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IMPROVEMENT OF AGRICULTURAL STATISTICS
IN ASIA AND PACIFIC COUNTRIES
(GCP/RAS/171/JPN)

**General status of the system
of food and agriculture statistics
in Bhutan**

**THE FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
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GENERAL STATUS OF THE SYSTEM OF FOOD AND AGRICULTURE STATISTICS IN BHUTAN

1. Background of agriculture in Bhutan

Bhutan is predominantly an agricultural country. Bhutanese agriculture consists of arable agriculture, horticulture, livestock and forestry. Locally referred to as the Renewable Natural Resources (RNR) sector, agriculture remains the most important sector of the national economy – it contributed 38.6 percent of the GDP in 1996. The population of Bhutan is still largely rural: for more than 85 percent of the people, farming is the main, often the only, source of income. Agriculture provides the foundation of industrial development, and the RNR sector is the main custodian of Bhutan's pristine environment and rich biodiversity.

Development of the RNR sector could lead to improvements in people's living standards and accrued wealth for rural communities. The current, eighth five-year plan defines three objectives of development for the RNR sector: national food security; conservation of natural resources; and sustainable economic production and enhancement of rural income. Strong agricultural policies, therefore, should be the mainstay of the country's development policies. In order to define them satisfactorily, good statistics are required.

Programmes to increase and improve both the quantity and the quality of agricultural products and for the country to achieve self-sufficiency in food grains and generate a marketable surplus for sale are of paramount importance in government planning.

Animal husbandry also plays a part in the farming system of Bhutan. Farmers keep cattle for draught and milking purposes, and some chickens and pigs for slaughter. High up on the mountains, herds of yaks and sheep are kept on pasture. Efforts are underway to improve the statistical system for agriculture.

2. Organizations concerned with agricultural statistics

Bhutan has adopted a decentralized statistical structure. The statistical programmes are administrated and operated under the authority of various government ministries. The statistical units in these ministries collect and compile data through surveys, administrative records, and periodic reports obtained from enterprises, institutions, households and others. The responsibility for official agricultural statistics is now with the Ministry of Agriculture, but the responsibility for general statistics has wavered from the Central Statistical Organization (CSO) to sundry ministries.

In 1992, the Ministry of Planning decided to have a centralized statistical system, in accordance with the Royal Government's policy to reduce duplication of efforts among ministries. Responsibility for agricultural statistics was shifted from the agriculture ministry to the CSO and in the process, some trained statisticians and staff members were transferred. But the CSO was a small organization with no local offices. Thus, in January 1998, the mandate went back to the Ministry of Agriculture. With a view to build a strong agricultural statistics system, the ministry reinforced the statistical unit, the Land Use and Statistics Section, within its Policy and Planning division. Having also delegated the responsibility to maintain sectoral statistics to the sectors themselves, the CSO is now responsible only for national aggregates of statistics and for analysis for economic purposes.

3. Agricultural statistics at the Ministry of Agriculture

3.1. Organization of the ministry

The Ministry of Agriculture is responsible for the promotion of agricultural development to develop Bhutan's agricultural sector in order to ensure that the population has access to food at all times, and to conserve the country's pristine environment and unique flora and fauna for the benefit of the present and future generations. The ministry employs 2,171 persons, 1,160 of whom are in professional and technical positions. The headquarters has two service divisions, which are the Administration and Finance Division and the Policy and Planning Division, and the Natural Resources Training Institute at Lobeysa.

The services provided by the ministry are delivered through three operational divisions:

- The Research Extension and Irrigation Division is responsible for promoting innovation and development at farm level. The division operates through RNR research centres, the *dzongkhag* (district) RNR offices, 157 agricultural and 112 animal husbandry extension centres in the *geogs* (blocks).
- The Crop and Livestock Services Division is responsible for animal health, livestock breeding, mechanization and input supply services. The division supervises the Agricultural Machinery Centre, the Royal Veterinary Epidemiological Centre, four regional veterinary laboratories, one satellite laboratory, one vaccine production centre, ten livestock breeding farms and 42 artificial-insemination centres.
- The Forest Services Division is responsible for the sustainable management of forest and protected areas. The division operates through ten territorial forest subdivisions and manages the ten national parks and protected areas. Under the seventh five-year plan (1992-1997), a social forestry and forestry extension programme was initiated with the appointment of forest extension officers to each *dzongkhag*.

