

PN-AAN-943

RESEARCH PAPER SERIES

Number 23

July 1983

RESOURCE ALLOCATION TO AGRICULTURAL
RESEARCH IN NEPAL

Ramesh P. Sharma



HMG - U.S. AID - A/D/C PROJECT
STRENGTHENING INSTITUTIONAL CAPACITY IN THE
FOOD AND AGRICULTURAL SECTOR IN NEPAL

Foreword

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RESOURCE ALLOCATION TO AGRICULTURAL
RESEARCH IN NEPAL

Ramesh P. Sharma*

ABSTRACT

This study describes the financial and manpower research resources for the period 1975/76 to 1979/80 for agricultural commodities and assesses the ex post resource allocation pattern. The average annual agricultural research expenditure was 0.23 percent of agricultural GDP. Research investment relative to the value of production was 0.33 percent in crops, 0.24 percent in horticulture, 0.02 percent in livestock, 0.26 percent in fishery, and 0.21 percent in forestry. The relative investment in livestock research is extremely low.

Food crops received less investment than cash crops. Poor farmers' crops such as millet, pulses, barley and the all-important crop--paddy--were underinvested compared to cash crops, maize, and wheat. Food crops were also underinvested relative to their cultivated area and importance in consumption.

This study indicates that investment in agricultural research should be increased, and livestock research in particular should receive more attention. Research on food crops, especially paddy and poor people's crops, also require additional investment. To correct the present misallocation of resources, it is suggested that ex ante studies on resource allocation be carried out to prepare a prospective agricultural research plan.

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INTRODUCTION

There has been increasing interest among social scientists in recent years in the problems and procedures related to establishing priorities in agricultural research programs. As a result, three international conferences--the 1969 Minnesota Symposium (Fishel 1971), the 1975 Virginia Conference (Arndt et al. 1977) and the 1981 Singapore Conference (Daniels and Nestel 1981)--were organized to address this issue. This interest, mainly among economists, is a reflection of the realization that research is an economic activity requiring scarce resources and producing something of value (Schultz 1979), and the growing realization of the critical role played by research in the development process.

The rates of return to agricultural research are often quite high, in the range of three to five times the rates of conventional agricultural development projects (Arndt et al. 1977). While this argues for a larger allocation of resources to agricultural research, there are severe limitations imposed by the lack of trained manpower and funds for research. In view of this, studies on resource allocation are extremely useful in agricultural research management. As a result of a recent study on resource allocation to rice research programs, IRRI has allocated relatively more resources to rainfed rice research as compared to irrigated rice research (Barker and Herdt 1979). A recent survey of resource allocation studies and their policy usefulness is provided by Oram and Bindlish (1981).

OBJECTIVE

While the available data on research resources in Nepal are not amenable to analysis of the allocation pattern, this first study on resource allocation in agricultural research in Nepal attempts to prepare an inventory of financial and manpower research resources in specific sub-sectors of agriculture and to evaluate the existing allocation system using the data for the five-year period 1975/76 to 1979/80.

AGRICULTURAL RESEARCH IN NEPAL

Although agricultural research was initiated in Nepal three decades ago, research infrastructure has only been established since the early sixties (Yadav 1976; APROSC 1978). Agricultural research is conducted by 16 national public institutions under four Ministries. Most agricultural research is conducted within the Ministry of Agriculture, and experimental research farms are scattered throughout the country. A list of all research institutions and their respective areas of research is given in Table 1. As a result of data constraints, not all research areas could be included in this study.

There is overlapping and duplication in research efforts both within institutions and among institutions, and because there was no plan to guide the establishment of experimental farms, duplication of work in similar ecological regions is common (APROSC 1981a). This unnecessary effort is largely the result of the lack of an effective institution to determine priorities and to coordinate research programs. In view of this, a proposal for creating an Agricultural Research Council has been submitted to His Majesty's Government (Pradhananga et al. 1977).

RESOURCE ALLOCATION SYSTEM

The most important declared objective of agricultural development in Nepal is to increase food production. Agricultural research is expected to play a crucial role by promoting timely modernization, diversification, and continuous improvement of the agricultural sector (NPC 1981). Research that contributes toward increasing production and productivity is to receive top priority.

