Proj. No. 367011 4 (2)
PD. AAD-036-81

AID 1025-1 (7-71) (FACE SHEET)
NONCAPITAL PROJECT PAPER (PROP)

I. PROJECT IDENTIFICATION

1. PROJECT TITLE

INTEGRATED CEREALS PROJECT

APPENDIX ATTACHED ☒ YES ☐ NO

2. PROJECT NO. (M.O. 1095.2) 367-11-110-114

3. RECIPIENT (specify)
☒ COUNTRY NEPAL
☐ REGIONAL _____ ☐ INTERREGIONAL _____

4. LIFE OF PROJECT
BEGINS FY 1975
ENDS FY 1980

5. SUBMISSION
☒ ORIGINAL 1/7/75 DATE
☐ REV. NO. _____ DATE
CONTR./PASA NO. _____

II. FUNDING ($000) AND MAN MONTHS (MM) REQUIREMENTS

29p.

A. FUNDING BY FISCAL YEAR	B. TOTAL $	C. PERSONNEL (1) $	C. PERSONNEL (2) MM	D. PARTICIPANTS (1) $	D. PARTICIPANTS (2) MM	E. COMMODITIES $	F. OTHER COSTS $	G. PASA/CONTR. (1) $	G. PASA/CONTR. (2) MM	H. LOCAL EXCHANGE CURRENCY RATE: $ US ____ (U.S. OWNED) (1) U.S. GRANT LOAN	(2) COOP COUNTRY (A) JOINT	(2) COOP COUNTRY (B) BUDGET
1. PRIOR THRU ACTUAL FY												
2. OPRN FY 75	740	572	198	93	105	75	--	572	198	155		
3. BUDGET FY 76	763	516	143	162	180	45	40	516	143	675		
4. BUDGET +1 FY 77	717	356	92	261	294	60	40	356	92	615		
5. BUDGET +2 FY 78	611	324	84	192	234	55	40	324	84	275		
6. BUDGET +3 FY 79	451	248	62	141	171	27	35	248	62	255		
7. ALL SUBQ. FY	118	40	10	48	60	--	30	40	10	100		
8. GRAND TOTAL	3,400	2,056	549	897	1044	262	185	2,056	549	2,275		

9. OTHER DONOR CONTRIBUTIONS

(A) NAME OF DONOR	(B) KIND OF GOODS/SERVICES	(C) AMOUNT
See Section V. 5 of PROP		

III. ORIGINATING OFFICE CLEARANCE

1. DRAFTER	Philip D. Smith/Carol Peasley	TITLE Chief, Ag.Div./Program Economist	DATE 1/22/75
2. CLEARANCE OFFICER	Jacob L. Crane/Charles R. Crader	TITLE Program Officer/Mission Director	DATE 1/23/75

IV. PROJECT AUTHORIZATION

1. CONDITIONS OF APPROVAL

2. CLEARANCES

BUR/OFF.	SIGNATURE	DATE	BUR/OFF.	SIGNATURE	DATE

3. APPROVAL AAs OR OFFICE DIRECTORS
SIGNATURE _____ DATE _____
TITLE _____

4. APPROVAL A/AID (See M.O. 1025.1 VI C)
SIGNATURE _____ DATE _____
ADMINISTRATOR, AGENCY FOR INTERNATIONAL DEVELOPMENT

SUMMARY

In response to a concern over declining per capita food availabilities and following analysis of the major constraints to agricultural development in Nepal, USAID and the Ministry of Food, Agriculture, and Irrigation (MFAI) have designed a new joint project focusing on the development and demonstration of improved production technology for the major food grain crops and related cropping systems. The project is based on a functional concept of research — i.e., outreaching adaptive research with strong linkages to the Extension Service and the farmer, both for feedback on applicability to improve research problem identification and for the promotion of acceptable technologies to increase production. This project complements other major efforts of the IBRD, ADB, UNDP and others in the agriculture sector — particularly their efforts in the areas of resettlement, irrigation development, and water utilization. These other donor/HMG activities will lead to an expansion of cultivated area and an intensification of land use through improved irrigation facilities, while the USAID/HMG efforts will lead to identification of improved technologies and increased yields per unit of cropped area. Viewed together, these activities offer the only means by which Nepal can maintain a level of agricultural production adequate to keep up with projected population growth.

The project purpose is to increase the MFAI's capacity to (1) generate improved production technology for the major food grain crops and related cropping systems and (2) transfer that technology to Nepali farmers to increase production. The project will build upon the facilities, organization and staff developed during the past decade. This expanded view of research revolves around a strengthened linkage between Research and Extension — i.e., a linkage forged partly through the establishment of a production specialist staff in the Regional Agriculture Development Directorates. This staff will have specialized knowledge of improved crop production practices and will ensure two way communication links between the farmer, the extension field staff and the research staff — identifying problems which require attention of the research staff and transmitting new developments to the district extension staffs.

The present project is planned over a five year period. This is a somewhat optimistic timeframe which could be extended for three or four years if USAID and the Government of Nepal subsequently see a continued role for USAID inputs. In this first five year phase of assisting HMG with its research/demonstration program, USAID will provide an advisory team of eleven long-term specialists (474 man months) and short-term consultants (75 man months), costing an estimated $2,056,000; dollar-funded participant training for 72 persons (87 man years), costing an estimated $897,440; commodity inputs totalling $762,000 (rupee and dollar funded); and project support costs of $685,000 (rupee and dollar funded). These project support costs will include construction costs for new facilities at HMG agriculture research stations and out-reach facilities and for in-country and international travel. In addition to these TA funds, USAID will provide a rupee capital grant for construction of a seed processing plant in the Far Western Development Region ($410,000 equivalent). The total USAID financial input over the 5 year life-of-the-project will be $4,810,440, out of which $1,460,000 will be local currency.

I. Rationale

As described in detail in the USAID Development Assistance Program (DAP) for Nepal, food grain production has been increasing at approximately 1.2% annually between 1966-69 and 1970-73, or significantly below the rate of population growth which is approximately 2.0-2.4% per annum. In summary form, this situation can be seen most easily in the following table on food grain production.

CHANGES IN THE PRODUCTION OF FOOD GRAINS IN THE HILLS AND THE TERAI
1966-1973

	Unit	1966-69 Average	1970-73 Average	Average Annual % Change
Hills				
Area	1,000 ha	626	691	2.5
Production	1,000 MT	1,174	1,246	1.5
Yield	Kgs	1,875	1,803	-1.0
Terai				
Area	1,000 ha.	1,241	1,317	1.5
Production	1,000 MT	2,046	2,177	1.6
Yield	Kgs	1,649	1,652	0.1

This relative stagnation in agricultural production has resulted in two major phenomena: (1) declining per capita food availabilities and (2) declining exportable surpluses.

With regard to per capita food availabilities, FY 73 production figures show national net available food grains of 2.2 million metric tons, or 191 kgs. per capita. This can be compared to the HMG definition of 160 kgs. per capita as a minimum requirement. These national figures, however, tend to mask the realities of life in Nepal. In the hills, where approximately 60% of the population lives, estimated per capita food availabilities are less than 100 kgs. in comparison to more than 300 kgs. per capita in the terai. In a country with only a rudimentary transportation system (e.g., 42 out of 55 hill districts or 62% of total land area and 41% of total population are unserviced by roads), direct efforts must be made to increase agricultural production in the hills. The people in the hills cannot depend to a very large extent upon the importation of surplus food grains from the terai — i.e., a marketing system directed towards India, a price structure which draws commodities to higher priced Indian markets, and the costs of transportation within Nepal all dictate against such trade patterns. While the Government's regional development concept is based upon increased trade and interdependence within and between regions and emphasizes horticulture and livestock specialization in the hills and mountains and food grain production in the terai, this is at best only a long-run possibility. Therefore, as stated in a number of recent publications, immediate and continuing attention must be given to maximizing food crop and livestock production in the hills to achieve an optimum degree of self-sufficiency for the people in that area.

Besides the human factor of declining food availabilities, stagnating agricultural production has led to decreased exportable surpluses. This is most important with regard to paddy exports to India — exports which have provided approximately 70% of Nepal's foreign exchange earnings and have enabled Nepal to import the bulk of its development and consumer goods from India. While only estimates, existing data show significant decreases in exportable surpluses: from about 500,000 MT of paddy in 1965 to approximately 300,000 MT in the past several years. If Nepal is to avoid serious foreign exchange problems, food grain exports to India must not fall even lower.

The above suggests the seriousness of the problems facing Nepal and the need to increase agricultural production, especially food grain production. There are only limited ways to increase production: (1) increase area under cultivation; (2) increase the intensity of land use, primarily through irrigation; and (3) increase per unit yields, primarily through improved production technology.

During the past decade, gross gains in national grain production have been achieved entirely from the first of these alternatives, expansion of acreage. While there is potential for a further increase (by 20-30%) in area which could be brought under cultivation in the Terai, further increase of the cultivated area in the hills is virtually impossible since the limited amount of new land brought under cultivation each year, by encroachment on the forest and cultivation of ever steeper slopes, will probably be concealed by the loss of acreage from erosion and abandonment.