Four public corporations are involved in the RNR sector:

- The Food Corporation of Bhutan is responsible for the import of foodstuff (mainly rice and edible oils), the management of World Food Program assistance, and the operation of permanent and seasonal auction yards for horticultural produce.
- The Bhutan Logging Corporation undertakes logging operations under commercial forest management concessions on behalf of the Forest Services Division.
- The Druk Seed Corporation was established in 1995 and took over the commercial seed and plant supply operations of the former National Seed and Plant Production Programme.
- The Bhutan Development Finance Corporation, through its network of branches in the *dzongkhags*, is the main source of credit for the agricultural sector. New lending by BDFC to the RNR sector in 1995 amounted to Nu376 million, divided between 731 seasonal and 2 097 longer-term loans.

It has been the policy of the Bhutanese government to promote the private sector in the provision of services to the RNR sector. Marketing of agricultural produce is entirely in the hands of private traders, the role of the agriculture ministry being to facilitate improvements through measures such as the Food Corporation of Bhutan auction yard system and the provision of information on prices and quantities traded.

The Policy and Planning Division of the ministry is responsible for policy formation and planning services and for monitoring and evaluating the various programmes and projects. The land use and statistics section within the division is responsible for the main agricultural statistics, and the agricultural marketing section for market information.

The Research, Extension and Irrigation Division is responsible for research, extension and irrigation services for agriculture, livestock and forestry. The extension and irrigation services have a countrywide network of branch offices composed of 35 RNR centres, 159 agricultural extension centres and 116 livestock extension centres. The agricultural extension centres collect the data for agricultural statistics at field level and have close contacts with and understanding of the people all over the land.

4. Activities on agricultural statistics at the Ministry of Agriculture

4.1. Basic situation and strategy for the development of agricultural statistics

In the eighth five-year plan (1997-2002), insufficient information and data is described as an institutional constraint bearing on the basic situation of renewable natural resources, in the following terms:

Government services in the agricultural sector continue to face a number of institutional constraints, which hamper their effectiveness. The lack of reliable data on farming systems and land use has hampered efforts to develop appropriate policies and programmes for the RNR sector. During the seventh five-year plan, considerable progress was made in addressing these constraints through the work of the land use and statistics section of the agriculture ministry. However, basic agricultural statistics are still lacking and only limited information is available on farm-level production systems and constraints.

In the current five-year plan, the guidelines for the improvement of agricultural statistical activities focus on the broad cross-sector policies required to maintain the natural resource base of the sector, promote economic growth and development, and ensure the efficient use of scarce public-sector resources.

Improving the planning base for the sector

The limited statistical base, lack of key agro-climatic data, and limited understanding of the main farming systems severely hinders efforts to develop appropriate policies and programme interventions for the RNR sector and to monitor and evaluate programme implementation. Steps to be taken to improve the planning base of the sector will include:

- the strengthening of agricultural statistics collection, analysis and dissemination;
- the provision of consistent land use information;
- a more farmer-oriented approach in agricultural research and extension;
- a greater emphasis on monitoring the impact of government policies and programmes; and
- the strengthening of professional capabilities, in particular at the regional and *dzongkhag* levels.

In this respect, improvement of RNR statistics is one of the main challenges of the country's development.

In the past, Bhutan used the administrative type of reporting system for most agricultural statistics. The agricultural marketing section of the Policy and Planning Division of the Ministry of Agriculture compiled statistical books by gathering the data from the technical divisions of the ministry. However, in recent years, the ministry has been implementing a land-use planning project, with the assistance of the Danish International Development Agency (DANIDA), to build a strong database

for the RNR sector. The sample survey for agricultural households, which is called the annual RNR survey, has been introduced in the country, and the first agricultural census is due to be conducted in December 2000. These efforts are all aimed at improving the national statistical service so that it can deliver accurate and objective figures for the correct formulation of policies. Currently, the agricultural marketing section of the planning division is in charge of not only the compilation of statistics but also of the implementation of surveys it plans itself.