Financial resource allocation in agricultural research follows the budget allocation system of His Majesty's Government of Nepal. First, research programs are identified at the national level and allocated to research farms. Based on these programs, the research farms prepare annual budgets and submit requests to their respective departments. The departments review these requests and forward them to the respective Ministries, which in turn review them and forward them to the Finance Ministry, which makes a final review and necessary

Table 1. Agricultural Research Institutions in Nepal

Institution	Area of Research
<u>Ministry of Agriculture</u>	
Department of Agriculture	Agricultural Crops, Horticulture, Fisheries
Department of Livestock and Animal Health	Livestock
Tea Development Corporation	Tea
Food and Agriculture Marketing Services Department	Agroeconomics, Statistics, Marketing
Agricultural Projects Services Centre	Agroeconomics
Tobacco Development Board*	Tobacco
Agricultural Tools Factory	Agricultural Tools
Agricultural Lime Industry	Agricultural Lime
<u>Ministry of Industry and Commerce</u>	
Jute Development Corporation	Jute
Cotton Development Board	Cotton
<u>Ministry of Forest</u>	
Botany Department, Department of Medicinal Herbs	Forest Products, Medicinal Herbs
Forestry Survey and Research Department	Forestry
Department of Soil and Water Conservation	Soil and Water
<u>Ministry of Education (University)</u>	
Centre for Economic Development and Administration	Agroeconomics
Agricultural Campus	Agriculture, Livestock
Research Centre for Applied Science and Technology	Agricultural Technology

* The Board is under Ministry of Industry and Commerce, but the research and extension components of Tobacco are under Ministry of Agriculture.

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adjustments. Finally, there are backward readjustments starting from the Ministries until the budgets for the lowest units are fixed.

Thus budget adjustment, which mostly means deductions, occurs at several places. The Finance Ministry is more concerned with aggregate Ministerial budgets, whereas allocation to research farms occurs mostly at the departmental level. At the departmental level, research competes with extension and with other programs. One important basis of budget allocation is the soundness of research projects, and frequent budget reductions indicate that research farms often do not submit sound research project proposals. Informal procedures are often important in the budget allocation process. To improve this situation, either there should be an effective organization to bargain for research programs, or the budget allocation process for research should be made more independent of the governmental budget allocation system.

Because agricultural research is entirely in the public sector, manpower allocation for research is the same as in other public sectors. A departmental request for a new post must be submitted to the Finance Ministry for budget provision and to the Ministry of General Administration for sanctioning the post. A committee of representatives from these two organizations and the concerned Ministry reviews the case and forwards it to the Cabinet. Once the Cabinet approves the post, the Public Service Commission advertises, selects, and recruits the staff. This process can take from six months to over a year, depending on how matters are expedited, both formally and informally. Recruitment for new permanent posts is lengthy and cumbersome. Temporary recruitment is less stringent. After the approval of the Public Service Commission, the concerned department can advertise and recruit staff. However, the motivation to work is low because temporary staff are released as soon as the Public Service Commission selects permanent staff.

One efficient way to overcome temporary staff shortages is to send someone on deputation. Because recruiting new staff takes time and may be constrained by non-availability of trained manpower, this system is popular. However, improper influence can be used to secure transfers to attractive areas at the cost of ongoing work, and research often suffers from such disruptions.

RESOURCE ALLOCATION TREND

Data for preparing an inventory of financial and manpower resources by sub-sectors and crops are not readily available, and thus much of this study was devoted to deriving such information from available budget and manpower data (see Appendix). Although the data reported here are indicative, some subjective estimates were used in this derivation, and they should not be interpreted as being precisely accurate¹

Financial Allocation

Financial allocation figures are given in Table 2. From 1975/76 to 1978/79² the average annual rate of increase in the agricultural research budget was 21 percent, with food crops and agricultural engineering research recording the highest rates of increase. From 1975/76 to 1979/80, out of the average total research budget of Rs. 26 million per year, over 68 percent was allocated to crops, with about 53 percent to food crops and 16 percent to cash crops. When basic biology, agricultural engineering, and soil/water, which indirectly support crops research, are included, almost 83 percent of the research budget was allocated for crops. Horticulture and forestry research each claimed about 6 percent of the total budget, while 4 percent was spent on livestock and fishery research. During the study period, the share of the research budget allocated to food crops increased. It declined for cash crops, horticulture, and fisheries, but remained constant for biology, engineering, and soil/water.