The second alternative, increased intensity of land use, continues to have substantial potential. At present, the average intensity of land use is 132% in the terai and 135% in the hills (100% = one crop per year). These figures are low and, as a consequence, it appears reasonable to suggest that substantial increases in production could be achieved through more intensive land use, and particularly if full irrigation potential were to be developed. Whereas only about 250,000 hectares (120,000 in the Terai and 130,000 in the Hills) were reported to be irrigated in 1970, it has been estimated that there is a potential for irrigating 1,200,000 hectares, most of which lies in the Terai. Aside from increasing the area under irrigation, increasing the area under controlled year-round irrigation and improvements in water utilization on the farms should make a substantial increase in land use intensity.

In the Hills, the potential for increasing intensity of land use is very much less than in the Terai because of already higher intensity of land use, more limited opportunity for irrigation, lower temperatures which usually mean longer growing seasons and probably more limited fertility. If appropriate efforts are made, an average intensity of land use in the Terai of 200% and for the Hills of 150% should be feasible.

The third alternative, improved production technology and resulting increased yields, offers another means for increasing production. This usually involves use of higher yielding varieties, fertilizers, pest control, improved cultural practices, higher plant populations, etc. As an example, given fertilizer responsive crop varieties and adequate attention to other practices, it is usually possible to obtain ten units of additional production for each unit of fertilizer nutrients used. Other new inputs should produce similar increases, although perhaps not of the same magnitude.

Looking at all three alternatives for increasing production, one can estimate the possible increases for each. According to estimates made by Dr. Francis LeBeau, increased land area could lead to a 20% increase in production, increased intensity of land use to a 54% increase in production, and improved production technology (improved yields) to a 97% increase in production. (See Annex.)

In order to increase agricultural production sufficiently to at least keep up with population growth, the Government of Nepal must direct its attentions to all three alternatives. Since the IBRD, ADB, and UNDP will play important roles in assisting the Government of Nepal to exploit the first two alternatives through various resettlement, irrigation, and water utilization projects, USAID will concentrate its assistance on the third alternative, the improvement of production technology.

This improvement of production technology involves a series of activities — creation, dissemination, and adoption. While it might be more clean to separate these into three discrete activities, we see them as inter-related points on a continuum. As stated in a recent paper by Dr. Richard Harwood from IRRI:

> The process of the creation, dissemination, and adoption of new technology is best viewed as a continuum, starting in laboratories or central research stations and continuing all the way to wide spread adoption by farmers. Intermediate steps along the way include regional testing on government farms/stations, field trials in farmers' fields, and demonstration plots. In such a view of the process there is no clear dividing line between research and extension. At one end of the spectrum, the work in labs and research stations is clearly research, and at the other end contact with large numbers of farmers is clearly extension. The large area in the middle is of much importance in improving technology for farming systems.... The researcher's job is unfinished until he has tested his new technology on farmers' fields and assessed whether or not it has performed according to his expectations. At this point it is still a research function, not an extension activity, even though the researcher may well get the extension workers involved, or at least aware of what he is doing.

The above statement clearly indicates that USAID is not proposing a traditional research program — rather, we are defining research as a broad out-reaching effort to help farmers. It will reach out to farmers for identification of farm-level problems, for testing and feedback/evaluation of potential new technologies, and for the promotion of viable new technologies. The development of new varieties in the laboratory or at the research station will be only intermediate objectives. The primary objective of this project will be to develop new technologies relevent to the realities of farm life in Nepal and to enable the Ministry of Agriculture to disseminate these technologies to farmers in order to increase production.

Part of the dissemination of these technologies will be the provision of necessary inputs: e.g., seeds, fertilizer, pesticides, and credit. At this point in time, availability of fertilizer, pesticides and credit do not appear to be major constraints to the adoption of new technologies.

Fertilizer and pesticide supplies are totally imported into Nepal. While higher prices and limited supplies in the world market are factors which will affect Nepal's capability to supply an expanding demand for these inputs, there is a

satisfactorily functioning mechanism in Nepal for their procurement and distribution. The former Agriculture Marketing Corporation, now separated into two corporations — The Nepal Food Corporation and the Agriculture Inputs Corporation — has in fact been able to increase its inventory of fertilizers during the past eighteen months. This new corporate arrangement should improve Nepal's capability to procure and distribute essential agricultural inputs.

Also, as stated in a recent UNDP report, "a major constraint on fertilizer use, apart from its much increased cost, is that the response to fertilizers of various crops in various areas/sub zones is generally not known with reasonable certainty." Therefore, USAID has determined that its assistance can be more effective in the development of appropriate technologies for the efficient use of fertilizers and pesticides and in the careful evaluation of cost-benefit relationships than in the supply and distribution of these inputs.

With regard to credit inputs, the Agriculture Development Bank of Nepal is being assisted by the Asian Development Bank, through technical assistance and loan funds, to expand the availability of credit to all farmers, including small subsistence ones. Increasing attention is being given to establishing ADB/N facilities and services and introducing its program of "guided" local cooperative development in the Hill areas. The supply of credit, therefore, does not appear to be a constraint at this time.

While we do not at this time see large-scale fertilizer, credit, and pesticide inputs as essential elements of an expanded research/demonstration program, we do see the need for an improved seed production/distribution system. This is partly because of the immediate potential which exists for national self-sufficiency in seed production and distribution — in contrast to a likely long-run dependence on imports of fertilizers and pesticides.

Historically Nepal has imported the major portion of its improved seed from India or other countries. Recently, "progressive farmers" have been encouraged to specialize in seed production, resulting in significantly increased domestic seed production. Very little additional effort will be required to eliminate entirely the need for seed imports. However, in order to maintain an incentive for domestic seed production and to increase the confidence of farmers to use locally produced seed, there must be an effective seed procurement, processing, storage and distribution system. This system must produce and distribute good quality seed. Varietal purity, freedom from foreign material (weeds etc.) and maintenance of high germination potential are essential to build and maintain a reputation for "quality seed". These qualities can only be guaranteed by the seed supply system — they are beyond the control of the researcher and extension worker. Yet if the results of the research system are to be made available to farmers, good quality seed must be produced and distributed.

On the continuum of the creation, dissemination, and adoption of new technology, a seed production/distribution system is the middle-point. Without such a system, the creation of new varieties means little. Hence, we consider a viable seed production/distribution system to be a leading edge in the acceptance and adoption of new technology, with the benefits of the system being the adoption of these technologies. In the converse, the cost of not having a strong seed production/distribution system is high — i.e., the cost of developing new varieties that are

not extended. (See USAID Inputs Section for more detailed discussion of proposed assistance to Nepal's seed industry).

Similarly, USAID is not proposing a traditional crop - specific research program. Rather, our efforts to develop new varieties and new technology packages for the major food grains (rice, wheat, and maize) will be based on a "farming systems" approach to research. This is of special importance for hill-directed research. The research done for the major food grains must be done in the context of the interactions between forests, grazing land, livestock, and crop area, including such so-called minor crops as barley, millet, potatoes, legumes, pulses, and oilseeds. These minor crops are planted before, during, or after the main crop growing season or on marginal lands. They lead to greater cropping intensity and productivity per unit of input, and they influence soil fertility — hence, they are an integral part of any "integrated cereals" research effort. As an example, the wide row-spacing of maize when intercropped with peanuts or soybeans reduces both downy mildew infestation and corn borer damage in the maize.

In proposing a research-oriented project, albeit defining "research" in a broader way, USAID acknowledges that substantial efforts have already been directed to crop-specific research in the past. But there is much work still to be done. First, as described above, the concept of research has to be broadened to include more feedback from the farm and to account for the realities of farming systems. In more specific terms, new rice varieties need to be developed which have blast resistance, cold tolerance, acceptable grain quality, insect resistance, and high yield characteristics. For maize, the existing new varieties are generally unsuited to the farming systems used by hill farmers due to extended maturity. As these two illustrations indicate, there is much "research" work still to be done — all of which is of particular importance when one recognizes that the three major food grains (rice, wheat, and maize) provide about 80% of the daily caloric intake of an average Nepalese.

While the benefits of a project such as this are bound to be nation-wide, we see special benefits for small farmers in the hills. As an explicit objective of the project (and as described more completely in the Course of Action section of this PROP), research will be directed towards small farmer plots and the systems which these farmers follow. This direction will evolve from continual feedback from the field and from economic analyses of the new technologies and of their impact on various socio-economic groups. For example, in some systems in some other countries, the benefits of new high yielding varieties of rice and maize with short maturity accrue to small farmers, while the benefits of long duration varieties are gained by large farmers. When such knowledge is available, resource allocations can be directed to promotion of those technologies which will have the greatest positive effect on small farmers. Also, in terms of individual crops, new varieties of wheat, barley, and millet will have relatively greater impact in the Western Hills and maize, potatoes, and oilseeds in the Eastern Hills.

In addition to the above efforts to direct the benefits of this project to the "poorest majority" (i.e., the 63.5% of all households farming less than one hectare and the 19.5% farming between one to three hectares), special efforts will be made to develop and promote new improved varieties of maize and to introduce high lysine characteristics to these maize varieties. Maize constitutes the major portion of the staple diet of 7.5 million people living in Nepal's hill and mountain areas. Approximately 900,000 hectares are currently estimated to be under maize cultivation

and approximately 840,000 MT produced per annum, of which approximately 560,000 MT (or 66%) is produced in the Hills.

Efforts to introduce high lysine characteristics to maize should improve the nutritional status of hill residents. Maize is one of the most important sources of protein in the daily diet of most hill Nepalese. Yet normal maize is a relatively poor source of protein, as it is not only low in quantity of protein (ranging from 4-9%), but also low in quality, since about 50% of that protein cannot be digested. The most serious deficiency of maize, in terms of nutritive value, is that it has a low content of lysine - an essential amino acid that man does not synthesize, and must obtain from his food.