4.2. Activities related to the Land Use Planning project

The Land Use Planning project, launched in July 1997 and due to end in June 2002, has already had a big impact on Bhutanese agricultural statistics, which have traditionally been gathered through the administrative system. The project is one of the components of the wider Environment Sectoral Programme Support project, which consists of land use and statistics, soil survey, nature conservation and so on. Its purpose is to build a strong database for the RNR sector.

To begin with, 81 topographic maps (1/50 000) were produced, using satellite data. Then land use was confirmed by eye measurement, using topographic maps countrywide. The Geographical Information System was used to preserve the data and build up the database. This has been completed at *dzongkhag* level and is under preparation at *geog* level as well. The data on land use will be the basis for the future activities of the Ministry of Agriculture.

4.2.1. Implementation of the annual RNR survey of sample households

In 1998, the land use and statistics section of the planning division, which is the main body in charge of the Land Use Planning project, launched a countrywide survey, known as the annual RNR survey, to collect information on agriculture, livestock and forestry in each *dzongkhag*. The first stage of the survey was implemented in March and April 1998.

National figures are compiled mainly from the results of the annual RNR survey of sample households and from other available sources such as the land use survey and administrative reporting. Publication of the results, originally planned for early 1999, has been postponed to check the consistency of each figure. The second stage of the survey took place in July and August 1999. The annual survey data are expected to be stored in the RNR database system and in the Geographical Information System.

The project also intends to implement an agricultural census in December 2000.

4.2.2. Methodology of the annual RNR survey of sample households

Sample unit, sampling frame, sampling technique and sample fraction

The household, defined as a group of people using the same kitchen, is used as sample unit and the individual *geog* register kept by the local *gup* serves as sample frame. The weakness, however, is that *geog* registers show a smaller number of households than there are in reality.

The Ministry of Agriculture prefers to use the systematic random sampling method, as it is a simple and precise method of sample selection.

Sample size was set at ten percent of a *geog*. Twenty percent had been proposed initially, but it was found through the pilot scheme that such a high percentage might not be feasible in the larger *dzongkhags*, as the extension agents who would be the enumerators of the survey could not spare as much time as such a spread would require.

Data collection schedules

Data collection is done twice a year – after harvesting of the summer crops and after winter crops – to minimize memory losses among farmers. The first survey is planned for August/September for information on winter crops and livestock, and the second for December/January, when the data on summer crops and forest products are collected.

Institutional roles and responsibilities

The RNR extension agents at *geog* level are mandated to collect the data at field level, including for livestock and forestry. They collect and validate the data of the samples in the two-tier survey after drawing the samples from the sample frames prepared for each *geog* by the planning division of the ministry. Then the data are submitted to the respective *dzongkhags*. The RNR extension agents also implement crop cutting for the main crops within their *geog*. At least five samples of each crop must be defined and surveyed.

At *dzongkhag* level, the sector heads (especially the RNR coordinators) supervise the RNR extension agents, validate and take down the data in the prescribed format, and submit them to the respective RNR research centres.

Then, the RNR research centres are responsible for technical backstopping to the *dzongkhags*. They validate the data and submit them to the planning division of the ministry.

Software and equipment

The RNR database is developed in Microsoft Access. The planning division has provided one laptop to each RNR research centre and a desktop computer to each *dzongkhag* office. Besides, the ministry has supplied each RNR extension agent with a calculator.

Conversion rates

Local units of measurement differ from place to place, which complicates compilation and affects the quality of the data in terms of area and production. The Land Use Planning project has begun to develop standard conversion rates for the main crops in 11 *dzongkhags*. The rest will be done soon.

Agro-meteorology to be shifted to the Ministry of Agriculture

Data on agro-meteorology are an integral part of RNR data. Without them, RNR information would be incomplete. Since 1991, the mandate for agro-meteorology has been with the Division of Power of the Ministry of Trade and Industry, but it will soon be transferred to the Ministry of Agriculture, which is already working on the operational guidelines and securing the budget to upgrade some of the equipment.

