

UNCLASSIFIED

DEPARTMENT OF STATE
AGENCY FOR INTERNATIONAL DEVELOPMENT
Washington, D.C. 20523

PROJECT PAPER

NEPAL

AGRICULTURE RESEARCH AND PRODUCTION
(367-0149)

USAID/NEPAL

Agricultural Research and Production Project
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PROJECT DATA SHEET

1. TRANSACTION CODE

A = Add
 C = Change
 D = Delete

Amendment Number

DOCUMENT CODE
3

2. COUNTRY/ENTITY

Nepal

3. PROJECT NUMBER

367-0149

4. BUREAU/OFFICE

Asia

04

5. PROJECT TITLE (maximum 40 characters)

Agricultural Research and Production Project

6. PROJECT ASSISTANCE COMPLETION DATE (PACD)

MM DD YY
1 | 1 | 3 | 0 | 9 | 0 |

7. ESTIMATED DATE OF OBLIGATION

(Under 'B.' below, enter 1, 2, 3, or 4)

A. Initial FY 85 B. Quarter 2 C. Final FY 89

8. COSTS (\$000 OR EQUIVALENT \$1 = Rs. 17)

A. FUNDING SOURCE	FIRST FY <u>85</u>			LIFE OF PROJECT		
	B. FX	C. L/C	D. Total	E. FX	F. L/C	G. Total
AID Appropriated Total	1,000	200	1,200	6,315	3,685	10,000
(Grant)	(1,000)	(200)	(1,200)	(6,315)	(3,685)	(10,000)
(Loan)	()	()	()	()	()	()
Other U.S.						
1. PL-480	-	20	20	-	207	207
2. Peace Corps	180	-	180	1,359	-	1,359
Host Country	-	275	275	-	3,885	3,885
Other Donor(s)						
TOTALS	1,180	495	1,675	7,674	7,777	15,451

9. SCHEDULE OF AID FUNDING (\$000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	C. PRIMARY TECH. CODE		D. OBLIGATIONS TO DATE		E. AMOUNT APPROVED THIS ACTION		F. LIFE OF PROJECT	
		1. Grant	2. Loan	1. Grant	2. Loan	1. Grant	2. Loan	1. Grant	2. Loan
(1) FN	110	070				10,000		10,000	
(2)									
(3)									
(4)									
TOTALS						10,000		10,000	

10. SECONDARY TECHNICAL CODES (maximum 6 codes of 3 positions each)

020 010 080

11. SECONDARY PURPOSE CODES

12. SPECIAL CONCERNS CODES (maximum 7 codes of 4 positions each)

A. Code	BRW	R/AG	TNG	DEL	TECH	ENV
B. Amount	10,000	7,500	600	1,500	3,000	600

13. PROJECT PURPOSE (maximum 480 characters)

To (a) strengthen GON institutional capabilities to develop appropriate new technologies for small farmers; (b) develop methodologies for conducting comprehensive production programs in the hills; and (c) improve hill farmers' access to improved seed.

14. SCHEDULED EVALUATIONS

Interim MM YY | MM YY | Final MM YY
 0 | 1 | 8 | 8 | | | 0 | 1 | 9 | 0 |

15. SOURCE/ORIGIN OF GOODS AND SERVICES

000 941 Local Other (Specify) Nepal

16. AMENDMENTS/NATURE OF CHANGE PROPOSED (This is page 1 of a _____ page PP Amendment.)

Raymond E. Dropik
 Raymond E. Dropik
 USAID/Nepal Controller

17. APPROVED BY

Signature

Dennis J. Brennan

Title

Dennis J. Brennan
 Director
 USAID/Nepal

Date Signed

MM DD YY
1 | 2 | 0 | 4 | 8 | 4 |

18. DATE DOCUMENT RECEIVED IN AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION

MM DD YY

11

Project Authorization
Nepal

Agricultural Research
and Production
Project

Project No. 367-0149

Pursuant to Section 103 of the Foreign Assistance Act of 1961, as amended, I hereby authorize the Agricultural Research and Production Project (the "Project") for Nepal (the "Cooperating Country") involving planned obligations of not to exceed ten million U.S. dollars (\$10,000,000) in grant funds over a five year period from the date of authorization, subject to the availability of funds in accordance with the AID annual appropriation process, to help in financing foreign exchange and local currency costs for the project. The planned life of the project is approximately six years from the date of initial obligation until November 30, 1990. A first year obligation of one million two hundred thousand U.S. dollars (\$1,200,000) is planned.

The project purpose is to (a) strengthen GON institutional capabilities to develop appropriate new technologies for small farmers; (b) develop methodologies for conducting comprehensive production programs in the hills; (c) improve hill farmer access to improved seed. The project will integrate research activities to address whole-farm needs, including agro-forestry and livestock; direct research more towards hill agricultural problems; improve the flow of extension information to hill farmers; and increase production and private sector distribution of seed in the hills.

Grant funds will finance approximately 28 person years of technical assistance; short-term, in-country, and degree training programs; construction of facilities on research stations; equipment for new programs and facilities; and partial funding of operating costs for GON programs.

The Project Agreement (s) which may be negotiated and executed by the Officer (s) to whom such authority is delegated in accordance with AID Regulations and Delegations of Authority shall be subject to the following essential terms and covenants and major conditions, together with such other items and conditions as AID may deem appropriate:

A. Source and Origin of Commodities, Nationality of Services

Commodities financed by A.I.D. under the Project shall have their source and origin in Nepal or in countries included in A.I.D. Geographic Code 941, except as A.I.D. may otherwise agree in writing. Except for ocean shipping, the suppliers of

- / -

List of Acronyms

AA	- Agricultural Assistants
ADB	- Asian Development Bank
ADB/N	- Agricultural Development Bank
ADO	- Agricultural Development Officer (district level)
AIC	- Agricultural Inputs Corporation
AID	- Agency for International Development
APROSC	- Agricultural Projects Services Center
CIAT	- International Center for Tropical Agriculture
CIMMYT	- International Center for Improvement of Maize and Wheat
CIP	- International Potato Center
CSR/E	- Cropping Systems Research/Extension
DOA	- Department of Agriculture
DOL(DOLDAH)	- Department of Livestock Development and Animal Health
FSR/E	- Farming Systems Research Extension
FSWG	- Farming Systems Working Group
FY	- Fiscal Year
GON	- Government of Nepal
IAAS	- Institute of Agriculture and Animal Science
IARC	- International Agricultural Research Center
IC (ICP)	- Integrated Cereals Project (367-0114)
ICRISAT	- International Center for Research in the Semi-Arid Tropics
ILCA	- International Livestock Center for Africa
IRNR	- Institute of Renewable Natural Resources
IRRI	- International Rice Research Institute
JT	- Junior Technician (extension agent)
JTA	- Junior Technical Assistant (extension agent)
MOA	- Ministry of Agriculture
M.Sc.	- Master of Sciences Degree
ODA	- Overseas Development Administration the United Kingdom
Ph.D.	- Doctor of Philosophy Degree
PLAA	- Panchayat Level Agricultural Assistant
PPVT (PVT)	- Pre-Production Verification Trial
RCU (RCUP)	- Resource Conservation and Utilization Project (367-0132)
SFCA	- Special Foreign Currency Account
SPIS (SPISP)	- Seed Production and Input Storage Project (367-0118)
STIP	- Seed Technology and Improvement Program
T.U.	- Tribhuvan University
T & V	- Training and Visitation System of Extension

AGRICULTURAL RESEARCH AND PRODUCTION PROJECT

(367-0149)

I. Executive Summary

The Agricultural Research and Production Project (ARP) is designed to help the Government of Nepal (GON) increase the flow of improved agricultural production technology to small farmers. The Project will help the GON Departments of Agriculture and Livestock Development and Animal Health to strengthen agricultural research and extension programs and will help the Agricultural Inputs Corporation to expand the seed production and distribution system in the hills.

The Project represents a continuation of assistance to GON programs which have developed with support from the Integrated Cereals Project (367-0114) and the Seed Production and Input Storage Project (367-0118). Support from the ARP Project will help to expand and strengthen these programs for farming systems and commodity research, intensive production programs and hill seed production. The Project will support research activities country-wide, but will focus support for seed and extension programs in hill areas.

The Project will assist the GON to activate a National Research Coordination Committee within the Ministry of Agriculture to coordinate research activities. It will also support establishment of a Central Agricultural Library, a Farming Systems Research Division, and Extension and Socio-Economic Research Divisions within the Department of Agriculture. The Project will also support commodity research, especially for minor crops and crops important to the hills, and will provide funding for special research activities focusing on agro-forestry, fodder production and livestock nutrition, and soil fertility maintenance.

The production program component of the project will initially support intensive production programs in four hill districts (Baglung, Myagdi, Parbat, Syangja) and will fund a mini-kit distribution program. An objective of this work will be to devise more effective methodology for implementing production programs in the hills. As new technology is identified by work at eight farming systems research sites, the Project will support pilot production programs based on this technology involving integrated livestock, agro-forestry and crop extension efforts.

The seed production component will support establishment of a National Seed Development Board and the expansion of area served by small seed plants producing improved seed in the hills. The Project will increase the number of small seed plants from 20 to 25 and institute a system of satellite seed producers with metal bins for seed storage.

The GON will provide the equivalent of US\$3,885,000 including in-kind contribution of existing facilities, personnel costs, and operating costs for various programs. AID will provide US\$10,000,000 for costs of technical assistance, training, construction, commodities and partial funding for operating costs of new programs. Additional support to the Project may be provided by Peace Corps and the AID India Training Project.

II. Project Rationale and Description

A. Project Rationale

1. Agricultural Sector

Agriculture, the dominant sector of the Nepalese economy, produces about 60 percent of the GDP, employs over 90 percent of the population and accounts for about 75 percent of total exports. The country's limited resource base currently allows few, if any, significant alternatives to agriculture as a basis for economic development and improvement in the lives of the population.

Traditional, subsistence-level agriculture dominates the sector, with very few farmers who would not be classified as small farmers by world standards. The average farm size is less than 1.25 ha. in the hills and 2.11 ha. in the Terai. The rapid rate of population increase (2.6 percent per year) is increasing pressure on the agricultural land and on the fragile mountain environment that serves as the major source of fuelwood and fodder and the watershed on which irrigated agriculture depends.

Since the beginning of the Fourth Five Year Plan (1971), the GON has put major emphasis on development of the agriculture sector. Despite this, agricultural production has stagnated and productivity has declined. Continued effort is needed to develop and introduce relevant new technologies, improve planning, policy making, and implementation of agricultural programs, and extend development efforts to all parts of the country.

Since Nepal began an active development program in the early 1950s, the growth of government programs serving the agricultural sector has been dramatic. From a base in 1956/7 of only 42 GON employees trained in agriculture at the officer level* and only 93 trained at the JT/JTA level**, GON agricultural manpower had increased to 797 officer level and 2,465 JT/JTA level by 1980.

The rapid growth of agricultural sector agencies and programs has given the country a good base for promoting agricultural development, but the growth of programs and

* Officer level refers to employees with four years training post-secondary school, or B.Sc. and above.

** JT (Junior Technician) level refers to personnel trained in two-year post secondary courses.
JTA (Junior Technical Assistant) refers to personnel who have had one-year of post secondary technical training.

institutions has frequently been uneven and unbalanced due to lack of overall planning and coordination, shortage of resources and reliance on donor funding which often has a geographic or commodity focus. There remains an important need for continuing assistance to the GON in its efforts to develop national level institutions to serve the agricultural sector.

2. Agricultural Research

When the Department of Agriculture (DOA) was established in 1952, little capability or priority was accorded to starting a research program. In the past, many Nepali administrators and even foreign advisors took the view that Nepal could not afford an agricultural research system, but rather should rely on India and other international sources for improved agricultural technology.

Today, although agreement exists that Nepal can not expect to do basic research, most observers agree that in-country capability to do adaptive research is essential for Nepal to be able to obtain and disseminate improved technology needed to increase agricultural production.

The first significant agricultural research in Nepal began in 1956 with AID assistance for cereal crop variety trials in Kathmandu and in Parwanipur in the Terai. Following this agricultural research, in 1965 the GON formed a new Department of Agricultural Education and Research. However, due to problems of coordination with extension and other departments, in 1972, the Department of Agricultural Education and Research was again merged into the Department of Agriculture.

APROSC (Agricultural Projects Services Center) and the Department of Food and Agricultural Marketing Service (DFAMS) currently have considerable capability and conduct socio-economic research - generally related to market analysis and project formulation. The Institute of Agriculture and Animal Science (IAAS), the Institute of Renewable Natural Resources (IRNR) and other agencies of Tribhuvan University conduct some research. The Ministry of Forests and Soil Conservation's Forest Research and Information Center conducts limited forestry-related research with support from the United Kingdom. The United Kingdom is planning a new project to provide considerable increase in support for this program.

Biological agricultural research and technology development is mainly the responsibility of the Department of Agriculture (DOA) and the Department of Livestock Development and Animal Health (DOL). However, neither has a separate division of research and both face the daunting challenge of carrying out research relevant to the wide number of farming systems, agro-climatic zones, and agricultural products found in Nepal.

The Department of Agriculture (DOA), the older of the two departments, has made relatively more progress in establishing a research system. The DOA has developed significant research capability in its technical divisions* and national commodity improvement programs**. Of these various programs, the rice, wheat, and maize commodity improvement programs and the Cropping Systems Program under the Agronomy Division, have made relatively more progress, but still require considerably more improvement before they can fulfill the role assigned them. Horticulture (including agro-forestry), oilseeds, and grain legume programs have recently begun developing the research programs needed for technology development in these areas. All of the technical divisions and commodity programs must split their resources and attention between research and services (soil testing, seed production, pest control, etc.).

The Department of Livestock Development and Animal Health (DOL) was established as a separate department in 1979. Due to continuing shortages of resources and manpower, there is little research being conducted by this department at present.

AID has played a significant role in assisting the GON to develop agricultural research capabilities. The Food Grain Technology Project (1957-1974) helped the GON establish most of the major research stations in the Terai and initiate work on the major cereals. The Integrated Cereals Project (1974-85) (367-0114) has continued assistance to the rice, maize, and wheat commodity programs and helped the GON establish a Cropping Systems Research Program under the Agronomy Division.

Despite the past growth and development of the agricultural research system, reports*** have identified serious weaknesses in the system and problems yet to be overcome. These mainly involve lack of coordination and planning, imbalance in commodity and geographic focus, and lack of attention to the whole farming system and to socio-economic research relevant to new technology.

Research coordination and review has been a recognized problem for some time. A Research Coordination Committee was proposed under the 1975-85 Ten Year Agricultural Development Plan, but, although the committee was established, it never became

* Including divisions of Entomology, Soil Science, Plant Pathology, Agronomy, Agricultural Botany, Horticulture and Vegetable Development.

** Including separate commodity programs for rice, wheat, maize, oilseeds, citrus, potatoes, sugarcane, and tobacco.

*** Including the 1982 ADB-HMG/N "Agriculture Sector Strategy Study"; a 1983 "Evaluation of the Integrated Cereals Project"; and a 1983 joint FAO-World Bank-AID-United Kingdom "Nepal Agricultural Research Review."

operational. In 1977/78 a GON committee and a Rockefeller Foundation team proposed an autonomous Nepal Agricultural Research Council, but no further action was taken.

The 1983 FAO "Nepal Agricultural Research Review" proposed four options for reorganization of agricultural research. These included: an autonomous research council, a secretariat under the Ministry of Agriculture (MOA) with deputy director-generals for livestock, agronomic and horticultural research either seconded from their departments or directly assigned to the Ministry, and a new Division of Research Planning and Coordination within the Ministry of Agriculture (MOA). Although the FAO team recommended the latter option, the GON favors developing an autonomous council, but requires additional time to develop detailed plans and the support necessary to undertake this more far-reaching reorganization.

The imbalance in commodity and geographic focus of research results from phased development of research rather than poor planning or mismanagement. Initially, the greatest potential pay-off from research was in the major cereal grains (rice, maize, wheat) and in the accessible and productive lands of the Terai; and, this is where the GON first developed research programs.

However, the need for wider coverage of agricultural research is evident. Research on "minor" crops, including millet, buckwheat, barley, oilseeds, and grain legumes, has been minimal, despite the fact that they are major crops in some regions and are, more widely, major sources of protein or cash income. These crops are especially important in the hills.

Livestock research is also important to the hills. Work done to date at hill cropping systems sites indicates that the role of livestock must be considered in any technology development or recommendation for the hills, where livestock provide major sources of cash income, fertilizer, power, and protein. Research is needed on (i) fodder and forage production; (ii) livestock breed improvement; and (iii) improved marketing of livestock products.

Also in the hills, technology development is essential for several reasons. Equity considerations alone require the GON to attempt to increase the productivity and standard of living of the 56 percent of the population living in the hills. Furthermore, protecting the environment by reducing erosion and deforestation and stabilizing watersheds is critical for the future of downstream farm lands, infrastructure projects, and populations.

Technology development for the hills is more difficult than for the Terai, because access and working conditions are more difficult and there is not as large a body of technology available which can be adapted to the hills. Livestock and hill crops require increased research attention. More importantly,

horticulture, agro-forestry, forages and forestry have important applications and potential for the hills. The GON recognizes this importance and is planning a major forestry research project with assistance from the United Kingdom. Preliminary documents prepared for the Seventh GON Five Year Development Plan indicate that priority attention will go to research and programs targeted on the hills, including increased attention to agro-forestry and forage development.

Agricultural research in the hills faces problems of inadequate physical facilities and a poorly defined program focus. The GON has too many small research farms and stations and insufficient operating funds. Although politically difficult, some farms and stations should be closed and resources devoted to developing viable programs at a smaller number of sites.

The Cropping Systems Program assisted by the Integrated Cereals Project (ICP) contributed substantially to the development of technology adapted to farmers' conditions. This program has helped researchers better understand cropping systems and has resulted in better "packages" of technology, well-tested and suitable for dissemination by extension programs. The GON has accepted recommendations of recent reports that the focus of this program be expanded to include the livestock, horticulture, and forage emphasis essential to a farming systems approach.

Finally, socio-economic research is needed both as a component of reporting on trials of other research and to understand better the relationships of different components of the farming system and the factors which influence technology adoption.

While progress has been made in developing agricultural research capabilities, the agricultural productivity situation is not encouraging, and the research system will have to increase its own productivity and address more difficult and more complex problems.

3. Agricultural Extension

Crop-related agricultural extension is the responsibility of the DOA, livestock extension is that of the DOL, and forestry extension that of the Ministry of Forests and Soil Conservation. The DOA has the best developed and staffed of the extension systems.

Extension in the DOA is under a Deputy Director General for Extension and Technical Services. At the regional level, a Regional Director of Agriculture supervises extension and other programs. At the district level, an Agricultural Development Officer (ADO), who may be assisted by an Assistant Agricultural Development Officer and/or Subject Matter Specialists, is in charge of extension and implementation of agricultural

development programs. Extension work at the village level is carried out by JT/JTAs (extension agents) and local farmers who are called variously Agricultural Assistants (AAs), Panchayat Level Agricultural Assistants (PLAAs), contact farmers, or "tukeys" (meaning "lamp"). The DOL extension system covers all 75 districts and is based on Livestock Service Centers of which there are currently about 450. Livestock health services are provided by village-level livestock health para-technicians.

In the past, extension systems were hampered due to lack of proper organization, training and support and lack of appropriate technologies to extend to farmers.

Adding to the problems of developing a national level extension system has been the large number of separate development projects supported by different donors and having different geographic focuses. A total of 47 projects cover virtually all of the country and, while the projects give much needed support to the extension system, it has been at the expense of development of a unified extension system and approach.

Since 1975, with World Bank funding, the GON has begun implementing the "Training-and-Visit" system* of extension in the Terai. This system will soon cover nearly all of the Terai and lends a uniformity of organization to the extension system there.

Over the past four years the Integrated Cereals Project has also supported pilot production programs utilizing technologies tested at cropping systems research sites. These extension programs followed a prior GON strategy of concentrating resources and focusing extension efforts on defined areas under "pocket production programs" or "production programs". The ICP-supported programs also developed a "production block" strategy whereby technology was introduced and used on blocks of contiguous land. The block approach also required concentration of extension workers in a block area and extension worker coordination of input supply and credit.

The production program based on production blocks proved quite successful in the Terai and area under the blocks increased from 16 ha. in 1981/82 to 642 ha. in 1982/83 and 16,481 ha. in 1983/84. In addition, the GON adopted the methodology for intensive rice production programs in 1983 and 1984 and the Asian Development Bank plans to fund irrigation projects which incorporate this extension methodology. The production block formation has been coordinated with the T and V system and the

* The "Training-and-Visit" or "T and V" system of extension is a standardized extension methodology utilizing a regular schedule of training of extension workers (usually fortnightly) who then visit farmers with a discrete, timely extension "message".

GON now has plans to incorporate this production block approach in the T and V extension system throughout the Terai.

Despite the progress made in developing a standard extension approach for the Terai, a different strategy is needed for the hills. Transportation difficulties make the training-and-visit system unworkable in the hills and the extreme variability in land and cropping patterns presents another obstacle to effective extension. Further work is needed to test and adapt a standardized extension methodology which can be used to implement production programs in the hills.

4. Seed Production and Supply

The GON has long recognized improved seed as a necessary input to increase agricultural productivity. In the 1950s and early 1960s, Nepal relied on import of seed of high yielding varieties from India. In the late 1960s, a seed testing laboratory was set up and small seed cleaners were imported, and in 1970-71 nearly 500 MT of seed was produced. The national seed program has expanded greatly since that time and in 1981/82 a total of 2,600 MT of domestically produced seed of major cereal crops was sold to farmers.

The seed program involves three major organizations within the GON-DOA: the commodity development programs, the Agricultural Inputs Corporation and the DOA Agricultural Botany Division.

The DOA commodity development programs breed, test and release new varieties, which are the base on which the national seed program must grow. To date, 33 varieties of the major cereal crops have been released and have attained some importance. Improved varieties now account for 26, 35 and 84 percent of land in rice, maize, and wheat respectively and the national commodity programs continue to test a number of promising varieties, especially for the hills. The DOA research farms develop and test new varieties and produce the foundation seed used for further seed multiplication. This arrangement for foundation seed production has been criticized because it distracts attention from research efforts of the staff of the national commodity programs. However, there are few other alternative sites for foundation seed production and the GON, with help from the ICP project, has established seed plants and seed storage facilities at the major commodity stations. The GON has decided to maintain responsibility for foundation seed production at the government research stations. The stations, however, must assign and train permanent staff for this responsibility and should have additional equipment to process small quantities of experimental seed.

The Agricultural Inputs Corporation (AIC) receives foundation seed from the DOA and multiplies it - usually on farmers' fields - for sale as certified seed. AIC has developed a reasonably adequate infrastructure for the seed program and has five large seed plants in the Terai with a combined annual

capacity of 9,000 MT and a network of 20 small seed plants in the hills, established with assistance of the SPIS project.

The responsibility for seed quality testing and inspection belongs to the DOA Agricultural Botany Division which operates a Seed Technology and Improvement Program. The DOA discharges this responsibility through a central seed testing laboratory in Kathmandu and four regional laboratories.

Despite the rapid growth and the importance placed on development of a national seed program, the seed industry continues to face major problems. Although steady progress is evident, frequent shortages of improved seed still occur in many areas. Quality of seed produced varies and the quantity and quality of foundation seed is often insufficient. Seed shortages frequently occur in the hills, a factor which has prompted many development projects to initiate seed production programs independent of the national program.

In response to these problems a National Seed Seminar was held in 1983. The seminar addressed the major issues relating to the national seed program and presented a number of recommendations to the GON. One of these was for the establishment of a National Seed Development Board to plan and coordinate national seed program development.

The seminar also recommended that the GON continue to give high priority to the development of a hill seed supply program. Due to transportation difficulties, improved seed for use in the hills must, almost by necessity, be grown there. The SPIS project has been assisting the GON to establish seed plants in the hills. These should all be operational in 1984/85, but even then will be able to produce only a combined total of 1,600 MT, or only five percent of the seed needs in the hills.

Formal, commercial private sector involvement in the seed industry is minimal. However 98 percent of seed used in the country is saved by farmers for their own use or is acquired through farmer-to-farmer seed exchange.

Improvement in the seed program is essential for Nepal to increase agricultural productivity. Use of improved varieties is necessary to realize the benefits of use of other inputs. In addition, use of improved varieties of maize and rice alone can increase production by 25-40 percent. In the hills, seed is likely to be the only improved input available, but even to assure this an innovative system is needed to link farmer seed producers to source seed supply from the national seed program.

Improved germplasm is also necessary to increase livestock productivity in the hills. Crosses with exotic breeds of livestock under proper management demonstrate five to six times greater productivity than local breeds. Testing, selection and distribution of forage seed and fodder tree seedlings also holds promise for increasing livestock production and promoting soil

conservation. Additional research is necessary before major production programs can be launched to increase livestock production.

5. Agricultural Research and Production Project

The Agricultural Research and Production (ARP) Project will continue assistance to GON research, production, and seed production programs. It will continue support to the programs initiated under the ICP and SPIS projects, while helping the GON expand the focus and coverage of these programs and improve the institutional structure on which they rest. As such, the project will capitalize on human, physical, and institutional infrastructure developed under past projects and help maximize the productivity of these earlier inputs.

The research component will help the GON address research planning and management problems, expand the cropping systems work to that of farming systems, increase research directed toward hill crops and problems improve research documentation and information systems, and maintain and strengthen links to international research centers. The research system needs considerable additional infrastructure and operational funding. At one point, it appeared that the World Bank would be able to provide this additional support through a parallel financed project. Although this is not possible at present, if such parallel financing becomes available at a later date, infrastructure and operational funding from such a project would complement assistance to be provided by the ARP Project.

The production program component will focus on extension and production campaigns in the hills. Expansion of this program must be slow because of the need to test technologies and methodologies. A production program approach is planned based initially on irrigated production blocks. As the project gains experience with production programs in the hills, changes in approach will probably be necessary. The project will help the GON adapt and test production program methodology for wider use by other projects throughout the hills.

In the seed production component, the project will continue support to the hill seed plant program and will help the GON to work out operating problems. Private sector involvement will be increased, as far as possible, and a more rational district-based pricing system instituted. The project will also help the GON to address organizational problems and foundation seed supply problems within the national seed program.

B. Project Description

1. Project Goal

The project goal is to increase the sustainable productivity of Nepali small farmers. The approach will be to increase whole farm production, including livestock, agro-forestry, and the important food crops. In order to achieve this goal, the farmer must have access to improved technology* which in turn must be developed and disseminated by the GON.

2. Project Purpose

The project purpose is to (a) strengthen GON institutional capabilities to develop appropriate new technologies for small farmers; (b) develop methodologies for conducting comprehensive production programs in the hills; and (c) improve hill farmers' access to improved seed.

The project will build on progress made to-date by the ICP and SPIS projects in helping the GON to develop agronomic research capability, intensive production campaign extension methodologies, and a hill seed production and distribution network. The project will help the GON expand these programs and further institutionalize them within the GON organizational structure.