Research on maize will be especially directed to small hill farmers who do not have access to motorable roads, credit, production inputs such as fertilizer, or a ready market. Even without these facilities, they should benefit because of such developments as: (1) better disease and insect resistant varieties; (2) shortened growing periods; (3) improved husk cover as a measure of reducing insect damage; (4) improved knowledge on placement and management of farm yard manures; and (5) improved methods of on-farm storage practices to reduce loss from insects and rodents.

II. Statement of Goal (See Annex for Logical Framework and Measures of Goal Achievement and Assumptions)

Goal: To increase the productivity of food grain crops in order to meet the longer term objective of increasing food availabilities, income, and nutritional status in Nepal.

III. Statement of Project Purpose

A. Purpose: To assist in strengthening the Ministry of Food, Agriculture, and Irrigation's (MFAI's) capacity to (1) generate improved production technology for the major food grain crops and related cropping systems and (2) transfer that technology to farmers.

B. Conditions Expected at End of Project: After completion of this project in five years, we anticipate a "creation/dissemination/adoption" system with the following characteristics.

1. Crop Research Division (CRD) of MFAI has effective operational linkages with the international research centers, with continuing interchange of technologies and information.

2. Interdisciplinary staff in place in CRD and functioning within individual units for food grains and cropping systems.

3. CRD, primarily through Crop Specialists, is reaching out to all farmers, including small subsistence ones, to discover production and technology problems at the farm level and basing research on this knowledge. Similarly, the Regional Directorates of the MFAI are automatically feeding back information to the CRD. A system exists which develops, tests, and evaluates new technologies on all the way to the farm level.

4. Within the MFAI, CRD programs in food grains are based on farm-level problems and research priorities, and resource allocations are determined as a result of analysis in the national context.

5. CRD is combining research on new food grain varieties, on optimal levels of inputs, and on ways of developing better cultural practices (including intercropping and multiple cropping) with an operational research capability for testing different technologies in different environments.

6. There is a close relationship between crop research and agriculture production economics functions — i.e., agricultural economists are providing analytic support to CRD.

7. Two-way communication exists between Crop Production Specialists in regions and CRD. CRD is automatically disseminating information to Specialists, who are in turn facilitating research trials and demonstrations in farmers' fields. Regional Directorates are capable of conducting on-farm demonstrations on minimum of 1,000 hectares per year.

8. Seven research farms/stations are operating in close collaboration with CRD, with additional multipurpose testing/evaluation stations in all regions and ecological zones.

9. The domestic production, processing, quality control, and distribution of newly recommended seed varieties are organized and administered by the Agricultural Inputs Corporation.

10. Regional Directorates are providing necessary information to accompany distribution of seed in order to facilitate the transfer of technology to the farm level.

11. A Seed Processing Plant in the Far Western Region is distributing at least 2,500 MT of new varieties per year.

IV. Statement of Project Outputs

Outputs	Magnitude
1. System designed to coordinate Research and Extension Functions	1. By end of year 1 of project
2. Diagnostic farm studies and definitions of farming systems and pressure points and research priorities	2. First studies by end of year 1 and continuing
3. Catalogues of Hill farming system models	3. Approximately 6 models by end of year 2
4. CRD training programs for Crop Production Specialists	4. FY 75-76: Programs Suffic. Place 4 Maize Prod. Spec. in 4 Devel. Regions.

Outputs	Magnitude
	FY 76-77: Programs Suffic. Place 2 Prod. Spec. in each Devel. Region for other crops.
	(Note: because Maize breeding program is further advanced than for other food grains, large-scale maize demonstrations will begin first)
5. CRD Regional Directorate training programs for crop-specific JTA's	5. FY 75-76: Programs Suffic. Place 10 Maize JTA's in each Devel. Region.
	FY 76-77: Programs Suffic. Place 10 Crop-specific JTA's in each Devel. Region.
6. Collection and testing program for existing varieties of "minor crops"	6. By end of year 1, programs have begun for oilseeds (mustard, niger, sesame, groundnut, castor bean and sunflower) and pulses (pigeon pea, chick pea, mung, blackgram, soybean, and cowpea)
7. On-farm demonstrations of newly adapted varieties	7. FY 76: 400 hectares (Maize) 77: 1,000 additional hectares 78: 1,000 " " 79: 1,000 " " 80: 1,000 " "
8. Economic and technical analyses and evaluations of on-farm demonstrations	8. Continuing
9. Development of technology packages for irrigated and dry land conditions to complement new varieties	9. Successful demonstrations of pkgs. at farm level by year 2 in Terai and year 3 in Hills
10. Newly developed, selected, and tested varieties of rice, maize, and wheat (as well as "minor" crops) that outperform traditional varieties	10. a. Maize: ready for introduction to farmers by FY 76 (with high lysine characteristic); b. Rice: first new varieties by FY 77; c. Wheat: first new varieties by FY 77;

Outputs	Magnitude
	d. Others: on continuing basis (Note: the number of varieties for all crops will be dependent upon analyses of agro-climatic, soil and economic factors and consequently cannot be quantified in advance.)
11. System designed for development of quality production, processing, and distribution of newly released seed varieties within AIC	11. System designed in FY 76 -- prior to construction #12 below
12. Seed processing plant in Far Western Terai	12. Capacity of plant: 2,500 MT/yr -- to be completed by FY 78
13. Trained Personnel	13. Life-of-Project (Dollar-Funded) M.Sc's - 24, (576 mm) Ph.D's - 7, (252 mm) S-T (HRRI & CIDMMT) - 28,(84 mm) S-T (Seed) - 6, (36 mm) L-T (Seed) - 2, (36 mm) L-T (Mss.Farm Mgt.) - 5, (60 mm)
14. Upgraded CRD stations	14. New construction (e.g., laboratories, office space, foundation seed facility, and staff quarters) to begin at Rampur, Khumaltar, and Parwanipur in FY 76
15. Upgraded CRD outreach stations	15. New facilities (e.g., office space, land preparation, and staff quarters) at Kakani and other hill experiment stations -- 4 or 5 across hills

V. Inputs

A. USAID Contribution

USAID's total financial contribution will be $4,510,440 (of which $1,460,000 equivalent will be rupee funded). Technical assistance funds will be provided for the following: 11 long-term advisors/specialists and short-term consultants to serve as external staff in the MPAI for a total of 453/4 man years and at an estimated cost of $2,056,000; participant training totalling 87 man years and at an estimated cost of $997,440; commodity assistance totalling $767,000 (of which $550,000 equivalent will be local currency), and other costs totalling $685,000 (of which $500,000 equivalent will be local currency). In addition, USAID will provide a rupee capital grant of $410,000 equivalent of construction of a seed processing plant in the Far Western Development Region.

1. **Technical Assistance Funds**

a. **External Specialist Staff**

USAID proposes to enter into a contract for the services of an External Staff Team Leader and of senior scientists from the International Research Institutes for Rice (IRRI) and Maize and Wheat (CIMMYT). Consultant services will be provided from IRRI and CIMMYT, as well as from other sources such as the International Potato Center, other International Research Institutes, and universities. Through this mechanism the project will have access to the wealth of information, plant materials and technical resources of these institutes as well as access to the other institutions making up the world network for agriculture research. Separate contracts are proposed with the Mississippi State University for short-term seed program consultants and with the International Volunteer Services (IVS) or similar organization for middle level technical specialists.

The following external staff members, period of service and posting locations in Nepal are anticipated:

1 - External Staff Team Leader; 60 man months; Kathmandu

1 - Senior Plant Breeder - Rice; 60 man months; Parwanipur (From IRRI)

1 - Senior Agronomist - Multiple Cropping; 60 man months; Kathmandu (From IRRI)

1 - Senior Plant Breeder - Maize, 30 man months; Rampur (From CIMMYT) — (Note: the Maize Plant Breeder will be required for a shorter period of time because of gains already made during the past three years of residency of a CIMMYT-provided Breeder)

1 - Senior Agronomist - Maize, 60 man months; Kathmandu (From CIMMYT)

1 - Senior Agronomist - Wheat/Barley, 60 man months; Kathmandu (From CIMMYT)

1 - Agriculture Production Economist, 48 man months; Kathmandu

4 - Middle-level Agronomists, 24 man months each, posted at Biratnagar, Kathmandu, Pokhara, and Nepalgunj (From IVS)

27 - Man months Seed Program Consultants (From Miss. State University)

48 - Man months specialist consultant services in agronomy, research station management, nutrition, food bio-chemistry, agricultural economics, farm machinery systems maintenance, and other related areas (From IRRI, CIMMYT, and other international institutions through the IHE contract)

In addition to the above technical staff, administrative project support staff will be provided through the contract. This staff will be comprised of one expatriate administrative officer, one Nepali administrative specialist, two Nepali clerk/typists, and required Nepali drivers/mechanics. This local support staff and other contractor logistical support will be financed with local currency, totalling approximate $275,000 equivalent over the life of the project.

b. Participant Training

Through the proposed contract, funds will be provided for foreign training of Nepalese specialists. Dollar-funded training is projected for approximately 72 persons for a total of 87 man years. The estimated cost of this training is $697,440.

Long term training at the graduate level (M.S and Ph.D) in the U.S. and third countries will be provided for upgrading research and supporting service personnel. Short term practical experience training will be provided at the International Research Institutes, in the U.S. and other countries in subject matter areas for which specific deficiences are known to exist - research farm management and operation; production activities; seed technology and production system organization and management; farm machinery and equipment operations, maintenance and repair; and multiple cropping and inter-cropping methods.