Collaboration among organizations involved in agricultural statistics

The statistics unit of the Policy and Planning Division of the Ministry of Agriculture is the prime organization for agricultural statistics in Bhutan. Its primary function is the collection of information on production for crops, livestock and forestry. However, the unit alone cannot satisfy all information requirements. The Research, Extension and Irrigation Division collects extension information, data on RNR facilities, etc. The Forest Services Division collects data on timber production and sale, etc. The Crop and Livestock Services Division collects input services information. The statistics unit must work closely with other information units.

The statistics unit of the planning division also maintains close collaboration with the Central Statistical Organization, the nexus of national information managers. Members of the unit have an important role to play as advisers in terms of technical backstopping, information standardization, training, etc.

The Department of Revenue and Customs provides information on import and export of crops. The Food Corporation of Bhutan plays a major role in food imports and exports, and the information it provides on transactions has a direct bearing on domestic production. In turn, it requires information from the Ministry of Agriculture for its own planning purposes. Thus, cooperation between the two bodies is essential.

4.2.3. Plan for a national census for agriculture

The first agricultural census, which will enumerate all agricultural households in Bhutan, is planned for the end of the year 2000. The census will be implemented directly by the Ministry of Agriculture using National Resources Training Institute graduates as enumerators to collect all of the agricultural household data in Bhutan, with technical assistance from the DANIDA project.

Once the data are collected, the now computerized *dzongkhags* will enter and compile the data at their level and forward them to the planning division of the ministry for national-level compilation, analysis and publication. The ministry intends to conduct agricultural censuses every five years thenceforth.

4.3. Data collection on forestry

The Forestry Services Division collects information on forest resources, the socio-economic status of the forest management units, and the ecological condition of the forest as a basis for forest management plans.

The division uses the method of systematic sampling in its surveys. Depending on the species available, the survey area is divided into blocks, compartments and sub-compartments. The enumeration areas are selected at the head office in Thimphu.

Two forms are used for data collection: a compass sheet, and a tally sheet for timber and non-timber species (separate). Wildlife and physical features are also recorded. Enumerators in the field collect the data by eye estimation and through interviews with representatives of the enumeration area. The collected data are sent to the head office to

be entered into the computer for processing and analysis. The statistics unit then combines the results with other data to compile the statistical yearbook.

4.4. Data collection and dissemination of marketing information

The agricultural market information unit was created under the agricultural marketing section of the Policy and Planning Division. The unit has made an effort to improve existing market information services for the public and private sectors.

Its mission is to:

- collect, analyse and disseminate information on retail and auction prices for agricultural commodities;
- maintain data for export and import of agricultural commodities; and
- monitor the supply and demand situation of selected agricultural commodities.

The unit is currently collecting information on retail prices in six *dzongkhags* and daily auction prices from the auction yards (wholesale markets) of Phuentsholing and Samdrup Jongkha, with the assistance of the Food Corporation of Bhutan. The unit also maintains reports on cash crops sold through the latter's auction yards.

Agricultural marketing information is collected from the Sunday markets. Every Sunday market has one designated data collector with in-country training. The collector submits monthly reports to the agricultural marketing section of the planning division.

Retail price data on 74 selected commodities at Thimphu are broadcast by radio each week, because retail markets open every Sunday in Bhutan. The auction-yard (wholesale) prices are broadcast by radio daily during the vegetable season. Daily auction prices for Samdrup Jongkha and Phuntsholing are also broadcast daily.

The aggregated retail price collected from the *dzongkhags* and the auction yards are disseminated through the *Policy and Planning Division Newsletter* and the *Agriculture Newsletter* on a monthly basis.

The agricultural marketing section publishes a quarterly bulletin for prices. The bulletin is expected to include information on export and import, analysis of retail prices for selected commodities, the supply and demand situation, and price forecasting.

4.5. Trade data

Proper analysis of trade statistics may help in framing the trade policy and customs tariffs. The Ministry of Trade and Industry always refer to trade statistics in trade negotiations, and so does the Royal Monetary Authority to prepare the balance-of-payment statement. Given that Bhutan is an agricultural country, trade statistics can also be used for farming instructions, the supply-and-demand policy, and so on, although trade statistics are primarily collected for taxation. It was the Department of Revenue and Customs which initiated trade data collection and processing, in collaboration with the Ministry of Trade and Industry.