3. Project Outputs

Research Component (Details in Annex L)

a. Improved Administration and Mangement

The project will assist the Ministry of Agriculture (MOA) to activate a National Research Coordination Committee within the Ministry to plan and monitor research activities. The National Research Coordination Committee will be chaired by the Joint Secretary for Planning of the MOA and will provide over-all policy guidance and direction for research activities. A newly established Farming Systems Research Group within the DOA will serve as the secretariat for this committee and the chief of the Farming Systems Research/Extension Division will serve as Member-Secretary for the National Research Coordination Committee.

* Improved technologies refer to new varieties, cropping patterns, inputs, cultivation practices or, in short, any new production innovation beneficial to the farmer.

The committee will develop over-all research goals and review annual research work-plans and budgets. The Farming Systems Research Group will manage a project-funded research grant program to support priority research activities by individuals and institutions. The committee will have the authority to manage research activities and direct them toward meeting practical needs identified by extension and farming systems work. The committee will guide research activities toward better integration of various programs and activities.

The DOA is planning to establish a National Agricultural Research Center at Kumaltar to coordinate crop research. This Center will for the first time bring all crop-related research under a single administration. The Farming Systems Research Group will include scientists from the National Agricultural Research Center plus scientists working on livestock, forestry and socio-economic research.

Within its first two years, the project will assist the Department of Agriculture (DOA) and Department of Livestock Development and Animal Health (DOL) to review their organizational and administrative structures and their proposed changes. The project will help these departments develop plans to improve administrative functions and will provide necessary in-country training for administrative and support personnel. This administrative management assistance will improve all aspects of operation of concerned departments and not be limited to research activities. Functions requiring special attention are routine maintenance, accounting for special projects and programs, and clearing and receiving commodities and assistance from international programs.

The project will assist the DOA and DOL to improve the operation of research farms and stations. Each of the seventeen DOA and DOL farms and stations identified for development as multi-disciplinary research centers by the 1983 FAO "Nepal Agricultural Research Review" will prepare a Farm Operational Plan and a Farm Development Plan consistent with over-all national research objectives and plans.

Other project assistance in developing the farming systems program and the information and documentation system will also contribute to improved research efficiency and better administration and management.

b. Agricultural Research Library

The project will assist the MOA to establish a central library in the Kathmandu valley to support agricultural and livestock research. The library will combine library collections of various separate divisions and departments and will develop a master catalogue of agricultural reports and reference materials available in Nepal. The library will provide technical information and publications to technical divisions and to research farms and stations.

The Agricultural Research Library will be responsible for editing and arranging for the printing of research papers presented at semi-annual agricultural workshops and annual livestock and horticulture/agro-forestry workshops. The library will also provide a grant to the Nepal Agricultural Association to cover costs of publishing the Nepalese Journal of Agriculture and will prepare extension materials and manuals based on agricultural and animal science research results.

c. Extension and Socio-Economic Research Division

The project will assist the DOA to establish an Extension and Socio-Economic Research Division based in the Kathmandu valley. This division will provide back-up support to ADOs (Agricultural Development Officers) and extension projects, conduct socio-economic research according to the needs of the DOA and the national research plan, and assist other research units with analysis of research results.

The project will also assist the DOL to strengthen socio-economic research and analytical capabilities to meet similar needs.

d. Farming Systems Research Unit

The project will continue support which the ICP project has given to the Cropping Systems Research Program. It will support the re-organization of this program and its expansion to include more elements of the farming system, and more comprehensive geographic coverage of Nepal's agro-climatic zones.

The GON will establish a Farming Systems Research/Extension Division in the Kathmandu valley, including socio-economists and representatives of each discipline division and commodity program, the DOL, and the Forest Research and Information Center of the Department of Forestry. Personnel will remain under their parent organization and work on deputation to the Farming Systems Research/Extension Division. This group will plan and monitor research conducted at farming systems sites throughout the country.

Work of the Farming Systems Research/Extension Division will be guided by a Farming Systems Coordinating Committee under the DOA and composed of representatives of the major agriculture, livestock and forestry research programs.

The farming systems sites will be re-organized to allow them to be supported by research personnel assigned to GON research farms and stations. One station in each of the five development regions will be designated a lead farming systems site research coordinating role. These stations will coordinate research work at sites in the Terai, mid-hills and high hills. The regional coordinating units will also plan and monitor pre-production verification trials within the region and will plan research activities to lead into major production programs.

The project will assist with the establishment of farming systems research sites at three elevations in the Central, Western, and Mid-Western Development Regions and at one location each in the Eastern and Far-Western Regions. ODA (Overseas Development Administration of the United Kingdom) is expected to continue to support agricultural farms at Pakhribas and Lumle. These farms will operate under the FSR/E Division and conduct both on-farm and on-station farming systems research work. The project will phase start-up of work at the various sites according to available personnel resources, but will attempt to establish eight sites by the end of the third year of the project.

The farming systems work will function as a research outreach program from research farms and stations and will do preparatory work leading to future production programs. While technical backstopping will come from the relevant research farm or station, the farming systems research work will be carried out on farmers' fields and community lands. Farming systems research sites will generally be within a half day's walk or travel from the assigned research station.

The Farming Systems Research Program will continue emphasis on the major cereal grain crops (rice, maize, wheat), but will give increasing attention to (i) grains and other crops important to the high hills (barley, buckwheat, millet, roots and tubers, amaranth), (ii) forage and feed for livestock, (iii) pulses and oilseeds, and (iv) agro-forestry and horticulture.

The Farming Systems Research Program will cooperate closely with work of a new program of the Soil Science Division for "Identification, Utilization and Promotion of Biological Sources of Plant Nutrients". The FSR/E program will assist with field trials for this program. This work will focus on improving use and production of compost, introducing legumes and microbial sources of nitrogen, and improving use of animal manures for fertilizer.

An agro-forestry component of the Farming Systems Research Program will coordinate field research activities with the ODA-supported forestry research program of the Forest Research and Information Center. The agro-forestry work will focus on (i) revegetation of denuded land, (ii) on-farm production of green manure, fodder and fuelwood from trees, (iii) production of fruit, coffee, nuts and other tree and perennial crops, and (iv)

inter-cropping tree crops with other food crops. A major component of this work will be development of selection criteria for tree species research and evaluation of various tree genetic resources.

e. Commodity Research

The project will assist the DOA to establish a National Pulse Development Program. The project will help to expand physical facilities for the program at an existing research station (possibly at Sarlahi or Hardinath) and to initiate an active pulse research program. The International Development Research Center of Canada is planning to provide complementary operational support to the pulse research program.

The project will also help to increase the amount and quality of research work directed at hill crops, livestock and horticultural products. Training of personnel specifically to address problems of hill agriculture and expansion of facilities at three hill farms and stations will help these centers to play a larger role in supporting the regional trials and research of the commodity program. The Kavre farm will become the major site for coordinating work on hill crops.

The project will help the DOA and DOL to maintain close linkages with the international agricultural research centers, principally IRRI, CIMMYT, ICRISAT, and ILCA and other international programs. (The Swiss-assisted National Potato Development program maintains a close linkage with CIP.) These linkages will provide access to international germplasm collections, training opportunities, and technical assistance for the commodity programs.

f. Research Support Funds

The project will fund independent research projects which address priority problems and constraints to increasing agricultural production. The technical assistance contractor will administer the research fund under the direction of the Farming Systems Research Group. The Farming Systems Research Group will announce availability of grants for specific research projects and will also consider unsolicited proposals. Approximately 25 projects will be funded. Priority for funding will go to agro-forestry research on fodder and multi-purpose tree species, socio-economic studies on technology adoption, soil fertility maintenance utilizing biological sources of nutrient supply, and nutritional research on livestock production.

Production Program Component (Details in Annex M)

g. Hill Production Program

The hill production program will start the first year of the project and will focus on testing technologies and extension methodologies for the hills. The program will begin by testing a production block program for the hills. The production blocks will cover irrigated areas and high production potential rain-fed lowland areas and gradually expand on to adjacent upland cropping patterns. This block approach may be modified based on experience during the project. The hill production program will reach at least 15,000 farmers in four districts (including part of the RCU project area) covering a total of 15,000 hectares.

The production program will be implemented by district ADO offices with production blocks initially clustered around nine agricultural service centers located at district sub-centers. Technology to feed the production program extension efforts will come from work at the Lumle Agricultural Center and the Pundi Bhundi cropping systems research site. As livestock production technologies are identified, the project will begin support to livestock extension efforts. Initially, however the focus will be on cereal production.

Production programs will include use of female extension agents and AAs (Agricultural Assistants) to disseminate extension methods. The project will use demonstration days to focus community attention on the production blocks. Farmer training will be held at district sub-centers (agricultural services centers) and mini-kits will provide for widespread testing and diffusion of new varieties.

The project will also conduct pilot production programs at farming systems sites to disseminate newly tested methodologies. These will likely include technologies for livestock, forage, and agro-forestry production and will require special planning to disseminate multi-disciplinary technologies in an extension program. By the end of the project, approximately 4,000 ha. at the farming systems research sites (an average of 500 ha. around each of eight hill sites) will be covered by production programs.

ARP will conduct training programs and workshops on hill extension program methodologies and potential, and will provide mini-kit program support for other defined area production programs. Mini-kits of seed or planting material or breeding stock of new varieties or breeds will be provided free to participating farmers. The spread effect of this element of the project will influence production on approximately 20,000 ha. of land in the hills.

Thus, by the end of the project, the GON will have tested and proven extension methodologies for the hills and the project will have directly affected production on 19,000 ha. and indirectly on 20,000 ha. The programs will involve approximately 39,000 farmers.

The external project evaluation scheduled in the third year of the project will address the question of viability of the production program methodology and technologies. If the evaluation concludes that technologies and methodologies are adequate to support production programs and that GON support is adequate and the policy environment appropriate, AID and the GON will consider expanding production program activities to cover up to 50,000 ha. in five hill districts, as appropriate.

Seed Component (Details in Annex N)

h. National Seed Development Board

The project will assist the GON to establish a National Seed Development Board within the MOA with the Secretary of Agriculture as Chairman and the Head of the Seed Technology and Improvement Program (STIP) as Member-Secretary. The STIP Office will be expanded and function as the coordinating office for various seed development programs.

The STIP Office will be responsible for overseeing the planning, production, and distribution of foundation seed produced on government farms and by contract growers. The project will assist the DOA to improve foundation and breeder seed production programs for principal cereal, oilseed, and pulse crops. It will also help to develop a program for production of forage and fodder seed and seed of green manure crops. The project will help strengthen the STIP office and the network of national and regional seed testing laboratories.

By the end of the project, a National Seed Development Board will be established and have approved an overall seed development plan for implementation by various GON and private agencies and sufficient quantities of foundation seed of the major food grains will be available to meet the country's needs.

i. Hill Seed Program

The project will continue to support the hill seed production program based on small seed plants established with assistance of the SPIS project. ARP will provide equipment and training to support establishment of five additional seed plants in the hills (sites to be determined) utilizing existing GON warehouses or other facilities. The project will continue to test the feasibility of turning over operation of these seed plants completely to the private sector. Seed production will continue to be done exclusively by private growers and, to the extent possible, seed will be marketed by private retailers.

The impact of small seed plants will be expanded by creating a network of satellite seed growers and retailers a day or more walk from the seed plants. These satellite seed producers will be the core of a system for farmer-to-farmer supply of improved seed. These satellite seed producers will receive training, subsidized seed storage bins, improved seed from the small seed plants, and recognition as growers of improved seed.

By the end of the project, a network of 25 small seed plants will be functioning in the hills with approximately half of them under private sector management. Small seed plants with satellite seed growers utilizing metal bins will produce approximately 5,400 MT of seed annually, or enough to meet the needs of approximately 108,000 farm families.

4. Project Inputs

a. Technical Assistance

The project will provide approximately 25 person years of long-term, 33 person-months of short-term technical assistance and 25 person-years of local technical services. The technical assistance will be directed towards helping the GON to establish new institutional entities and to develop and implement innovative research, extension, and seed production programs. The technical assistance will be in the fields of research station management, seed technology, library science, socio-economics, agro-forestry research, livestock research, farming system research, and extension and production program organization.

For some short term consultant services, the project will draw upon services from AID centrally funded projects. These will likely include the Farming Systems Support Project (936-4099); the Forestry Research and Development Project (498-0276); the Pre/Postharvest Rodent/Bird Control Project (936-4120); the Agricultural Policy Analysis Project (936-4084); and the Seed Technology Improvement Project. Services will be used only in support of on-going project activities.

Approximately 118 person-years of Peace Corps volunteer services will support project field activities in women's extension programs, socio-economic research and survey work, seed production activities, and appropriate technology. Peace Corps support to the project will be subject to the availability of volunteers and Peace Corps - GON agreements on placement.

b. Training

The project will provide advanced degree training at U.S. and Philippine universities for thirteen participants to study socio-economics, agro-forestry, animal science and agronomic courses relevant to hill agriculture. It will provide short-term, overseas training for 56 participants to study farming systems research and production, library science and administrative

management, and to participate in appropriate programs of international agricultural research centers. In-country training programs will utilize technical assistance advisors and returned participant trainees to train lower-level and support staff implementing research, extension, and seed production programs.

If additional funding and places become available from the SFCA (PL-480) India Training Program, that project will provide: ten places for advanced degree programs in agricultural economics, extension and rural sociology; fifteen for horticulture, animal science, and agronomy; three for agro-forestry, and one in agricultural engineering and irrigation water management; and ten short-term courses in administrative management.

c. Equipment and Materials

The project will supply vehicles, equipment and materials for the operation of new offices and programs and for the expansion of work at research centers. It will also supply seed cleaning equipment for new seed plants; subsidies for metal bins for farmers; books, journals and materials for the Khumaltar library; and some replacement equipment for seed testing laboratories.

d. Construction

The project will fund construction of a central library and a Farming Systems Research Building at Khumaltar; and of office space, staff housing, and storage facilities on five research stations - Kavre, Doti, Marpha, Dhunche and a new pulse station.

e. Operating Support

The project will fund increased operating costs for expansion of hill production programs, establishment of the Extension and Socio-Economic Research Division and the Farming Systems Research/Extension Division and expansion of hill seed production programs. AID grant funding will provide a diminishing percentage of total program operating costs.

5. PID Approval Cable Issues

a. Seed Subsidy

A study on "Seed Pricing" completed in July, 1984 by the SPIS project noted that issues of seed pricing and subsidy are closely linked to questions of seed quality and timely availability. In the past, seed marketed by the Agricultural Inputs Corporation (AIC) has been of variable quality and led to a lack of confidence in AIC seed. AIC is improving the quality and uniformity of its seed, but until farmer confidence is restored, it is probably necessary to subsidize seed production and sales in order to expand usage and increase agricultural production.

The GON will, however, take some steps to improve its seed pricing policy. Seed sales prices will be established on a district basis. This will eliminate the problems of seed transported from the Terai (with transport costs subsidized) selling at a lower price than locally produced seed. At the same time, continued subsidy of transport for seed will help ensure that improved seed is available in the hills, even in those areas and cases when local production of seed is insufficient.

The GON will further explore the possibility of altering pricing policy to reduce premiums paid to seed producers and increase commissions to seed retailers. The project will also help the GON expand use of private retailers in seed marketing.

Under the Seventh Five Year Plan, the GON is proposing to eliminate subsidies for seed marketing. The ARP project will support this by helping to improve quality and availability of seed in the hills - necessary prerequisites to the elimination of the subsidies.

b. Export of Oilseeds

The ARP project will not give major emphasis to research or production of oilseeds. At time of PID preparation, the GON had proposed a combined "Pulse and Oilseed Development Program". Since then the DOA has decided to establish a separate "Pulse Development Program", which will receive support from this project.

Both pulses and oilseeds are important minor crops in both hill and Tarai cropping patterns and both are important nutritionally in providing protein and oil to the diet. The emphasis of project supported research on these crops will be to increase small farmer production for home consumption.

While oilseeds are exported from Nepal to India, edible oils are imported. Reliable data on exports and imports are not available, but, to the extent to which project activities involve oilseed production, the emphasis will be on production in the hills for home consumption and not for export. Likewise, the greater project emphasis on pulses is also based on the need to increase protein intake in the diet and is not directed toward export.

III. Cost Estimate and Financial Plan

Table 1 presents the project cost estimate and financial plan. AID bilateral grant funding is estimated at 65 percent and the GON contribution at 25 percent of total project costs. Other project costs are provided by Peace Corps and the PL-480 - funded AID India Training Program. Tables 2 and 3 present detailed breakdowns of AID and GON contributions by fiscal year.

The GON contribution includes the estimated fifty percent of the research budget of the DOA and DOL for programs supporting this project. It also includes in-kind contributions of additional land for research stations, equipment and materials, and office and warehouse facilities and additional recurrent costs for expanded programs.

Inflation for the AID contribution is estimated at eight percent compounded annually. This is less than the eleven percent annual estimate provided by AID/W for training activities, but is considered adequate considering the current inflation rate in U.S. and the fact that the inflation rate should be less for other inputs. The grant budget contains a contingency line item of approximately 9.0 percent of other costs including inflation.

Table 4 presents costs of project inputs and outputs; Table 5 presents a projection of project expenditures by fiscal year; Table 6 presents the planned obligation schedule.

IV. Implementation Plan

The life-of-project will be approximately six years from the date of signing of the grant agreement until the PACD (11/31/90).

Implementation of most project activities will continue based on the experience and relationships developed between AID and GON agencies under the ICP and SPIS projects. GON agencies demonstrated the capability to implement these previous projects and, although the scope of this project is broader, the GON participating agencies will benefit from previous administrative experience, revised organizational structures and specific project activities targetted toward building institutional capabilities.

The project continues the emphasis of previous projects on technical assistance. ARP, however, begins to phase out technical assistance in the areas in which GON capabilities have been amply developed. Technical support for Terai production programs will end with the ICP project; assistance for the hill seed program and farming systems agronomic research will be phased out during this project; and by the end of the project further technical assistance in socio-economics and minor crops agronomy assistance will probably not be necessary.

Table 1: Summary of Cost Estimates and Financial Plan

(US \$000)

Input	AID	Grant	PL-480	Peace Corps	GON	Total	
	FX	LC	LC	FX	LC	FX	LC
Technical Assistance	3,470	200	-	1,062	180	4,532	380
Equipment & Material	515	80	-	-	100	515	180
Training (Overseas)	775	-	207	-	125	775	332
Training (In-country)	-	400	-	-	100	-	500
Operating Costs	-	1,155	-	-	2,415	-	3,570
Construction	-	965	-	-	150	-	1,115
Land and Facilities	-	-	-	-	320	-	320
Contingency*	535	300	-	-	-	535	300
Inflation*	1,000	605	-	297	495	1,297	1,100
Total	6,295	3,705	207	1,359	3,885	7,654	7,797

* Inflation estimated at eight percent compounded annually for A.I.D. contribution and five percent for GON contribution; contingency for A.I.D. contribution calculated at 9.0 percent.

Table 2: Summary of AID Contribution
(US \$000)

	FY 85	FY 86	FY 87	FY 88	FY 89	FY 90	Total
Technical Assistance:	230	870	1,050	910	400	210	3,670
- Agronomist	(40)	(120)	(120)	(120)	(120)	(120)	(640)
- Research Station Specialist	-	(120)	(120)	(70)	-	-	(310)
- Socio-Economist	-	(70)	(120)	(120)	(70)	-	(380)
- Farming Systems Agronomist	(40)	(120)	(120)	(100)	-	-	(380)
- Agro-Forestry Researcher	-	(120)	(120)	(120)	-	-	(360)
- Livestock Researcher	-	-	(120)	(120)	(120)	-	(360)
- Seed Production Specialist	-	(120)	(120)	(70)	-	-	(310)
- Production Agronomist	(40)	(120)	(120)	(70)	-	-	(350)
- Short-Term Consultants	(90)	(60)	(60)	(40)	(70)	(30)	(350)
- Local Consultants	(20)	(20)	(30)	(20)	(20)	(30)	(140)
- Audit & Evaluation	-	-	-	(60)	-	(30)	(90)
Commodities:	35	190	135	145	80	10	595
- Vehicles	(35)	(64)	-	(30)	-	-	(129)
- Office Equipment	-	(20)	(44)	(100)	(35)	-	(199)
- Other	-	(106)	(91)	(15)	(45)	(10)	(267)
Overseas Training:	10	115	210	230	170	40	775
- Degree	-	(55)	(130)	(140)	(75)	(15)	(415)
- Short-term	(10)	(60)	(80)	(90)	(95)	(25)	(360)
In-country Training	10	90	100	100	70	30	400
Operating Costs:	-	205	255	240	230	225	1,155
- Research Programs	-	(80)	(115)	(80)	(80)	(60)	(415)
- Production Programs	-	(75)	(100)	(110)	(150)	(165)	(600)
- Seed Programs	-	(50)	(40)	(50)	-	-	(140)
Construction:	-	225	360	300	80	-	965
- Central Library	-	(60)	(110)	(90)	-	-	(260)
- FSR/E Building	-	-	(115)	(110)	-	-	(225)
- Pulse Program Facilities	-	(105)	(55)	-	-	-	(160)
- Hill Station Facilities	-	(60)	(80)	(100)	(80)	-	(320)
Sub total	285	1,695	2,110	1,925	1,030	515	7,560
Inflation Factor	0	.08	.17	.26	.36	.47	-
Inflation	-	135	360	500	370	245	1,610
Sub-Total	285	1,830	2,470	2,425	1,400	760	9,170
Contingency (9.0%)	25	170	220	215	130	70	830
Total	310	2,000	2,690	2,640	1,530	830	10,000

Table 3: Summary of GON Contribution*

(US \$000)

	<u>FY 85</u>	<u>FY 86</u>	<u>FY 87</u>	<u>FY 88</u>	<u>FY 89</u>	<u>FY 90</u>	<u>Total</u>
Support for TA Team**	20	40	40	40	20	20	180
Equipment and Material for Research**	50	50	-	-	-	-	100
Salary and Transporta- tion for Participants	-	25	25	25	25	25	125
Facilities and Staff for In-country Training**	-	20	20	20	20	20	100
Operating Costs:							
- Research Program	150	300	300	330	330	330	1,740
- Production Program	-	50	50	60	150	165	475
- Seed Program	30	30	35	35	35	35	200
Construction:							
- Warehouses	-	20	20	20	-	-	60
- Land**	-	25	25	-	-	-	50
- Supervision**	-	10	10	10	10	-	40
Land and Existing Facilities:							
- Research Station Facilities**	25	25	25	25	25	25	150
- Seed Plant Facilities (5)**	-	100	-	-	-	-	100
- Production Program Facilities**	-	10	10	10	20	20	70
Sub-total	275	705	560	575	635	640	3,390
Inflation ***	-	35	55	90	140	175	495
Total	275	740	615	665	775	815	3,885

* Provides other donor funding and in-kind contributions provided under prior AID projects.

** In-kind contribution.

*** Inflation estimated at five percent compounded annually.

Table 4: Estimated Costing of Project Outputs/Inputs*

(US \$000)

<u>Project Outputs</u>	<u>Project Inputs</u>							<u>Total</u>
	<u>Technical Assistance</u>	<u>Equipment and Material</u>	<u>Training Overseas</u>	<u>Training In-country</u>	<u>Operating Costs</u>	<u>Land and Facilities</u>	<u>Construction</u>	
Administrative Improvement	100	100	50	100	50	-	-	400
Research Station Management Improvement	500	-	-	100	50	-	-	650
Khumaltar Library	100	200	50	-	100	-	350	800
Extension and Socio-economic Division	400	100	600	-	200	-	-	1,300
FSR/E Division	2,500	100	100	200	700	-	450	4,050
National Commodity Program	600	200	600	-	1,000	200	450	3,050
Research Support Fund	100	-	-	-	100	-	-	200
Hill Production Program	1,300	150	100	150	1,351	100	100	3,251
National Seed Board	200	50	-	50	-	-	100	400
Hill Seed Program	600	100	-	100	400	150	-	1,350
Total	6,400	1,000	1,500	700	3,951	450	1,450	15,451

* Inflation and contingency included.

Table 5: Projected Expenditure by Fiscal Year (US \$000)

<u>Fiscal Year</u>	<u>AID</u>	<u>PL-480</u>	<u>Peace Corps</u>	<u>GON</u>	<u>Total</u>
FY 85	285	20	180	275	760
FY 86	1,675	40	180	705	2,600
FY 87	2,090	40	180	560	2,870
FY 88	1,925	40	180	575	2,720
FY 89	1,030	40	180	635	1,885
FY 90	515	27	162	640	1,344
Inflation*	1,605	-	297	495	2,397
Contingency**	<u>875</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>875</u>
Total	10,000	207	1,359	3,885	15,451

* For AID contribution estimated at eight percent per year compounded; for GON contribution estimated at five percent per year compounded.

** Estimated at 9.6 percent for AID contribution.

Table 6: Planned Project Obligation Schedule by Fiscal Year (US \$000)

<u>Fiscal Year</u>	<u>Obligation</u>	<u>Expenditure*</u>	<u>Pipeline</u>
FY 85	1,200	310	890
FY 86	2,100	1,985	1,005
FY 87	3,000	2,680	1,325
FY 88	2,700	2,655	1,370
FY 89	1,000	1,535	835
FY 90	<u>-</u>	<u>835</u>	<u>-</u>
Total	10,000	10,000	-

* Includes inflation and contingency distributed by year.

A. GON Staff and Organization

The GON will name the Director General of the DOA as Project Director and a staff member of the DOA as Project Coordinator.

The GON will establish several new or reorganized institutional entities: an MOA National Research Coordination Committee, a National Seed Development Board, a Farming Systems Research/Extension Division in the DOA with a Farming Systems Research Coordinating Committee and an Extension and Socio-Economic Research Division. The MOA with approval of the National Planning Commission has the authority to establish these institutions.

In general, relatively few additional GON staff will be needed to implement the project. The Extension and Socio-Economic Research Division will be a new discipline division and, because of the shortage of socio-economists within the DOA, it will take two to three years to fully staff this division. The Farming Systems Research/Extension Division will draw personnel on deputation from other disciplines and this will require replacement by creating new positions in the parent programs and divisions. For farming systems site work, perhaps half of the needed staff can be reassigned from current duties and the others will have to be recruited for new positions. Additional staff will also be needed in the Pulse Program, Seed Technology and Improvement Program, hill research station programs, and foundation seed production program.

Altogether approximately 37 additional officer level and 60 JT/JTA level staff will be needed for project supported programs. In the context of a build up over the first three years of the project this increase in staff should not present a problem administratively or budgetarily for the MOA.

B. Contracting Arrangement

AID will contract directly to provide technical assistance, training, equipment, and construction. Because of the complexity of the project, the range and specialized nature of technical services required, and the difficulty of staffing and implementing projects in Nepal, AID/N has concluded that this project is not suitable for set-aside for contracting with minority or woman-owned firms, historically black colleges and universities, small business firms, or universities. The complexity of the tasks requires selection of the most experienced, best qualified contractor possible, a requirement

which dictates the decision by AID/N for open, competitive contractor selection. Minority or women-owned firms, small business and universities should be encouraged to offer proposals individually or in association with other contractors.