During the study period, food crops received 77 percent of the crops research budget. Paddy, maize, and wheat received over 97 percent of the total food crops research budget and less than 3 percent was spent for research on millet, barley, and pulses. Cash crops research claimed 16 percent of the agricultural research budget and 23 percent of the crops research budget. Of the cash crops budget, potatoes received the largest share (27 percent) followed by oilseeds (18 percent), sugarcane (14 percent), tobacco and jute (each 12 percent), cotton (9 percent), cardamom (4 percent), and ginger (3 percent). Tea is an important cash crop for Nepal, but no research program has been initiated.

Table 2. Agricultural Research Budget Allocations

(Rs. 000)

	1975/76	1976/77	1977/78	1978/79	1979/80
Cereal Crops	8110	12470	14446	19042	14243
Paddy	2374	4749	4879	6459	4699
Maize	3006	3770	4635	6428	5079
Wheat	2439	3656	4620	5770	4113
Millet	30	35	55	67	70
Barley	104	92	100	106	113
Pulses	48	68	71	95	103
Others	73	100	86	117	66
Cash Crops	3970	3389	3413	4218	5342
Potato	391	659	878	1021	2587
Sugarcane	959	509	441	527	435
Oilseeds	1062	835	454	808	505
Cotton	536	300	356	382	320
Jute	315	360	495	640	690
Tobacco	380	420	480	630	620
Cardamom	109	159	136	193	154
Ginger	218	147	173	17	31
Tea*	---	---	---	---	---
Livestock	549	658	738	757	795
Horticulture	1685	1516	1718	1879	1514
Fishery	291	530	382	381	290
Forestry	1088	1656	1466	1901	2109
Agricultural botany	525	448	451	500	538
Plant pathology	484	500	564	600	542
Entomology	519	525	536	1187	739
Soil science and agricultural chemistry	613	715	897	861	864
Agricultural engineering	530	678	807	1245	1064
Soil and water resources	350	437	386	433	481

* There are no research programs on tea.

Manpower Allocation

Manpower data is given in Table 3. Total agricultural research manpower (including non-research areas) increased from 352 officers and 1045 assistants in 1970/71 to 773 officers and 2450 assistants in 1979/80. In terms of the administrative divisions of officer-level manpower, 7 percent are in Class I, 22 percent are in Class II, and 71 percent are in Class III. Similarly, 2 percent have Ph.D.s, 26 percent have M.Sc.s, and 72 percent have B.Sc.s. The vacancy rate is about 15 percent at the officer level and 9 percent at the assistant level. Of the total agricultural manpower, 29 percent of the officers and 12 percent of the assistants are engaged in research.

The total number of agricultural research scientists in Nepal is 226, which means that there are 17 research scientists for every one million people in the agricultural population. The highest concentration of manpower is in crops research, with about 47 percent of the manpower. When non-commodity research areas indirectly supporting crops research are taken into account, crops research engages 80 percent of all research manpower.

About 77 percent of all officer-level crops research manpower is allocated to food crops. Paddy, maize, and wheat have together claimed 95 percent of all food crops research manpower and 67 percent of all crops research manpower. Millet, pulses, and barley research programs received only 5 percent of the manpower engaged in research on food crops. Cotton research has engaged 35 percent of the cash crops research manpower, while there are 19 percent in the sugarcane program, 13 percent each in the potato, oilseeds, and tobacco programs, and the rest are in jute and cardamom.

ASSESSMENT OF RESOURCE ALLOCATION PATTERN

Allocation Criteria

Many models have been developed to guide resource allocation in agricultural research (Fishel 1971). While these models' decision criteria are usually based on the impact of commodity research on production and income distribution, an IFPRI study (IFPRI 1977) uses gap and trend analysis to allocate research resources on the basis of the gap between the

Table 3. Manpower in Agricultural Research (man-years, 1980)

	Scientists ^a	Assistants ^b
All Crops	97.3	149.2
Food Crops	75	96
Paddy	27	35
Maize	24	28
Wheat	20	29
Millet	0.5	1.5
Barley	1.1	0.7
Pulses	2.1	1.7
Cash Crops	22.3	53.2
Potato	3	5.4
Sugarcane	4.3	6.4
Oilseeds	3	5.4
Cotton	7	21
Jute	1	4
Tobacco	3	7
Cardamom	1	4
Horticulture	13.5	18
Livestock	10	6
Fishery	4	6
Forestry	21	22
Entomology	15	14
Soil science and agricultural chemistry	19	18
Agricultural botany	12	15
Plant pathology	15	13
Plant quarantine	6	8
Agronomy	3	1
Agricultural engineering	8	13
Soil and water research	2	5

^aThose with the degree of B. Sc. or above.