The primary source of trade data is the import and export declarations made by traders at the frontier customhouses. There are five regional offices of the Department of Revenue and Customs in the south of Bhutan, and none in the north, as there is no trade there. There are 18 permanent checkpoints and three seasonal checkpoints (the latter usually for oranges).

For the import of oranges and apples, a Nu800-per-truck charge is imposed, and Nu3000 for cardamom. Other agricultural commodities are not taxed. There is an import tax on processed goods composed of a sales tax and a custom tax. The trade with India is free (no export or import custom duties).

Since 1993, the Department of Revenue and Customs, with Danish assistance, has installed computers in all its regional offices and at the main checkpoint at Phuentsholing, where 60 percent of the country's international trade takes place. The department has built up its in-house capability to carry out data collection, processing, compilation and publication in a semi-automated way.

The Food Corporation of Bhutan, whose main role is to adjust food supply and demand through market intervention, collects trade information on food and agriculture-related materials through its auction records. Although FCB information on trade is limited, it can be used in the evaluation of import prices.

5. Activities of the Central Statistical Organization

The Central Statistical Organization is responsible for national aggregates of statistics and analysis for economic calculation. As the central body of national statistics, it takes the lead in coordinating efforts to avoid duplication and promote resource sharing. Given its superior technical expertise, it should advise the other ministries in the operation of their own statistics programmes.

6. Conclusion

In the past, different agencies in Bhutan collected data independently. To avoid duplication of activities and close data gaps among the various stakeholders, the government has adopted a decentralized statistical system in which the responsibilities of each organization are clearly defined. Nonetheless, there remains a strong need for reliable, efficient, consistent and up-to-date information for appropriate development planning.

The Policy and Planning Division of the Ministry of Agriculture has overall responsibility for the coordination of activities in the ministry, and it should see to it that the whole ministry develops a reliable, consistent and efficient RNR information management system. It is therefore very important that the staff at all levels be committed to achieving this goal for the benefit of the whole RNR sector. In this respect, the agricultural statistics unit of the division should further strengthen agricultural statistical activities and pay attention to the following:

Contribution of the DANIDA project

The Land Use Planning project assisted by DANIDA contributes to improve the data collection method, by moving away from the administrative type of reporting in favour of a more scientific approach. The project activities should be a mainstay of future food and agriculture statistics.

The agricultural census

The first national agricultural census is scheduled for December 2000 with technical assistance from the DANIDA project. It will enumerate all agricultural households in Bhutan and will be carried out every five years. However, the questionnaire of the census is the same as the one used in the RNR annual survey. It centres mainly on crop and livestock production and has few survey items on agricultural structure, due to limited resources and to avoid duplication of survey items with agencies such as the Central Statistical Organization.

The census offers a good opportunity to grasp not only agricultural commodity production but also the structure of agriculture. The two combined would provide a comprehensive, multidimensional picture of the nation's agriculture. It would thus be better to follow the guidelines for the world census of agriculture prepared by FAO, if not this time around, then the next in five years' time. The document may assist the future development of the Bhutanese census for agriculture by providing definitions, concepts, standards and guidelines in order to generate a database of internationally comparable figures.

After the census is implemented, detailed analysis of confidence limits and data reliability for the RNR annual survey will be carried out. The results of the census may suggest appropriate sample numbers in heterogeneous *geogs*, *dzongkhags* or smaller areas in order to improve data reliability.

Collaboration with other divisions of the Ministry of Agriculture

The statistics unit has no staff specialized on data collection in the field. The unit depends on the agricultural extension agents, who are administratively under the control of the Ministry of Home Affairs and technically under the Research, Extension and Irrigation Division of the Ministry of Agriculture.

Collaboration between the Ministry of Agriculture and the Central Statistical Organization

The Central Statistical Organization compiles the national accounts and the gross domestic production. The Bhutanese economy is comprised of nine sectors, of which agriculture (i.e. RNR) is the largest. From the point of view of the CSO as the biggest data user, the present RNR statistics should be reinforced. For one thing, there are at least two gaps in agricultural data collection: neither kitchen-garden information nor production on government land is available. For another, the national income survey questionnaire should be finalized with the collaboration of other ministries.