Initial contract negotiation will be in AID/W after which contract management will be transferred to AID/N.

Host country contracting is not appropriate due to the number of GON institutions involved in project implementation and the relatively easier working relationships possible between the GON and the contractor when AID can assume administrative responsibilities for the contract.

The technical assistance contractor will procure equipment and materials needed for the project and will contract with local firms for design work and construction of facilities at GON research stations. All construction activities are relatively small and are in scattered locations. Thus, it is unlikely that international firms would be interested in bidding on these contracts. Local contracting also serves the added purpose of building local capacity.

The decision to have the technical assistance contractor sub-contract for construction and improvement of facilities at research stations is a result of experience under the ICP project which showed that contracting is difficult for the GON to administer when sites are scattered and construction activities are diverse. The same holds true for arranging short courses and seminars on an irregular basis and involving expatriate trainers.

Farmer training programs and research, production and seed production programs will be funded through the GON budget on the working capital fund system. Such funding has proven workable under the ICP project and it is expected that financial reporting can be improved through training under the new project. Under this system, AID will fund a portion of the operating costs of production programs, the metal bin purchase subsidy program, and the Extension and Socio-Economic Research Division, the Farming Systems Research/Extension Division and farming systems research sites. AID funding for these programs will be on the basis of a diminishing percentage of costs.

C. Methods of Implementation and Financing

1. The following information is provided per the "Payment Verification Policy Implementation Guidance" dated December 30, 1983 and the "Mission Financing Policy and Procedures Assessment" dated March 22, 1984:

Table 7: Method of Implementation and Financing (\$000)

Method of Implementation -----	Method of Financing -----	Approximate Amount -----
Technical Assistance/AID Direct Contract	Direct Reimbursement	3670
Procurement/AID Direct Contract	Direct Reimbursement	555
Participant Training/AID Direct Contract	Direct Reimbursement	1175
Construction/AID Direct Contract	Direct Reimbursement	965
Sector Assistance - GON	Direct Reimbursement	1155
	Sub-Total	7520
	Inflation	1605
	Contingency	875
	Total AID	10,000

2. There are no financing methods indicated which need justification, per AID/W guidance. Methods of payment are entirely consistent with preferred AID payment procedures as indicated in AID/Nepal's Mission General Assessment of Mission Financing Policies and Procedures.

3. GON contracting and commodity procurement procedures follow competitive procedures acceptable to AID/N.

D. Pre-Implementation Actions

Since this project will support GON programs and agencies which have received previous assistance under the ICP and SPIS projects, there is a continuity and momentum developed on which the project will be able to build. AID/N extended PACDs and technical assistance contracts for the ICP and SPIS projects to continue support to GON hill seed production, cropping systems research and production programs. The PACD for these projects is May 31, 1985 for ICP and August 31, 1985 for SPIS.

E. Estimated Timetable of Implementation Actions

Following is a projected timetable for project implementation action:

<u>Action</u>	<u>Time Frame</u>
PP Authorization (AID/N)	December, 1984
Non-funded PIO/T submitted to AID/W (AID/N)	December, 1984
Grant Agreement Signing (AID/N; GON)	December, 1984
Conditions Precedent Met (GON)	January, 1985
Request for Technical Proposals Issued (AID/W)	January, 1985
Joint Secretary for Research Named (GON)	March, 1985
Technical Proposals Received (AID/W)	March, 1985
Technical Proposals Evaluated (AID/W; AID/N)	May, 1985
Integrated Cereals Project Ends (AID/N)	May, 1985
Project Workplan and Budget Prepared for NFY 42/43 (GON)	June, 1985
Technical Assistance Contract signed (AID/W)	June, 1985
First Long-Term Advisor Arrives (Contractor)	July, 1985
Socio-Economic Research Division, Farming System Research Group, and National Seed Development Board Established (GON)	July, 1985
Seed Production and Input Storage Project Ends (AID/N)	August, 1985
Research Planning Specialist Arrives (Contractor)	September, 1985
Administrative Management Specialists Arrive (Contractor)	October, 1985
Completion of T.A. Contractor's Project Workplan (Contractor)	November, 1985

Administrative Reform and Implementation Plans Completed for DOA and DOL (Contractor; GON)	December, 1985
Metal Bin Seed Storage Program Started (GON)	December, 1985
Staff Assigned to at Least Five of New Farming System Research Sites (GON)	December, 1985
A&E Work Contracted for Project-Funded Construction (Contractor)	January, 1986
Foundation Seed Production Plan Completed (GON)	February, 1986
Research Planning Specialist Arrives on Second Visit (Contractor)	February, 1986
First Project Participant Trainees Sent for Degree Training (GON; Contractor)	April, 1986
First Project Funded Construction Contracted(Contractor)	May, 1986
Hill Production Programs Started in Target Districts (GON)	May, 1986
First Farm Operational Plan and Farm Development Plan Completed for GON Research Station (GON, Contractor)	May, 1986
Staff Assigned to all Farming Systems Research Sites (GON)	July, 1986
First Annual Agro-Forestry and Horticulture Research Workshop Held (GON)	August, 1986
Second Group of Project Participant Trainees Leave for Degree Program (GON; Contractor)	August, 1986

Livestock Research Specialist Arrives to Complete T.A. Team (Contractor)	October, 1986
Baseline Surveys Completed for Project Sites (Contractor)	December, 1986
Research Planning Specialist Arrives on Third Visit (Contractor)	February, 1987
National Seed Development Board Completes Plan for Development of Seed Industry (GON)	June, 1987
Third Group of Participant Trainees Leave for Degree Program (GON; Contractor)	August, 1987
External Project Evaluation (AID/N)	January, 1988
Final Project Funded Construction Contracted (Contractor)	February, 1988
Research Station Management and Seed Technology Specialists Complete Assignments (Contractor)	March, 1988
Library and Farming Systems Building Construction Completed (Contractor)	August, 1988
Final Group of Project Funded Participants Leave for Degree Programs (GON; Contractor)	August, 1988
Agro-Forestry Research Specialist Completes Assignment (Contractor)	September, 1988
Farm Operational and Development Plans Completed for Last of GON Stations (GON; Contractor)	October, 1988

Production Program Launched at Farming Systems Research Sites (GON; Contractor)	November, 1988
PID for Second Phase Project Completed (AID/N)	December, 1988
Research Planning Specialist Arrives on Fourth Visit (Contractor)	March, 1989
Research Coordinating Committee Completes Plan for Restructuring Agricultural Research (GON)	April, 1989
Follow-up Surveys of Project Sites Started (Contractor)	April, 1989
Final Project Funded Construction Completed (Contractor)	September, 1989
PP for Second Phase Project Completed (AID/N)	October, 1989
Final Project Evaluation (AID/N)	January, 1990
Project Follow-up Surveys Completed for Project Sites (Contractor)	July, 1990
Technical Assistance Team Completes Work (Contractor)	September, 1990
PACD	November, 1990

V Project Monitoring Plan

A. Routine Project Implementation Monitoring

Within AID/Nepal a project officer in the Agriculture and Resource Conservation Office and a Mission Project Committee will have primary responsibility for project monitoring. The Mission Engineer in the Project Development and Implementation Support Office will monitor project construction. Project monitoring will be done through regular site visits, meetings with GON counterparts and technical assistance personnel,

meetings of the Project Implementation Committee, preparation of annual GON budgets and workplans, technical assistance contractor reports, and GON reports.

The Project Officer and assistant project officers will make frequent field trips and, except for the scattered small seed plant sites, will visit each project field site an average of twice a year. AID engineers will visit active construction sites on a regular basis. In addition, trip reports and other reports from the GON and technical assistance contractor will help mission staff to monitor field activities.

Frequent meetings with GON counterparts and technical assistance personnel will be a major means of resolving problems and expediting project implementation. Such organizations as the National Research Coordination Committee, National Seed Development Board and Farming Systems Research Coordinating Committee will expedite specific project-supported activities. For overall coordination of project activities, a Project Implementation Committee, chaired by the Joint Secretary for Planning (MOA), and including the Director Generals of the DOA and DOL, General Manager of AIC, the Chief-of-Party of the technical assistance team, the AID Project Officer, Mission Engineer and Chief of the Agriculture and Resource Conservation Office, will meet two to three times a year, as needed, to set policy for project implementation, review progress and resolve any major problems.

The AID Project Officer and assistants will participate with GON and contract personnel in preparing annual GON budgets and workplans for the project. During this process, project targets and budget requirements are determined for the Nepali fiscal year (July 16-July 15). During the year the Project Officer and Office of Financial Management will monitor budget expenditures and workplan accomplishments. The AID payment process and financial review arrangements are summarized in Table 8.

The technical assistance contractor will submit consultant reports for all short term specialists and a semi-annual project progress report. The contractor will also prepare technical reports as appropriate and as agreed with AID/N and the GON.

The GON will also prepare an Annual Project Report following the end of the Nepali fiscal year for submission to AID/N by September 15 each year. This report will consist of three sections: a Seed Development Program Report prepared by the Seed Technology and Improvement Program and a Research Program Report and a Production Program Report prepared by the DOA Farming Systems Research/Extension Division. The Annual Project Report will include data on budget expenditures, project activities and program accomplishments. GON agricultural workshop proceedings and research journal articles will also be a means of monitoring project impact and achievements.

TABLE 8

SUMMARY OF AID PAYMENT PROCESS

AND

FINANCIAL REVIEW OF PROJECT IMPLEMENTATION

<u>Type of Assistance</u>	<u>Method of Implementation</u>	<u>Method of Payment</u>	<u>Pre-Payment Review</u>	<u>Post-Payment Review</u>	<u>Audit</u>	<u>AID Internal Control</u>	<u>Comments</u>
Technical Assistance: Direct Contract	For-profit Contractor	Direct Pay	PO-ACO	N/A	IG	Good to Excellent	For services performed in field, Project Officer should have good basis for voucher approval.
Procurement: Direct Contract	For-profit Contractor	Direct Pay	PO-ACO	N/A	IG	Good	Full Mission review of contract charges. 37
Training: Direct Contract	For-profit Contractor	Direct Pay	PO-ACO	N/A	IG	Good	Full Mission review of contract charges.
Construction: Direct Contract	For-profit Contractor	Direct Pay	PO-ACO	N/A	IG	Good	Full Mission review of contract charges.
Misc. Grants: Host Country Contract	For-profit Contractor	Direct pay	PO-FM	N/A	IG	Good	-

Note: PO - Project Office; ACO - Area Contracting Office;

IG - Inspector General; FM - Financial Management Office

B. Monitoring Project Impact

The project will monitor impact of the three major project components. Impact monitoring plans are outlined below.

1. Agricultural Research: Monitoring the impact of research activities is difficult due to the frequent long lead time involved in the development of new technology. However, much of the emphasis of the project research component is on improving the management and productivity of the research system and indicators of quantity and quality of research activities will be used to monitor research improvement.

The Agricultural Research Planning Specialist will develop information needed for measurement of project impact during his annual visits to Nepal. Baseline data is not now available, but will be developed by the Specialist on his first visit during year one of the project. The Specialist will quantify GON research activities, develop quantitative indicators of research activity relevance and quality and establish targets for improvement. Tentatively, the project will aim for a five percent annual increase in numbers of research activities and a demonstrable annual improvement in quality. In subsequent annual visits the Specialist will review GON research activities and prepare annual estimates of indicators of research quality and quantity.

A secondary indicator of research impact will be numbers of new varieties released for cereal crops, pulses, forages, and tree crops. Targets will be two new varieties approved for release each year, with at least one new variety of an important hill crop being released by year three and a second by year five. Information on newly released varieties will be available in GON and contractor reports.

2. Production Program: The impact of production programs will be measured by numbers of hectares under the production program and by the percentage of production increase resulting from program participation. The target will be for at least a ten percent production increase for participating farmers and for participation under the programs to increase from 60 ha. in year one to 270 ha. in year two, 1,430 ha. in year three, 5,750 ha. in year four, and 14,000 ha. in year five. These targets are less than total program area coverage targets (Annex M) as production increases may not be achieved on all land under the program. The target for the fifth year represents approximately 40 percent of cropland in the target districts.

Annual reports on the project production program will include data on farmer participation, hectares under the program and yield data as obtained from crop cuttings. In addition, as a further check on project impact, the technical assistance contractor will arrange for baseline surveys of production program districts and farming systems sites during the first year of the project. The surveys will estimate current yields of major crops, areas under various cropping patterns, and use of improved

varieties and technologies. Follow-up surveys in years four and six of the project will measure project impact.

3. Seed Program: Production of improved seed at small seed plants and metal bin sites will be an indicator of impact of the seed program. Seed production is estimated to be 400 MT. the first year of the project, increasing to 650 MT. the second year, 1,250 MT the third year, and 2,000 MT. the fourth and fifth years. These impact targets are approximately fifty percent below the GON targets included in the seed production implementation plan (Annex N) and reflect more conservative estimates on rate of area expansion and rejection of seed due to weather damage. Data will be available in AIC reports on the seed production program.

A second indicator of impact of the hill seed program will be the percentage of farmers using improved varieties of rice, wheat and maize. Baseline data is contained in the baseline surveys of SPIS project sites. In year three of the project the contractor will arrange follow-up surveys of small seed plant sites. The surveys will estimate area under different varieties and farmers' current sources of seed. The project target will be an increase of fifty percent for area under improved varieties of rice and maize and ten percent for area under improved varieties of wheat.

VI Summary of Analyses

A. Administrative/Institutional Analysis

The ARP project faces several difficult challenges in developing inter-agency linkages. However, the institutional arrangements proposed are workable and improvements in GON agency programs and operations can be expected as a result of these changes. The project will also provide a sound base for future, more far-reaching institutional development within GON agencies.

The National Research Coordination Committee and the Farming Systems Research/Extension Division should help the GON to improve the quality and output of agricultural research. Major emphasis will go towards making the research system responsive to extension needs and quickly integrating research outputs into production programs.

The National Seed Development Board should help to improve coordination of the many seed development programs. The Agricultural Inputs Corporation has the experience and mandate and should continue to manage the hill seed production and distribution system. To the extent possible, private sector participation will be encouraged.

GON staff requirements to implement the program will require an increase of approximately 37 officer level and 60 JT/JTA level

staff. While substantial, these increases can be phased over the first three years of the project and should easily be within GON capabilities. Some of these staff positions will be temporary, only for the duration of the project.

B. Technical Analysis

The project approach to improvement of national research, production and seed programs is technically sound. Appropriate agricultural technology is available for production programs and, in many cases has already been demonstrated in Nepal.

The Farming Systems Research component and the broader project support for agricultural research are directed toward the right priorities. Research work must continue on the major cereal crops, but attention toward pulses, livestock, minor grains, forages and agro-forestry is also necessary.

The Project recognizes the difficulty of working in the hills. The known base of technology for improvement of productivity is much narrower and the hill farming systems more complex than in the terai. To a large degree, productivity may depend on soil nutrients, and the problems of supply of soil nutrients in the hills appears difficult at best. Sequencing attention on cereal crops, forage and fodder, livestock, and agro-forestry is a rational step-wise approach to developing hill agriculture. Despite the constraints to working in and developing technology for the hills, the effort is worth making and carries reasonable chance of success.

Project inputs should be adequate for implementation of the project. In the hills technology must be fairly simple and require few outside inputs. Human capital development is important, as is backstopping by sound national systems for extension, technical information, and research laboratories.

C. Social Soundness Analysis

Although the rural Nepal population consists of diverse ethnic and cultural groups and the society is basically heterogenous, village communities are highly integrated. Project benefits will likely accrue first to "large" farmers who nonetheless are largely living on a subsistence basis. However, benefits will spread readily and widely through the target population, if technologies developed and extended are low-cost, low-risk innovations, such as new varieties and techniques using local inputs.

Prior experience under the ICP and SPIS project has shown that local participation in seed production, on-farm research trials and block production programs is feasible. Spread of project technology is enhanced by use of thoroughly tested technology, FSR/E sites in different agro-ecological zones, a block production approach, local extension agents of both sexes, and local participation.

Project direct beneficiaries include: 875 farmer seed producers at small seed plant sites; 4,400 metal bin seed producers; 160 farmer cooperators at FSR/E sites; 19,000 participants in production programs; and 1,700 GON officials to be trained under the project. Indirect beneficiaries include users of improved seed from the project; 20,000 participants in production programs funded by other projects; and nearly the entire rural population which may eventually benefit from new technology developed and the resulting improved food supply.

D. Environmental Analysis

The Initial Environmental Examination attached as Annex I to the PID for this project recommended a finding of no significant environmental impact by any project activities. This finding was approved by the Asia Bureau Environmental office. No further environmental analysis has been done. The facesheet of the IEE is attached as Annex F of this PP.

E. Economic Analysis

Although ex ante benefit cost analysis of agricultural research activities is difficult the social returns to agricultural research is usually high. Although it has not been quantified, past research investments have provided good returns in Nepal, and it is reasonable to expect attractive rates of return on future investments.

Economic analysis (Annex G) of the ARP project demonstrates a positive net present worth of \$ 2.5 million and a benefit cost ratio of 1.2 in the seventh year (discounted at 12 percent). This analysis is conservatively based on benefits from the production and seed production components of the project and ignores the potential broader future benefits accruing from agricultural technology innovation, the likely positive impacts on the environment, and the probable diversion of benefits to consumers.

The analysis recognizes that technology dissemination and adoption is essential for realization of present and future benefits to agricultural research and that a favorable GON policy environment is necessary for technology adoption.

F. Financial Analysis

The project financial analysis (Annex H) estimates a financial internal rate of return of 13.7 percent over the first seven years of the project (12 percent discount rate). This early positive rate of return is significant and supports a recommendation for project implementation. However, it is relatively sensitive as a ten percent increase in costs results in delay until the eleventh year to achieve a positive net present worth and a ten percent decrease in benefits would delay positive returns until the twelfth year.

Financial returns to seed producers and production program participants are 49 percent and 90 percent increases in net income per hectare respectively and are easily sufficient to encourage participation.

VII Conditions and Covenants

A. Conditions Precedent to Initial Disbursement

Prior to the first disbursement under the Grant, or to the issuance by AID of documentation pursuant to which disbursement will be made, the GON will, except as may otherwise be agreed in writing, furnish to AID in form and substance satisfactory to AID: documentation demonstrating designation of a Project Director.

B. Conditions Precedent to Additional Disbursement

1. Prior to disbursement under the Grant, or to the issuance by AID of documentation pursuant to which disbursement will be made for any project activity other than technical assistance and training, the GON will, except as may otherwise be agreed in writing, furnish to AID, in form and substance satisfactory to AID: evidence of the establishment of a Farming Systems Research/Extension Division.

C. Covenants

The GON will agree, except as may otherwise be agreed in writing:

1. to establish a National Research Coordinating Committee;
2. to establish a National Seed Development Board;
3. to continue to monitor and evaluate policy constraints to increasing agricultural production; and
4. to institute district-based seed sale- pricing policy.

VIII Evaluation and Audit Plan

A. Evaluation Plan

AID and the GON will conduct annual internal project reviews each year. These will be scheduled following completion of the GON Annual Project Report (in September) and the technical assistance contractor's semi-annual progress report (in October). The reviews will focus on progress on implementation, major problems affecting the project and progress toward realizing project objectives.

In addition to annual internal reviews, a major project

funded external evaluation is planned for early FY 1988. The evaluation will be conducted by a joint team of one Nepalese and two U.S. consultants. If possible, the team will also include a representative of AID/W. The purpose of the evaluation will be to recommend future strategy for AID/N support to agricultural research, production and seed supply programs in Nepal.

The evaluation team will review progress on project activities and toward achievement of objectives. It will specifically address the question of whether AID and the GON should expand the hill production program activity. The team will review project and research reports, studies and reports on the agricultural sector, other donor projects and planned projects, and GON data on agricultural production and prices. They will visit field sites and meet with project implementors. The evaluation will:

1. review progress on providing project inputs and achieving outputs;
2. assess adequacy of institutional arrangements to support agricultural research, production programs and seed production;
3. assess quality, relevance and adequacy of current GON research programs, with special focus on progress on inter-disciplinary work and agro-forestry research;
4. evaluate potential for moving into larger scale production programs in the hills;
5. identify areas of continued weaknesses in GON agricultural programs;
6. suggest modifications in project targets and implementation in light of evaluation findings; and
7. recommend to AID and the GON actions which may be taken to further develop agricultural sector programs.

Plans for a final project evaluation are contingent upon recommendations of the mid-term evaluation. Specific issues to be addressed will be further developed prior to the evaluation. Project funds are budgeted for the external project evaluation to be conducted by one Nepali and two U.S. consultants. The final evaluation will:

1. assess the success of the project in meeting its objectives and identify any constraints which may have prevented the project from achieving its objectives;

2. identify strengths and weaknesses in the GON research, seed production and hill production programs; and
3. recommend to the GON, actions necessary to further develop these agricultural sector programs.

B. Audit Plan

The on-going project may be audited by the AID/Inspector General (AID/IG). AID/Nepal's Financial Management Office staff may also conduct limited financial reviews during the life of the project. A stateside post-contract audit of U.S. direct contractors is normally conducted by the Defence Contract Audit Agency (DCAA). In addition, project funds are budgeted for a mid-term audit of project activities utilizing the services of a contract audit team.

TELEGRAM

AMERICAN EMBASSY KATHMANDU, NEPAL

ADR - 11

UNCLASSIFIED

Classification

ACTION:
AID-2

INFO:
AMB
DCM
ECON
ADMIN
CHRON

ANNEX A

7/

NNNEVV 01A97GESA790
PP KUNJHT
DE RUEHC 03160 061055
ZNR 00000 07
P 01340Z MAR 81
FM SECSTATE WASHDC
TO AMEMBASSY KATHMANDU PRIORITY 0110
BT
UNCLAS STATE 060360

AIDAC

P.O. 10300: LZA
TAGS: AFLD
SUBJECT: AGRICULTURAL RESEARCH AND PRODUCTION PROJECT
(367-0142) PID

REF: KATHMANDU 0925

ACTION
ARC - 2

INFO
D/DD - 1
AM - 1
RF - 1

1. SINCE PROJECT COMMITTEE REVIEW INDICATED NO MAJOR ISSUES, NO AFAC REVIEW WAS CONSIDERED NECESSARY. PID IS HEREBY APPROVED.

2. MISSION IS COMMENCED FOR DEVELOPING PROJECT WHICH VENTURES INTO AGRO-FORESTRY DECISIONS INTENSELY REFLECTING THE IMPORTANT LINKAGES BETWEEN FORESTRY AND AGRICULTURE WITHIN THE FARMING SYSTEMS APPROACH.

FOLLOWING GUIDANCE IS PROVIDED FOR PP PREPARATION.

A. REQUEST ISSUE OF CREDIT SUPPORT TO BE CONSIDERED IN THE EXTENT OF AND RATIONALE FOR SUPPORT SHOULD BE DISCUSSED IN LIGHT OF BROADER ECONOMIC AND AID POLICY CONSIDERATIONS TO THE CONTRARY.

B. PP SHOULD OUTLINE PLANNED EVALUATION SCHEDULE AND PROVIDE APPROPRIATE BUDGET.

C. PP SHOULD CLARIFY POINT THAT CEREALS WILL BE USED FOR DOMESTIC CONSUMPTION AND NOT FOR EXPORT.

3. REFEEL CABLE, PACR EXTENSION REQUEST GRANTED BY PALLANTYNE (BASED ON NOTES PREPARED BY ALEX) AFTER VISIT BY AA/ASIA. EXTENSION GRANTED FOR EIGHT MONTHS UNTIL MAY 31, 1985. IN ADDITION, AA APPROVED WAIVER FOR NON-COMPETITIVE PROCUREMENT TO EXTEND IAS CONTRACT FOR SAME 8-MONTH PERIOD. SHOULD

BT
060360

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

AIC 1020-28 (7-71)
SUPPLEMENT 1

(INSTRUCTION: THIS IS AN OPTIONAL FORM WHICH CAN BE USED AS AN AID TO ORGANIZING DATA FOR THE PAR REPORT. IT NEED NOT BE RETAINED OR SUBMITTED.)

Life of Project
From FY 85 to FY 91
Total U. S. Funding \$10,000,000
Date Prepared: 1/1/81

Project Title & Number Agricultural Research and Production Project

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Program or Sector Goal: The broader objective to which this project contributes:</p> <p>To increase the sustainable agricultural productivity of Nepali small farmers.</p>	<p>Measures of Goal Achievement:</p> <p>Agricultural productivity increases at a rate not less than 3 percent per year for the next 20 years.</p>	<p>GON, IBRD, and FAO reports.</p>	<p>Assumptions for achieving goal targets:</p> <ul style="list-style-type: none"> - World economic and political situation does not restrict Nepal's ability to increase agricultural production. - GON policies do not limit the ability and motivation of farmers to utilize new technology. - Other donors continue to support GON agricultural development programs.
<p>Project Purpose:</p> <p>To (a) strengthen GON institutional capabilities to develop appropriate new technologies for small farmers;</p> <p>(b) develop methodologies for conducting comprehensive production programs in the hills; and</p> <p>(c) improve hill farmers' access to improved seed.</p>	<p>(a) Research planning and management system established and functioning. Increased attention to agro-forestry, coarse grains, forage, and conservation in agricultural research program.</p> <p>(b) Hill production program (extension) methodology being utilized in at least 13 hill districts.</p> <p>(c) Hill seed program operational in 25 districts providing a local source of certified seed linked to satellite farmer seed producers.</p>	<p>Project and GON reports and site visits.</p>	<p>(a) --</p> <p>(b) Other donors and projects will adopt proven effective production program methodology.</p> <p>(c) --</p>

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PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

AID 1020-28 (7-71)
SUPPLEMENT 1

Life of Project:
From FY 85 to FY 91
Total U.S. Funding \$10,000,000
Date Prepared: PP Submission

Project Title & Number: Agricultural Research and Production Project

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p><u>Outputs:</u></p> <p>1. Improved Research Administration and Management.</p> <p>2. Improved Research Information and Documentation System.</p> <p>3. Expanded Socio-Economic Research Program.</p> <p>4. Improved Farming System Program.</p>	<p>1. Annual budgets for research are prepared based on annual and long-term research goals and plans and results of previous year's work.</p> <p>- National Research Coordination Committee is functioning.</p> <p>- Research stations have long-term development plans.</p> <p>2. Khumaltar Central Library functioning.</p> <p>- Research reports published promptly.</p> <p>3. Extension and Socio-Economic Research Division functioning.</p> <p>4. Program is established as a separate division and includes work on agro-forestry and livestock.</p> <p>- Research work on-going in at least ten farming systems sites.</p>	<p>1. GON budget and reports.</p> <p>- Project reports.</p> <p>- Station reports and site visits.</p> <p>2. Site visit.</p> <p>- Research reports.</p> <p>3. Project reports; research reports; site visit.</p> <p>4. FSR/E Division annual reports.</p>	<p>1. GON will restructure the research system and adopt improved management practices.</p> <p>2. --</p> <p>3. --</p> <p>4. GON will integrate livestock and crop research programs into a farming systems program.</p>

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**PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK**

AID 1020-28 (7-71)
SUPPLEMENT I

Life of Project:
From FY 85 to FY 91
Total U.S. Funding \$10,000,000
Date Prepared: PP Submission

Project Title & Number: Agricultural Research and Production Project

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<u>Outputs:</u>	<u>Magnitude of Outputs:</u>		<u>Assumptions for achieving outputs:</u>
5. Improved Commodity Program and Discipline Division Research.	5. National Pulse Development Program established at new station. - Expanded research work on hill crops and at hill research stations. - Good linkage between national research programs and IARCs.	5. Site visits; research reports; project reports.	5. --
6. Hill Production Program.	6. Production program covering approximately 5,000 ha. in each of three districts. - Pilot production programs around farming systems sites include work on agro-forestry and livestock. - Mini-kit program and production program methodology used by ten other projects.	6. Project reports; site visits.	6. Improved production technologies can continue to be identified for the hills. - GON policy environment allows farmers to adopt production-increasing technologies.
7. National Seed Development Board.	7. National Seed Development Board functioning.	7. Project and GON reports.	7. --
8. Hill Seed Production Program.	8. Twenty-five operating seed houses in the hills. - Satellite seed producers with metal bins multiplying seed in remote areas of 22 districts.	8. Project and GON reports.	8. --

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**PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK**

Life of Project:
From FY 85 to FY 91
Total U.S. Funding \$10,000,000
Date Prepared: PF Submission

AID 1020-28 (7-74)
SUPPLEMENT I

Project Title & Number: Agricultural Research and Production Project

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Inputs:	Implementation Target (Type and Quantity)		Assumptions for providing inputs:
1. Technical Assistance.	1. Long-term T.A. - 25 person years. Short-term T.A.- 3 person years.	1. Project reports.	
2. Training.	2. Academic - 13 participants. Short-term - 56 participants. In-country - 100 programs and 2,000 participants. Farmer Training - 135 programs and 5,000 participants.	2. Project reports.	
3. Construction.	3. - Farming Systems Building. - Khumaltar Library. - Pulse Program Station. - Hill Station improvements.	3. Site visits.	
4. Equipment and Materials.	4. \$555,000	4. Project reports.	
5. Research Support.	5. \$415,000	5. Project reports and GON budgets.	
6. Production Program Support.	6. \$600,000	6. Project reports and GON budgets.	
7. Hill Seed Program Support.	7. \$280,000	7. Project reports and GON budgets.	