Complementary to this project USAID has re-initiated its support for a program of training Nepalese to the B.Sc. level in agriculture sciences at Indian Universities. It is anticipated that approximately 50 candidates will be sponsored for each of 4 years to qualify an additional 200 at this level. These individuals will play an essential role in research/demonstration. By the time this group completes its education, the Institute of Agriculture and Animal Sciences at Rampur will be producing 25-50 B.Sc. level graduates annually.

c. Commodities

Dollar financing will be included in the technical assistance contract for procurement of commodities in support of the activities of contract personnel assigned to the project. The commodities will consist of laboratory equipment and supplies, training materials, small farm demonstration machinery and equipment, vehicles for use of contract and project personnel, and miscellaneous other equipment for the research stations and for support of these stations.

Actual commodity lists will be made up by the contract team, but it is estimated that dollar funding levels will be as follows:

FY 76: $75,000
FY 77: $45,000
FY 78: $50,000
FY 79: $65,000
FY 80: $27,000
$262,000 from dollar funds

In addition to these dollar-funded commodities in the contract, local currency funding will be provided for the procurement of materials for demonstration production kits and for other materials and equipment to be used in the CRD's research program. It is anticipated that this will total $550,000 equivalent over the life of the project, the bulk of which will be for demonstration kits.

Production Kits $440,000 equiv.

Repair/Maintenance Equip.: $ 40,000 equiv.
Misc. other research equipment : 70,000 equiv.
$550,000 equiv.

d. Other Costs

Under this component of the project, USAID will be providing dollar and local currency funds to cover the local support costs of the USAID-financed technicians and to assist the Government of Nepal in financing limited construction at the national research centers and outreach hill stations and in the establishment of a central repair and maintenance facility at the Khumaltar Research Station. While the minor construction plans will be finalized in annual FMF Budgets, it is likely that the general order of magnitude will be $550,000 equivalent over the life of the project and will cover construction such as that as listed below:

(1) Small Seed Processing Units at each of the 3 major Crop Research Centers (Rice, Maize, and Wheat) @ $40,000 equiv. = $120,000 equiv.

(2) Small Seed Storage Units at 6 hill stations testing varieties for major Crops @ $12,000 equivalent — assuming construction of units at Kakani, Doti, Jumla, Jiri, Daman, and Dhankuta = 72,000

(3) Central Repair and Maintenance Facility at Khumaltar to support national CRP programs and stations = 75,000

(4) Upgrading of National Maize Center at Rampur and testing stations (laboratories, office space, staff housing, trainee accomodations, and land development) over the life of project = 100,000

(5) Upgrading of National Rice Center at Parwanipur and testing stations (pathology and entomology laboratories, screen house facilities, library, and office space) over the life of project = 90,000

(6) Upgrading of National Wheat Center at location yet to be determined and testing stations (laboratories, office space, land development) over the life of project = 93,000
$550,000 equiv.

In addition to these local currency support funds, it is estimated that dollar requirements will be approximately $185,000 over the life of the project ($40,000 in FY 76-78, $35,000 in FY 79, and $30,000 in FY 80). These funds will cover such items as invitational travel, international conferences, and in-country dollar-funded travel (helicopter time).

2. Excess Capital Grant

In conjunction with the purpose of this project to assist the Government of Nepal in the creation and promotion of new production technologies, USAID proposes a local currency capital grant of $900,000 equivalent to cover the equipment and construction costs of a Seed Processing Plant in the Far Western Development Region and of a nation-wide plan to convert existing (or portions of existing) ADC storage facilities so that they will be suitable for storing and maintaining seed.

These two major capital items are outlined below, although final approval for obligation of funds must await further documentation. Therefore, following tentative approval in substance by AID/W, USAID will submit supplementary

documentation providing more detailed justification of the specific construction to be financed and detailed construction design and cost estimates.

a. Seed Processing Plant

At the present time, there is only one modern seed processing plant in Nepal — a UNDP/FAO assisted plant at Hetaura in the Central Terai which has just become operational. This recently completed plant has a capacity to handle 2500 MT of seed per year, or sufficient to supply only the immediate needs of the Central Terai and Kathmandu area. Moreover, even if the capacity of this plant were increased, the lack ofadequate transportation facilities would make it impossible to serve the needs of the Pokhara (Western) and the Surkhet (Far Western) development regions. Because of a poor east-west transportation system and because of increasing regional demand for new improved seeds, the ARC has projected a need for 5 new regional seed processing plants over the next 5 years.

With regard to the potential input of seed utilization, the Nepal Rastra Bank's recent Agricultural Credit Survey Report shows high marginal value productivity (MVP) for seed inputs. For example, the MVP (for an additional rupee input) for maize seed on unirrigated land in Kavre, Lalitpur, and Syanja districts in the hills would be Rs 10.03, Rs 26.63, and Rs 12.76, respectively. While making no claim that a one rupee investment in improved seeds would have such an impact on productivity, these figures do indicate an underutilization of new improved seeds and the consequent substantial potential gains from their increased use.

With regard to the Far Western Development Region, there is only limited use of improved seeds at this time. In terms of the Agriculture Marketing Corporation's projected sale of seed (wheat, paddy, and maize) in FY 75, only 16% was targeted for the Far Western Region. In terms of actual area under improved seeds during 1969-72, the MFAI's records show the following:

	Per Cent of Total Area Under Improved Seed		
	Paddy	Maize	Wheat
Eastern Terai	5%	8%	78%
Western Terai	5%	4%	38%
Inner Terai	4%	4%	35%
Eastern Hills	1%	1%	1%
Western Hills	1%	1%	6%
Kathmandu Valley	41%	8%	61%

The above clearly indicates that there is real potential for increasing productivity through the introduction of improved seeds in the Far Western Hills. Accepting this, the key then becomes to ensure the availability of adequate quantities of quality seed.

While again not firm projections, we estimate the demand for improved seeds to be approximately 2,250 MT p.a. within the next few years in the Far Western Region. This is based on an assumption that 20% of the total area under paddy, wheat, maize, millet, and barley cultivation in the three zones nearest Surkhet (Bheri, Seti, and Karnali which are most likely to be serviced by a seed plant in Surkhet or Nepalgunj) could be covered with improved seeds by 1978-79 (if sufficient seeds were available).

PROJECTED DEMAND FOR IMPROVED SEED
(Bheri, Seti, and Karnali Zones)

	Area Under Cult. 1972-73 (ha.)	20% Coverage (ha.)	Seed Rate Kg/ha	Demand MTs
Paddy	130,204	26,040	55	1,432
Wheat	50,436	10,087	66	665

	Area Under Cult. 1972-73 (ha.)	20% Coverage (ha.)	Seed Rate Kg/ha	Demand MTs
Maize	58,382	11,676	30	350
Millet	13,470	2,694	25	67
Barley	6,896	1,379	25	34
Total	299,388			2,548

As stated in the Rationale of this PROP, the Mission views a viable seed industry as an essential element (and a logical follow-on) of an adaptive research program. This view is also held by the World Bank which reportedly considers "seed development" to be a crucial need — and superceded only by a need for improving agricultural education.

The seed processing plant (and limited consultancy services) proposed in this project will be closely coordinated with any eventual nation-wide program financed by the IBRD. However, because it is unlikely that any IBRD project could be developed prior to 1978 or 1979 and because the Mission wants to demonstrate the close relationship between the "seed processing function" and adaptive research, we propose financing of one plant in this project. Through the efforts of the Mississippi State University consultants and their HMG associates, this plant will demonstrate the "model" role to be played by the seed industry in the national research program — as such, it will help to develop a national system and improve the environment into which any large scale IBRD investment would be make. It is anticipated that the experiences learned in the UNDP/FAO project will be applied in the Far West.

The plant will be equipped to process seed of the principal crops - rice, maize, wheat, barley, and millet and will have a capacity to process approximately 2,500 MT of seed annually. The plant will be provided with storage facilities and seed handling equipment adequate for handling the seed at different stages in the processing. It will serve as a facility in which to undertake practical studies on methods of storing seed for maintaining high germination under conditions of high temperatures and high humidities and as a focal point for launching a better organized and controlled program for production of quality seed which is expected to result from technical assistance also provided under this project.

Financing in the amount of $410,000 equivalent for one plant is projected for FY 76/77.

Seed Storage Conversion

As part of an effort to encourage the increased utilization of improved seeds, the Agricultural Inputs Corporation is currently preparing a plan to convert existing (or portions of existing) storage facilities so that they will be suitable for the storage and maintenance of seed. At present, there is significant loss of seed due to poor storage. This "conversion" plan of the AIC is meant to alleviate this situation. The detailed plan proposed by the AIC is expected to be released in the near future — at which time USAID will submit supplementary documentation detailing the program and its cost. The present rough estimate is $490,000 equivalent.

B. HMG Contribution

HMG, through the various sections of the MFAI, will provide personnel, physical facilities and operating expenses for carrying out the research, demonstration, and production promotion programs discussed in this PROP.