On the other hand, the Policy and Planning Division of the Ministry of Agriculture is interested in collecting data on the agricultural household economy. Although the objectives of the two agencies are different, there is plenty of room for compromise in terms of data collection. A meeting therefore should be convened before the household income survey questionnaire is finalized to agree on modalities.

Since the Central Statistical Organization is the lead agency in terms of information management, it should provide more advisory services and backstopping to the different stakeholders.

Need for training and equipment

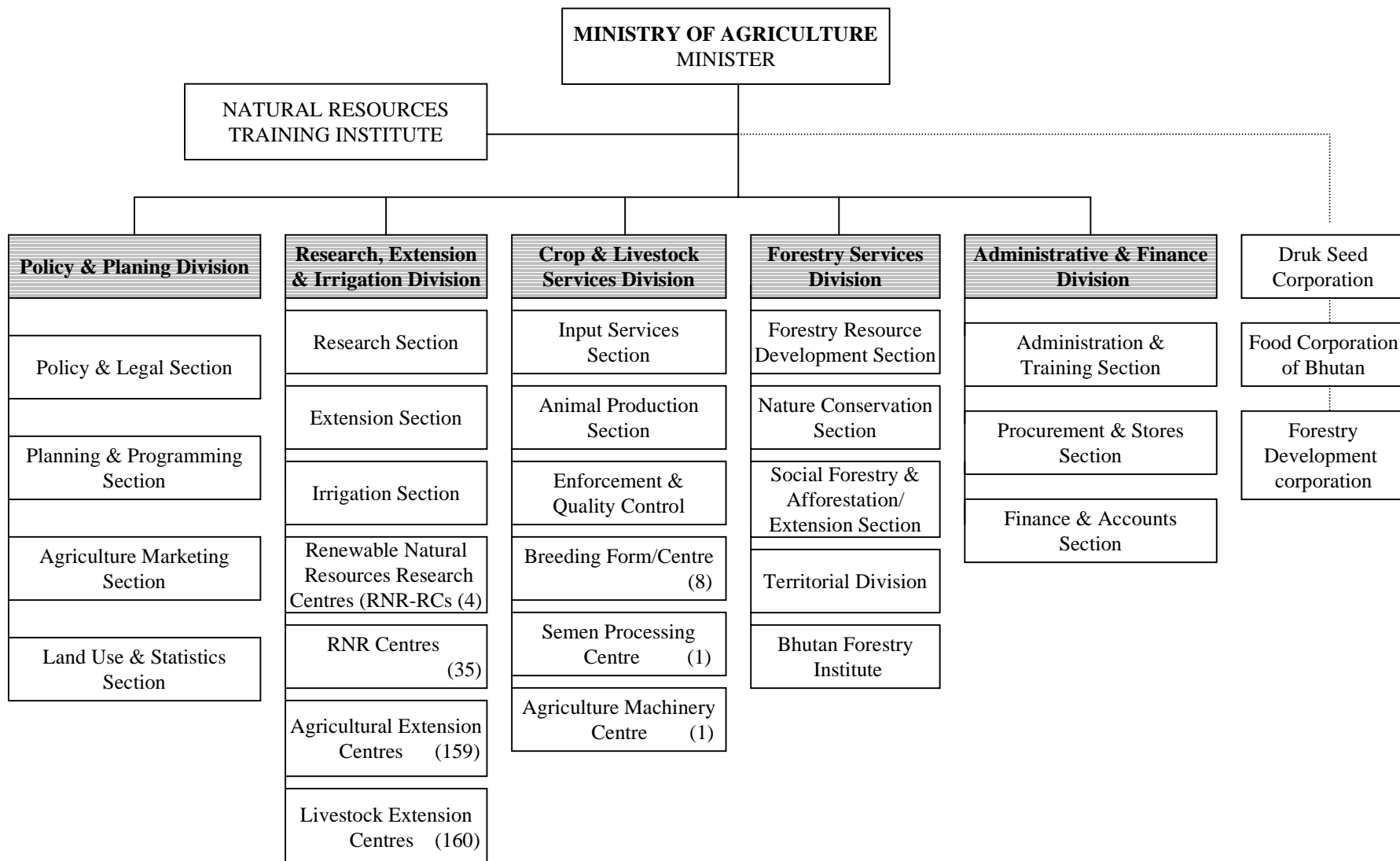
Staff members, especially in the *dzongkhags*, have limited experience in statistics management. It is recommended that short training sessions and seminars be made available to them in terms of data collection and operation of software programs.