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ANNEX C

Administrative and Institutional Analysis*

The ARP project will extend the successful approaches of the ICP and SPIS projects with some modifications adapted to the problems of hills. It will expand these activities in certain selected hill areas of the country. The activities, policies and coordination of agency responsibilities defined in the PP will afford a reasonable and institutionally sound base for realization of project objectives. While the project faces several difficult challenges in developing inter-agency linkages, the relationships proposed are workable and improvement in programs can be expected as the institutional arrangements are established. The organizational plan demonstrating institutional relationships under the ARP project is shown in Attachment 1 to this Annex. In the long term, the project will provide a sound base for future, more far-reaching institutional reorganizations. By the end of the project the methodologies, technical information and working relationships of agencies involved should provide the GON with the necessary institutions and technologies to continue and further expand the programs. A follow-up program would probably be beneficial to continue to assist with this effort.

An analysis of the present MOA effectiveness reveals a serious weakness in its ability to affect production at the farm level. Research often is done without knowledge of farm problems and needs, extension activities are confined primarily to the introduction of new varieties because other technology does not exist or is not farm tested and the availability of quality inputs is uncertain or nil in the hills. Long-term institutional development and reorganization is necessary to address these problems. The project as designed addresses these constraints and is a feasible and desirable avenue for implementation to achieve its objectives.

Research Program

According to estimates contained in the FAO report, Nepal is spending approximately US\$ 660,000 per year on agricultural research. While this amount should be increased, it is doubtful whether the GON is getting optimal return for the current investment. Better management of research activities is essential and may be obtained through work of the National Research Coordination Committee.

*Adapted from a report prepared by: Dr. David James and Anderson Renshaw, Resources Development Associates, Dr. Fanindra Neupane, IAAS, Mr. Ganesh K.C., GON Dept. of Agriculture, and Mr. Purna Bajracharya, No Frills Development Consultancy.

The National Research Coordination Committee will consist of the Joint Secretary/Planning (MOA) and equivalent authorities in the DOL, DOA and Department of Food and Agricultural Marketing Service. This committee will meet once or twice a year to review and direct research programs. The Committee will provide for linkages and coordination among researchers working on related topics.

Communication with CIMMYT, IRRI and CIP have been excellent and ARP will help to cement these relationships in place. The A P budget provides for expanded inter-changes: more Nepali Farming Systems Group workers going to the IARC's for training and more IARC experts coming to Nepal for technical assistance. Other IARC's especially ICRISAT, CIAT and ILCA, have had limited impact in Nepal. Important channels of communications will be established with all IARC's that are able to contribute to the ARP goals and objectives.

Extension Program

At the national level administrative backstopping is not yet adequate to support extension efforts. Because of the difficulty of implementing field programs, the GON has rightfully assigned priority to organizing extension efforts on the basis of intensive area specific production campaigns.

For implementation of production campaigns in hill districts, extension linkages with research through the Farming Systems Research/Extension (FSR/E) Division will assure the dissemination of well tested technology of a sound and practical nature based on relevant farming systems. The need for these linkages is recognized, but they have not yet been adequately developed. The interaction of extension specialists with their research counterparts in the FSR/E Division will encourage practical research and rapid extension of new technologies developed by researchers.

In addition, direct Extension and Socio-Economic Research Division administration of district extension programs will improve administration and clarify backstopping responsibilities. Assignment of an additional accountant/administrator to district ADO offices implementing production programs will facilitate financial reporting and project implementation and will eliminate bottle-necks found in past projects activities.

Farming Systems Research/Extension Division

The Farming Systems Coordinating Committee will be chaired by a Farming Systems Coordinator under the Director General (DOA). The Committee will consist of the FS Coordinator, Director General (DOL), DDG Livestock, DDG Research, DDG Extension, Division Chiefs, Regional Officers, DDG Evaluation & Planning, a representative of the Ministry of Forestry, and a representative of the Ministry of Irrigation. The Committee will insure that research addresses needs of farmers and that

practical production packages emerge from research. The Committee will also evaluate and develop extension efforts in such a way as to insure that the approved production package recommendations are extended and made available to the farmers after testing in PVTs (Preproduction Verification Trials).

Extension specialists in the FSR/E Division will plan production programs and develop extension information and recommendations in conjunction with research counterparts. They will assist with establishment of PVTs and with training the farmers and JTs involved with working on PVTs and production programs. Based on results of PVTs, they will train ADOs, subject matter specialists, and JTs assigned to implement production programs in other areas.

Research specialists in the FSR/E Division will be assigned from commodity programs and discipline divisions. They will plan and monitor farming systems and component technology research at farming systems sites and, occasionally, on GON farms. They will evaluate technology in terms of applicability to various ecological areas, feasibility in terms of input requirements, and economic practicability. They will help to develop packages of technology for regional testing and production programs and will refer problems back to the commodity and discipline researchers for modification of technologies and help to develop technological solutions compatible within farming systems.

Seed Program:

AIC will continue to be the primary supplier of agricultural inputs. Seed will be produced on private farms and, under the project, to the extent possible distribution will be channeled through the private sector. Local production of improved seed in hill areas will reduce transport problems and expenses and is a sound strategy. Multiplication and supply of quality seed of high performance varieties is imperative to the success of agricultural development programs and capability must be developed so that management, administration and distribution of quality seed can be done in the hill areas themselves. Three years of continued project support to this activity should be sufficient to institutionalize the system.

Seed quality control will be improved by institutionalizing improved seed testing procedures. Seed testing, now the sole responsibility of the Botany Division, is slow and often leads to seed deterioration during the wait for return of test results. Proposals for improving seed quality are given in Annex D and require no new organization arrangements. Policy changes and determination of organizational responsibilities will be made by a National Seed Board.

Establishment of a National Seed Board will help the GON to deal with issues related to assuring a timely availability of quality seed to farmers. This is one of the major constraints to success of production programs. The National Seed Board will

address problems of policy, coordination, and assignment of responsibility.

Board members would include the Secretary of Agriculture, as Chairman; General Manager of AIC; Chief of Seed Division of AIC; General Manager of ADB; National Commodity Research Coordinators; Chief of the marketing division; Director General (DOA); DDG Crops (DOA), DDG Extension (DOA); AND DDG Pasture (DOL).

Other Considerations:

1. Program Monitoring and Evaluation: The whole GON agriculture development system needs improvement in this area. The organizational and relationship arrangements proposed for this project should materially improve monitoring and ARP implementation. The Agricultural Development Council under an AID-funded grant is working with the Ministry of Agriculture to develop capabilities of an Implementation Monitoring Unit in the MOA.

2. Research Grants: The MOA is not a self-regenerating institution in the sense that the Ministry must look beyond itself when considering staff expansion and replacement. The main source of skilled technical manpower is the university system. The system of research grants to be administered by the FSR/E Coordinating Committee, will help teachers in higher educational institutions contribute to resolving practical, current problems and will help to develop linkages between the MOA and Tribhuvan University institutes.

Availability of grants will be advertized for specific topics to backstop FSR/E information needs that are not being met elsewhere. Grants will be awarded on a competitive basis and will include provision for the editing and publishing of research results.

3. Logistical Support: Because of the remoteness of some hill areas, special efforts are needed to facilitate communication with the research centers and to improve facilities and amenities for staff. Towards this end ARP will provide two-way radios for stations and construct staff housing.

4. GON Personnel Requirements: Table C-1 shows the current GON staff involved in the cooperating programs and the increases in personnel that will be necessary. Personnel increases should not be a major problem for the project. A primary need will be to assign certain existing personnel to the project.

The GON should also clarify personnel assignments as research specialists and others as production (extension) specialists. For example there are nine staff at Khumaltar in the Entomology Division. Each is now doing research, extension and service work on a need basis. Two or three could be

Table C-1: GON Program Staff Requirement

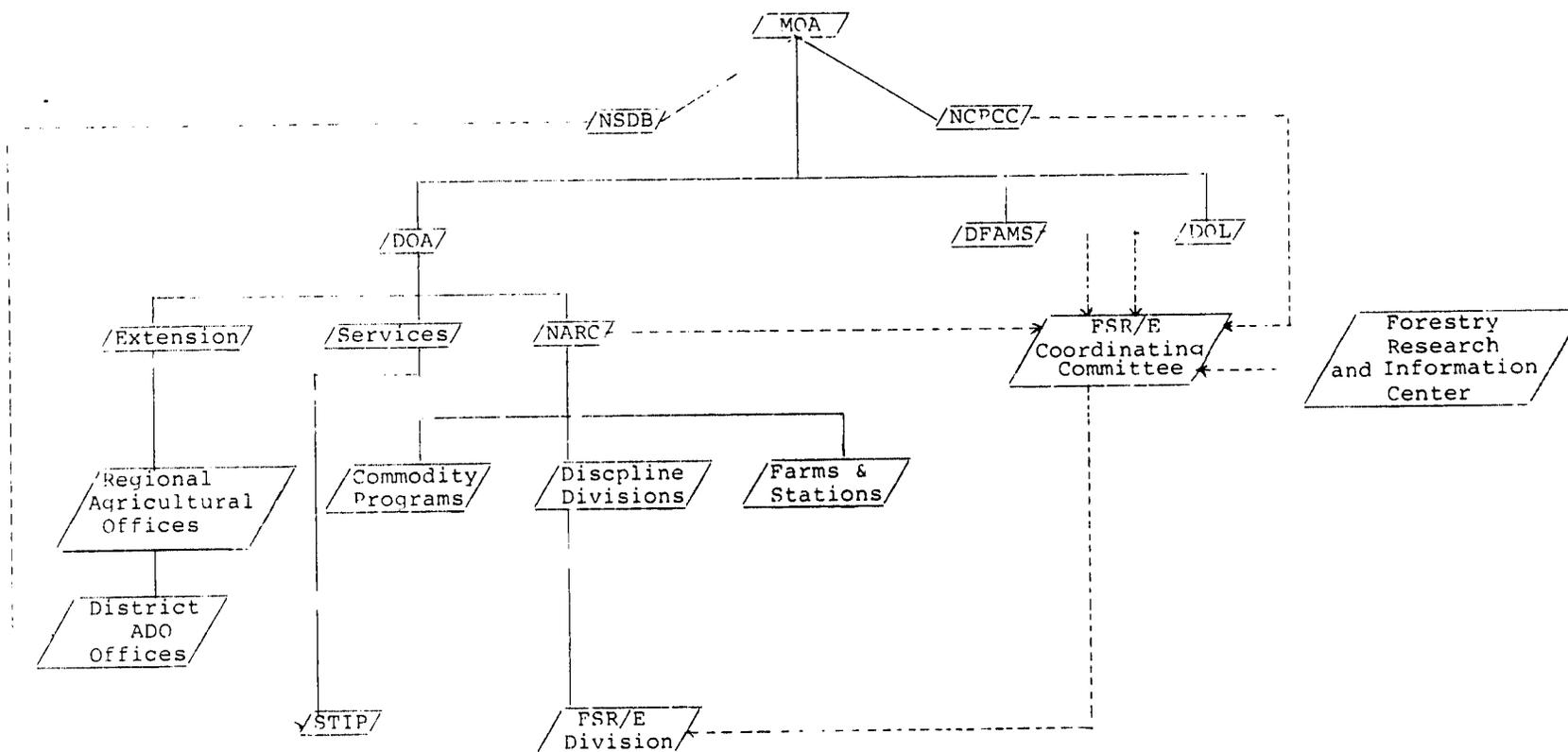
<u>Program</u>	<u>Required Staff</u>		<u>Current Staff</u>		<u>Staff Increases Required</u>	
	<u>Officer</u>	<u>JT/JTA</u>	<u>Officer</u>	<u>JT/JTA</u>	<u>Officer</u>	<u>JT/JTA</u>
Agr. Research Library	1	7	-	1	1	6
Extension and Socio-Economic Research Division	9	7	1	-	8	7
FSR/E Division	14	22	7	11	7	11
FSR Sites	22	24	12	12	10	12
National Pulse Development Program	6	6	2	2	4	4
Seed Technology and Improvement Program	10	10	9	9	1	1
Hill Seed Program	2	25	2	20	-	5
National Extension System	-	-	109	2080	-	-
District Production Program (3 Districts)	9	27	3	14	6	14
Total Increases Required					37	60

designated fulltime extension specialists and the rest as researchers. Thus, duties and organizational assignments would be clearer and more complementary.

Reassignments, better delineation of duties and, in some instances, increases in numbers will permit efficient project implementation and should increase research and extension capability and output.

5. Livestock: There has been no concerted research effort on livestock production and management. This area of activity will receive priority attention in the hill areas by establishing legume/grass forage and tree fodder production programs together with animal health and breed improvement. The ARP will provide technical assistance and commodities in support of these activities.

SIMPLIFIED MINISTRY OF AGRICULTURE (MOA) ORGANIZATIONAL CHART



----- Coordination Linkage
 - - - - - Administrative Linkage
 NSDB National Seed Development Board
 NRCC National Research Coordination Committee
 NARC National Agricultural (Crop) Research Council
 STIP Seed Technology and Improvement Program

Attachment I

ANNEX D

Technical Analysis*

Farming Systems Research and Extension (FSR/E)

The ICP program, which ends in May 1985, successfully demonstrated the utility of cropping systems research/extension methodology. Specifically, it is possible to understand and reduce small farm production constraints by conducting research and extension programs directly on small farms in close collaboration with farmers.

The ARP project will build upon the success of ICP. The Cropping Systems Program will be expanded to an FSR/E thrust by including work on livestock, socio-economics, horticulture, agro-forestry and minor crops. FSR/E will concentrate on the hills, but will also continue FSR activities in the Terai.

In addition to the subject matter and geographic expansion associated with FSR/E within Nepal, ARP will focus on correcting persistent research and extension deficiencies. CSR/E profited immeasurably from close association with the IARCs. IARC inputs generally related to crop varietal improvement - breeding lines and variety testing. While the number of improved varieties has expanded, research and extension on other factors of crop productivity (soil fertility and plant nutrition; water management, and insect, disease and weed control) have not kept pace. As an example, the basic DOA document upon which current fertilizer recommendations are based was written in 1976. ARP will draw all pertinent disciplines into the main-stream of FSR/E by channeling technical assistance and financial resources into existing research and extension divisions of the DOA and DOL.

FSR/E activities will be planned and implemented by an inter-disciplinary group of scientists on deputation from other research units. They will necessarily depend on other units for basic research and technology innovation. FSR/E is farm-oriented and will have immediate application to production programs. FSR/E field activities will eventually be conducted at 13 locations in all five regions. Initially, ARP will support work at eight locations (Kabhre, Dhunche, Palpa, Marpha, Doti, Surkhet, Bhairahawa and Parsa). These locations are appropriate as they are representative of wider agro-climatic areas and are relatively accessible.

*Adapted from a report prepared by: Dr. David James and Anderson Renshaw, Resources Development Associates, Dr. Fanindra Neupane, IAAS, Mr. Ganesh K.C., GOA Dept. of Agriculture, and Mr. Purna Bajra Bajracharya, No Frills Development Consultants.

Although the focus of ARP work will be in the hills, very little is known about important elements of hill agriculture in Nepal. Therefore, ARP activity will initially be largely exploratory and pilot in nature, and designed to establish bench-mark information on soil-plant-animal management systems currently in use by hill farmers. As experience and information accumulate, the scope will broaden and efforts will become more focused. Work will begin on agronomic crops and pasture and forage development (including fodder trees). Later work will include livestock improvement, vegetable and fruit crop and other specialty crops and animals. Ultimately, pest management in crops and livestock and plant and animal pathology control measures will be introduced. Agro-forestry and livestock do not come under the DOA and, therefore, ARP will direct its early efforts to integrate these disciplines into the FSR/E program.

Diversification of the major grain crops has received much attention in Nepal under the ICP program. Progress attained under ICP will be exploited and the CSR/E efforts diversified toward more research and extension on non-genetic factors. Moreover, FSR/E will intensify the "system analysis" of the major crops grown in tandem with each other and with oilseeds, pulses and minor crops.

Research Activities:

Pulses: Pulses, including soybeans in the mid and low hills and pigeon pea, lentil, chick pea, garden pea, black gram and green gram in the Terai and inner Terai, are an important component of the Nepalese diet. Increasing research work on these crops is a sound priority.

Pasture and forages: The key to FSR/E in the higher elevations of Nepal is forage production and utilization. This would include agronomic species, legumes, grasses, and trees. ARP will concentrate initially on identifying and testing plant species currently utilized by farmers. The program will move to introduce new forage types and improved strains and will evaluate their performance together with indigenous species. Criteria will include rapidity of field establishment, and yield and quality. Forage preservation for use during the dry season will also be studied.

Fertilizers and Fertilizer Alternatives: Soil fertility enrichment and conservation are innately associated with forage production and animal husbandry: legumes for nitrogen-fixation; green manure crops; and collection, preservation and utilization of animal manures. Studies will attempt to maximize the efficiency of on-farm soil fertility resources. This will include projects on composting and segregating fact and folklore related to fertililzer use.

This effort requires access to an efficient soils diagonstic laboratory to demonstrate the role of forages in soil erosion control and fertility maintenance. More research is needed on

questions related to fertilizer kind (nitrogen, phosphorus, potassium, sulphur, etc.) required for most economic crop performance. This issue is largely virgin research territory in Nepal but is of considerable economic importance.

Other Crops: Other crops (such as finger millet, buck wheat, barley, amaranthus, etc.) play an important role in hill agriculture. As these crops have been neglected in the past, the Kabre farm will be designated as a lead research station for work on these crops.

Agricultural Economics and Rural Sociology: ARP will assist the GON to expand its research and extension capacity in the area of socio-economics. The purpose will be three-fold: (a) to help establish pertinent agricultural research objectives and methodologies in the technical disciplines; (b) to evaluate cost/benefit relations; and (c) where applicable, to help organize extension programs that effectively teach and demonstrate new technology. Much of the work of this division will be in surveying farmers to determine their needs and production constraints and devising ways and means of involving farmers in extension planning.

Specific socio-economic disciplinary research projects will include socio-economic surveys of agro-ecological areas; farm management; natural resource evaluation and development; and marketing research and development for "comparative advantage" opportunities in Nepali agriculture. This division will also investigate ways of increasing local participants in the research extension processes in order to ensure that new technological innovations respond to farmers' needs.

Livestock Research: GON capacity for research on livestock production management is very limited. ARP will assist the DOL initiate a hill livestock research program, involving pasture and forage management as a prelude to animal nutrition studies. Technical assistance and training will help assess the extent and intensity of animal disease problems and identify methods for their control. Since livestock represent the major capital resource of many farm families, socio-economic inputs will evaluate ways and means to reduce the total number of stock while replacing them with higher producing cross breeds.

Farm animal types currently in use will be classified and benchmark data collected on growth rate, yield of milk (including methods of milk processing and product quality), yield of animal fiber; and in the case of bullocks and buffalo, draft efficiency. The program will move rapidly into cattle and buffalo nutrition work following the forage program outlined above.

Information Storage, Retrieval and Dissemination:

A limited number of books, journals and articles are now housed in respective subject matter divisions at Khumaltar. In no instance are the library materials adequate. Under ARP, a

central library will be established and cataloged. In addition, the project will help to expand the centralized library to include pertinent journals, books, bulletins, and papers of both national and international origin that are needed by the agricultural scientific community of Nepal.

Library expansion will also provide for micro-film and micro-fiche readers and storage-retrieval systems for micro-processed information. Past and present editions of some international journals are now available in micro-reduced form which is the most economical way to achieve an updated library.

An editorial and publication service will be established as a section of the library. Authors will submit articles for publication that have been reviewed and approved for technical content by their subject matter division. The library staff will then edit the articles for language and format and contract printing through private firms.

Research Station Facilities:

Three currently established hill research stations will be equipped by ARP to expedite the FSR/E hill program. The three stations are: Kabre, Dhunche, and Doti. The designated research stations must be able to support interdisciplinary agricultural research work.

Facilities to be provided under ARP include living quarters for technicians and office/laboratory buildings. Since no electricity is available at these stations, laboratories will consist of work benches and storage cabinets with equipment consisting of balances, glassware and microscopes for diagnosis of insect/disease problems and for specimen collection and preservation. Appropriate veterinary equipment and supplies will be included as well as.

Major diagnostic tests for soils, plant nutrition and feed quality will be provided for all research stations by the central service laboratories at Khumaltar. Khumaltar laboratories are fairly well equipped to service the research needs of hill stations. ARP will provide these laboratories with necessary reagents, equipment, and, especially training to allow personnel to respond in a timely manner with analytical results on samples and specimens.

The GON has limited installed capacity for research in hill regions. ARP will augment the available facilities, especially housing facilities necessary to retain technicians in remote farms and stations. Limited laboratory facilities and field research equipment and supplies will also be provided.

Technical assistance will continue to assist on-going Terai research, on agronomy, pest control and soil fertility. The technical assistance will also assist with design and analysis of hill crops and soils programs. Technical assistance

positions in socio-economics, livestock management and agro-forestry are important for the hill focus of the project.

Extension Program:

The extension approach will be based on FSR/E work. It will capitalize on the demonstrated utility of the present cropping pattern program and production blocks.

Organizational arrangements described in Annex C permit technically sound practices to be demonstrated as a means of obtaining more rapid adoption and utilization of technology. These provide better opportunities for researchers and extension personnel to coordinate efforts and to communicate by assigning both to the FSR/E Division.

Extension activities will focus on refining present production program methodology for cereal crops in hill areas. Subsequently, extension programs will expand to include other crops, integration of livestock and forage enterprises and agro-forestry.

Since production program potential with current technology is related to input accessibility and availability of irrigation, these factors are important criteria for the selection of production areas. Other considerations should be amount of contiguous land, uniform ecological areas, and cooperative and progressive farmers. Present or potential livestock, forestry and horticultural technology appropriate to the area should also be evaluated in selecting sites. Districts selected for production programs are appropriate based on the above characteristics.

Selected areas within each district will be known as production blocks and will form the basis of the program at the village-level. Two Production Officers at the district level will supervise nine JT/JTAs (one per block) who will work with farmer leaders (PLAs) selected by area farmer. Some PLAs, as well as some JT/JTAs, will be women, since women do most of the farm work and have a major influence on the farming operation.

Farmer demonstrations, meetings and training courses will be conducted at the sub-district service centers and in the farmer's fields. Sub-district "centers" should be used to implement the program though various agencies involved may be physically separated. Pre-production Verification Trials (PPVTs) should serve for verification of research recommendations and as an extension tool for farmer education, demonstration and motivation.

Seed Production:

The project will continue support to "mini-seedhouses" which have been developed in hill areas. The project will expand this system by establishing seed producing farmers around the small

seed plants. These local seed producers will spread improved seed through local barter as is traditionally done. The small seed plant will be used to supply seed to outlying farmers with steel bins for seed storage.

AIC will initially have to be responsible for the operation of small seed houses. Ultimately the ideal would be for them to be in the private sector. The mini-seedhouse should contract maize seed production with farmers having contiguous fields to minimize cross pollination and loss of potential. Mini-seedhouses and producers receiving foundation seed should not require new seed every year. Foundation seed will be required for maize only every three years and rice and wheat every five years.

Outlying farmers who receive certified seed from the mini-seedhouse will produce seed for their area beyond the reach of the mini-seedhouse. The use of metal bins coupled with technical training and farmers know-how can provide sufficient good, quality seed in the metal bin areas for farmer-to-farmer exchange. A mini kit program should be continued by the commodity programs through the small seed houses. Preference should be given to owners of metal bins to ensure good cleaning and storage for further distribution of the F-1 generation.

Supply of foundation seed to the hillseed program should be sufficient to produce the seed requirement of the surrounding areas and for owners of metal bins. Timely supply of foundation seed is essential to enable the system to relieve AIC of the need to supply production seed to hill areas.

Project Inputs:

Technical Assistance will be provided through (1) USAID contract for long term and short-term expatriate personnel and Nepalese consultants, and (2) Peace Corps Volunteers working with GON personnel on field activities. Establishment of new programs and addressing the difficult constraints to productivity in the hills requires intensive use of technical assistance. Local consultants in agronomy and library science are available in Nepal and should be utilized for their experience with Nepalese agriculture and institutions until an adequate number of GON staff are trained to take over the required tasks.

Commodity Procurement:

As electric power is not available at hill stations, only a modest amount of equipment and supplies should be purchased for those stations. Other laboratory support should be provided for Khumaltar, where modest amounts of equipment and expendable supplies are needed to backstop field research.