^bJunior technicians (JT) have matriculation and two years training. Junior technical assistants (JTA) have matriculation and one year training.

projected demand for food and the projected trend in supply. Ideally, allocation should be based on the specific contribution of the research to government objectives, and should be as objective as possible. Peru is now using a comprehensive allocation model (Paz 1981) which takes into account nine quantitative and four qualitative government objectives³, with relative weights assigned by a panel of experts. The International Rice Research Institute employs a scoring model, and a productivity approach--the contribution of each type of rice research to the net value of production--is used to guide future resource allocation (IRRI 1978).

In this study three criteria are used to assess the past allocation of resources to various sub-sectors. The first criterion is contribution to agricultural GDP. The implicit assumption is that for a first approximation to optimal allocation of resources, the ratio of research expenditure to agricultural GDP from each sector should be equal. This criterion is used for all sub-sectors in the study. The second criterion, for cereal and cash crops only, is the size of cultivated area. The third criterion, used for four basic food crops, is the importance of these crops in Nepal's consumption pattern.

Financial Resource Allocation

The average annual agricultural research expenditure between 1975/76 and 1979/80 was 0.15 percent of GDP and 0.23 percent of the agricultural GDP. Research expenditure relative to agricultural GDP is somewhat higher than in Indonesia and Bangladesh but is considerably lower than in developed countries and other Asian countries (Boyce and Evenson 1975; Daniels and Nestel 1981).

Research investment relative to the value of production was 0.33 percent in crops, 0.24 percent in horticulture, 0.02 percent in livestock, 0.26 percent in fisheries, and 0.21 percent in forestry. Thus, investment in crops research is relatively higher than in other sectors, and relative investment in livestock research is very low (Table 4).

The annual rate of growth in research investment relative to the value of production was highest in crops, constant in livestock, and fluctuated in horticulture, fisheries, and forestry. Unless corrective steps are taken, only crops research investment is likely to change according to its value of production.

Table 4. Agricultural Research Expenditure Relative to Agricultural GDP and Total Agricultural Research Expenditure (Rs. million)

	1975/76	1976/77	1977/78	1978/79	1979/80	Average
Total Agricultural Research Expenditure (TARE)	17.778	22.816	25.053	32.295	27.950	25.178
Crops						
Agricultural GDP (AGDP) ^a	6746	6121	6168	6411	5743	6238
Research Expenditure (RE) ^b	14.165	18.456	20.749	27.377	23.242	20.798
% of AGDP	0.21	0.30	0.34	0.43	0.40	0.33
% of TARE	79.7	80.9	82.8	84.8	83.2	82.6
Horticulture						
AGDP	699	668	668	711	721	693
RE	1.685	1.516	1.718	1.879	1.514	1.662
% of AGDP	0.24	0.23	0.26	0.26	0.21	0.24
% of TARE	9.5	6.6	6.9	5.8	5.4	6.6
Livestock						
AGDP	3482	3324	3358	3394	3421	3396
RE	0.549	0.658	0.738	0.757	0.795	0.699
% of AGDP	0.02	0.02	0.02	0.02	0.02	0.02
% of TARE	3.1	2.9	2.9	2.3	2.8	2.8
Fishery						
AGDP	132	133	134	159	166	145
RE	0.291	0.530	0.382	0.381	0.290	0.375
% of AGDP	0.22	0.40	0.28	0.24	0.17	0.26
% of TARE	1.6	2.3	1.5	1.2	1.0	1.5
Forestry						
AGDP	556	895	813	805	882	790
RE	1.088	1.656	1.466	1.901	2.109	1.644
% of AGDP	0.20	0.18	0.18	0.25	0.24	0.21
% of TARE	6.1	7.3	5.8	5.9	7.5	6.5

^a Calculated from NPC (1979).