Physical facilities at 12 research farms make up the existing research establishment. Project activities will be concentrated at 7 of these farms for which the FY 74 operating budgets totaled Rs 2,354,500 ($235,450). More limited activities will be carried out at the remaining 5 stations whose operating budgets totaled Rs 1,849,762 ($184,976) in FY 74. The three national crop programs (wheat, rice and maize) within which the project will operate had combined operating budgets in FY 74 of Rs 698,206 ($69,821). A total of Rs 8,932,960 ($893,296) was budgeted in FY 74 for the extension services including Regional Development Directorates and the District Extension Offices. Supporting Divisions in the Department of Agriculture received budget allocation totaling Rs 2,887,973 ($288,797) in FY 74. Thus the total Budget allocation of HMG entities which will be involved in the project amounted to $1,067,841 in FY 74. It is expected that budget allocations for these services will increase by at least 10% per annum through the life of the project.

Assuming this to be the case and using a low FY 74 figure of $1,000,000 as a base, the total proportion of HMG contributions to the project can be seen below.

	Expected HMG Budget	Total Expected USAID Contribution
FY 75	$1,100,000	
FY 76	1,210,000	
FY 77	1,331,000	
FY 78	1,464,000	
FY 79	1,610,000	
FY 80	1,771,000	
	$8,486,000	$4,810,440

Total Expected Project Costs $13,296,440

HMG Contribution as Per Centage: 64%

Besides this financial contribution, HMG will be providing the personnel to make the project work. At present, the seven research farms with which the project will be primarily concerned have a total technical staff of about 153, while the three National Crops Coordinators' Offices have technical staff which number 17. The Regional Development Directorates have a total staff of 873, of which 307 are at the junior technical assistant level.

While still awaiting the recommendations of the recent Rockefeller Team Hill Study, it is likely that HMG will need to create new gazetted and non-gazetted civil service positions. There might be as many as 100-130 new gazetted and 50-90 non-gazetted positions required over the life of the project which will be financed by HMG.

C. Other Donors

The proposed project will be the only significant donor activity in the area of adaptive research and technology development and demonstration with the basic food crops and for the production system in Hill areas. A UNDP/FAO

project which is terminating in June 1974 was concerned primarily with demonstration of use of high yielding crop varieties with adequate levels of fertilization (including the seed processing plant at Nepura in the central Terai area) and involved close cooperation with the terminating USAID Food Grain Technology Project.

Several on-going and/or proposed projects by other donors are relevant to the proposed project. The on-going Federal Republic of Germany assisted Gandaki Agricultural Development Project in the Pokhara Region will continue to provide an avenue for research trials as well as practical farmer trials of new technology in this area. A similar role is expected to be served by a newly initiated Japanese supported project in the central Terai; by a project which is currently under study by the IBRD for the Trisuli valley and watershed area; by an area development project which the Swiss have under study along a proposed road connecting Jiri with the Kodari road; and by two U.K. supported projects for training repatriated Nepalese military personnel, one in the Pokhara Development Region and one in the Dhankuta Development Region.

Other on going and/or proposed donor activities will complement this project in the pursuit of HMG sector goals: i.e., land resettlement projects supported by the IBRD and the Republic of Israel; irrigation projects (including groundwater development) by the IBRD and Asian Development Bank (ADB), and the ADB assistance to Nepal's major agriculture credit institution, the Agriculture Development Bank.

As this project and those of other donors evolve, there will be constant efforts to ensure complementarity. This will be of special importance with regard to Nepal's seed industry and the possible future interest of the IBRD in financing national seed processing facilities.

VI. Course of Action

As discussed in the Rationale of this PROP, the project will focus on the substance of adaptive research and related production promotion linkages for the principal food grains (rice, wheat, and maize) and related minor crops (such as millet, barley, potatoes, and pulses). This work will build upon the existing organizational framework of the MFAI and established physical facilities.

A. Adaptive Varietal and Production Technology Research

The research efforts of this project are based upon a close interaction between the traditional functions of Research and Extension — with a constant feedback between the two.

The research program will combine commodity and subject matter oriented programs into a farming systems approach. This approach will require the MFAI to improve its system of problem identification — e.g. through performance of the following functions: (1) gain an understanding of the farming system in selected geographic areas, (2) define the pressure points in the system, (3) identify which ones represent opportunities for improvement, (4) select those that are researchable, and (5) inform the coordinated national commodity programs or subject matter groups of problems needing

solution. These functions might best be performed by an interdisciplinary "Diagnostic Team" of senior-level personnel. The members of this Team would come from the NPAI and would serve in this special capacity on a part-time basis. The members would include crop specialists, a farming systems specialist, a livestock expert, a forage and fodder expert, and at least one agricultural economist. The External Staff Team Leader will consider the creation of this Diagnostic or Problem Identification Team to be one of his first major tasks. The Multiple Cropping Agronomist will be the key External Staff member assigned to this Team. Other members of the External Staff will supplement HMG expertise on the Diagnostic Team and will work to ensure coordination with the individual crop research programs.

The commodity research programs will work on components of the farming system within which their expertise lies. Their work on these components is to tailor the components to be just that: i.e., components in an overall system. The subject matter programs will receive the prescription or description of what the new or improved component must embody from the interdisciplinary team and then try to make the technology fit the system, always working to move the system to a higher level of productivity.

With regard to specific varietal improvements, the External Staff Specialists will assist the National Maize Coordination Team in the development of acceptable high lysine maize; will assist the National Rice Coordination Team in the development of varieties better adapted to the monsoon cycle in the terai and the higher altitudes and cooler conditions in the hills — especially with respect to disease and insect resistance and adaptability to cooler soil and air temperatures; and will assist the National Wheat Coordination Team in the development of varieties which will assure maintenance of resistance to prevalent diseases and which are more adaptable to higher elevations. In order to be full members of the HMG National Crop Teams, the External Staff specialists will be resident at the research stations housing the national programs — i.e., the Maize Breeder will be at Rampur, the Rice Breeder at Parwanipur, and the Wheat/Barley Agronomist and Multiple-cropping Agronomist at Khumaltar.

In addition, the project will look at the so called minor crops (such as millet, barley, potatoes, and pulses) which have special importance in the hills. The focus of activities with these crops, will be in the first instance on studying adaptation of different varieties to varying conditions and production systems rather than attempting to develop varieties specifically for local conditions. Variations in dates of maturity, reaction to disease and pests, responsiveness to different levels of soil fertility among available materials should permit a wide range in selection of materials adapted to the varied conditions. The Multiple-cropping Agronomist from NPAI will assist HMG in the creation of a collection and screening program for these minor crops.

With regard to production technology research, and as already discussed in the Rationale, improved production technology usually means use of higher yielding varieties in combination with use of fertilizers (chemical as well as manures) and better cultural practices. It also involves the economic study of production packages — i.e., new packages must be more profitable than old ones. It is not usually sufficient, therefore, to show on research farms, or

to demonstrate in farmers fields, that the new varieties and associated practices result in greater yield, but also that these fit in the production and climatic cycles and result in greater returns to the farmer. This project therefore combines research for developing improved varieties, for determining optimum levels of fertilization and for developing better cultural practices, including intercropping and multiple cropping, with an operational research aspect for testing the different technologies under different agro, socio and economic conditions. This will provide a better understanding of why certain technologies are accepted while others fail to gain acceptance. This evaluative/research aspect of the project will require an interdisciplinary approach and will be dependent upon the full cooperation of the Regional Directorates. All External Staff Specialists and their HMG associates will be providing this type of feedback/evaluation information, but a system of coordinating the technical and economic data will be a special responsibility of the expatriate Agriculture Production Economist and his HMG associates. The four External Staff Crop Specialist assigned to the Regional Directorates will also assist in the provision of the essential feedback information and on-farm testing. These Specialists will receive functional guidance from the CRD and Crop Teams and will serve as their outreach agents, although they will be administratively within the Regional Directorates.

A number of largely untried possibilities for increasing production would appear to merit attention: use of disease and insect resistant varieties and use of seed treating chemicals and insecticides - there is little information on the amount of losses which occur because of diseases and insects in Hill agriculture. Reports of losses from potato blight, from smuts of small grain and from a number of insect pests are frequently made in reports on Hill agriculture, however, the magnitude of such losses as well as the probability for effective control remains unknown. Insects and other pests are reported to cause heavy losses in stored grain. Reducing these losses could result in a net increase of available grain.

B. Seed Industry Development

As discussed in the Rationale, a viable seed industry is an indispensable element of an out-reaching research program. Therefore, an important element of this project will be assistance for improving the existing system for production, quality control and distribution of seed. A study by Mississippi State University (MSU) in December, 1973 made a number of recommendations for improving the organization and operation of a quality seed program. The chief of the seed section of the new Agricultural Inputs Corporation has proposed certain management and operational changes for improving performance of the section in accordance with the MSU recommendation, however, further assistance is necessary. This project will provide assistance for (1) organizing an effective seed unit in the Agricultural Inputs Corporation (AIC) with sufficient autonomy to permit responding to the specific needs of a seed program, (2) designing a cooperative effort involving the AIC, the Botany Section and the District Agricultural Officers, under the Director General of Agriculture of the MFAI, for managing and operating a program of quality seed production by select farmers under a system of field "certification" until such a program of production of true certified seed can be organized and effectively operated, (3) establishing in the Southeast region a seed processing unit which

will serve as a center for research in methods of treating and storage of seed for preserving germination under conditions of high temperatures and relative humidity, serve for in-service training of personnel and at the same time serve the seed processing and storage needs of the Surkhet Development Region [redacted] and (4) providing training of personnel for staffing the AIC organization and of personnel of the cooperating elements of the MVAI.