Annex E

Social Soundness Analysis*

The population of Nepal consist of over 16 million persons of different ethnic groups scattered throughout the country. About 94 percent live in rural areas. The major portion of the total population is of Indo-Aryan origin and is divided into different castes. The hilly and mountainous regions are mostly inhabited by Tibeto-Burman speaking groups including Magars, Gurungs, Tamangs, Rais, Sherpas, and Limbus. Tharus, another indigenous people of undetermined origin, are mostly confined to the Terai region. People belonging to the various ethnic groups in the mountains, hills and Terai regions have evolved their own dialects and customs.

Along this dimension of ethnicity, agriculture dominates the economy, providing income and employment to over 90 percent of the population. Land is the principle resource of every rural household of Nepal. However, the ownership of land in Nepal is highly skewed with about 56 percent of the farmers owning less than 12 percent of the land and six percent of the farmers owning almost 44 percent of the land. In the hills, the average land holding is 1.25 ha. and in the terai 2.11 ha. This situation illustrates the precarious agriculture base of Nepalese farmers and contributes to the low per capita annual income of US\$ 130.

In this socio-cultural setting, a variety of economic strategies based on land resources characterize the subsistence system. The vast majority of households combine cereal grain production with small-scale livestock husbandry and supplement their income through other non-farm sources (e.g., wage labour, petty trading, seasonal migration, etc). The pattern of land use and cropping patterns vary according to the ecological zone and the type of land resources available rather than according to the ethnic groups. Cropping patterns are usually based on rice in the irrigated lowlands (khet land) and maize and millet in sloping upland (pakho land). Wheat, barley, buckwheat, mustard, and potatoes assume greater importance in the higher elevations.

Rural communities throughout the country are highly integrated units held together by strong and ancient bonds of kinship, religious affiliation, intensive social interaction, agricultural activity in a contiguous territory, common dependence on in-kind economic exchanges and a common village panchayat structure.

Nevertheless, rural society is basically heterogenous and most villages are dual or plural societies. Competition over scarce common land resources, tension arising from traditional patterns of exploitation, differential power and status hierarchies, differences in culture and language, as well as long-standing

*Prepared by Mr. Shyam Khadka, APROSC Social Science Analyst, under a personal services contract with AID/Nepal.

village disputes and political rivalry are factors that often mitigate against unity in rural life.

The major groupings that constitute village society could be conveniently classified into two categories: large farmers and small farmers. The interests of these two groups do not always converge, and points of friction among them occasionally lead to bitterness, hatred and rivalry. However, in this classification all but the largest of the "large" farmers are basically living on a subsistence basis. Despite economic differences, for the vast majority of the rural population, cooperation, mutual interdependence, and sharing of mutual interests is the rule.

The target beneficiaries of the project are largely subsistence farmers. Among them the small hill farmers and farm women are the most vulnerable groups. Women in all ethnic/caste groups occupy an inferior status vis-a-vis men. Among all groups, except a few large-farm households, women conduct over 50 percent of the agricultural field work and almost 100 percent of the food processing and preparation and fuelwood and fodder collection. They are the backbone of on-farm management decisions. However, women have so far been largely excluded from participation in modern development.

Social Feasibility

The ultimate objective of the ARP project is to promote widespread adoption of improved agricultural technologies by small farmers of Nepal in order to increase sustainable agricultural productivity. As such, its success depends upon the degree to which sound local behavioral changes necessary for the adoption of improved agricultural technologies can be encouraged and supported. The local behavioral changes required for the success of the project can be broadly classified into two categories: acceleration of on-going household decision-making processes and establishment of new forms of organized behavior.

The former category encompasses the adoption of new technologies by individual households - use of improved varieties of cereal and minor crops, forage and fodder crops, new livestock breeds, animal health practices and use of agricultural inputs, such as chemical fertilizers. Behavioral changes to accommodate these new technologies are a continuing feature of rural households of Nepal. However, some technologies are accepted sooner than others.

Recent evidence indicates that farmers are using improved varieties on 84 percent of wheat land, 26 percent of rice land and 35 percent of maize land. Most of Chitwan Valley is planted with mansuli variety of improved rice. Low cost technologies, such as adoption of a new variety appear to be readily accepted, while high-cost, high-risk technologies, such as use of chemical fertilizer, are less readily accepted. The project will stress development and extension of low cost technologies, such as new varieties. Small seed plants, metal bin programs and production

programs will attempt to minimize costs to farmers.

The proposed project encourages farmers to adopt technologies that have been thoroughly tested on farmers' fields and have demonstrated suitability to the particular area and its relative advantage. The project should not run the risk of introducing an inappropriate technology and, by encouraging a type of behavioral change already underway, will be accelerating an already existing process.

Five attributes of an innovation-relative advantage, compatibility, simplicity, observability and trainability-significantly influence the farmers' decision-making process. Earlier work done by the Cropping Systems Research Program (CSRP) supported by the Integrated Cereals Project evolved technologies taking into consideration all the above attributes. This program has developed proven technologies that are acceptable within the local farming system. As a result, improved varieties of cereal crops and their accompanying cultural practices are diffusing rapidly throughout Nepal. However, the acceptability of any particular farming technology is highly variable-differing by specific technology, by agro-climatic area and by economic considerations. The adaptability and short-term productivity potential of any new technology are cautiously gauged by farmers and are compared to the economic and social costs involved.

Only after new varieties and cultural practices are proven acceptable within local farming systems are they adopted. Past experience has shown Nepali farmers willing to readily adopt appropriate new technologies. Since most new technologies to be introduced by the project will have been well-tested for different agro-climatic areas, there is no reason to expect social constraints to adoption of the new technologies. However, the project should be sensitive to the fact that technological innovations in agro-forestry, livestock and forages have not been as thoroughly tested or studied and may be accepted less readily than cereal crop technology.

Project activities which require new forms of organized behavior include farmer participation in intensive block production programs and formation of Seed Grower's Associations for managing local seed production and distribution. Experience in past cropping systems research, production and hill seed production programs indicate that the planned local level participation is possible. Furthermore, sensitive project training, dialogue and supervision can facilitate implementation of activities such as local seed production and distribution and participation in on-farm research and production programs.

Feasibility of Project Strategies and Spread Effects of the Project

The local behavioral changes sought by the project appear socially feasible but at varying degrees and with differing potentialities. The principal question of analysis becomes: to what extent do the project strategies encourage spread effects of the changes induced by the project.

While the farmers of Nepal increasingly perceive agencies of government as a source of needed inputs and support, the credibility of these government agencies is low. The social distance between government agents and poor farmers is very great. Because of scarcity and social hierarchy, government sponsored inputs and services often go first to the rural elite who have greater social access and can better afford the risks that technological innovation usually entails. Transactional costs involved in procuring the inputs and services are also lower for them than for the poor majority. However, since the rural community is a closely-knit entity, characterized by ancient bonds of kinship, common economic strategy, common dependence on in-kind economic exchange and common forms of patron-client relationship, information on new technology often spreads readily through this system. For example, new varieties often spread relatively rapidly. In contrast, where adoption of technological innovations depends on direct interaction between farm households and government agencies (such as to obtain credit or fertilizer) evidence indicates that the number of farmers who adopt innovations is considerably lower.

The ICP program has successfully demonstrated the utility of cropping system research methodology, including production program methodology based on a "production block approach". ARPP will draw upon the successful experiences of CSR/E methodology of the ICP program and adopt the following strategies to overcome production constraints and to enhance spread effects.

- a. ARPP will generate adequately tested improved technologies by conducting research on small farms. Research will be conducted in close collaboration with farmers. Technologies will be highly divisible in nature, thereby increasing applicability to even small parcels of land. The highly divisible character of such technologies coupled with the potential relative advantage accruing from them will enable farmers to adopt such technologies on a wide scale.
- b. Establishment of farming system research field activities in five regions and at 12 locations will have a demonstration effect of improved technology use for local farmers.
- c. Intensive production programs in selected districts will utilize technology proven at cropping system sites and will help farmers organize for more effective use of improved technologies. Methodology based on a "production block

approach" will be appropriately adapted for the more variable environment of the hills. Participating farmers will have increased access to inputs, credit and quality extension services and blocks will serve as highly visible demonstrations to neighboring farmers.

- d. Use of Panchayat Level Agricultural Assistants (PLAA's) and Production Leader Farmers (PLF's) of both sexes to serve as local extension agents will reduce the social distance normally found between farmers and extension workers and will increase credibility and communications. This strategy will be further reinforced by project emphasis on training at all levels. Development of infrastructure and supporting services will serve to increase the morale and productivity of government officials serving in the rural area.
- e. Project use of female extension workers (Production Officers, JT/JTA's and PLAA's) will give farm women easier access to goods and services hitherto not available to them.
- f. The project will help develop effective local organizations to manage seed production, processing, storage and retail marketing through small seed plants. It will also encourage private sector participation in seed production through the metal seed bin program. The project will use the traditional barter system for seeds to spread new varieties.
- g. The project will encourage local participation of farmers in planning and implementing pre-production verification trials, on-farm research trials, production programs and management of seed production and distribution.

Each of the above strategies is basically sound. Although all strategies may not work as anticipated, it is impossible to predict which will be most effective. The simultaneous application of the above strategies to encourage diffusion and adoption of improved technology is likely to increase project success in achieving the stated objectives. Project success will also depend on the ability of project managers to identify bottlenecks and incorporate necessary corrective actions through project monitoring systems.

Social Impact

The increased use of more productive technologies, increased availability of government services in the rural area and greater degree of local participation in government sponsored programs will have a number of social impacts on project beneficiaries. In Nepal's highly stratified society, different segments of rural society will have different access to resources and services made available through government agencies. However, as project activities expand, rural households and communities will have increased access to inputs, information and services and should be able to exert increasing influence over them. Experience has

shown that a project strategy aiming to provide all benefits exclusively to small and marginal farmers usually fails because either it is blocked by local elites or its benefits are pre-empted by them. Successful strategies for reaching small and marginal farmers depend on including wealthier farmers among the beneficiaries, while simultaneously directing sufficient resources and services to benefit the large number of small farmers.

The production block approach results in nearly 100 percent of an area's population sharing the benefits of the program; farmer-to-farmer seed exchange also ensures that benefits are widely distributed; the socio-economic component of farming systems research ensures that constraints affecting all groups of farmers are recognized in research work; and use of women extension workers allows the female half of the population a larger share in the development process.

Effectiveness of female extension workers, especially of paraprofessionals, will depend on appropriate policies for recruitment and training and on back-stopping by female or male professionals who are sensitive to the issue of reaching women in the development process.

While the ultimate success of the project depends on the quality of project implementation, analysis of project strategies in terms of social factors involved indicates that the project is soundly designed to achieve its stated objectives. As a result of project activities, food production and consumption should be qualitatively and quantitatively improved. Prospects for increased income-generating opportunities for the marginal farmers and wage laborers will also be high because of the project's emphasis on increasing sustainable agricultural productivity through use of productive technologies on a whole-farm basis. It is unlikely that the project will change present economic status disparities to a considerable degree. However, it has potential to enhance significantly the quality of life of the majority of small farmers of Nepal.

INITIAL ENVIRONMENTAL EXAMINATION (IEE)

PROJECT LOCATION : NEPAL

PROJECT TITLE : AGRICULTURAL RESEARCH AND PRODUCTION
(367-0149)

FUNDING : \$ 9,000,000

LIFE OF PROJECT : SIX YEARS: FY 1985 through FY 1991

IEE PREPARED BY : John J. Pinney 1/26/84
John J. Pinney Date
Project Development
& Implementation
Support Office
USAID/Nepal

Environmental Action Recommended: Negative determination
on all project activities.

Concurrence: Dennis J. Brennan 1/27/84
Dennis J. Brennan Date
Mission Director
USAID/Nepal

Bureau Environmental Office's Decision:

Approved

Michael Q. Phully

Disapproved _____

Date

6/19/84

Annex G

ECONOMIC ANALYSIS*

It is now widely accepted that agricultural research is an important means of raising agricultural productivity. As the shortage of arable land begins to act as a serious constraint on the growth of agricultural output, investment in agricultural research can increase the rate of advance in new technology implementation and produce a relatively high rate of social return. The homogeneity of agricultural products and the small size of the average farm in Nepal make it difficult for an individual agricultural producer to either bear research costs or capture a large individual return from gains from innovations based on research. That research, therefore, must be carried out by the public sector.

There are few market signals to aid innovators and decision-makers in the allocation of scarce resources for the research process. Benefit-cost analysis can help compensate for this deficiency, particularly at the macro level for the adaptive research of primary importance in this ARP project. Although benefit-cost analysis is more readily adaptable to an ex post examination of agricultural research, utilization of this tool with appropriate assumptions is possible in ex ante situations. The intent is not to guide individual decisions in the research selection process but to determine the economic usefulness of the overall project.

Our assumptions in developing a benefit-cost analysis include:

(1) Increased agricultural output is the most widely recognized contribution of agricultural research. Rather than focusing on the long-term goals of increased consumer welfare, environmental conservation, and others, this analysis estimates the returns from increased agricultural production for foodgrains and seeds as the main ingredient in calculating benefits. Values for improvement in the quality of agricultural products, improved nutrition, conservation of production inputs, reduced cost of farm inputs, etc., will not be estimated for this ex ante analysis.

(2) Due to the project focus on adaptive research, the crops to be developed and relied on through the research and production components will be those of existing cropping patterns and, therefore, suitable to the dietary patterns and desires of the project area population.

*Prepared by Mr. Tek B. Thapa, Economist, No Frills Development Consultancy, and Mr. Paul Morris, AID/N Economist.

(3) Numerous variables normally associated with research are nullified because they will not, ex ante, be assigned monetary values. This includes such primary factors as serendipity -- solving (or creating) problems through chance discoveries -- and some secondary effects of research, such as the fact that negative results from research may not be measureable even though the knowledge they contribute helps to eliminate future errors. Adaptive research requires well-defined objectives and a programmed process for achieving such, leaving less to chance.

(4) This analysis reflects conditions under existing agricultural policies of the GON, rather than under those policies of an idealized situation. GON pricing and marketing policies, with their urban consumer-oriented bias, result in a unique situation for agriculture in the Nepal hills. The benefit-cost ratios in Table G-1 do not approximate the higher rates of return normally associated with agricultural research for various reasons. The time span covered is very limited, basically to the period of project investment. Furthermore, economic policy plays a significant role in determining the consumer/producer distribution of benefits from research. Existing GON policies, and the low benefit-cost ratios, imply that a share of the benefits will be transferred away from project area producers for consumer utilization elsewhere. We cannot estimate the extent of this diversion of benefits. This analysis does not estimate the extent to which existing policies discourage adoption of research innovations, and/or distort price relationships.

(5) Technical change, associated with implementation of research findings from this project, will not cause any deleterious consequences. The project results will not lead to an unexpected shift in the distribution of income, the premature release of labor from agriculture, or negative effects in the environment. Though significant within the individual implementation areas of the project, project impact will remain limited in comparison to current nationwide challenges.

This analysis has resulted in an overall net-present-worth economic benefit-cost ratio of 1.20 by the seventh year of the project (12% discount rate). This fast return indicates the positive productiveness of the project. It does not identify the optimum method of performing the research specified in the project, nor does it identify the amount and level of research which should be performed. It is limited to demonstrating the economic viability of the project's pre-determined level of research. Even though the seventh year benefit-cost ratio is relatively low, when compared to the returns normally associated with agricultural research, it is favorable, and indicates the economic viability of the project. Further explanations for this low ratio are:

(1) Total project costs have been included in the calculations, whereas the benefit stream is limited to inclusion of the results from the seed and production programs.

- (2) Comprehensive reviews of agricultural research projects consistently indicate a time lag of five to eight years between research investment and impact on production. Measurement at year 7 of the project therefore biases the findings against strong positive results favoring implementation.

The implication is that the seventh year NPV benefit-cost ratio of 1.20 is the minimum to be expected from the project. Potential growth, beyond that measured here, would be sacrificed if the project is not implemented. The value of the project to the Nepal economy is also positive, after the seventh year, with the net present worth of benefits in excess of costs at \$ 2.1 million in the seventh year. Over seven years, the project benefits will return 27 percent per annum, compounded, on all investment costs.

Sensitivity analysis indicates that with a ten percent increase in project costs the benefit-cost ratio will fall to 0.98 in year seven and take until year eight to reach 1.07. If a ten percent decrease in benefits should occur the project benefit-cost ratio will not be favorable until the tenth year.

The non-measurable secondary benefits of agricultural research are normally numerous and significant. It is expected that this general condition will also apply in the ARP project. However, existing agriculture sector conditions and GON policies have influenced the project design and location, reducing opportunity for some of the normal secondary benefits to arise. For example: the conservation of inputs (chemical fertilizers are not a major concern to success); improvements in the marketing system to efficiently handle increased production (the production programs are located in food deficit areas, under the assumption that household consumption will absorb all or nearly all production increases); etc. Changes in economic policy are often required to make possible the most effective and widest diffusion of given technical innovations. These policies which affect project activities will be identified by the GON and the technical assistance team and addressed at later stages in the project. Monitoring and assessing the research process, and its outputs, will not only identify policy modifications needed but also provide indication of a basis for realizing such. As and when such changes are implemented by the GON the stream of benefits from this project should make a larger and more effective contribution to Nepal's agricultural development.

An important caveat must be remembered in connection with the favorable results of this economic analysis, and that is that they are dependent upon successful implementation of each component of the project. Agricultural research (the major component and focus of this project) will provide only the opportunity for realization of a stream of benefits. Those benefits can be nullified through non-distribution (the smallest component of the project) of the necessary knowledge to the project area population. This analysis has focused on measuring

the output of research in terms of its impact on the production process. Individual farmers will have to assimilate the new technical knowledge made available and then institute the final adaptations necessary to fit it all to their particular situations. Interactions between the farming population and the research stations constitute an important link in realization of project benefits. Therefore, although extension aspects absorb few of the project's total resources, successful implementation of that component is vital to success of the project.

Note 1: Figures in tables are in constant 1984 prices.

Note 2: The attached tables for this analysis were done based on a draft budget for the project. The final project budget incorporates minor changes in various project elements and in expenditure schedules. It also revises estimates for inflation from ten percent to eight percent per year and for contingency from five percent to 9.6 percent. These changes do not substantially effect the validity of this analysis.

Table G-1

Project Benefit-Cost Ratio, Net Present Worth and Economic Rate of Return (Million Rupees)

	<u>Incremental Costs</u>		<u>Incremental Benefits</u>		<u>Net Present Worth 1/</u>
	<u>Actual</u>	<u>Present Worth 1/</u>	<u>Actual</u>	<u>Present Worth 1/</u>	
Year 1	16.08	14.36	3.07	2.74	-11.62
Year 2	45.33	36.13	6.50	5.18	-30.95
Year 3	56.35	40.12	17.12	12.19	-27.93
Year 4	69.52	44.21	57.31	36.45	- 7.76
Year 5	79.84	45.27	132.50	75.13	29.86
Year 6	67.12	34.03	159.04 ^{2/}	80.53	46.60
Year 7	48.29	21.83	156.45 ^{2/}	70.72	48.89
Benefit Cost Ratio after:		Year 5	131.69 Rps	÷	180.09 Rps = 0.73
		Year 6	212.32 Rps	÷	214.12 Rps = .99
		Year 7	283.04 Rps	÷	235.95 Rps = 1.20
Net Present Worth after:		Year 6	-1.82 Million Rps		(-\$83,000)
		Year 7	47.07 Million Rps		(\$2,140,000)

Economic Internal Rate of Return Through Year 7: 27%

1/ Based on discount factor of 12%.

2/ Includes allowance for salvage value for construction, equipment and vehicles of 26.54 Million Rps. in Year 6 and 23.95 Million Rps. in Year 7

Table G-2

Sensitivity Analysis For Project Economic Analysis

10 Percent Increase in Costs; Benefits Unchanged

Benefit-Cost Ratio at 12 Percent after:

Year 6	212.32 Rps	÷	258.68 Rps	= 0.82
Year 7	283.04 Rps	÷	287.97 Rps	= 0.98
Year 8	336.57 Rps	÷	314.15 Rps	= 1.07

Net Present Worth at 12 Percent after:

Year 7	-4.89 Million Rps	(\$-220,000)
Year 8	22.46 Million Rps	(\$1,020,000)

Economic Internal Rate of Return Through Year 8: 17.6%

10 Percent Decrease in Benefits; Costs Unchanged

Year 7	198.49 Rps	÷	235.95 Rps	= 0.84
Year 9	267.04 Rps	÷	272.89 Rps	= 0.98
Year 10	295.89 Rps	÷	288.44 Rps	= 1.03

Net Present Worth at 12 Percent after:

Year 7	-37.47 Million Rps	(\$-1,700,000)
Year 9	- 5.85 Million Rps	(\$-270,000)
Year 10	7.45 Million Rps	(\$340,000)

Economic Internal Rate of Return Through Year 10: 13.8%

Production and Seed Programs
Project Incremental Economic Costs and Benefits^{1/}
Rice-Wheat-Fallow Cropping Pattern
(Million Rupees)

	<u>Incremental Costs</u> ^{2/}				<u>Incremental Income</u> ^{2/}		
	<u>Production Program</u>	<u>Seed Program</u>	<u>Project Components</u> ^{2/}	<u>Total</u>	<u>Production</u>	<u>Seed</u>	<u>Total</u>
Year 1	0.20	0.71	15.17	16.08	0.30	2.77	3.07
Year 2	1.30	0.71	43.32	45.33	3.73	2.77	6.50
Year 3	4.87	0.90	50.58	56.35	13.66	3.46	17.12
Year 4	19.52	0.90	49.10	69.52	53.85	3.46	57.31
Year 5	47.39	0.90	31.55	79.84	129.04	3.46	132.50
Year 6	47.39	0.90	18.83	67.12	129.04	3.46	132.50
Sub-Totals				334.24			349.00
Year 7 And Beyond	47.39	0.90		48.29	129.04	3.46	132.50

1/ With project only. See 1/ Table H-3.

2/ Excludes budget items for inflation, GON contribution of land and existing facilities and costs of long-term training which is a long term investment in human capital formation. Except for Peace Corps costs which represent a reallocation of existing local currency expenditures, foreign currency share has been converted at \$1US = 22 Rps. to reflect its scarcity value which exceeds the official rate of exchange.

Table G-4

Production and Seed Programs
Economic Costs and Benefits, Rice-Wheat-Fallow Cropping Pattern
(Million Rupees)

	<u>Total Production Program</u> ^{1/}				<u>With Project Increment</u>	
	<u>Costs</u>		<u>Benefits</u>		<u>Costs</u>	<u>Benefits</u>
	<u>W/o Project</u>	<u>With Project</u>	<u>W/o Project</u>	<u>With Project</u>		
Year 1	1.16	1.36	2.93	3.23	0.20	0.30
Year 2	4.62	5.92	11.71	15.44	1.30	3.73
Year 3	15.02	19.89	38.06	51.72	4.87	13.66
Year 4	53.15	72.67	134.67	188.52	19.52	53.85
Year 5						
And Beyond	115.54	162.93	292.77	421.81	47.39	129.04
<u>Total Seed Program</u> ^{2/}						
Year 1	1.16	1.87	2.93	5.70	0.71	2.77
Year 2	1.16	1.87	2.93	5.70	0.71	2.77
Year 3	1.44	2.34	3.66	7.12	0.90	3.46
Year 4	1.44	2.34	3.66	7.12	0.90	3.46
Year 5						
And Beyond	1.44	2.34	3.66	7.12	0.90	3.46

1/ Derived from per hectare costs and benefits of Table G-5, and project area expansion and farmer acceptance rates of Table H-7. For specific methods see footnotes of Table H-4.

2/ Derived from Table G-5, and hectareage of Table H-5.

Table G-5

Production and Seed Programs
Economic Costs and Benefits Per Hectare
(Rupees) 1/

	<u>Benefits</u>		<u>Costs</u>	
	<u>W/o Project</u>	<u>With Project</u>	<u>W/o Project</u>	<u>With Project</u>
<u>Production Program</u>				
Rice	6,660	9,990	2,578	4,185
Wheat	7,980	13,300	3,199	4,939
Net	8,863	14,166		
Annual Increment With Project		5,303 (=60% increase)		
<u>Seed Program</u>				
Rice	6,660	11,990	2,578	4,265
Wheat	7,980	16,500	3,199	5,099
Net	8,863	19,126		
Annual Increment With Project		10,263 (=116% increase)		

Table G-6

Production and Seed Programs
Economic Costs For Rice/Wheat/Maize Cultivation
(Rupees per hectare) 1/

	<u>Rice</u>		<u>Wheat</u>		<u>Maize</u>	
	<u>W/o Project</u>	<u>With Project</u>	<u>W/o Project</u>	<u>With Project</u>	<u>W/o Project</u>	<u>With Project</u>
1. Human Labor						
Hired	525	1,000	315	600	350	800
Family	875	1,000	525	600	700	800
2. Animal Labor	945	1,080	1,080	1,215	945	1,080
3. Seed ^{2/}	166	216	426	830	119	154
4. NPK Fertilizers	67	802	421	1,262	-	1,262
5. Compost	-	-	432	432	432	432
6. Pesticides	-	87	-	-	-	44
	<u>2,578</u>	<u>4,185</u>	<u>3,199</u>	<u>4,939</u>	<u>2,546</u>	<u>4,572</u>

1/ Based on economic prices of Table H-9, and input quantities of Table H-8.

2/ W/o-project seed is assumed equivalent to produce price; with-project seed is at improved seed cost.

ANNEX H

FINANCIAL ANALYSIS

Prepared by Mr. Tek Thapa, Economist, No-Frills Development Consultancy and Mr. Paul Morris AID/N Economist.

Project inputs will be directed to production, research and research-supporting activities over six fiscal years. Those inputs will cost an estimated \$15.451 million. An eight percent per year inflation factor, compounded, has been included, as well as a 9.6 percent contingency factor to lessen the impact of unknown and unplanned for, yet probable, physical and financial situations which may adversely affect normal implementation of the project. The inflation factor is above the current average rate in the United States but consistent with available data for Nepal.

Analysis utilizing the best information and current prices available in Nepal indicates that the project concept is feasible, that project cost and benefit estimates are reasonably firm for the project components and that farmers participating in the production and seed programs will receive returns sufficient to encourage their involvement. It is also estimated that incremental returns to production and seed farmers will serve as an attraction for an increasing number of farm families to adopt the procedures resulting from the research component of the project.

The probable financial benefits from the production and seed program components of the project, focused on increasing food production and farm income in three hill districts of the project (Baglung, Myagdi and Gulmi) have been quantified and analyzed. Additional project investments in technical assistance, equipment, training, improvements in administration and local management and construction will be made through the project. They are necessitated by the poverty and inaccessibility of the project area, the lack of adequately trained HMG/N staff, the shortage of useable and adequate research facilities and by the nature of adaptive research programs. Although these investments have important benefits, these benefits have not been quantified in this analysis, for reasons discussed in Section VI.E., Economic Analysis.