^b Includes research areas such as agricultural engineering, basic biological research, and soil/water research, which indirectly support crops research, but excludes some crops whose contribution to agricultural GDP is not available. They are some minor food crops, cotton, cardamom, and ginger.

Research investment as a percentage of production value from 1975/76 to 1979/80 was 0.01 - 0.02 percent for millet and pulses, 0.19 percent for paddy and barley, 0.24 - 0.29 percent for oilseeds and jute, 0.42 - 0.49 percent for maize and wheat, and 0.60 - 0.67 percent for sugarcane and tobacco. This value was 0.26 percent for all food crops and 0.33 percent for all cash crops. Except for maize and wheat, there is underinvestment in food crops research; on the other hand, cash crops research has received a high level of investment relative to its production value.

When investment is compared to cultivated area, food crops are underinvested by 11 percent and cash crops are overinvested by 50 percent. The millet and paddy research programs are especially underinvested (Table 5).

Relative to their importance in the consumption pattern, all food crops except wheat have been underinvested, with millet and barley research showing considerable underinvestment (Table 5).

Table 5. Percentage Distribution of Research Investment Relative to Area Under Crops and Consumption Pattern

	Research		Cultivated area	Consumption levels
	Investment	Manpower		
Paddy	27	31	52	42
Maize	27	28	18	36
Wheat	24	23	14	12
Millet	0.3	0.6	5	10 ^a
Oilseeds	4	3.2	5	--
Potato	7	3.2	2	--
Others ^b	10	11	4	--

^aOut of this, 7 percent is millet and 3 percent is barley.

^bIncludes barley, sugarcane, tobacco, and jute.

The three criteria used here broadly confirm the imbalance in relative resource allocation among crops. With reference to these criteria, rice and millet research is underinvested, and maize and wheat research is overinvested. A recent study on economic rates of return to crop research in Nepal shows similar results for paddy, maize, and wheat (Sharma 1983).

Manpower Resource Allocation

The percentage distribution of agricultural research manpower and the value of production of various sectors is uneven, as shown below. The livestock sector is considerably understaffed, while fisheries and forestry are relatively overstaffed. Crops research is nearest to the appropriate allocation pattern.

	Crops	Horticulture	Livestock	Fisheries	Forestry
Value	56	6	30	1	7
Manpower	66	9	7	3	14

There is also disproportionate distribution of manpower relative to the value of production of crops. Research programs in millet, pulses, and paddy in food crops and potato, oilseed and jute in cash crops, are understaffed. A wide deviation in manpower resources relative to value is evident in millet, pulses, and jute.

When manpower is compared with the distribution of cultivated area, paddy, millet, and oilseeds are understaffed, while the remaining crops are relatively overstaffed (Table 5). On the basis of consumption criteria, underinvestment in research manpower is evident in all food crops except wheat, but the extent of underinvestment is small in paddy and maize (Table 5).

OTHER ISSUES

Agroeconomics Research. Because of data constraints, estimates of resources allocated to agroeconomics research were not included in the above analysis. In 1979/80 approximately Rs. 3.7 million was spent on agroeconomics research (mostly of a multicommodity nature) by the three public institutions involved in this area (Table 1). This Rs. 3.7 million was 11 percent of the agricultural research budget in 1979/80. In 1979/80 there were approximately 53 posts in agroeconomics and agristatistics in agriculture-related institutions, but none of these were exclusively in research.

Integrated Cereals Project. This 5-year project was initiated in 1976 with assistance from USAID. The main components of the project are strengthening the existing research base for cereal crops through logistic and training support, initiating a research program in cropping systems, and introducing a minikit program of improved cereal crop varieties--mainly rice, maize, and wheat--and other inputs for wider adoption of modern technology. The most significant aspect of the project is the initiation of a cropping systems research program, although most of the project budget of U.S. \$ 9 million was spent on advanced level academic training abroad.

Location of Research Farms. There are geographical and regional imbalances in the distribution of research farms and stations in Nepal. The mountain and hill regions, which include two-thirds of Nepal's land area, have the least concentration of research facilities and manpower, with the exception of Kathmandu Valley. There are also many experimental farms where research facilities are poor, research staff are few, and budgets are too small to operate effectively (APROSC 1981a).