C. Production Promotion

While USAID has not established specific production targets, it is an explicit objective of this project to assist the MVAI strengthen its capability to transfer newly developed technologies to farmers in order to increase production. This strengthening will be based on improved linkages between traditional research and extension functions — primarily through the creation of Crop Production Specialist staff in the Regional Directorates. In order to assist HMG in the development of these linkages with the farmers of Nepal, USAID will provide the services of Farm Crop Specialists in the Regional Directorates. They will help to identify practical problems which require attention of the CRD, as well as transmit new research developments to the district-level extension workers.

These Specialists will work with CRD staff in the training of HMG Extension personnel. With assigned HMG associates, they will conduct research trials and demonstrations in farmers fields as well as training and field day demonstrations at the research farms and farmers trials. Heretofore these activities have reached only a relatively small area immediately surrounding research farms. The Regional Production Specialists will try to ensure that these demonstrations reach farther into the hinterland. In addition, they will play an important role in coordination of efforts of the research farms and the AIC to assure that adequate supplies of inputs - quality seeds of suitable varieties, fertilizers etc., are made available to farmers in a timely fashion and the AIC to assure that credit is made available. Initially the project will focus on a production promotion program for maize due to its relative importance for Hill agriculture. As trained personnel become available and relevant positions can be authorized, other HMG production specialists will be added.

D. Project Review and Evaluation

Annual Project Agreements will provide for the development of annual work plans for each of the project elements. A quarterly review of progress in accordance with these plans will be scheduled and conducted by the Project Review Committee of the MVAI, with participation of USAID and the External Staff. An annual evaluation of the project will be conducted prior to the development of annual project agreements. This evaluation will follow A.I.D. evaluation procedures, plus any special requirements of the Project Review Committee. External Staff and Nepalese project principals, the USAID Project Liaison Officer, and a representative of the Secretary, MVAI, will participate.

E. Planned Implementation Schedule of USAID Inputs

See Table on following page.

PLANNED IMPLEMENTATION SCHEDULE FOR USAID INPUTS

	FY 75	FY 76	FY 77	FY 78	FY 79	FY 80	Funding
National Specialist Staff							
1. Team Leader	X ——— 60 mm ——— X						
2. Rice Breeder	X ——— 60 mm ——— X						
3. Mult. Cropping Agronomist	X ——— 60 mm ——— X						
4. Maize Breeder	X ——— 60 mm ——— X						
5. Wheat/Barley Agronomist	X ——— 30 mm ——— X						@ $48,000 per man year = $1,512,000
6. Maize Prod. Agronomist	X ——— 60 mm ——— X						
7. Ag. Prod. Economist	X ——— 60 mm ——— X						
8. Prod. Specialists — Biratnagar	X ——— 48 mm ——— X						
9. " " — Kathmandu		X ——— 24 mm ——— X					
10. " " — Pokhara		X ——— 24 mm ——— X					@ $25,000 per man year = $ 200,000
11. " " — Nepalgunj		X ——— 24 mm ——— X					
		X ——— 24 mm ——— X					
Seed Consultants							
1. Seed Specialist (Mgt.)	X—X3mm	X—X3mm	X—X3mm				
2. Seed Specialist (Tech.)	X—X3mm	X—X3mm	X—X3mm				
3. Seed Plant Designer	X-X1mm	X—X2mm					= $ 200,000
4. Seed Plant Engineer		X——X6mm					
Other Short-term Consultants							
Continuing	X ——— 48 mm total ——— X						@ $ 6,000 per 2 month TDY = $ 144,000
Participants							
1. M.Sc's	X — 3 participants — X	X — 5 participants — X	X — 6 participants — X	X — 5 participants — X	X — 5 participants — X		
2. Ph.D's	X — 1 participant — X	X — 3 participants — X	X — 3 participants — X				

	FY 75	FY 76	FY 77	FY 78	FY 79	FY 80	Funding
3. Short-term at IRRI and CIMMYT		5 partic. X—X	6 partic. X—X	6 partic. X—X	6 partic. X—X	5 partic. X—X	= $ 897,440
4. Research Farm Mgt.		X 2 partic. X	X 2 partic. X	X 1 partic. X			
5. Seed Tech. & Production		X 1 partic. X	X 1 partic. X				
		3 partic. X—X	3 partic. X—X				
Commodities (Year of Procurement)							
1. Dollar-funded Commodities	$75,000	$45,000	$60,000	$55,000	$27,000		= $ 812,000
2. Production Kits (rupees	$40,000 equiv.	$100,000 equiv.	$100,000 equiv.	$100,000 equiv.	$100,000 equiv.		
3. Repair/Maint. Equip. (rupees)			$40,000 equiv.				
4. Misc. other research equip.		$20,000 equiv.	$30,000 equiv.	$20,000 equiv.			
Other Costs							
1. Dollar-funded costs support External Staff		$40,000	$40,000	$40,000	$35,000	$30,000	= $ 185,000
2. Rupee-funded costs support External Staff	$55,000 equiv.	$55,000 equiv.	$55,000 equiv.	$55,000 equiv.	$55,000 equiv.		= $ 275,000
3. Construction Costs	$100,000	$150,000 equiv.	$100,000 equiv.	$100,000 equiv.	$100,000 equiv.		= $ 550,000
Rupee Capital Grant							
1. Seed Processing Plant		$410,000 equiv.					= $ 410,000
2. Seed Storage Conversion			$490,000 equiv.				= $ 490,000
						GRAND TOTAL	= $5,675,000

LOGICAL FRAMEWORK

PROJECT TITLE: INTEGRATED CEREALS PROJECT

PROJECT NUMBER: 367-11-110-114

ANNEX 1

DATE PREPARED: 1/7/79

	MEASURES OF GOAL ACHIEVEMENT	MEANS OF VERIFICATION	ASSUMPTIONS
GOAL To increase the productivity of foodgrain crops in order to meet the longer term objective of increasing food availabilities, income, and nutritional status, in the hills and the terai	(1) Total hectarage where improved technology used increases from current 7% of total cultivated hectarage to 15% in terai by 1980 and to 5% in the hills	(1) MFAI records and results of analysis done by MFAI — in conjunction with sample surveys done as part of USAID-HMG Ag Econ Data Analysis Project	(1) That HMG pursues policies which provide adequate incentive (e.g.) prices of inputs and final products) to make the new technology attractive to farmers
	(2) Productivity of foodgrains in areas using new technology at least 50% higher than areas using traditional methods by 1980	(2) ——— do ———	(2) That complementary HMG investment in agriculture (e.g., measures to intensify land use) is realised
	(3) New technologies introduced for hill-specific crops (e.g., potatoes, millets, forage, and high altitude rice) as well as for terai-specific foodgrains	(3) MFAI/Crop Research Division (CRD) records	(3) That farmers will adopt new improved technologies which are economic — and that this adoption is not entirely dependent upon an Extension Service whose effectiveness is not assured
	(4) Food Grain Production in both hills and terai growing at least the rate of population growth	(4) MFAI records	(4) That new varieties developed are economically feasible in Nepal and in fact better than traditional varieties
			(5) That HMG policy remains to invest resources in the hills for social/equity purposes, although purely production/economic criteria might dictate otherwise — this will allow for investment in hill specific crops
			(6) Adverse weather does not have negative impact on production
PURPOSE To assist in strengthening the MFAI's capacity to (1) generate improved production technology for the major foodgrain crops and related cropping systems and (2) transfer that technology to Nepali farmers	END OF PROJECT STATUS		
	(1) Crop Research Division (CRD) of MFAI has effective operational linkages with the international research centers, with continuing interchange of technologies and information	(1) Observation	(1) HMG supports CRD with required staffing and budgets
	(2) Interdisciplinary staff in place and functioning within individual units for foodgrain crops and cropping systems	(2) Observation and CRD records	(2) HMG rules/regulations permit necessary training abroad, especially for Research Agronomists and Crop Production Specialists
	(3) CRD, primarily through Crop Specialists, is reaching out to all farmers, including small subsistence ones, to discover production and technology problems at farm level and basing research on this knowledge. Similarly, the Regional Directorates of the MFAI are automatically feeding back information to the CRD. A system exists which develops, tests, and evaluates new technologies — all the way to the farm level	(3) ——— do ———	(3) HMG commitment is strong enough to break through any bureaucratic rigidities which might impinge upon linkages between traditional research and extension functions
			(4) Farmers willing to participate in "feedback process"
			(5) Cost effective and technically feasible technologies possible
	(4) Within the MFAI, CRD programs in foodgrains are based on farm-level programs and research priorities, and resource allocations determined as a result of analysis in national context	(4) ——— do ———	(6) AMC given the responsibility and authority, with concomitant staff, to enable it to discharge its production, processing, and distribution functions
	(5) CRD is combining research on new foodgrain varieties, on optimal levels of inputs, and on ways of developing better cultural practices (including intercropping and multiple cropping) with an operational research capability for testing different technologies in different environments	(5) ——— do ———	
	(6) There is a close relationship between crop research and agric. production economics functions — i.e., Ag Economists are providing analytic support to CRD	(6) Observation	
	(7) Two-way communication exist between Crop Production Specialists in regions and CRD. CRD is automatically disseminating information to Specialists, who are in turn facilitating research trials and demonstrations in farmers' fields. Regional Directorates capable of conducting on-farm demonstrations (a minimum of 1,000 hectares per year.	(7) ——— do ———	
	(8) Seven research farms/stations are operating in close collaboration with CRD, with additional multipurpose testing/evaluation stations in all regions and ecological zones	(8) Observation	