1. Rate of Return to Seed and Production Farmers

Analyses of projected cropping pattern, with and without project investments, have been correlated with costs and availability of expected inputs to be delivered through the project. It is assumed that farming conditions within the three production program districts will be sufficiently similar to allow use of the farm budgets in Table H-8 as representative of conditions throughout the entire area. Furthermore, we have assumed conservative adoption rates for farmer participants (Table H-7), and continuation of the most popular cropping pattern (rice-wheat-fallow) that currently exists in the project districts. A farm budget for maize cultivation has also been included, for adaptation in those situations where farmer cropping patterns may differ. The tabulations of expenditures and income for farmers participating in the seed and production programs cover the minimum period necessary--five years of project life (Tables H-4, H-5 and H-6). These indicate the profitable returns from program participation--49 percent increase in net income per hectare for production farmers and 90 percent increase for seed farmers. These rates are well in excess of the standard thirty percent increase normally required to help farmers overcome the risk aversion associated with new programs.

2. Project Net Financial Benefits, Net Present Worth and Internal Rate of Return

Incremental income for the seed and production programs' participants, and incremental expenditures for every component of the project (Table H-3), indicate a positive return on project related costs after six years. However, discounting of these project costs and benefits reveals that net present worth will become positive after seven years (Table H-1), at \$0.8 million. The financial internal rate of return for total project investments is 13.7 percent through the first seven years. This positive rate of return is significant--it is achieved even though net present worth is negative for each of the first four years--and supports a recommendation for project implementation. Positive net present worth after seven years is, however, relatively sensitive (Table H-2). A ten percent increase in project costs will require eleven years to reach a positive position of \$0.97 million. A ten percent decrease in benefits will delay achievement of a positive return position for the project until the twelfth year.

Note 1: All figures in tables are in Constant 1984 prices.

Note 2: The attached tables for this analysis were done based on a draft budget for the project. The final project budget incorporates minor changes in various project elements and in expenditure schedules. It also revises estimates for inflation from ten percent per year to eight percent and for contingency from five percent to 9.6 percent. These changes do not substantially effect the validity of this analysis.

Table H-1

Project Net Financial Benefits, Net Present Worth and
Financial Rate of Return (Million of Rupees)

	<u>Costs</u>	<u>Benefits</u>	<u>Incremental Net Benefits</u>	<u>Discount Factor (12%)</u>	<u>Present Worth</u>
Year 1	14.45	2.47	-11.98	0.893	-10.70
Year 2	38.93	5.12	-33.81	0.797	-26.99
Year 3	47.77	13.46	-34.31	0.712	-24.43
Year 4	56.92	45.12	-11.80	0.636	-7.50
Year 5	62.07	104.80	42.73	0.567	24.23
Year 6	51.24	104.80	53.56	0.507	27.15
Year 7	33.85	104.80	70.95	0.452	32.07

Net Present Worth after:

Year 5	-45.39 Million Rps.	(\$-2,670,000)
Year 6	-18.24 "	(\$-1,070,000)
Year 7	13.83 "	(\$ 810,000)

Financial Internal Rate of Return Through Year 7: 13.7%

Table H-2

Production and Seed Programs
Sensitivity Analysis For Project Financial Aspects
(Millions of Rupees)

10 Percent Increase in Costs; Benefits Unchanged

Net Present Worth at 12% Discount after:

Year 10	- 1.54 Million Rps.	(\$-90,600)
Year 11	16.42 Million Rps.	(\$965,900)

10 Percent Decrease in Benefits; Costs Unchanged

Net Present Worth at 12% Discount after:

Year 11	-4.69 Million Rps.	(\$-275,900)
Year 12	4.65 Million Rps.	(\$274,000)

Table H-3

Production and Seed Programs
Project Incremental Income and Expenditures, Rice-Wheat-Fallow
Cropping Pattern (Million Rupees)

	Incremental Expenditures ^{1/}				Incremental Income ^{1/}		
	Production Farmers	Seed Farmers	Project Components ^{2/}	Total	Production	Seed	Total
Year 1	0.15	0.53	13.77	14.45	0.23	2.24	2.47
Year 2	0.92	0.53	37.48	38.93	2.88	2.24	5.12
Year 3	3.43	0.65	43.69	47.77	10.66	2.80	13.46
Year 4	13.69	0.65	42.58	56.92	42.32	2.80	45.12
Year 5	33.20	0.65	28.22	62.07	102.00	2.80	104.80
Year 6	33.20	0.65	17.39	51.24	102.00	2.80	104.80
Sub-Total				271.38			275.77
Years 7							
And Beyond	33.20	0.65	- ^{3/}	33.85	102.00	2.80	104.80

^{1/} With project only. As project is concerned with improving productivity of existing producing areas only incremental income and expenditures are considered.

^{2/} Excludes inflation budget item, GON contribution of land and existing facilities and long-term training which is long-term investment in human capital formation. Includes contingency. Converted at exchange rate of \$1US = 17 Rps.

^{3/} Assumption of zero post-project costs isolates the project from recurrent cost issues and implies that productive conditions generated through the project are self-proving and will continue under farmer initiative without need of government support.

Table H-4

Production Program
Participating Farm Families' Income and Expenditures^{1/}
Rice-Wheat-Fallow Cropping Pattern (Million Rupees)

	Cash Operating Expenditures		Income		With Project Increment	
	W/o Project	With Project	W/o Project	With Project	Expenditures	Income
Year 1	0.49	0.64	2.40	2.63	0.15	0.23
Year 2	1.97	2.89	9.60	12.48	0.92	2.88
Year 3	6.41	9.84	31.20	41.86	3.43	10.66
Year 4	22.70	36.39	110.40	152.72	13.69	42.32
Years 5						
And Beyond	49.34	82.54	240.00	342.00	33.20	102.00

^{1/} Based on project area expansion rates and participation rates in Table H-7, operating expenses of Table H-8, yields from Table H-7, and farmgate prices from Table H-9

Table H-5

Seed Program
Participating Farm Families' Income and Expenditures^{1/}
Rice-Wheat-Fallow Cropping Pattern (Million Rupees)

	Cash Operating Expenditures		Income		With Project Increment	
	W/o Project	With Project	W/o Project	With Project	Expenditure	Income
Year 1	0.49	1.02	2.40	4.64	0.53	2.24
Year 2	0.49	1.02	2.40	4.64	0.53	2.24
Year 3	0.62	1.27	3.00	5.80	0.65	2.80
Year 4	0.62	1.27	3.00	5.80	0.65	2.80
Year 5						
And Beyond	0.62	1.27	3.00	5.80	0.65	2.80

1/ Assumes (a) Seed house supplies of seed all come from farmers additive to those participating in the production program; (b) All seed comes from farmers utilizing recommended practices; and (c) AIC purchases maximum of 2 MT of seed from one hectare and seed house supplies require 200 ha. in Year 1-2 and 250 ha. in Years 3-5. Income and expenditures per hectare derived from Table H-6.

Table H-5

Production and Seed Programs
Individual Farmer's Annual Income and Expenditures
(Rupees/hectare)

Crop.	Production Farmers				Seed Farmers			
	Income ^{1/}		Expenses ^{2/}		Income ^{1/}		Expenses ^{2/}	
	F.P.	R.P. ^{3/}	F.P.	R.P.	F.P.	R.P.	F.P.	R.P.
Rice	6,000	9,000	958	2,051	6,000 ^{4/}	10,800 ^{5/}	958	2,151 ^{6/}
Wheat	6,000	10,000	1,509	2,746	6,000 ^{4/}	12,400 ^{5/}	1,509	2,946 ^{6/}
Net Annual Increment with Project	9,533	14,203			9,533	18,103		
		4,670	(=49% increase)			8,570	(=90% increased)	

1/ Based on yield and acceptance rates from Table H-7 for Year 2 and above. Farmgate prices for production farmers are from Table H-9). Seed farmers receive a premium of 30 percent (see 3/ Table H-9). Assumed cropping intensity of 2.0 for all areas, both under F.P. and R.P.

2/ Does not include allowance for tenant payments to landowner. Tenancy is not widespread among hill farm families.

3/ Based on assumption that when a farmer commences participation in recommended practices he commits 100% of his land immediately.
F.P. = farmer practices (i.e. without project);
R.P. = recommended practices (i.e. with project).

4/ Assume no premium payment to farmers not using recommended practices (R.P.).

5/ AIC will purchase seeds up to a maximum of 2 MT/ha. from a farmer. Production in excess of 2 MT/ha. is valued at edible grain prices.

6/ Seed production requires roguing, requiring: for rice, twice at 5 persondays each (100 Rps.); for wheat, twice at 10 persondays each (200 Rps.).

Table H-7

Production Program
Participation Rates For Farmers and Project Area
Rice-Wheat-Fallow Cropping Pattern

	<u>Area (ha.)</u> ^{1/}		<u>Yield (MT/ha.)</u> ^{4/}		<u>Production (MT)</u>	
	<u>F.P.</u> ^{2/}	<u>R.P.</u> ^{3/}	<u>F.P.</u>	<u>R.P.</u>	<u>F.P.</u>	<u>R.P.</u>
Year 1						
Rice	180	20	2.0	2.5	360	50
Wheat	100	100	1.5	2.0	150	200
Year 2						
Rice	640	160	2.0	3.0	1,280	480
Wheat	200	600	1.5	2.5	300	1,500
Year 3						
Rice	1,820	780	2.0	3.0	3,640	2,340
Wheat	520	2,080	1.5	2.5	780	5,200
Year 4						
Rice	5,520	3,680	2.0	3.0	11,040	11,040
Wheat	1,380	7,820	1.5	2.5	2,070	19,550
Years 5-8						
Rice	10,000	10,000	2.0	3.0	20,000	30,000
Wheat	2,000	18,000	1.5	2.5	3,000	45,000

1/ Assumes project area expansion as follows: Year 1 = 200 ha; Year 2 = 800 ha; Year 3 = 2,600 ha; Year 4 = 9,200 ha; and Years 5 and beyond = 20,000 ha.

2/ F.P. = farmer practices; R.P. = recommended practices

3/ Assumes farmer acceptance rates as follows: Year 1 - rice at 10%, wheat at 50%; Year 2 - rice at 20%, wheat at 75%; Year 3 - rice at 30%, wheat at 80%; Year 4 - rice at 40%, wheat at 85% and Years 5 and beyond - rice at 50%, wheat at 90%.

4/ Lower yields in Year 1 allow for delay in commencing use of research findings and recommended practices.

Table H-8

Production and Seed Programs Farmers' Operating Expenditures For Rice-Wheat Cultivation and
Maize Cultivation
(Inputs Per Hectare)

Item	Rice-Wheat Cropping Pattern				Maize Cropping Pattern	
	Rice		Wheat		W/o Project	With Project
	W/o Project	With Project	W/o Project	With Project		
1. Human Labor (Persondays)						
Hired	75	125	45	75	50	100
Family	125	125	75	75	100	100
2. Animal Labor (Days)	35	40	40	45	35	40
3. Seed Rate (Kg)	50	50	80	120	25	25
4. NPK Fertilizer (Kg)	5/0/0	60/0/0	20/10/0	60/30/0	0/0/0	60/30/0
5. Compost (MT)	-	-	6	6	6	6

Expenditures (Rupees Per Hectare)

1. Human Labor						
Hired	750	1250	450	750	500	1000
Family	-	-	-	-	-	-
2. Animal Labor ^{1/}	-	-	-	-	-	-
3. Seed ^{2/}	150	225	320	780	94	150
4. NPK Fertilizer	38	456	239	716	-	716
5. Compost	-	-	480	480	480	480
6. Other Inputs	-	100	-	-	-	50
7. Land Tax	20	20	20	20	20	20
Sub-Total	958	2051	1509	2746	1094	2416
8. Interest on Sub-Total (6%)	56	122	89	164	64	144
Total	1014	2173	1598	2910	1158	2560

^{1/} Assume all user-owned.

^{2/} W/o project seed is assumed equivalent to product price; with project seed is at improved seed cost.

Table H-9

Prices of Inputs and Outputs (Rupees)

<u>Item</u>	<u>Financial Price</u>	<u>Economic Price</u>
Improved Seed		
Paddy	4.50/kg ^{1/}	4.33/kg ^{3/}
Wheat	6.50/kg ^{2/}	6.92/kg ^{3/}
Maize	5.99/kg	6.18/kg ^{3/}
Fertilizer		
Urea (46% N)	3.50/kg	6.15/kg
Complex (20:20:0)	3.25/kg	5.74/kg
Labor		
Human	10/day	8/day (With Project) 7/day (W/o Project)
Bullock Pair With Driver	30/day	27/day
Compost	80/MT	72/MT ^{4/}
Produce		
Paddy	3.00/kg ^{5/}	3.33/kg
Wheat	4.00/kg ^{5/}	5.32/kg
Maize	3.75/kg ^{5/}	4.75/kg

1/ Average of AIC prices for coarse (Rps. 3.26-4.37) and for medium fine (e.g. Mansuli) (Rps. 3.42-6.26).

2/ Based on price range of Rps. 5.00-6.82/kg.

3/ Assumed to be 30% above economic produce price, to account for quality, storage, etc.

4/ 0.90 percent of financial price.

5/ For edible grain purposes. Premium to seed producers is assumed at 30% above grain prices, i.e., paddy = 3.90/kg., Wheat = 5.20/kg., and maize = 4.88/kg.

Annex I

Project Training Plan

The project technical assistance contractor will implement the project-funded training plan. Degree training will help the DOA and DOL to develop a socio-economic research capability and to increase capability to conduct research on agro-forestry, livestock and hill crops.

Overseas short courses, study tours, and participation in regional seminars and workshops will help researchers to keep abreast of current developments in their fields, obtain assistance for specific technical problems and develop linkages with international centers. The project will also provide short-term training overseas in research management and administration for the MOA and in library science for the Khumaltar library staff.

The project will support a large-scale, in-country training program. Past projects (SPIS, ICP, Food Grain Technology and others) have trained a large cadre of technical personnel. The in-country training component of this project will (a) help to keep these technical staff current in their work and disciplines, (b) utilize their training and skills to train lower level technicians, extension workers and farmers, and (c) upgrade the skills of other support personnel in order to increase productivity of researchers, extension workers, and seed technicians in the agricultural sector.

The India Training Program, now scheduled to end in FY 1986, may be extended. Although there is no assurance of the project's extension or of the availability of seats for agricultural courses under the project, it could provide valuable reinforcement and complementarity to training funded by this project. For that reason this training plan includes proposals for training under the India Training Program. If that project is not extended, contingency funds may be used to fund priority training programs in India.

Project-funded training will conform to normal USAID/Nepal regulations and policies. Participants for international training programs should complete a minimum period of work (six months for short-term trainees; one year for long-term participants) in their assigned, project-related position prior to training and will be required to sign a bond that, upon completion of training, they will return to their assigned position for a period at least equal to that of their training.

The project implementors (GON and the technical assistance contractor) will attempt to obtain the maximum possible participation of women in the training program. Because of the lack of large numbers of women in GON agencies, there may be difficulties in identifying qualified women candidates for higher level training. However, at least ten percent of degree fellow-

ships; ten percent of overseas short-term training opportunities; ten percent of in-country, officer-level and JT/JTA level trainees and thirty percent of all farmer trainees will be women. If GON female employees are not available for such training opportunities, Nepali female technical staff of the technical assistance contractor with required work experience will be considered for this training.

The technical assistance contractor will prepare non-funded PIO/Ps for clearance with AID and the GON for all overseas participant trainees and invitational travel programs.

A. Degree Programs

The project will fund thirteen advanced degree programs in the following fields: rural sociology (2), agricultural economics (4), resource economics (1), agronomy - with emphasis on hill crops (2), agro-forestry (2), and forage production and livestock production for hill areas (2).

Most programs will be at the Masters level, although Ph.D. programs may be considered. Furthermore, because of cost considerations and the fact that, for much of the proposed training, university programs within the region are more relevant than U.S. programs, most of the training will be at universities within the Asia region.

The GON will nominate candidates for the participant training positions and forward nominations to the home office of the technical assistance contractor for review of qualifications, final approval, and placement in a university. Placement will match the training needs for the participant's work assignment with the strengths and programs of the university to which the participant is sent.

The proposed schedule for start of degree training programs is as follows:

<u>FY 1986</u>	<u>Number</u>
M.A Rural Sociology (DOA)	1
M.A. Agricultural Economics (DOA)	1
M.Sc. Agro-Forestry /Forest Genetics (DOA)	1
M.Sc. Forage Production for Hills (DOL)	1
 <u>FY 1987</u>	
M.A. Resource Economics (DOA)	1
M.A. Agricultural Economics (DOA)	1
M.A. Rural Sociology (DOL)	1
M.A. Agricultural Economics (DOA)	1
M.Sc. Hill Crop Agronomy (DOA)	1
M.Sc. Hill Livestock Production Systems (DOL)	1

FY 1988

M.A. Agricultural Economics (DOA)	1
M.Sc. Agro-Forestry (DOA)	1
M.Sc. Hill Crop Agronomy (DOA)	1

Total	13

The budget for the degree training programs is listed below. Budget figures are based on training costs in the Philippines with a separate contingency line item for possible training in the U.S.

<u>Training Programs</u>	<u>FY85</u>	<u>86</u>	<u>87</u>	<u>88</u>	<u>89</u>	<u>90</u>	<u>Total</u>
M.Sc./M.A. (4)	-	40	40	20	-	-	100
M.Sc./M.A. (6)	-	-	60	60	30	-	150
M.Sc./M.A. (3)	-	-	-	30	30	15	75
Contingency for U.S. Training (3)	-	15	30	30	15	-	90
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Total	-	55	130	140	75	15	415

B. Short Courses, Workshops and Study Tours

The project will fund a total of 56 programs for participation of GON officials in overseas short course, workshops, study tours and seminars. All such programs will be for training related to activities supported by the project and for participants working on implementation of project activities.

The project will provide three training courses related to research management and administration to higher officials of MOA working with the National Research Coordination Committee and two in library science for Khumaltar library staff. The project will also fund programs for: five socio-economic staff (4-DOA; 1-DOL) to attend professional workshops or short courses; 20 Farming Systems Research/Extension Division staff or research collaborators to attend workshops or monitoring tours on farming systems research; 10 farming systems site coordinators to attend training programs or monitoring tours on farming systems research and extension; and 16 programs (4-DOL; 12-DOA) for research and extension personnel to attend short courses and workshops at IARCs on topics relevant to their current work programs.

The budget for project funded short courses and study tours is as follows (\$ 000)

	<u>FY85</u>	<u>86</u>	<u>87</u>	<u>88</u>	<u>89</u>	<u>90</u>	<u>Total</u>
Research Management Course (3)	-	5	5	5	-	-	15
Library Science Course (2)	-	-	-	10	-	-	10
Farming Systems Research/ Extension Program (30)	10	15	30	30	45	20	150
Socio-Economic Research Course/Workshop (5)	-	-	5	5	10	5	25
IARC Course/Workshop (16)	-	40	40	40	40	-	160
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Total	10	60	80	90	95	25	360

C. In-Country Training Programs

In-country training will be an important input to development of GON programs in each of the three project components - research, extension, and seed production. The farmer training programs related to hill production programs will be funded through the GON budget as part of the GON operating costs. The technical assistance contractor will be responsible to organize other in-country training programs for GON staff and farmers participating in seed production programs.

For most in-country training courses, the technical assistance contractor will obtain use of GON training facilities (IAAS campuses, DOA training centers or research farms, or others) and will provide training materials, instructors, and living allowance for trainees. Instructors will include special project consultants, long-term project advisors and Nepali technical staff of the contractor, but will consist mainly of GON officers working in relevant programs. The contractor will pay GON trainers training honoraria as authorized by the GON (approximately Rs. 100 /session).

In training courses for GON accountants and middle level managers, most of whom will be from the DOA and DOL, an attempt will be made to include those persons involved in implementation of this project. Nominations of other staff not directly involved with the project will also be accepted. Training may be through placement in on-going short courses in Nepal (10 persons at \$500/person) or through project-organized workshops which

will last about one week and include some courses on accounting or management and other sessions on administrative matters directly related to implementation of the project (70 persons at \$140/person).

The technical assistance contractor will also arrange training for about 200 GON support personnel, including secretaries, typists, mechanics, lab technicians, computer operators, maintenance personnel and others. Most of these personnel will be trained by providing time from work and paying costs of training courses available in Kathmandu. For others, such as laboratory technicians and mechanics, special courses will be arranged and the project will pay costs of putting on the course and maintenance allowances for the trainees. IAAS, Tribhuvan University, or technical schools may be sites for some of this training. Average cost per person per training program will be about \$125.

The research station management advisor will organize training programs for officer-level and JT level GON research personnel. Courses for officer-level staff will include experimental design, statistical analysis, research methodology, and principles of research station administration. Courses for JT-level personnel will emphasize research trial methodology and how to resolve practical problems in establishing and carrying out trials. Other long-term advisors, GON personnel, and perhaps other consultants will assist with officer-level training and GON research staff will assist the research station management advisor with JT-level training.

Farming systems research related training will serve to acquaint other GON research program staff with the work of the Farming Systems Research/Extension Division and to help plan and evaluate research and extension programs. The Farming Systems Research /Extension Division will present a series of approximately ten workshops and courses, 20 participants each, for other GON research staff to evaluate farming systems research programs and plan trials incorporating research activities from various disciplines (i.e. agro-forestry, entomology, pathology, forages, pulse varietal trials, etc.) into the on-going farming systems research program.

In another series of training courses and workshops, farming systems site research staff (officer level and/or JT level) will meet periodically (approximately three times per year) with Farming Systems Research/Extension Division staff and other researchers to evaluate research activities and develop detailed plans for implementing research activities.

In the production program component of the project, farmer and extension worker training will be funded through the GON budget. The technical assistance contractor will, however, arrange approximately ten seminars and workshops on hill production program methodology. These will be used to exchange information on various extension programs in the hills, evaluate

experience on use of female extension agents, prepare to implement pilot programs, and train staff on preparation and use of extension materials.

The seed production component will focus on training personnel producing foundation seed and will continue a strong program of in-country training for farmers and small seed plant operators. The seed production specialist will organize training courses for DOA research staff producing breeder seed and for DOA agricultural farm personnel assigned to manage production of foundation seed. Other courses will be given for seed plant operators and managers and will stress plant maintenance and repair. The seed production specialist will arrange courses and will be assisted by other advisors and GON staff who will conduct most of the training sessions.

In support of the project hill seed production activity, the technical assistance contractor will organize combination training programs/planning sessions two or three times a year for the twenty-five seed plant managers and five to ten Peace Corps volunteers working with small seed plants. These sessions will include technical training, budgeting and workplan development and "trouble-shooting". They are important to the program in monitoring field problems at the scattered sites and devising new procedures for marketing, advertising, quality control and managing seed plants.

The project will also fund farmer training for seed producers at each seed plant. Since there are frequent changes of cooperating farmers from year to year, there will be three one-day training-cum-organizational sessions each year for approximately 35 farmers at each of the 25 sites. The project will fund training allowances, cost of training materials and travel costs for AIC and DOA trainers.

In the 22 districts in which the project will establish the metal bin satellite seed producers' network, the project will fund two two-day training sessions for participating farmers. There will be approximately 200 participating farmers in each of the 22 districts.

Estimated costs for in-country training programs are as follows (\$000):

<u>Training Program</u>	<u>FY65</u>	<u>66</u>	<u>67</u>	<u>68</u>	<u>69</u>	<u>70</u>	<u>Total</u>
Accountants/Managers	-	5	5	-	5	-	15
Support Personnel	-	5	5	10	5	-	25
Research Station Management and Research Methodology	-	10	10	10	10	-	40
FSR Training & Workshops	10	10	20	30	40	20	130
Hill Production Programs	-	10	10	10	10	10	50

Foundation Seed Program	-	10	10	-	-	-	20	
Seed Plant Managers	-	10	10	10	-	-	30	
Farmer Seed Producers	-	30	30	30	-	-	90	
Total		10	90	100	100	70	30	400

D. India Training Program

Although there is uncertainty as to whether or not this program will be extended beyond FY 1986, it could provide valuable complementary training to that funded directly by this project. Consequently, a plan is proposed for advanced degree level training under the India Training Program. If that project is not extended, contingency funds from this project may be used to fund some of this training in India.

This proposed training program includes 23 advanced degree and 10 short-term training programs for a total of approximately 64 person years of training. The estimated total cost is \$ 207,000.

FY 1985

	<u>Agency</u>	<u>Number</u>
M.Sc. Agronomy (finger millet)	DOA	1
M.Sc. Extension	DOA	1
M.Sc. Agricultural Engineering (tools)	DOA	1
M.A. Planning	DOA	1
Ph.D. Administrative Management	DOA	1
M.Sc. Pasture & Fodder Production	DOL	1
M.A Planning	DOL	1

FY 1986

M.Sc. Agro-Forestry	DOA	1
M.Sc. Agronomy (hill crop)	DOA	1
M.Sc. Livestock Nutrition/Fodder Tree	DOL	1
Ph.D. Agricultural Economics	DFAMS	1
Short Courses Executive Management	DOA/DOL	5
Ph.D. Soils/Biological Nitrogen Fixation	DOA	1
M.Sc. Agronomy (pulses)	DOA	1

FY 1987

M.A. Rural Sociology	DOA	1
M.A. Agricultural Economics	DOL/MOA	2
M.A. Entomology (Biological Control)	DOA	1
M.A. Horticulture (Coffee/Agro-Forestry)	DOA	1
Short Course Executive Management	MOA/DOA/DOL	5
Ph.D. Plant Breeding (Maize)	DOA	1

FY 1988

M.Sc. Agronomy (pulses)	DOA	1
M.Sc. Agronomy (hill crops)	DOA	1
M.Sc. Entomology (Biological Control)	DOA	1
Ph.D. Livestock Nutrition/Fodder Prod.	DOL	1
M.A. Extension (Livestock)	DOL	1

FY 1989

M.Sc. Agro-Forestry	DOA	1
M.Sc. Livestock Management (hills)	DOL	1
M.A. Agricultural Economics	DOA	1
Ph.D. Agronomy (hill crop)	DOA	1
M.Sc. Agronomy (pulses/breeding)	AIC	1

Annex J

Technical Assistance Plan

The project technical assistance contractor will provide approximately 25 person years of long-term technical assistance, 30 person months of short-term consultancy services and 25 person years of local services to assist with implementation of project activities. The contractor will also arrange for project training as described in the Project Training Plan (Annex I), will procure equipment and materials, and contract for construction as described in the Project Procurement Plan (Annex K).

Technical assistance personnel will work with GOB staff on the development, planning and implementation of GOB programs receiving support under this project. Advisors will live in Kathmandu but will be expected to travel extensively, especially in the hill areas which are the focus of project activities. In addition to advising GOB project implementors, technical assistance personnel will cooperate in presenting an extensive agenda of in-country training programs; assist in designing research trials and evaluating research results; help to plan and implement hill production programs and seed production programs; and develop baseline data and follow-up information and data to monitor project impact. Technical assistance personnel will emphasize a practical, hands-on approach over theory and basic research. Low-cost, appropriate technology will be used to the extent possible.

The technical assistance contractor, with guidance from the GOB, will procure necessary project equipment and materials and contract local firms for design and construction of facilities funded by the project. The contractor will place participants in project funded training programs and provide technical backstopping for monitoring, placement and progress of participants sent to India under the India Training Program.