Future Manpower Situation. Between 1980/81 and 1984/85 (Sixth Plan Period) there will be a surplus of professional manpower in agriculture (APROSC 1981b), but the livestock sector will face a manpower deficit. The ineffective use of existing manpower is more of a problem in Nepal than the manpower shortage. The ratio of expatriate agricultural research manpower to total manpower in Nepal is negligible.

CONCLUSIONS

Agricultural research investment in Nepal is low relative to other Asian countries, and further investment in research is necessary. The direction and extent of future investment should be determined on the basis of cost-benefit studies.

In general, agricultural development policies in Nepal have been biased toward crops and this is also the case for research. Examination of the resource allocation pattern revealed a startlingly low level of financial and manpower resources in livestock research relative to its value of production. This imbalance should be corrected.

During the last five years, only research investment in the crops sector has been increasing relative to growth in its value of production. Unless investments in other sectors are also increased in proportion to the value of production, the existing misallocation of resources among agricultural sub-sectors will continue.

The first objective of agricultural development in Nepal is to increase food grain production, and cash crops development is the second. This study indicates that research on food crops is relatively underinvested and understaffed compared with cash crops research. Thus, the present allocation pattern contradicts the declared objectives of agricultural development. This misallocation should be corrected.

In particular, research on paddy, millet, and pulses is underinvested and understaffed. Maize and wheat research programs appear to have received larger resources than their importance would justify.

Inadequate resources for paddy research is serious because paddy is the most important crop in Nepal in area, production, value, consumption, and exports. Millet and pulses are important consumption crops. The commodity development program for these and other minor crops should be strengthened in terms of budget and manpower.

Maize is a staple crop in the hills and has great production potential. In view of recurring food shortages in the hills and the suitability of maize farming for hilly terraces, the relatively high level of resources allocation for this crop should continue.

Wheat has recently become the most important winter crop in Nepal, and more than 90 percent of the wheat area is covered by modern varieties. This may partly be explained by the high proportion of research resources allocated to wheat. Although farmers have switched from traditional to modern varieties, wheat productivity has not improved. Future wheat research programs should concentrate primarily on factor research rather than varietal selection. Efficient use of soil, fertilizer, and conservation of soil fertility should be accorded top priority in this research.

Cash crops research programs have received more resources than their importance would justify. Because resources are limited, some resources should be transferred from cash crops research to food crops research.

The cropping systems research program which began in 1976 is valuable and this program should continue to receive adequate funding.

Monitoring, evaluation, and special studies on agricultural research in particular and related agricultural policy issues in general are far from adequate in Nepal. Studies on productivity of agricultural research investment by commodity, continuous monitoring of resources allocation, provision of research resources and programs for minor crops, and development of an effective evaluation system are needed.

Information about resource allocation is currently inadequate, and studies on this topic should be emphasized. Misallocation is likely if the present pattern continues in the future, so ex ante resource allocation studies should receive top priority. Bangladesh has a perspective agricultural research plan (BARC 1979), and the main objective of research allocation studies here should be to design an appropriate plan for Nepal.

APPENDIX

Method Used to Compute Distribution of Financial and Manpower Resources by Sectors and Commodities

1. Information about research on jute and tobacco was obtained from the Jute Development Corporation and the Tobacco Development Board. Additional basic data were obtained from HMG, Statements of National Revenue and Expenditure, Annual Issues, 1975/76 to 1979/80, Ministry of Finance.
2. For other crops, a detailed allocation of research resources is not available except for crops covered by Commodity Development Programs. In most research farms/stations, resources are specified under the heading "crops," which includes more than one crop. Disaggregation of this total was done as follows:
 - (i) A list of crops research on all farms/stations was prepared.
 - (ii) The number of research experiments conducted on each crop was noted for each farm/station for which this information was available.
 - (iii) Information obtained in (ii) roughly indicated the proportion of resources allocated to different crops.
 - (iv) This proportion was adjusted on the basis of subjective judgment by experts.
 - (v) These "allocation ratios" were used to disaggregate total crops resources into various commodities.
 - (vi) Resources devoted to individual commodities were aggregated to determine the total allocation.
3. Data on forestry research was estimated by the Survey and Research Office of the Department of Forestry and by the Department of Medicinal Plants.
4. In each livestock and horticulture sector there are about twenty farms/stations where production, research and

extension activities are carried. Because exact data on research expenditures are not available, three experts with experience in horticulture farms/stations were asked to estimate the proportion of research efforts in the total activities. There was little variation in the estimates of the three experts, and the average of these estimates was used to segregate financial and manpower resources in research. The same technique was used for livestock research.

