venue and Attendants

The Convention was held on 1 October to 4 October 1990 at the Nagoya International Center

and Hotel Nagoya Castle Plaza in Nagoya. The theme aptly chosen for the Convention is "Academic Cooperation for the Improvement of Agriculture in Asia."

The activity was conceived in order to 1) discuss ways and means of enhancing agricultural productivity in Asian countries through international academic cooperation and of promoting sustainable and more extensive exchange of active researchers and graduate students among member institutions; 2) identify recent advances in biotechnology that are relevant and applicable to agriculture and post harvest industries in Asia and discuss their implications on curricular-content improvement; and 3) to examine the role of agricultural colleges and universities in national efforts towards environment conservation.

Representatives of 26 member and affiliate institutions, observers, and resource persons attended this gathering. The total number of participants was 61 and Kinki University was represented by Dean Dr. G. Fuse, Dr. A. Kawai, Dr. S. Ouchi, and the reportor.

3.2 International Academic Cooperation and Exchange of Researchers and Students

International academic cooperation played a key role in the development of agriculture in Asian countries. The International Agricultural Research Centers (IARCs) of the Consultative Group for International Agricultural Research (CGIAR) triggered off the much publicized green revolution in Asia, notably through the modern varieties of wheat and rice. Several developing countries have bilateral agreements with a number of donor countries facilitating exchange of scientist and students, training, etc.

What is of relevance to the members of AAACU but unfortunately, received inadequate attention is the mutual cooperation and collaboration among the countries of South and Southeast Asia which share many common features: dependence on monsoons; predominantly agrarian character; dominance of rice based cropping system; small and resource poor farmers; wide-spread rural poverty; etc.

AAACU should therefore take a lead in developing academic cooperation.

Recommendations

AAACU should encourage collaborative programs among the member institutes through the following:

1. A brochure should be prepared providing information for member institutions on strengths of the AAACU member institutions using the following outline:
 - a) Name and address of the institution
 - b) contact person
 - c) areas of excellence in research and teaching
 - d) educational programs available to
 - (i) undergraduates
 - (ii) graduates
 - e) financial resources available for foreign students and scientists
 - f) residence facilities available
 - g) tuition and living expenses
 - h) possibilities for joint research programs
 - i) research facilities and teaching programs for scientists on sabbatical leaves
 - j) language of institute
2. A list of possible donor funding assistance programs should be instituted at the host institutions for AAACU sponsored students. Such a list could be distributed via the newsletter.
3. Tuition fee waiver and financial assistance programs should be instituted at the host institutions for AAACU sponsored students.

4. Each institution should send information on collaborative programs, its annual report or other reports of significance periodically to the AAACU sponsored students.
5. AAACU members should actively participate in and promote AAACU programs.

3.3 Recent Advances in Biotechnology and Their Adoption in Curricular Contents

Introduction

Many industries and societies are will be revolutionized by the application of biotechnology. Biotechnology is best defined as the industrial exploitation of biological systems or processes and it is largely based upon the expertise of biological systems.

These days there has been undoubtedly an extraordinary increase in interest in biotechnology. This has manifested itself in many ways from the development of many biotechnological companies to the widespread introduction of university courses in biotechnology.

Man has exploited biotechnology for thousands of years in such activities as brewing, wine-making, bread-making, food preservation and modification by fermentation (e.g. cheese, vinegar, and soy sauce). However, it is the development of genetic engineering techniques via recombinant DNA technology, which is responsible for the current "BIOTECHNOLOGY FEVER." Recombinant DNA technique could be defined as the process of joining DNA molecules *in vitro* and introducing them into living cells where they replicate.

What can be done by the current recombinant DNA techniques? Principally there are three sorts of things:

1. Isolation of a desired sequence from a complex mixture of DNA molecules, such as a eukaryotic genome, by utilizing a recently developed technique, the polymerase chain reaction (PCR), and replication of it to provide milligram quantities for biochemical study.
2. Alteration of a DNA molecule by site-directed mutagenesis and chemical synthesis of genes, the so-called man-made genes. Site-specific mutagenesis is quite helpful in determining the functions performed by various parts of a DNA sequence.
3. Synthesis in prokaryotes as well as lower and higher eukaryotes of large amounts of peptides or proteins that are of interest to science, medicine, and commerce.

Biotechnology is an integration of several subjects including microbiology, cell biology, biochemistry, genetics and biochemical engineering. This is a multifaceted discipline that requires the introduction of a new curricula designed to provide not only the underlying basic knowledge in general and cell biology, microbiology, genetics, immunology, general and organic chemistry, biochemistry, enzymology, and other areas, but also in specialized topics. These include genetic engineering, nucleic acid sequencing and hybridization, animal and protein synthesis, applied microbiology, fermentation scale-up, computer science, and industrial management. It is therefore obvious that the curricula aimed for biotechnology have to be carefully designed to satisfy all the requirements for the subjects. and arranged to be carried out effectively. Some examples of curricula provided for undergraduate students at both Nagoya University and University of Tokyo have been introduced from various aspects during the workshop. The participants realized that almost all subjects on biotechnology are well organized and taught as basic knowledge increases. In addition to lectures, students at Nagoya University for example, have to carry out rather extensive laboratory experiment courses like gene manipulation followed by its expression in microbes and students at the University of Tokyo isolate and characterize chromosomal DNA from *E. coli*. The importance of the experimental training has been recognized by everyone.

Recommendations

The following are the special topics and their recommendations discussed during the workshop.