In the development of all project supported programs, and the implementation of the various project activities, the contractor should ensure that technologies, institutions, equipment, buildings and training conform to Nepalese conditions, constraints and potentials. Long-term technical assistance personnel will be encouraged to learn Nepali. Project technical reports should be produced/translated into Nepali.

Project activities will be directed toward the broad goals of institution building, research and system development and training. Under the broad goal of training, project activities will involve junior level scientists and technicians in rigorous research, production and seed production activities, thus giving them experience and the confidence of having worked with well qualified counterparts on successful programs adapted to the realities of Nepal.

The contractors, advisors and consultants will work with GON counterparts in all project activities. Due to the need to augment GON manpower in new programs and to monitor dispersed field locations and the broad range of activities, the contractor will employ approximately five Nepalese technical staff to assist with project implementation. This will include agricultural and socio-economic personnel and engineering staff necessary to implement the construction program. The number of technical staff may be increased on a temporary basis as necessary. The contractors' local staff compensation plan will conform, as appropriate, to those of USAID/Nepal and the GON.

In addition to the major technical assistance contractor, the project will fund in-depth external evaluations in FY 1988 and FY 1990 and a project audit in FY 1988 and will involve participation of Peace Corps volunteers as described in section J below.

The technical assistance contractor will select one long-term advisor to serve as local team leader. This person will be responsible for coordinating support and activities for other project personnel. Terms of reference for technical assistance personnel will include assisting with presentation of in-country training programs and coordinating overseas training. Other duties of project personnel are briefly summarized below:

A. Minor Crops Agronomist (36 mon. - for budgeting assumed as team leader and total 63 mon. assignment)

The Minor Crops Agronomist will work with counterparts from the DOA, especially with the Pulse Development Program and persons working on hill crop development (barley, buckwheat, millets, amaranth) and root and tuber crops. He/She will:

1. help researchers obtain germplasm and design and carry out varietal trials on minor crops;
2. coordinate training programs to support work on minor crops, including thesis research for degree participants;
3. help incorporate technology for minor crops into production programs; and
4. advise on development of the Pulse Development Program, programs for development of hill crops, and research station facilities for work on pulses and hill crops.

B. Research Station Management Specialist (30 months)

The Research Station Management Specialist should be a senior scientist with administrative experience and expertise in the field of soils and plant nutrition. He/She will work with soil scientists on programs for biological supply of soil nutrients. He/She will also work with Deputy Director Generals of the DOA and DOL and with the managers of major GON research

farms and stations on station management. He/She will travel extensively to visit GON farms and stations. Responsibilities will include:

1. helping GON research farm managers prepare long-range farm development plans and farm operations plans (approximately 17 stations);
2. planning and evaluating research on soil fertility, biological supply of soil nutrients, and improved methods of composting;
3. organizing training courses in research methodology and research station management;
4. advising on on-going research and station operations; and
5. procuring equipment and contracting for project-funded construction, as needed by the stations.

C. Socio-Economist (36 mon.)

The Socio-Economist will assist the DOA with establishment of an Extension and Socio-Economic Research Division, the DFAMS and the DOL with development of socio-economic research capabilities. He/She will work with the Chief of the Extension and Socio-Economic Research Division and an appropriate person in the DOL and DFAMS as counterparts. He/She will:

1. assist the Extension and Socio-Economic Research Division with research design, implementation and analysis;
2. assist other divisions, particularly the Farming Systems Research/Extension Division, with the planning and analysis of research;
3. plan and monitor baseline surveys and data collection in project areas (seed production, production programs, and farming systems sites);
4. work with personnel of the DFAMS and advise on their research activities, especially as related to pricing and marketing;
5. assist with in-country training programs, especially those related to farming systems work, and with plans and placement of trainees in overseas courses; and
6. assist with installation and use of mini-computers in the DOA and DOL.

D. Farming Systems Research Agronomist (36 mon.)

The Farming Systems Research Agronomist will work with the Chief of the Farming Systems Research/Extension Division and with other technicians in that division. He/She will travel extensively to visit the farming systems sites and work with site coordinators. He/She will:

1. help design, monitor and analyze results of farming systems agronomic trials;
2. organize in-country training, courses related to farming systems work;
3. train farming systems site coordinators in research methodology; and
4. arrange overseas training in farming systems.

E. Agro-Forestry Research Specialist (36 mon.)

The Agro-Forestry Research Specialist will work with researchers in the Horticulture Division and the Forestry Research and Information Center. He/She will assist with the development of an agro-forestry research program and capability and give special attention to the establishment of linkages between forestry and agricultural research and production programs. Much of the work will be with the Farming System Research/Extension Division at farming system research sites. He/She will:

1. assist with planning, design, monitoring and analysis of research activities;
2. help to organize and present in-country training programs and arrange overseas training in agro-forestry;
3. direct research attention towards: revegetation of denuded land, increasing on-farm production of green manure, forage and fodder trees and shrubs, species/provenance trials of fast-growing multi-purpose trees, and evaluating potential of various fruit, coffee and nut trees in the hills; and
4. help evaluate livestock production potential of various fodder systems and technologies.

F. Livestock Research Specialist (36 mon.)

The Livestock Research Specialist will work with counterparts in the DOL to develop research strategies and plans for livestock research. Most work will probably be with nutrition, forage production and management systems. The Livestock Research Specialist will:

1. assist the DOL plan, design, monitor and analyze livestock research activities;
2. collaborate closely with the Farming Systems Research Division on the design and implementation of livestock research;
3. help organize and present in-country training programs and arrange overseas training courses;
4. locate sources of supply of forage and fodder seed and planting stock and of improved breeds of livestock; and
5. plan for the development of farm and station research facilities for the DOL.

G. Seed Production Specialist (30 mon.)

The Seed Production Specialist will work with counterparts in AIC and the DOA on development of the national seed program. It is expected that the seed production Specialist will also serve as Deputy Team Leader. He/She will:

1. provide technical assistance to the National Seed Development Program on development of Nepal's seed industry;
2. assist the GON to develop and implement plans to meet Nepal's needs for breeder and foundation seed;
3. organize in-country training programs on seed technology;
4. arrange support and provide technical assistance to the hill seed program; and
5. plan procurement of equipment and materials and construction of facilities for the seed program.

H. Production Agronomist (32 mon.)

The Production Agronomist will be an extension specialist with broad experience in organizing extension programs. He/She will work with counterparts in the DOA and DOL to plan and implement production programs in the hills. He/She will:

1. assist the GON develop and implement a strategy for production programs in defined hill districts;
2. work with the socio-economist to complete baseline surveys and follow-up in production program areas;
3. help the GON develop extension materials for JT/JTAs and farmers;
4. assist with in-country training courses and with preparation of workshops and seminars on hill extension systems; and

5. work with the Farming Systems Research/Extension Division and other DOA and DOL researchers to incorporate relevant technology into production programs in the hills and to focus research on production problems.

Team Leader

The Team Leader will be selected from among the long term Technical Assistant team on the basis of demonstrated successful experience as leader of a multidisciplinary research team in a less developed country.

I. Short-Term Consultants

In the first year of the project the contractor will provide a Research Planning Specialist (7 mon.) for two months to review the status of agricultural research programs in Nepal. The consultant will review completed and on-going research programs and the proposed arrangements to improve the research planning and management system. He/She will make recommendations on administrative arrangements and research priorities to the National Research Coordination Committee. The Research Planning Specialist will then make return visits for one month, over the next five years. During these visits he/she will advise the National Research Coordination Committee on the progress of research programs and priorities for funding future research. These visits should be timed to conform to the GOB budget cycle and preparation of annual programs. The consultant should be a senior scientist with wide research administration experience.

Also in the first year of the project, the contractor will provide the services of two Administrative Management Specialists (6 mon.) for three months each. These consultants will work with a local consultant to review the administrative structures and procedures of the DOA and DOL. They will recommend options to improve administrative efficiency, including changes of policies and regulations and will identify specific training and equipment needs of the departments. One specialist should have familiarity with financial management and one with personnel management in research organizations.

The contractor will arrange with the International Agricultural Research Centers (IARCs), including the International Rice Research Institute (IRRI), the International Center for the Improvement of Corn and Wheat (CIMMYT), the International Livestock Center for Africa (ILCA), and the International Center for Research in the Semi-Arid Tropics (ICRISAT) to increase the frequency of visits of staff from these centers to relevant research programs in Nepal. The project will fund approximately twenty visits of two weeks each for staff from centers or their regional programs to Nepal. In addition to other visits funded by the IARCs, this should result in visits two to three times a year to the rice, wheat, maize, pulse and oilseed, and livestock research programs. Visits should be scheduled to coincide with Summer and Winter Crops Workshop meetings.

Other Consultants (7 person month) will be provided by the contractor to address special problems that may be identified during project implementation or to fill special needs. These may include such technical fields as: Tree Nursery Specialist (1 mon.), Forage Seed Production Specialist (1 mon.), Maize Breeder (1 mon.), Leguminous Tree Specialist (1 mon.), Root and Tuber Crop Specialist (1 mon.), Biological Nitrogen Fixation Specialist (1 mon.), and Extension Materials Specialist (1 mon.).

J. Peace Corps Volunteers

The project will involve approximately 118 volunteer years of Peace Corps assistance. The volunteers will be assigned only when GON counterparts are available and will work on women's extension programs in the hills (40 person-years), research and survey work (16 person-years), appropriate technology (20 person-years), specific research projects (10 person-years), and hill seed production programs (32 person-years).

In the women's extension program, female volunteers with B.Sc. degrees in agriculture will work in districts with JTA and AA in-service training and farmer training. Other female volunteers with agricultural experience and skill-training will work as JTAs supervising and assisting AAs (especially women AAs). As trained Nepali women become available, they will work as colleagues and counterparts and eventually replace the Peace Corps volunteers.

Socio-economists (B.Sc.level) will work in each of the zones in conjunction with a Nepali agronomist. They will supervise and monitor PPVTs, conduct surveys and work on baseline and follow-up surveys of program areas. As trained Nepalis become available, the volunteers will be replaced.

Volunteers experienced in appropriate agricultural technology will work in simple research and design, demonstration, training, and extension activities at hill sites. The technology will include: home seed and grain storage, composting, green manuring, food preservation and storage, composting latrines, small scale irrigation techniques, and farm implements. Volunteers will train counterparts.

Other volunteers with advanced training will do research on topics identified by the technical assistance contractor and the Research Coordination Committee. Peace Corps will support these researchers as other volunteers and the project will fund expenses of their research. These may frequently be candidates for M.Sc. or Ph.D. degrees.

Volunteers will continue to work with managers of small seed plants to improve administration of these operations. They will work especially with private sector - managed plants and with establishment of metal bin programs, seed marketing and varietal introductions

K. Evaluation

An external evaluation in FY 1988 will assess the progress toward project objectives, validity of the project design, continuing need for assistance to research and hill extension and seed supply systems and scope for expanding hill production program activities. A second external evaluation in FY 1990 will address similar concerns and focus on the need for continued assistance to GON programs. USAID/Nepal will contract for evaluation services on AID-direct contracts. Specialist requirements for each evaluation will be one expatriate and one Nepalese research specialist and one expatriate extension specialist.

USAID/Nepal will contract for an external audit of project activities in FY 1987. Approximately two months of audit services will be required for this activity.

L. Estimated Budget

An estimated budget for technical assistance is as follows:

Summary of Technical Assistance

(\$ 000)

	<u>FY 85</u>	<u>86</u>	<u>87</u>	<u>88</u>	<u>89</u>	<u>90</u>
<u>Long-Term Advisors:</u>						
Minor Crops						
Agronomist (63 mon.) *	40	120	120	120	120	120
Research Station Management Specialist (30 mon.)	-	120	120	70	-	-
Socio-Economist (36 mon.)	-	70	120	120	70	-
Farming Systems Agronomist (36 mon.)	40	120	120	100	-	-
Agro-Forestry Research Specialist (36 mon.)	-	120	120	120	-	-
Livestock Research Specialist (36 mon.)	-	-	120	120	120	-
Seed Production Specialist (30 mon.)	-	120	120	70	-	-
Production Agronomist (32 mon.)	40	120	120	70	-	-

Short-Term Consultants:

Research Planning Specialist (7 mon.)	20	20	20	20	20	20
Administrative Management Specialist (6 mon.)	60	-	-	-	-	-
IARC Consultants (10 mon.)	10	20	20	20	20	10
Other Consultants (7 mon.)	-	20	20	-	30	-
Evaluation (6 mon.)	-	-	-	30	-	30
Audit (2 mon.)	-	-	-	30	-	-

Local Consultants:

Surveys and Monitoring Various Specialities (300 mon.)	20	-	10	-	-	10
	-	20	20	20	20	20
Total:	230	870	1050	910	400	210

Grand Total: 3,670
=====

* Assumed team leader.

Note: Costs of local support, vehicles and equipment built into cost estimates.

ANNEX K

Procurement Plan - Commodities and Construction

A. Commodity Procurement Plan.

The following equipment and materials will be procured for the project by the technical assistance contractor. Equipment and materials are to be provided to appropriate discipline divisions, research farms and stations, regional seed laboratories, AIC seed testing labs and mill production programs. Prior to procurement this plan will be reviewed by the technical assistance contractor, the GON and AID.

<u>Activity</u>	<u>FY</u>	<u>ITEMS</u>	<u>Estimated Cost US \$ Including Transportation Cost of 25-35</u>
National Research Program Activities	84-87	2 vehicles:4 wheel drive, diesel, jeep-type	24,000
		4 pick-up truck, 4 wheel drive, diesel	48,000
		Furniture/Office Equipment	83,000
		9 Motorcycles - 175cc, trail model	27,000
		Farm Equipment (Hill station)	10,000
		Farm Equipment (Pulse Program)	15,000
		2 Spectrophotometer	10,000
		3 Microscope	3,000
		Glass ware	2,000
		Veterinary Supplies & Equipment	15,000
		3 Radio Telephone	4,000
		3 Micro Computer & printer software	24,000
			Sub total
Central Library	87-88	Books	25,500
		Journal Subscription	20,000
		Furniture/Office Equipment	37,000
		1 Micro film reader	4,000
		1 Micro-fiche reader	5,000
		2 Slide projector	3,000
		1 Xerox Machine	8,000

		2 Mimeo graph	10,000
		1 Micro computer/word processor & printer supplies	8,000
		Sub total	120,000
Hill Production Program	85-86	One pick-up truck, 4 wheel-drive, diesel Audio-visual Equipment	12,000 10,000
		Agricultural Implements	12,000
		Portable Moisture Tester(3)	1,500
		PH meter (3)	1,500
		Office Equipment	5,000
		Furniture for Temporary Offices	4,000
		Imported seed, planting stock	4,000
		Sub total	50,000
National Seed Program	85-86	One pick-up truck, 4 wheel drive, diesel	12,000
		Office furniture and equipment	30,000
		3 Germinators, flourscent light attached	4,000
		5 Moisture tester, Dole 4000	3,000
		10 Sets of sample probes	2,000
		5 Scales, Triple beam	3,000
		4 Sample divider, Boernier type	3,000
		Audio visual equipment	4,000
		Microscope, Swift model M 89 B	4,000
		Miscellaneous Seed Testing & Laboratory Equipment	45,000
		Sub total	110,000

Bill
Seed
Production
Program

Miniseedhouse equipment replacement	15,000
New equipment to equip 5 new seedhouse sites	35,000
Sub total	50,000
Grand Total	595,000

B. Construction Procurement Plan

Details on the construction procurement plan are included in the report "Proposed Construction Program for the Agricultural Research and Production (ARP) Project" prepared by the AID/Nepal Engineering Office. Construction will include the following:

1. Buildings in the Kathmandu Valley

a. Farming Systems Research/Extension Group (FSRG) Building
(5520 sq. ft)

This building is proposed to be constructed of load bearing brick masonry walls in cement mortar with reinforced concrete flat roof to conform to the designs of the existing buildings. The bricks to be used should be machine made. Exposed brick finish is recommended instead of the present plaster and paint finish in the existing buildings which requires repainting at least every two years. The inside of the building should be cement plastered and painted. The inside of the floor finish recommended is terrazo in the form of terrazo tiles or in-situ terrazo.

b. Agricultural Research Library Building(8100 sq. ft)

This building is proposed to be constructed as a framed reinforced concrete structure since large open spaces are required in the building. However, as in the FSRG building, the outer cladding and partition walls will be of machine made bricks. The inside of the building will be plastered and painted. The outside will be a mixture of plastered and painted and exposed brick surfaces.

2. Buildings for the Pulse Development Program

Buildings for the pulse development program will include a small office/lab building (950 sq.ft), four staff quarters (840 sq.ft each), a 120 MT warehouse for seed and supplies (1200 sq. ft), a threshing floor (400 sq. ft) and a machine

shed/shop (480 sq. ft). These buildings have been designed in a manner to suit the Terai. The buildings are single storeyed and the roofing system recommended is corrugated galvanized iron (C.G.I.) sheets with a plank false ceiling. Since it is likely that water supply will be limited in the site selected the toilet facilities may have to be constructed as a separate entity and outside the building.

3. Buildings for Hill Farms

Buildings at hill farms will include two small office/lab buildings (950 sq. ft each), eight staff quarters (840 sq. ft each) and irrigation, fencing and other works. For the hill farms, the major construction materials are stone masonry in mud mortar. Cement pointing will be used on the exterior surfaces and painting and plastering is recommended on the inside surfaces. The floors will be plain cement floor finish. The toilets are recommended to be built outside the buildings because of the scarcity of water in these hill farms. All the buildings will be single storeyed with a C.G.I. sheet roofing with plank false ceiling. All doors and windows will be of timber. Electrification will be done only at those sites where electricity is available.

4. Proposed Budget for Construction:

	<u>Cost in US \$</u>
1. FSRG Building - Kathmandu valley	200,000
2. Agricultural Research Library - Kathmandu valley	230,000
3. Pulse Development Program	140,000
4. Hill Farms	
a. Small office/lab (1)	25,000
b. Staff quarters (2) at Marpha	40,000
c. Small office/lab. (1) and staff quarters (2) at Dhunche	65,000
d. Staff quarters (4) at Kavre	80,000
e. Misc. (irrigation, land leveling, fencing)	60,000
Sub Total	\$ 840,000
5. Design and Supervision (15%)	125,000
Total	----- \$ 965,000

ANNEX L

Research Program Support Plan

I. Improved Administration and Management

a. National Research Coordination Committee

The MOA will establish a National Research Coordination Committee to direct and monitor agricultural research activities. The Joint Secretary for Planning (MOA) will serve as chairman of the National Research Coordination Committee. The committee will include representatives of the DOA, DOL, APROSC (Agricultural Projects Services Center), DFAMS (Dept. of Food and Agriculture Marketing Services), the Department of Forestry, Institute of Agriculture and Animal Science (IAAS), and Institute of Renewable Natural Resources (IRNR). The committee will meet 2-3 times per year to review agricultural research plans and progress and to approve research activity plans and budgets for the next Nepali Fiscal Year.

The Farming Systems Research/Extension Division will serve as the secretariat for the National Research Coordination Committee and will implement a research program integrating work of various discipline divisions and commodity programs. Through the Farming Systems Research Coordinating Committee, a working level guidance group, the Farming Systems Research/Extension Division will coordinate priority research work and manage a research support fund administered by the technical assistance contractor.

In addition to the umbrella National Research Coordination Committee in the MOA, the DOA is planning to centralize administration of its crop research activities under a National Agricultural Research Center at Kumaltar. This Center will be responsible for administering research farms and stations, discipline divisions and commodity development programs. The Center will have five units: Farm Management; General Administration; Planning; Monitoring and Evaluation; Research Publication and Documentation; and Research Outreach. The DOL is considering establishment of a similar center, although on a small scale.

b. Administrative Improvement (DOA, DOL)

In the first year, the project will provide two consultants for three months each to review the organizational structures and administrative weaknesses in the DOA and DOL. The consultants will review findings with the GON and recommend options for administrative re-organization and detail training needs for administrative support staff and equipment needs to improve the management and administration of the DOA and DOL. This effort will specifically assist the DOA with planned establishment of a National Agricultural Research Center.

The project will provide short-term in-country training for approximately 80 accountants and mid-level managers and support personnel, including typists, mechanics, lab technicians, computer operators, and others. It will also provide office equipment (typewriters, and computers) and a motorcycle and utility vehicle for both the DOA and DOL.

To the extent possible, training for accountants and administrative personnel will be planned to directly support implementation of the various components of this project. If the PL-480 funded India Training Program is extended and if training places are available, the project will send ten senior administrative officers from the DOA and DOL to three to six month management courses in India.

The administrative specialists working with the DOA and DOL will investigate possible options for improving job satisfaction and terms of service for research personnel. These may include revised job descriptions, increased support and flexibility in conducting research, revised personnel policies, and others. The specialists will present these options to the GON for consideration and action. Project budget support is as follows (\$000):

	<u>FY85</u>	<u>86</u>	<u>87</u>	<u>88</u>	<u>89</u>	<u>90</u>	<u>Total</u>
In-country Training	-	10	10	10	10	-	40
Vehicles & Office Equipment	-	30	30	-	-	-	60

c. Research Station Management Improvement

The project will provide one long-term advisor to work with research farm and station staff to improve management of stations, research plot lay-out, and research design. The advisor will conduct short courses for middle level and junior level research staff at various stations and will help station chiefs to develop farm operational plans and farm development plans for each of the seventeen centers for multi-disciplinary research identified in the 1983 FAO/world Bank Cooperative Program "Agricultural Research Review". The GON will use the farm plans and attempt to obtain the additional support from other donors to implement these plans and provide necessary additional station infrastructure. The project will provide \$10,000 each year from FY 86 through FY 89 for in-country training programs for 40 officer level and 400 research assistant level staff of the DOA and DOL.

II. Agricultural Research Library

a. Central Library: Kathmandu valley

The project will assist the GON to establish a central library in the Kathmandu valley for use by the DOA, DOL, and others, with special emphasis on meeting needs of researchers in these departments. The central library will combine collections

of various division libraries and develop a catalog on all reference materials, reports, and journals on agricultural topics available at various sites in Nepal. The library will also develop a system to make reference materials available to research personnel working on government farms and stations outside of Kathmandu.

The project will fund construction of a library building (Approx. 8,000 sq. ft.), purchase of furniture, equipment, reference books and journals and training for library staff. A local consultant will help to organize the library and technical assistance personnel will help plan for obtaining regular subscriptions of journals most relevant to the needs of Nepali agricultural researchers.

The GON will provide library staff, including a librarian and assistant librarian, two typists, an administrative assistant, and three assistants. Project budget support is as follows (\$000):

	<u>FY85</u>	<u>86</u>	<u>87</u>	<u>88</u>	<u>89</u>	<u>90</u>	<u>Total</u>
Building	-	60	110	90	-	-	260
Equipment & Materials	-	-	-	80	40	-	120
Short-Term Training	-	-	-	10	-	-	10

b. Research Information and Documentation

Central Library staff will manage a research information and documentation system to facilitate publication of research results. Under this system, library staff will contract with private printing firms in Nepal for the publishing of proceedings of Summer and Winter Crops Workshops and of proceedings of annual workshops for livestock research and horticulture and agro-forestry research. Researchers from relevant divisions and programs will assist with editing and proof-reading of articles for publication. Articles will be in English with a Nepali summary, or in Nepali with an English summary.

In addition, the MOA will provide an annual grant to the private Nepal Agricultural Association to publish the Nepalese Journal of Agriculture. This Journal will contain articles covering more complete research studies (often multi-year trials) and will receive wider international distribution.

The project will cover 50 percent of the cost of publishing workshops proceedings and journals for two years and 25 percent for the next three years. Annual costs are estimated as follows:

	<u>Cost</u>
Nepalese Journal of Agriculture (Printed) (2,000 copies, 200 pg. 8 1/2 x 11 1/2)	\$ 7,000
Proceedings (Cyclostyled):	
Winter Crop Workshop (300 pg; 2000 copies)	2,000
Summer Crop Workshop (300 pg. 2000 copies)	2,000
Livestock Workshop (200 pg; 2000 copies)	1,500
Horticulture and Agro-forestry Workshop (150 pg; 1000 copies)	<u>500</u>
Total	\$15,000 =====

Project costs are estimated at \$ 5,000 per year from FY86 to FY90.

III. Extension and Socio-Economic Research Division

The DOA will establish an Extension and Socio-Economic Research Division in the Kathmandu valley area. This division will provide backstop training and planning support for extension programs, conduct socio-economic research on agricultural technology development and adoption, perform economic analysis of agricultural research studies, and assist other units with the design and preparation of extension materials. The Extension and Socio-Economic Research Division will work closely with the Farming Systems Research/Extension Division.

According to an alternative proposal, the DOA may establish separate divisions for Extension and Socio-Economic Research. In this case the project will support both divisions, with major support going to the Socio-Economic Research Division.

The Extension and Socio-Economic Research Division will have one Class - I Officer as Chief, three Class - II Officers, and four Class - III Officers, a statistician, five research assistants and two typists. The annual operating budget for the division will be approximately \$ 30,000 when the division is fully established.

The project will fund 50 percent of the division budget the first three years and 25 percent the next two years. It will provide office furniture and equipment, including a micro-computer, two motorcycles, a utility vehicle, technical assistance and training for division staff. The project will support establishment of the division by funding one masters degree in rural sociology, four masters degrees in agricultural economics, including one in resource economics, and four short courses at International Agricultural Research Centers.

The project will also fund two masters programs in agricultural economics and rural sociology for the DOL and one short course at an international center. It is expected that most of the masters programs will be done at universities within the region, most likely in the Philippines. If additional places become available in the PL-480 funded India Training Program, the project will attempt to provide one additional masters in rural sociology and one in agricultural extension for the DOA, one in agricultural economics for the MCA, and a Ph.D. in agricultural economics for the DFAMS. Project budget support will be as follows (\$000):

	<u>FY85</u>	<u>86</u>	<u>87</u>	<u>88</u>	<u>89</u>	<u>90</u>	<u>Total</u>
Operation Costs	-	5	10	15	10	10	50
Vehicle & Equipment	-	15	10	5	-	-	30
Degree Training (7)	-	20	60	60	30	5	175
Short-Term Training (5)	-	-	5	5	10	5	25

IV. Farming Systems Research

a) Farming Systems Research Group

The DOA will establish a National Farming Systems Research/Extension Division to plan and monitor farming systems research work in Nepal. A Farming Systems Research Coordinating Committee will guide the activities of the Farming Systems Research/Extension Division. This Committee will be headed by the DOA Deputy Director General/Crops and will include the Chief of the Farming Systems Research/Extension Division as Member-Secretary and Deputy Director General (DOL), heads of DOA and DOL research programs and representatives of the Forest Research and Information Center. The Board will meet once or twice a year to review plans and programs of the Farming Systems Research Division (FSR/E).

The Farming Systems Research/Extension Division will be located in the Kathmandu valley area and will be composed of a Class - I officer as Chief; technical personnel belonging to a parent division/faculty but seconded to the FSRG (agronomists - 2, extension specialists - 2, soil scientist - 1, entomologist - 1, plant pathologist - 1, agricultural engineer - 1, forage specialists - 2, agro-foresters - 1, and socio-economists - 2); and support personnel (research assistants - 4, JTs - 4, administrative officer - 1, accountants - 2, field assistants - 4, translator - 1, typists - 4, drivers - 2, and peons - 2). Annual operating costs for the FSR/E Division are estimated at \$ 80,000.