NOTES

1. All budgets used in this paper are sanctioned budgets, not actual expenditures. For this study sanctioned budget figures are more appropriate because they reflect the decisions of the officials who allocate resources. About 85 to 90 percent of the sanctioned budget is actually spent.
2. The budgets allocated to most sectors declined in 1979/80 relative to 1978/79.
3. Quantitative objectives: gross value of production, aggregate value per hectare, employment generation (labor per hectare), cultivated land or fixed capital, proportion of the family basket, saving of foreign currency through import reduction, importance as imports of principal industries, gross value of the agricultural product, and nutrition value.

Qualitative objectives: importance of the incorporation of new land, potential for productivity increment, possibilities for industrialization, and potential production due to ecological diversity.

REFERENCES

- APROSC, Nepal Agricultural Extension Phase II, Volume IV, Kathmandu, 1978.
- APROSC, Evaluation Study of Agricultural Farms and Stations in Nepal, Kathmandu, 1981a.
- APROSC, Nepal: Trained Manpower for the Agricultural Sector, Kathmandu, 1981b.
- Arndt, T. M., D. G. Dalrymple and V.W. Ruttan, eds., Resource Allocation and Productivity in National and International Agricultural Research, University of Minnesota Press, Minneapolis, 1977.
- BARC, National Agricultural Research Plan, Bangladesh Agricultural Research Council, Bangladesh, 1979.
- Barker, R. and R. W. Herdt, "Rainfed Lowland Rice as a Research Priority," IRRI Research Paper Series, Number 26, Philippines, 1979.
- Boyce, J. K. and R. E. Evenson, National and International Agricultural Research and Extension Programs, Agricultural Development Council, New York, 1975.
- Daniels, D. and B. Nestel, eds., Resource Allocation to Agricultural Research, International Development Research Centre, Ottawa, 1981.
- Fishel, W. L., ed., Resource Allocation to Agricultural Research, University of Minnesota Press, Minneapolis, 1971.
- HMG, Statements of National Revenue and Expenditure, Annual Issues, Ministry of Finance, Kathmandu, (Nepali), 1975/76-1979/80.
- IFPRI, Food Needs in the Developing Countries: Projections of Production and Consumption to 1990, International Food Policy Research Institute, Research Report No. 3, Washington, D. C., 1977.
- IRRI, "IRRI Long Range Planning Committee Report," Draft V, International Rice Research Institute, Los Banos, (mimeo), 1978.

- NPC, **Estimates of National Income from the Agriculture Sector: The Fifth Plan**, National Planning Commission, Kathmandu, (mimeo), 1979.
- NPC, **The Sixth Plan, Part I**, National Planning Commission, Kathmandu, (Nepali), 1981.
- Oram, P. A. and V. Bindlish, **Resource Allocation to National Agricultural Research: Trends in the 1970s**, (A Review of Third World Systems), IFPRI and ISNAR, 1981.
- Paz, L. J., "A Methodology for Establishing Priorities for Research on Agricultural Products," in Daniels and Nestel, IDRC, 1981.
- Pradhananga, A. M., M. Shah and K. Keshari, **A Proposal for a Nepal Council for Agricultural Research**, Report of the joint review team, Kathmandu, 1978.
- Schultz, T. W., "The Economics of Research and Agricultural Productivity," International Agricultural Development Service Occasional Paper, 1979.
- Sharma, R. P., "Agricultural Research Resource Allocation in Nepal," in Daniels and Nestel, IDRC, 1981.
- Sharma, R. P., "Economic Returns to Agricultural Research in Nepal," APROSC Staff Paper Number 7, APROSC, Kathmandu, 1983.
- Yadav, R. P., "A Glance at the Present Agricultural Research Education and Extension in Nepal," APROSC Staff Paper Number 1, APROSC, Kathmandu, 1976.

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Suggested Citation:

Sharma, Ramesh P., "Resource Allocation to Agricultural Research in Nepal," Research Paper Series No. 23, A/D/C-APROSC, Kathmandu, July 1983.

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