Although one computer was distributed to almost every *dzongkhag*-level office, this is not sufficient. Lack of adequate numbers of computers leads to delays in data input,

especially during an agricultural census, and delays in data entry, especially in the larger *dzongkhags*, could become a major problem.

Moreover, there is no networking available between the *dzongkhags* and the statistics unit of the planning division. Networking would certainly improve data flows and is thus to be recommended.

ORGANIZATION CHART OF THE MINISTRY OF AGRICULTURE



**The Eighth Five Year Plan (1997-2002)
(Extract)**

Volume I; Main Document

**PART IV
SECTORAL DEVELOPMENT STRATEGIES & PROGRAMMES**

Objectives and Strategies for the 8 FYP

Objectives

The objectives for the RNR sector for the 8FYP are

National Food Security: The objective of national food security has three aspects:

- Maintaining broad national self-sufficiency level whereby the export of crops for which Bhutan has comparative advantage provides sufficient foreign exchange to cover the costs of food imports.
- Achieving a minimum of 70% self-sufficiency in food grain production compared with the current level of around 65%.
- Ensuring household food security whereby the population have assured access to food at all times.

The national food security policy has implications beyond the RNR sector alone and call for a much broader cross-sectoral approach, the requirements of which were addressed under the Comprehensive Food Security Programme developed during the 7FYP.

- Conservation of Natural Resources: An over-riding objective of RGOB is to protect Bhutan's fragile mountain environment and its unique flora and fauna for future generations. This requires that natural resources are utilized in a sustainable way and involves trade-offs between short-term economic gains and sustained long-term economic development. The protection and management of forest areas and improved land husbandry practices in agriculture are essential to achieving this objective, and will be actively pursued during 8FYP.
- Sustainable Economic Production and Enhancement of Rural Income: At the farm level,

production has to be both economic and sustainable. The RGOB will, therefore, aim to provide.

(i) appropriate, viable, and ecologically sustainable agricultural technologies, (ii) rural communities with access to the benefits provided by the market; and (iii) an enabling regulatory framework which allows economic activity to flourish while ensuring the conservation and protection of the natural resource base.

- Social and Regional Balance and Equity The support and services provided by RGOB in the RNR sector will be available and accessible to all, while reflecting differences in local natural and economic conditions.
- Role of Government: The role of Government in the RNR sector is guided by the principle that agriculture, animal husbandry and to some extent forestry are primarily private domains in which farmers and local communities take initiative, provide their own labour and capital, and take the risks and consequences of their actions. The RGOD therefore cannot direct and manage economic activity in the sector. Instead, its role is that of facilitator, extending the range of available opportunities through constructive regulatory measures, appropriate fiscal policies, provision of infrastructure, and cost effective research, technical support and advisory services.

Strategies for the 8FYP

The strategies for the RNR sector for the 8FYP focus on the broad cross-sectoral policy measures required to. (i) maintain the natural resource base in the sector, (ii) promote (economic growth and development; and (iii) ensure the efficient use of scarce public sector resources.

Improving the Planning Base for the Sector

The limited statistical base, lack of key agro-climatic data and limited understanding of the principal farming systems severely constrain effort to develop appropriate policies programme interventions for the RNR sector and to monitor and evaluate programme implementation. Step to be taken to improve the planning base for the sector will include (i) the strengthening of agricultural statistics collection analysis and dissemination; (ii) the provision of consistent land use information; (iii) a more farmer-centred approach in agricultural research and extension; (iv) a greater emphasis on monitoring the impact of government policies and programmes; and (v) strengthening of professional capabilities, particularly at the regional and Dzongkhag levels.

Ensuring an Enabling Regulatory Framework

One of the most important roles of RGOB in the RNR sector is to ensure an enabling legal, economic and social environment that encourages the best possible use of the available natural, human and capital resources. Certain aspects of the present regulatory framework, particularly in the areas of land use, taxation and trades are inconsistent or place inappropriate restrictions on the rural population. Greater attention needs to be given to assessing the economic and social

impact on the RNR sector of existing and proposed legislation as part of an on-going review and updating of the legislative framework for the sector.