The project will fund construction of a Farming Systems Research/Extension Division office building (5500 sq. ft.), provide technical assistance, furniture and equipment for the office, two utility vehicles and four motorcycles, and four

training for 20 staff members at regional short courses and monitoring tours and 200 staff in in-country training programs. Operating costs may also be used on occasion to rent farmers' land to conduct trials when work can not be reasonably done on GON farms and when technology is not well enough tested to ask farmers to assume risks involved. The project will also fund 50 percent of the FSR/E Division operating expenses the first two years and 25 percent the second two years.

Most of the regional training programs will be for FSR/E staff to attend farming systems research workshops and monitoring tours at IRRI. A limited number may be for senior staff to attend farming systems research and extension workshops and conferences conducted by the Farming Systems Support Project (936-4099). In-country training will stress training lower level staff (JT/JTA) and staff of other research units in the principles, methodology, and strengths of farming systems research. Project budget support will be as follows (\$000):

	<u>FY85</u>	<u>86</u>	<u>87</u>	<u>88</u>	<u>89</u>	<u>90</u>	<u>Total</u>
Building	-	-	115	110	-	-	225
Equipment & Materials	35	-	-	20	-	-	55
Short-term Training(20)	10	10	20	20	30	10	100
In-Country Courses	-	-	10	10	10	10	40
Operating Costs	-	25	40	20	20	-	105

b) Farming Systems Research Sites

The farming systems field research will be reorganized to link the research work with technical support available from regional GON farms and stations. Research will continue to be conducted at selected sites and on farmers' fields. However, the sites will be located reasonably near GON farms and stations in order to link-up with technical back-stopping of these stations and combine the farming systems work with the GON research outreach program. The new research sites will also provide better coverage of Nepal's agro-climatic zones.

One research farm or station in each Development Region will be designated as the lead center for coordinating farming systems research and extension work in that region. This lead center will have a farming systems program staff, including at least two Class - II level officers - generally one agronomist and one other Class - II level technician (livestock, soil science, agro-forestry, forage, horticulture, socio-economist, or plant protection). The farming systems staff of these centers will conduct farming systems research on the station and monitor work on private farms at a farming system site near that station and at other farming systems research sites in the Development Region.

The farming systems research sites will be selected to be representative of wide agro-climatic areas; relatively accessible for travel and visits of technicians; and suitable for launching future production programs. Sites should have representative farming systems and practices and farmers should be interested in cooperating.

Each farming systems research site, whether near the lead station or near a branch research station, will conduct on-farm farming systems research trials and will be staffed by one or two Class - III officers of an appropriate discipline, two JTs, two JTAs, and three field assistants.

Proposed farming systems research sites are as follows:

<u>Site</u>	<u>Area</u>	<u>Elevation(ft)</u>	<u>Existing Facility</u>
<u>Eastern Region:</u>			
Tarahara	Terai	550	Agriculture Station
Pakhribas(Lead)	Mid-Hills	5,100	ODA Farm
Pakhribas area	High Hills	9,000	ODA Farm
<u>Central:</u>			
Parwanipur(Lead)	Terai	450	Agriculture Station
Kabre (Jiri)	Mid-Hills	4,800	Agriculture Station
Dhunche	High Hills	6,000	Horticulture Farm
<u>Western:</u>			
Bhairawa	Terai	550	Agriculture Farm
Lumle	Mid-Hills	5,700	ODA Farm
Palpa (Lead)	Mid-Hills	4,500	Horticulture Farm
Marpha	High Hills	8,500	Agriculture Farm
<u>Mid-Western:</u>			
Nepalgunj	Terai	600	Agriculture Farm
Surkhet (Lead)	Mid-Hills	2,200	Agriculture Farm
Jumla	High Hills	7,600	Livestock Farm
<u>Far-Western:</u>			
Doti	Mid-Hills	4,600	Agriculture Farm

Annual operating costs for the farming systems research sites will be \$ 130,000 when all sites are operational. It is expected that ODA will fund costs of sites near Lumle and Pakhribas. This project will assist with establishment and operation of the other eleven sites. Start-up of these sites will be phased based on availability of trained staff. Eight sites should be operational by year three of the project and all sites by the end of the project.

Research work at the current cropping systems sites will be phased out as priority work is completed. Several sites can be discontinued in FY 85-86. Parsa (Parwanipur) will continue as a site in the new network and Ratna Nagar will continue as a site

for several years. Research work at the farming systems sites will continue to emphasize production of the important cereal crops. However, increasing attention will be given to (i) minor grains important to the high hills, (ii) pulses, oilseeds, roots and tubers (iii) forage and livestock feed production and (iv) horticulture and agro-forestry. Areas of major emphasis will be: composting and maintenance of soil fertility by means other than chemical fertilizer; revegetation of denuded land through appropriate use for production of fuelwood, fodder and tree crops; and biological control of pests and diseases of crops.

The project will provide technical assistance, training, and partial costs of operating expenditures for the farming systems sites. The project will fund 50 percent of operating costs the first two years and 25 percent the next three years. Project funded training will include overseas short courses in farming systems research, probably at IRRI for ten persons and in-country short courses for 200 officer - level personnel and 500 JT/JTA - level personnel. The in-country training will focus on planning and evaluation of the farming systems research work and will be conducted by FSR/E staff. Project budget support will as follows (\$000):

	<u>FY85</u>	<u>86</u>	<u>87</u>	<u>88</u>	<u>89</u>	<u>90</u>	<u>Total</u>
Operating Costs	-	25	40	20	25	25	135
Short-Term Training(10)	-	5	10	10	15	10	50
In-Country Training	10	10	10	20	30	10	90

V. Commodity Program Research

a) National Pulse Development Program

The project will assist the GON to establish the National Pulse Development Program at an existing GON agricultural farm (possibly at Sarlahi or Hardinath). The GON will provide land for this program and will also increase staff from the current two officer level and two JTA level staff to six officers, six JT/JTAs, and necessary support personnel. The International Development Research Center of Canada may provide the GON operational support for this program.

The project will provide technical assistance and fund construction of four units of staff housing, a maintenance garage, a small office/lab and a threshing floor for the new station. The project will also provide furniture and equipment, a utility vehicle (pick-up truck) and a motorcycle for the station. Project budget support will be as follows (\$000):

	<u>FY85</u>	<u>86</u>	<u>87</u>	<u>88</u>	<u>89</u>	<u>90</u>	<u>Total</u>
Construction	-	60	55	-	-	-	115
Equipment & Materials	-	20	20	20	-	-	60

b) Support to Hill Farms

While most of the commodity programs are located in the terai, research trials on various crops are done at various hill stations to provide information on technology and varietal performance in various agro-climatic zones. Hill farms need to be strengthened to better enable them to fulfill this role of regional testing.

The farms and stations associated with the farming systems research sites will be reorganized to varying degrees to include multi-disciplinary work. These may maintain parent tree orchards for forage crops and other perennials, fruit tree nurseries, and livestock for breed improvement.

The project will fund procurement of equipment for various hill farms and fund construction of necessary additional facilities. The project funded construction will include: at Doti a small office/lab and two staff quarters; at Marpha - two staff quarters; at Dhunche - two staff quarters and a small office/lab; and at Kavre - four staff quarters. The project will also provide these four stations with equipment and research materials and farm improvements, including land leveling, fencing and irrigation.

The project will fund advanced degree training programs for: two participants in agronomy to study grain crops important to the hills (amaranth, millet, buckwheat, barley), two participants in animal science to study fodder production and hill animal production systems, and two participants in agro-forestry. These programs may be in the US, the Philippines or another country, but it is expected that research will be done in Nepal. At least three years prior experience working at hill research stations will be a prerequisite to qualify for this training. If the program is extended and spaces are available, two additional advanced degree programs in each of these three disciplines will be provided from the PL-480 India Training Program.

	<u>FY85</u>	<u>86</u>	<u>87</u>	<u>88</u>	<u>89</u>	<u>90</u>	<u>Total</u>
Degree Training (6-M.Sc.)	-	35	70	80	45	10	240
Construction	-	60	80	100	80	-	320
Equipment & Materials	-	10	10	10	30	-	60

c) Linkages With International Agricultural Research Centers

The project will assist the GON to develop and maintain linkages with major international agricultural research centers (IARCs) relevant to Nepal. These will include CIMMYT, IRRI,

ICRISAT, and ILCA. The project will provide funding for short term training at the IARCs and for IARC scientists to visit relevant research programs in Nepal on a regular basis. This funding should in no way reduce the training and consultancies normally provided by the centers to Nepal.

The MOA will sign letters of agreement with the IARCs to govern linkages and assistance to be provided. Funds will be included in the technical assistance contract to cover costs of the IARCs in support of Nepali research programs. The technical assistance team will help to establish a mechanism within the GON to maintain contacts and liaison with the IARCs.

The project will fund approximately four short courses for GON officials at each of CIMMYT, IRRI, ILCA, and ICRISAT and five visits to Nepal for staff of each of these centers. The project budget for short courses will be approximately \$ 40,000 per year for FY86 through FY89.

VI. Research Support Fund

The technical assistance contractor will administer a research grant fund for the Farming Systems Research Coordinating Committee. The committee will consider unsolicited research proposals, but will advertise the availability of grants to study certain specified priority research problems. The Institute of Agriculture and Animal Science and the Institute of Renewable Natural Resources are likely to be the recipients of some of the grants. Private individuals and firms will also be eligible. Approximately \$20,000 per year (FY86-90) will be available for such grants.

VII Summary Cost Estimates for the Research System Support Component (Exclusive of Technical Assistance)

Estimated Cost By Input Category ((\$000))

	<u>FY85</u>	<u>FY86</u>	<u>FY87</u>	<u>FY88</u>	<u>FY89</u>	<u>FY90</u>	<u>Total</u>
Materials, Vehicles and Equipment	35	75	70	135	70	-	385
In-Country Training	10	30	40	50	60	20	210
Degree Training	-	55	130	140	75	15	415
Short-Term Training	10	55	75	85	95	25	345
Operating Costs	-	80	115	80	80	60	415
Construction	-	180	360	300	80	-	920
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Total	55	475	790	790	460	120	2,690
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Annex M

Hill Production Program Support Plan

Because of the lack of well tested technologies and production program methodologies, production programs have expanded slower in the hills than in the terai and inner terai. Although appropriate technologies (Khumal and Arun maize; Kanchan, Himal, K-39, and other rice varieties; oats for forage, etc.) are becoming available for hill areas, there is a continuing need to fully test technologies and extension methods before planning large scale production campaigns.

The project strategy toward hill production programs will have three dimensions: a) intensive production campaign in four hill districts where pilot pre-production verification trials (PPVTs) have been started (Baglung, Myagdi, Parbat, Syangja); b) training and assistance with planning and mini-kit support for integrated rural development projects and hill agricultural development projects conducting production programs in other areas; and (c) pilot production programs at the seven farming systems research sites starting in year two or three of the project and dependent on results of farming systems research work. In addition, by year three of the project the external evaluation will assess technical and methodological capabilities and the policy environment to determine whether the project should expand the production program area coverage in the hills.

The intensive production programs in four hill districts will provide an opportunity to test production program methodology specific to the hills. The proposed methodology will be based on "production blocks" similar to those used in the terai production program. However, in the hills the blocks will of necessity be smaller and more variable and extension likely can not easily be conducted on the basis of a "training-and-visit system".

The districts selected should be typical hill districts with little road access, but not extremely remote. The districts should have a significant amount of cropland and population and should be adjacent or reasonably close together to facilitate program supervision. In addition improved technology for the district should be available from research sites in the immediate area.

The district offices of Agricultural Development Officers will implement the production program. Minimum staff requirements will be for two officer-level subject matter specialists and one administrative officer per district and nine JT or officer level

extension agents, one per agricultural service center. This minimum GON staff will be supplemented by farmer leaders or panchayat level agricultural assistants who will demonstrate technologies and organize farmers to form production blocks. Initial production blocks will be near agricultural service centers. Later blocks will be formed throughout the target districts and eventually the program will affect production on approximately half of the cropland in the districts.

The production program will draw on work from the Pumdi Bhumdi cropping systems research site and the Lumle Agricultural Center for improved technology. Farmer production leaders will conduct pre-production verification trials (PPVTs) on their own farms prior to wider dissemination of any technology.

In the target districts, the GON will form District Implementation Committees headed by the District Agricultural Development Officer and including Agricultural Inputs Corporation and Agricultural Development Bank district managers, agricultural cooperative representatives, Department of Irrigation water management officers, production block officers, and a representative of Nepal Food Corporation. These district committees will expedite implementation of production programs and the Extension and Socio-Economic Research Division will provide technical support for implementation of these programs.

Production program implementation will follow the following strategies:

1. use of technology based on and tested for farming systems appropriate to the area and covering an entire agricultural year;
2. establishment of "production blocks" involving use of recommended technologies on areas of contiguous land, initially centered on irrigated valleys or "taars" (relatively broad, level areas);
3. use of a production team, including three production officers per district; one JT/JTA per block; and one farmer production leader per 50 ha.;
4. assignment of an accountant to each participating district office to handle financial reporting and administration of the project;
5. careful prior planning for supply of credit and input requirements and Nepal Food Corporation purchase of excess production;
6. careful sequenced training of (a) program management personnel, (b) Production Officers, (c) JT/JTAs, (d) farmer production leaders, and (e) farmers;

- 7. a management information system involving short biweekly reports from production officers, frequent field visits by Extension and Socio-Economic Research Division program staff, and farmer survey and crop cutting yield checks; and
- 8. three years of intensive program implementation in an area and subsequent shift to new areas.

The program will begin with blocks in high production potential irrigated areas and expand to include more rainfed crop areas. Tentative area coverage targets for the program are as follows:

	<u>FY 85</u>	<u>FY 86</u>	<u>FY 87</u>	<u>FY 88</u>	<u>FY 89</u>	<u>FY 90</u>
Blocks	*	30	30	120	300	300
Hectares	*	150	600	1950	6900	15000

In all production program areas, although extension activities will involve both male and female farmers, the project will specifically target farm women to be reached with extension messages transmitted by women extension workers. Production blocks will be formed by using women contact farmers, women JT/JTAs, and women production officers. Peace Corps volunteers will assist with this and other aspects of the hill production program.

The GON will coordinate other programs in support of this production program to the extent possible. This may include Nepal Food Corporation purchase of food grains in these districts, improvement of hill irrigation systems and supply of credit and production inputs. In addition, as part of the GON contribution to the production program and as a pilot activity, the GON will construct small warehouses for collection and storage of cereal grains at several high production-potential areas in the target districts. These warehouses will serve as collection points and market outlets - possibly for Nepal Food Corporation purchases - and facilitate marketing of surplus production.

In order to monitor progress, the project will conduct baseline surveys of target districts in year one and follow-up surveys in years three and six. This will complement routine monitoring and reporting and provide independent evidence of project impact. The technical assistance contractor will contract these surveys through local firms or consultants.

* Areas surveys and pre-production verification trails.

The project will provide technical assistance and training to personnel working on other integrated rural development and hill agricultural development projects with production components. Collectively, by the end of the project these projects should be implementing production programs covering approximately 15 districts and 2,000 ha. per district. The project will budget US \$ 10,000 per year for costs of in-country training programs and seminars related to hill area extension programs. In addition, the project will fund costs of mini-kit programs to support defined area production programs in other hill areas of the country.

As implementation of hill production programs progresses, the project will rely on technical assistance from the AID centrally funded "Agricultural Policy Analysis Project" (936-4084) in order to help identify policy constraints to increasing agricultural production and to developing acceptable alternatives.

By the fourth year of the project, the farming systems research program should have identified and adequately tested improved technologies for hill agricultural production. These will likely include agronomic, livestock, and agro-forestry technologies for the eight farming systems sites in the hills. Although at this time it is not possible to predict the potential for moving into production programs, the project will budget US \$ 35,000 per year each of the final two years of the project for implementation of multi-disciplinary production programs at the seven hill farming system sites. Pilot production activities will cover an average of 500 ha. around each of eight hill farming systems sites.

If the mid-term project evaluation determines that conditions are appropriate, the project may be revised in the third year to provide for wider geographic expansion of the production program. Alternatively, a follow-on project could support wider coverage of production program in the hills.

The project will provide a utility vehicle to the Extension and Socio-Economic Division for supervision of the production program and equipment for district offices implementing the program. Project budget estimates are given below. For operating costs the GON will fund 50 percent and AID 50 percent of costs. For the mini-kit program, AID will fund all costs the first three years and 50 percent the final two years.

Estimated Budget for Production Program Supported Activities

(AID funding)(\$'000)

	<u>FY 85</u>	<u>FY 86</u>	<u>FY 87</u>	<u>FY 88</u>	<u>FY 89</u>	<u>FY 90</u>	<u>Total</u>
Operating Costs	-	50	50	60	100	115	375
Equipment and Materials	-	10	10	10	10	10	50
In-Country Training	-	10	10	10	10	10	50
Mini-kits	-	25	50	50	50	50	225
	<u>-----</u>						
	-	95	120	130	170	185	700

ANNEX N

Seed Production and Distribution

System Support Program

I. National Seed Development Board

As recommended by the participants in the First National Seed Seminar, the CON will establish a National Seed Development Board. The purpose of the Board will be to a) foster development of the national seed program and of various agencies serving the seed industry; b) coordinate activities of the various agencies working with the national seed program; c) ensure adequate production of foundation seed and certified and improved seed; d) plan for training and manpower development needed for the seed industry; and e) coordinate activities of foreign assisted seed projects.

The Secretary of the Ministry of Agriculture (MOA) will be the Chairman of the National Seed Development Board and the Chief of the Seed Technology and Improvement Program will be the Member-Secretary. Other members will include: the General Manager and the Chief of the Seed Division of the Agricultural Inputs Corporation (AIC); the General Manager of the Agricultural Development Bank (ADB); a representative of the Department of Cooperatives; a farmer representative; one of the coordinators of a national commodity development program; the Chief of the Marketing Division of the Department of Food and Agricultural Marketing Service; the Director General of the DOA; the Chief of the Agricultural Extension and Socio-Economic Research Division; and the Deputy Director General for Pasture Development of the DOL. The National Seed Development Board will approve an over-all national seed development plan and review feasibility of establishing a National Seed Corporation.

The Board will meet twice a year, or more often if needed, to act on proposals put forward by the Seed Technology and Improvement Program which will act as the permanent secretariat for the Board. The Seed Technology and Improvement Program will assign officer-level staff to positions for: Coordinator for Foundation Seed Production, Quality Control and Seed Legislation Officer, Vegetable Seed Program Development Officer, Seed Production and Distribution Planning Officer, and Training and Information Specialist.

The DOA will provide the Seed Technology and Improvement Program with additional office space resulting from the consolidation of divisional libraries in the Agricultural Research Library. The project will provide supplemental office furniture and equipment, a vehicle to facilitate field operations and technical assistance.

The Coordinator for Foundation Seed Production in the Seed Technology and Improvement Program will prepare an annual plan

for production of breeder and foundation seed for the major cereal crops, pulses, and oilseeds. The plan will include detailed production and distribution plans. The Coordinator will attempt to identify and resolve bottle-necks in the foundation seed program.

The project will provide technical assistance and in-country training for 60 GON staff working with breeder and foundation seed production programs, including approximately 30 research personnel producing breeder seed, 20 foundation seed plant operators and assistants and 10 plant managers. The project will also provide necessary seed processing and handling equipment and seed handling and storage facilities for the National Pulse Development Program; equipment for processing small lots of seed at three national commodity program stations; and motorbikes and additional equipment for regional seed testing laboratories. Project budget support will be as follows (\$000):

	<u>FY85</u>	<u>FY86</u>	<u>FY87</u>	<u>FY88</u>	<u>FY89</u>	<u>FY90</u>	<u>TOTAL</u>
Vehicles and Equipment	-	80	30	-	-	-	110
In-country Training	-	10	10	-	-	-	20
Warehouse	-	40	-	-	-	-	40

II Hill Seed Supply Program

The project will build upon and continue support to the twenty small hill seed plants established with assistance from the SPIS Project. The project will continue to provide operational support, technical assistance and staff training for these seed plants and will continue to emphasize participation of the private sector in all seed production, in seed retail marketing, and, to the extent possible, in management of the seed plants. It will also assist the GON to establish from five to ten additional sites utilizing pre-existing physical facilities. If necessary contingency funds may be used for construction of small seed plants of a simplified design. New sites may include Myagdi, Sanfe Bagar, Arghakhanchi, Ramechap, and Rolpa.

Small seedhouse sites and locations for farmer-owned metal bin seed production should be areas which can not easily be supplied seed by road. The seed production sites should be in areas with potential for surplus production which can be sold for seed and must be areas for which improved varieties are available.

The hill seed program will continue to be administered by the Agricultural Inputs Corporation under the guidance of the National Seed Development Board and District Seed Committees, which will be established in each mid-hill district with a small seed plant. These committees will be headed by the District

Panchayat Chairman or his designee with the Agricultural Development Officer as Member-Secretary. Other members will include the Agricultural Inputs Corporation branch manager, district representatives from the Department of Food and Agricultural Marketing Service, Agricultural Development Bank, Department of Cooperatives, and Nepal Food Corporation and a representative of the district farmer seed growers.

The District Seed Committee will meet as necessary to (a) set district prices for purchase and sale of seed; (b) approve targets for seed production and sales; (c) approve plans for operation of small seed plants and other district seed programs; and (d) arrange for normal, routine maintenance of seed plants and equipment.

On the operational side, the project will continue for the first three years to support the hill seed program by delivery of foundation seed to the project sites and by providing seed processing and packaging needs. The GON will undertake to phase out subsidies for transport of terai produced seed to the hills and encourage movement of seed between hill regions where this is advantageous over movement of seed from the terai to the hills.

Because of the small size of the hill seed plants and because of transportation difficulties in the hills, the small seed plants can serve only about five to ten panchayats surrounding the seed plant. The project will assist the GON to institute a system to serve outlying panchayats in districts served by small seed plants. This will be done through a system of farmer-to-farmer seed exchange.

The project will subsidize up to 30 percent of the cost of small metal seed bins (500-1,000 kg. capacity; total cost US\$ 50). The project will facilitate sale of these to registered seed growers in outlying panchayats and will provide training and recognition (through appropriate signboards and advertising) to these farmers. Training will cover technical aspects of seed production and storage, especially use of traditional, non-chemical means of preventing insect damage during storing. These farmers will be expected to purchase source seed from the small seed plants and will be responsible for their own pricing and sale of seed. These farmers will also be eligible to purchase seed directly from small plants for resale in their areas, if demand allows.

Because of logistic constraints the project will implement the metal bin program on a phased basis and will cover a total of twenty-two districts: eight the first year; six the next; and eight the third. In areas covered by integrated rural development or hill agricultural development projects, these projects can fund metal bin programs based on this model and the experience of this project.

Estimated project outputs of improved seed are given in the table below. Seed production is estimated to be approximately 50

percent wheat, 25 percent maize and 25 percent rice. The projection includes some lag between set up of metal bins and seed production. An additional category of spin-off seed production is expected to take place when metal bin seed producers and their neighbors expand seed production beyond that which can be stored in metal bins.

	<u>FY85</u>	<u>FY86</u>	<u>FY87</u>	<u>FY88</u>	<u>FY89</u>	<u>FY90</u>
No. of Operating Seed Plants	20	20	25	25	25	25
Seed Plant Seed Production (MT)	800	800	1000	1000	1000	1000
No. of Metal Bins Distributed (Cumulative)	-	1000	2000	3000	4400	4400
Seed Production by Farmers with Metal Bins (MT)	-	500	1500	2500	3700	4400
Additional Seed Production at Metal Bin Sites (MT)	-	-	500	1500	2500	3700

Each district will receive approximately 300 bins. The budget per district will be US\$ 4,500 for metal bin subsidy and US\$ 3,000 for contingencies. In support of this program the project will budget US\$ 20,000 per year for training purchasers of metal bins in technical aspects of seed production and storage.

The project will provide training for plant managers (JT/JTAs) and Peace Corps Volunteers (2 sessions/year for 30 persons); training for farmer seed growers (25 sites with 3-one day sessions per year per site for 35 farmers); equipment to equip five new sites, and replacement equipment for established sites.

The project budget will include the following (\$000):

	<u>FY85</u>	<u>FY86</u>	<u>FY87</u>	<u>FY88</u>	<u>FY89</u>	<u>FY90</u>	<u>TOTAL</u>
Metal Bin Program	-	40	30	40	-	-	110
Seed Plant Operational Support	-	10	10	10	-	-	30
Equipment	-	25	25	-	-	-	50
Plant Manager Training	-	10	10	10	-	-	30
Farmer Training	-	30	30	30	-	-	90

II Summary Cost Estimates for the Seed Production and
Distribution System Support Program (Exclusive of
Technical Assistance)

(\$'000)

	<u>FY85</u>	<u>FY86</u>	<u>FY87</u>	<u>FY88</u>	<u>FY89</u>	<u>FY90</u>	<u>TOTAL</u>
Equipment and Materials	-	85	35	-	-	-	120
In-Country Training	-	50	50	40	-	-	140
Operating Costs	-	50	40	50	-	-	140
Construction	-	45	-	-	-	-	45
Total	-	230	125	90	-	-	445

ANNEX O

Request for Assistance

His Majesty's Government



MINISTRY OF FINANCE
Bagh Durbar,
KATHMANDU
NEPAL

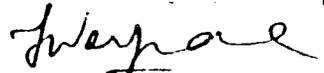
December 4, 1984.

Dear Dr. Hash:

In view of USAID/Nepal's prior and continued assistance for Integrated Cereals Project and the Seed Production and Input Storage Project, His Majesty's Government of Nepal hereby requests continued to support for agricultural research and production in Nepal. As per our discussion you will process for finalization of this project.

I would appreciate if you could kindly take further action in this respect.

With best regards,

Sincerely yours,

(T. Neupane)
Under Secretary

Dr. Charles T. Hash
Agriculture Chief
USAID/Nepal
Kathmandu.

Annex P
Certification Pursuant to Section
611 (e) of the Foreign Assistance
Act of 1961, as amended

The Agricultural Research and Production Project (367-0149) will assist the GON to improve programs and physical facilities for agricultural research, extension and seed production programs. The GON has placed a high priority on increasing agricultural production through such programs. The GON has adequately maintained and utilized the physical plant of research station facilities developed under previous AID-funded projects.

I, Dennis J. Brennan, the Director of the Agency for International Development Mission to Nepal, having taken into account among other things the maintenance and utilization of GON facilities in projects previously financed or assisted by the United States, do hereby certify that in my judgement Nepal has the capability, both as to financial and human resources, to effectively maintain and utilize the Agricultural Research and Production Project.



Dennis J. Brennan
Director

Annex Q

Background Documentation Used in Project Preparation

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Seed Production and Input Storage Project - Project Reports (Various).

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