	(9) The domestic production, processing, quality control, and distribution of newly recommended seed varieties are organized and administered by the AIC.	(9) MFAI & AIC records & observation
	(10) Regional Directorates are providing necessary information to accompany distribution of seed in order to facilitate the transfer of technology to the farm-level	(10) MFAI records on use of inputs, district by district
	(11) A Seed Processing Plant in the Far Western Region is distributing at least 2,500 MT of new varieties per year	(11) Observation
[illegible]	MAGNITUDE OF OUTPUTS	MEANS OF VERIFICATION
1. System designed to coordinate Research & Extension functions	1. By end of year 1 of project	1. Observation & Contract team reports
2. Diagnostic Team studies and definitions of farming systems pressure points and research priorities	2. First studies by end of year 1 and continuing	2. Observation
3. Catalogue of Hill farming system models	3. Approximately 6 models by end of year 2 of project	3. MFAI records
4. CRD training programs for Crop Production Specialists	4. FY 75-76: Programs sufficient place 4 Maize Prod. Spec. in 4 Devel. Regions FY 76-77: Programs sufficient place 2 Prod. Spec. in each Devel. Region for rice, wheat, and multiple cropping (Note: Because Maize breeding program is further advanced, large scale maize demonstrations will begin first)	4. MFAI records
5. CRD/Regional Directorate training programs for crop-specific JTA's	5. FY 75-76: Programs sufficient place 10 Maize JTA's in each Devel. Region FY 76-77: Programs sufficient place 10 crop-specific JTA's in each Devel. Region for rice, wheat, and multiple cropping	5. MFAI records
6. Collection and testing program for existing varieties of "minor crops"	6. By end of year 1, programs have begun for oilseeds (mustard, niger, sesame, groundnut, castor bean and sunflower) and pulses (pigeon pea, chick pea, mung, blackgram, soybean, and cowpea)	6. MFAI records
7. On-farm demonstrations of newly adapted CRD varieties	7. FY 76: 400 hectares under demonstration (Maize) 77: 1,000 add. " " " " 78: 1,000 " " " " " 79: 1,000 " " " " " 80: 1,000 " " " " "	7. MFAI/CRD/Regional Directorate records
8. Economic and technical analyses and evaluations of on-farm demonstrations	8. Continuing	8. MFAI reports
9. Development of technology packages for irrigated and dry land conditions to complement new varieties	9. Successful demonstration of packages at farm level by year 2 of project in Terai and year 3 in hills	9. MFAI reports
10. Newly developed, selected, and tested varieties of rice, maize, and wheat (as well as minor food crops) that outperform traditional varieties	10. (a) Acceptable new varieties of maize (with high lysine characteristic) ready for introduction to farmers by FY 76; (b) Acceptable new varieties of rice (including high altitude varieties) available by FY 77; (c) Acceptable new varieties of wheat (including rust resistant characteristics) available by FY 77; (d) Other new varieties on continuing basis (Note: The number of varieties for all crops will be dependent upon analysis of agro-climatic and economic conditions and consequently cannot be quantified in advance).	10. MFAI/CRD records
[illegible]m designed for development of quality [illegible]duction, processing, and distribution of [illegible]ly released seed varieties within AIC	11. System designed in FY 76 — prior to construction #12 below	11. AIC & Contract team reports

12. Seed processing plant in Far Western Terai	12. Capacity of plant: 2,500 MT/yr. — to be completed by FY 78	12. Observation
13. Trained Personnel	13. Life-of-project M.Sc.'s (U.S.) — 24 participants, (576mm) Ph.D's (U.S.) — 7 " (252 mm) S-T (IRRI & CIMMYT) — 28 " (84 mm) S-T (Seed Tech & Prod in U.S.) — 6 participants, (36 mm) L-T (" " " " ") — 2 " (36 mm) L-T (Research Farm Mgt.& Operations) — 5 " (60 mm)	13. USAID & MFAI records
14. Upgraded Crop Research Division stations	14. New facilities (e.g., laboratories, office space, foundation seed facility, and staff quarters) at Rampur, Khumaltar, and Parwanipur — construction to begin in FY 76	14. MOAI records
15. Upgraded CRD outreach stations in hills	15. New facilities (e.g., office space, land preparation, and staff quarters) at Kakani and other hill experiment stations — 4 or 5 stations across hills	15. ——— do ———

INPUTS

I. USAID

A. Advisory Assistance

1 - External Staff Team Leader (IIE)
1 - Maize Plant Breeder (CIMMYT thru IIE)
1 - Maize Production Agronomist (CIMMYT thru IIE)
1 - Wheat/Barley Prod. Agron. (CIMMYT thru IIE)
1 - Rice Plant Breeder (IRRI thru IIE)
1 - Multiple Cropping Agron. (IRRI thru IIE)
1 - Ag Production Economist (IIE)
4 - Middle-level Regional Crop Spec. (IIE)
11

Short-term Consultants

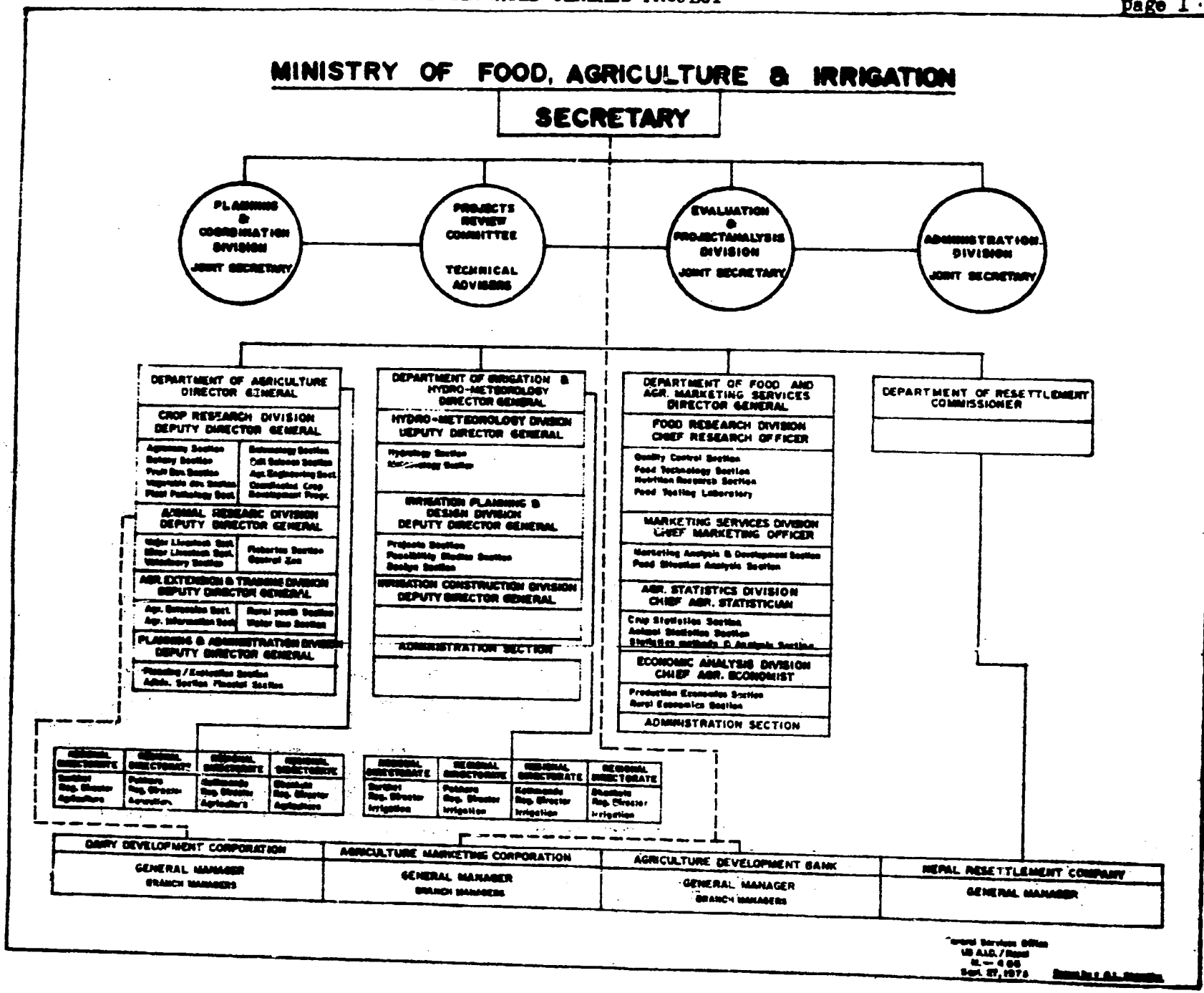
Seed Program Consultants (Miss. St. Univ.) 27 mm
Research/Agronomy/Nutrition/Management Consultants 48 mm
75 mm

B. Participant Training

	FY 75	FY 76	FY 77	FY 78	FY 79	FY 80		Total
1. Advanced Degree Training (Research & Agronomy) for M.Sc.'s & Ph.D's (U.S.)	-	4	8	9	5	5	=	31
2. S-T at IRRI & CIMMYT	-	5	6	6	6	5	=	28
a. Maize	-	(3)	(1)	-	-	-		
b. Other	-	(2)	(5)	(6)	(6)	(5)		
3. Seed Tech. (L-T and S-T in U.S.)	-	1	3	4	-	-	=	8
4. Research Farm Mgt. (S-T in U.S. and T.C.)	-	2	-	2	1	-	=	5