Strengthening Natural Resources Management

The management of Bhutan's natural resources is the responsibility of both the RGOB and local communities. Ensuring the sustainable management of the state forests and protected areas requires that the costs to the government are minimized. In the forest areas, therefore, revenues from forest utilization will be recycled to finance forest conservation and management, while the costs of managing the protected areas are increasingly being covered from the Bhutan Trust Fund. To strengthen natural resource management in the agricultural areas, greater emphasis will be placed on land husbandry practices in agricultural research and extension, and the integration of social forestry into the extension programmes. The legislation on Tseri land passed during the 7FYP will be implemented in a way that is sensitive to its social and economic impact

Introducing Improved Technologies

The introduction of technologies and practices that improve the viability of grain production will be pursued, so as to increase self-sufficiency. Improved agronomic and post-harvest practices will also be promoted to help Bhutan to realize its regional and seasonal comparative advantage in horticultural crops. Initiatives to increase productivity in the livestock sub-sector will focus on intensification and measures to ensure sustainability of traditional production Systems. Within this context the role of the research and extension services is to provide a menu" of technological choices to farmers. To cater for the wide range of agro-climatic zones in Bhutan, the research programme will be conducted across a broad front, emphasizing the utilization of research results from elsewhere rather than focusing on experimentation at a limited number of sites.

Promoting People's Participation

Local communities are already involved in the planning and monitoring of RNR sector programmes in their areas through the structure of GYTs and DYT. The role of private individuals in providing input supply and marketing services and basic curative animal health services will be encouraged. Greater emphasis will also be given to promoting farmers groups to manage rural infrastructure, deliver services and market agricultural produce, building on the successful experiences from the water users' associations.

Ensuring Well-Managed, Cost-Effective and Responsive Public Services

There remains considerable scope for improving the efficiency and effectiveness of public services in the RNR sector. Critical to this will be measures to strengthen management within the MOA. This will require the elimination of unnecessary bureaucracy, allowing managers greater flexibility in the implementation of their programmes, and better technical back-stopping and supervision of field-based staff. Research, technical and advisory services will be (i) restructured

to make them more farmer-responsive and cost-effective; and (ii) subjected to regular monitoring and impact assessment. The imbalance in funding of national programmes implemented by the MOA and district programmes implemented by the Dzongkhags will be addressed and measures introduced to ensure better integration between MOA and the Dzongkhag RNR offices.

Promoting Commercialization and Privatization. and Reducing Subsidies

Input supply services are most appropriately the domain of the private sector, which can respond quickly to the demands of the market. During the 8FYP, the policy of commercialization and privatization will be extended to cover mechanization services and livestock breeding services. Cost recovery will be sought for technical and advisory services provided to commercial horticulture and the scope for such services being provided directly by independent organizations, such as growers associations, will be investigated. Input subsidies distort resource allocation and impose considerable costs on government. In future, such subsidies will be retained only where there is a strong economic and social justification.

Improving Access to Markets

For many communities, the opportunity to increase incomes and living standards depends on improved access to markets. This requires continued emphasis to be given to the development of rural access roads and mule tracks. Price controls, which may distort market mechanisms and discourage local production, will be reviewed.

Promoting Human Resources Development

The human resources, most decisive for the development of the RNR sector, are those of the rural communities themselves. Primary education and literacy programmes have a crucial role in opening up capacities for innovation and development among rural communities. The benefits of education can be enhanced by making curricula more sensitive to the needs of rural life. Extension programmes in the RNR sector also help to promote knowledge and understanding among the adult population in the rural areas. The RGOB's aim is to improve the quality of education and extension services by providing an appropriately qualified teaching and extension staff backed up by adequate resources and supervision.

Management and Utilization of External Assistance

In 1995/96 almost 75% of the RNR sector budget was funded under external assistance programmes.

During 8FYP efforts will be made to ensure that external assistance to the RNR sector reflects more closely government policy and programme priorities supports institutional capacities and programmes in the sector, and avoids the creation of separately managed project structures which cannot be sustained. An appropriate balance will also be sought between capital financing, recurrent expenditure support and technical assistance.