1. Biotechnology for higher plants

- To develop plant genotypes which have less toxic compounds, and are resistant to pests.
- To produce single cell protein (SCP) using root crops such as sweet potato and cassava (as carbon sources) in order to enrich the protein of these crops as animal feed.
- 2. Biotechnology for higher animals
 - To develop animals with high digestion efficiency
 - To increase efficiency of embryo transfer using cryopreservation techniques
 - To utilize animals for production of commercially valuable proteins by expressing the genes for various proteins in the mammary gland of farm animals
- 3. In the field of microbiology
 - To utilize naturally occurring microorganisms with special characteristics such as their high capacity to secrete protein, as host organisms for the production of commercially valuable proteins
 - To develop classical biotechnology techniques like fermentation and the dissemination of these techniques from advanced countries to developing countries
- 4. Steps to develop biotechnology
 - To exchange information between and among international and academic institutions
 - Technologically advanced countries should accept, train and educate students and researchers from developing countries for a short period
 - Teachers, researchers and other professionals must be “brushed-up” on the recent advances and applications of biotechnology
- 5. Other proposals
 - To change the name “College of Agriculture” to something like “College of Agriculture and Bio-science” or “College of Agriculture and Life Sciences” to reflect the expanding scope of the current curricula in biotechnology
 - To add new topics on biotechnology to the existing curricula with the aim of achieving a balance between the study of classical microbiology and advanced techniques

Conclusion

The current advances in biotechnology implies the absolute importance of close collaboration among international research and academic institutions to realize the potentials of this new technology. The workshop group concluded that the development and application of biotechnology in Asian countries could be achieved successfully through the exchange of mutual interests and information on many aspects of biotechnology as well as the continuous exchange of students and scientists among member institutions.

3.4 The Role of Agricultural Colleges and Universities in a National Effort to Protect the Natural Environment

Introduction

The participants noted with concern the serious ecological crisis presented by various speakers at the Convention. They agreed that the destruction of the remaining tropical rainforest represents the most visible aspect of this crisis. However, the crisis covers the whole natural support system including soil and land degradation, siltation of rivers, chemical pollution, and more globally, greenhouse effects.

The participants were further convinced that in the decade ahead, this crisis will aggravate. The reasons for this intensification of the crisis include: rapid population growth; widespread poverty; growing landlessness; unchecked destruction of natural resources as underscored in the doubling of deforestation rates as reported by FAO in its 1990 Tropical Forest Resources Assessment Project.

The participants therefore felt that the Association should respond to this crisis in practical and

specific ways proper to its role as agricultural colleges and universities as dictated by the specific agro-ecological realities in which each of the institutions operates. The participants recommend that the Convention consider the following courses of action :

Recommendations

I. On Research

1. AAACU member institutions should initiate and complete an inventory of their ongoing research on environment and its conservation. And, on the basis of this inventory, member institutions should evaluate ongoing research efforts and, where needed, redirect such efforts to ensure that future research activities should address the environmental concerns expressed at this Convention.
2. Many member institutions are located in countries that still have considerable holdings of tropical forests. Collaborative research should be undertaken on such urging subjects as deforestation, soil erosion, land degradation, destruction of fishing ground, conservation of genetic resources and chemical pollution.
3. Cooperation from both the public and private sectors, including those of consumer countries, should be sought in this undertaking.
4. The participants took note of the inadequate communication between member institutions on research findings as well as between government agencies and agricultural universities on relevant activities. It is urged that AAACU member institutions take whatever necessary steps to improve information flow and exchange.
5. Participants also noted the importance of and necessity for interdisciplinary collaborative work on these subjects. In this regard the AAACU Executive Board is requested to take initiatives to relate academic activities of the AAACU with those of such other international academic bodies and research programs as the International Council of Scientific Union (ICSU), United Nations Environment Programme (UNEP) and International Geosphere Biosphere Program (IGBP) which are also deeply concerned and involved with the global environmental problems.

II. On Teaching

1. If the AAACU member institutions are to effectively discharge their teaching mandate, their curricula must respond to the environmental crisis of the 1990s. Ways of ensuring that the curricula achieve this purpose are properly the concern of individual institutions.

In this connection, the participants noted with appreciation the initiative undertaken by FAO in supporting the Network for Asian Forestry Education. Composed of representatives of forestry schools from AAACU member institutions, this effort promises to bring about curricular revisions relevant to the crisis. Similar efforts should be undertaken to meet needs in other aspects of the environmental issues in the 1990s.

2. The participants noted that many member institutions of AAACU were not aware of the existing networks on different aspects of environmental problems. They, therefore, recommended that AAACU Secretariat circulate information on these networks to member institutions as they are useful sources of relevant materials for enrichment of teaching programs.
3. Specifically, the AAACU Executive Secretary was requested to secure from FAO the documents and action program from "the Global Meeting on Sustainable Agriculture" to be held in 1991 at the Hague, and circulate the said materials to all the member institutions.

III. On Extension

1. Participants were convinced that agricultural colleges and universities have a special responsibility to ensure the conservation of the environment in the communities in which they are geographically sited and serve. Therefore, the extension functions of the universities must take a more active role in disseminating information on protection and conservation of the natural

resource base.

2. Recognizing the significance of this role, member institutions are urged to give greater support for their communication aimed at inbringing research findings and conservation themes to the communities they serve. Agricultural colleges and universities are also urged to undertake additional communication activities to reach policy makers to bring about greater support for conservation programs.

IV. General

Given the magnitude, complexity and adverse effects of widespread rural poverty and their direct association with environmental deterioration, member institutions are urged to initiate or reinforce activities that reduce economic and social disparities through agrarian reform, poverty alleviation and similar programs.