C. Commodities (Year of Procurement)

	FY 75	FY 76	FY 77	FY 78	FY 79	FY 80	
1. Dollar-funded Commodities		$ 50,000	$ 45,000	$ 35,000	$ 30,000	$ 27,000	
2. Production Kits (rupees)		$ 40,000 equiv.	$100,000 equiv.	$100,000 equiv.	$100,000 equiv.	$100,000 equiv.	= $762,000
3. Vehicles (rupees)		$ 25,000 equiv.	$ 25,000 equiv.				
4. Repair/Maint. Equip. (rupees)		$ 20,000 equiv.	$ 20,000 equiv.				
5. Misc. other research equip.		$ 20,000 equiv.					
D. Other Costs							
1. Dollar-funded costs support External Staff		$ 40,000	$ 40,000	$ 40,000	$ 35,000	$ 30,000	= $185,000
2. Construction Costs		$150,000 equiv.	$100,000 equiv.	$100,000 equiv.	$100,000 equiv.	$ 50,000 equiv.	= $500,000
E. Nepal Capital Grant							
1. Seed Processing Plant			$410,000 equiv.				= $410,000


MINISTRY OF FOOD, AGRICULTURE & IRRIGATION
SECRETARY
PLANNING & COORDINATION DIVISION
JOINT SECRETARY
PROJECTS REVIEW COMMITTEE
TECHNICAL ADVISERS
EVALUATION & PROJECT ANALYSIS DIVISION
JOINT SECRETARY
ADMINISTRATION DIVISION
JOINT SECRETARY
DEPARTMENT OF AGRICULTURE
DIRECTOR GENERAL
CROP RESEARCH DIVISION
DEPUTY DIRECTOR GENERAL
ANIMAL RESEARCH DIVISION
DEPUTY DIRECTOR GENERAL
AGR. EXTENSION & TRAINING DIVISION
DEPUTY DIRECTOR GENERAL
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DIRECTOR GENERAL
HYDRO-METEOROLOGY DIVISION
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ADMINISTRATION SECTION
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CHIEF RESEARCH OFFICER
Quality Control Section
Food Technology Section
Nutrition Research Section
Food Testing Laboratory
MARKETING SERVICES DIVISION
CHIEF MARKETING OFFICER
AGR. STATISTICS DIVISION
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Crop Statistics Section
Animal Statistics Section
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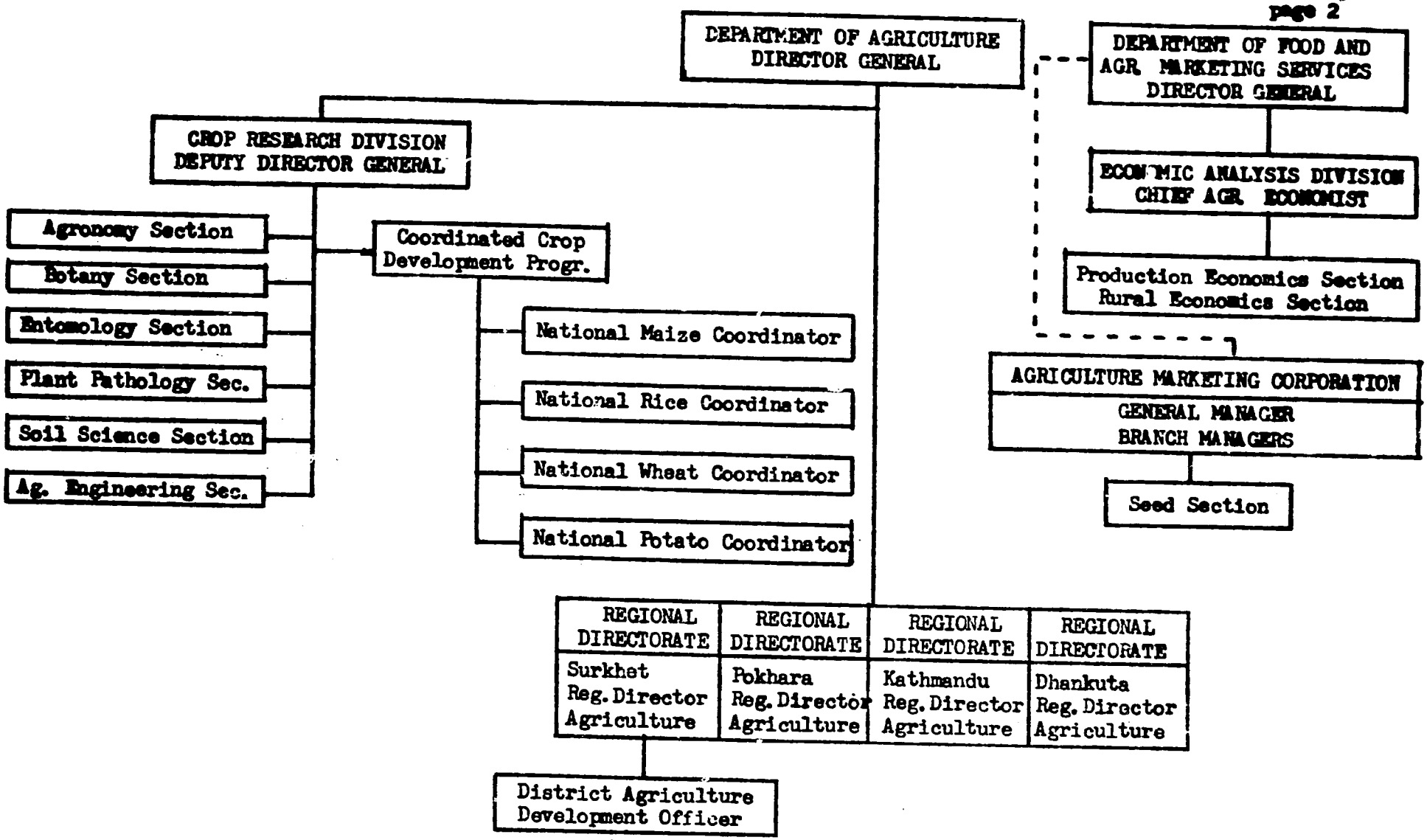
REGIONAL DIRECTORATE
Regional Director
Agriculture
REGIONAL DIRECTORATE
Regional Director
Irrigation
DAIRY DEVELOPMENT CORPORATION
GENERAL MANAGER
BRANCH MANAGERS
AGRICULTURE MARKETING CORPORATION
GENERAL MANAGER
BRANCH MANAGERS
AGRICULTURE DEVELOPMENT BANK
GENERAL MANAGER
BRANCH MANAGERS
NEPAL RESETTLEMENT COMPANY
GENERAL MANAGER

INTEGRATED CEREALS PROJECT
Organizations with Specific Relevance to the Project



Annex 2

INTEGRATED CEREALS PROJECT

Table 3 Estimation of possible contributions of three potential sources for increasing foodgrains production in the Terai and in the Hills.

SOURCES	Production Increase %	TERAI			HILLS			TOTALS	
		Cropped Area 1000 has.	Production 1000 MT	Cumulated Production 1000 MT	Cropped Area 1000 has.	Production 1000 MT	Cumulated Production 1000 MT	Cropped Area 1000 has.	Cumulated Production 1000 MT
1970-71 base for all grain crops	(a)	1299	2273	2273	690	1208	1208	1989	3481 (g)
(1) Bringing new land in production in the Terai - assumes it to be feasible to bring into cultivation 400,000 new has.	(b) 20	400	700	2973	690	1208	1208	2389	4181
(2) Increasing Cropping Intensity - assumes Terai land Cropped to factor of 200 and Hills lands Cropped to factor of 150	(c) 54	1227	2147	5120	70	123	1331	3686	6451
(3) Same as (2) except assuming only 50% of intensity target for the Terai are achieved	(d) 28	(614)	(1075)	(4048)	(70)	(123)	(1331)	(3073)	(5379)
(4) Improved Technology - assumes improved technology will increase yields by 1000 kg/ha - if applied to 50% of area	(e) 28	(1463)	(1463)	(6583)	(380)	(380)	(1711)	(3686)	(8294)
(5) Same as (4) if applied to 100% of cropped area	(f) 56	2926	2926	8046	760	760	2091	3686	10137 (h)

(a) Area and production for all grain from 1972 Agriculture Statistics of Nepal

(b) Estimates of new land which could be brought in production in the Terai range from 300,000 - 6000 has., none in the hills.

(c) An intensity of 200 and 150 means 2 and 1½ crops respectively are harvested from the same area in one year. With controlled year-round irrigation an intensity of 300 is feasible in the Terai.

(d) To achieve a cropping intensity of 200 in the Terai essentially all irrigable land will have to be brought under irrigation. This will require the development of 40,000 has. per year over a 25 year period.

(e) The assumed gain from new production technology is based on the assumption that the use of high yielding varieties and improved cultural practices including water management will yield on an average an additional 1000 kg of grain if fertilizer use was increased by 100 kg of nutrients per ha. Average current usage in slightly over 5 kg of nutrients per ha. achieving this target will require the additional use of approximately 185,000 tons fertilizer as nutrients.

(f) Achieving this target will require approximately 370,000 tons additional fertilizer nutrients.

(g) Provides 305 gross kg/person/year

(h) Would provide 441 gross kg/person at population projected for the year 2001.