Proceedings of the Symposium on "Use of Agricultural and Environmental Statistics for the Development of Hill and Mountain Region"

Chairman : Dr. B.N. Tyagi

Convenors : Dr. H.V.L. Bathla
Dr. J.B. Singh

The Chairman introduced the topic of the symposium and impressed upon the importance of the symposium in relation to the development of hill and mountain region. The Convenors briefly provided an orientation towards the symposium. The following four papers were presented.

1. Agriculture Statistics System in Hill Area of North East India – presented by Shri A.K. Srivastava, NSSO (FOD), Faridabad.

2. Resource Inventory Needs for Uttaranchal – presented by Dr. O.P.S. Bana, GBPUAT, Pantnagar.

3. Linkage of Agricultural Informatics with Simulation Models to Assess the Productivity of Crops – presented by Dr. Subhash Chander, IARI, New Delhi.

4. Use of Environmental Statistics for the Development of Hilly and Mountain Region – presented by Dr. J.P.N. Rai, GBPUAT, Pantnagar.

Following recommendations were made

1. Considering the basic difficulty of collection of agricultural statistics due to specific features of the area and absence of regular reporting agency in most of the hilly states, there is a need to constitute a technical committee involving members from IASRI, DES, NSSO, Planning Commission and other related organizations to look into the whole gamut of problems related to agricultural statistics of the area and suggest suitable system for adequate and reliable data collection.

2. Environmental resource inventory needs for hilly areas need to be worked out and relevant information collected and used for effective planning, execution, monitoring and evaluation of developmental activities.

3. Hilly and mountainous regions are characterized by wide variability with respect to water, soil, plant species, pests, socio-economic factors, water

availability etc. There is a need to document these and transform them into Agri-informatics databases which can be utilized for predicting the growth and yield of crops using simulation models.

4. Statistical issue involved is bio-diversity and its conservation need to be examined. Accordingly, collective efforts of environmental scientists and statisticians are required to tackle these problems.

Agriculture Statistics System in Hill Area of North East India

A.K. Srivastava
National Sample Survey Organisation (FOD), Faridabad

Sound and reliable statistics on Agriculture is the essential requisite for the development of any region. In our country land use statistics is available for 95% of the reporting area through well organized system of land records or through sample survey employing sampling techniques. The remaining 5% area comprising mainly hilly tracks of North East Region, however, does not have any organized system of reporting due to its topography and unique system of Jhum / shifting cultivation.

The North – Eastern Region, comprising the states of Assam, Manipur, Meghalaya, Nagaland, Sikkim and Tripura and the Union Territories of Arunachal Pradesh and Mizoram, stands generally on a different footing from the other States of the country in the matter of collection of agricultural statistics. In regard to crop statistics, unlike the other States where area statistics are built up either on the basis of complete enumeration or sample surveys and the yield statistics of principal crops on the basis of random sampling crop cutting experiments, the system followed in the North-Eastern Region is based mainly on the conventional method of eye-estimation. The need for a special consideration of the development of agricultural statistics in the Region has been recognized since long.

The region is mostly hilly, lacking in transport and communication facilities. The land is generally not cadastrally surveyed and recording of agricultural area by physical measurement is not found practicable. The cultivators too do not generally have an idea of the area under cultivation. There is no village agency for recording details of land utilizations. There is no regular land record system and individuals in village do not have record of rights of land except that of temporary cultivation. There is also no regular system of payment of land revenue. The area suffers from the disadvantages of having long rainy

season (from the later part of April to October) and the rest of the period of the year experiences intense winter. The region is scarcely populated with small scattered villages.

The nature of special consideration to be given to this Region has been examined in recent times by many agencies. In 1976, the National Commission on Agriculture (NCA), noting that this Region constituted the main portion of the non-reporting areas for land utilization and area statistics in the country, expressed the view that it should be possible to estimate the geographical area of these areas and their broad land use classification on the basis of aerial photographs coupled with broad topographical survey on the ground. Noting the fact that aerial photographs are already available with the Survey of India, the Commission suggested that what is necessary is a interpretation of these photographs. The Commission also took up with the Governments of Assam, Nagaland, Manipur, Tripura and Mizoram, the preparation of ad-hoc estimates of land utilization in respect of non-reporting areas on the basis of aerial photographs, broad topographical survey and other available information and recommended that the coverage of land utilization and crop statistics should be extended to the entire geographical areas.

The National Sample Survey Organisation (NSSO) has also been considering the steps to be taken for improving the agricultural statistics in the region. A meeting of the directors of State Statistical Bureau of these and some other States and Union Territories discussed the problem in May 1976 and from the 31st round of the NSSO Socio-Economic Survey (1976-77), the Organisation has been conducting in the rural areas of the North-Eastern Region a few enquiries specially suited to the needs. Some particulars on 'Jhum' and permanent cultivation were collected in the Village Schedule and the Household Schedule on Jhum Cultivation in the 31st round.

About five lakh tribal families practice shifting cultivation in the north east region of India. The region has largest area under Jhum cultivation in the country. Out of the total reporting area of 33 million hectares, about 3 million hectares are under cultivation and out of this 2.6 million hectares are in Jhum cultivation. Nagaland and Mizoram have largest area under Jhum cultivation while Manipur has the least area. The incidence of jhuming and the level of agriculture practiced depends upon the proximity of contact with the planes people who have adopted more advanced agricultural activities.

In view of the specific topographical conditions in the hilly regions of these states, the method of eye-estimation is generally used for estimating the area under cultivation while scientific method of crop cutting experiments is used to a very limited extent for estimation of yield rates of crops.

In this paper the system of crop statistics as adopted in different states of the North Eastern Region is briefly described.

Considering the basic difficulty of collection of agriculture statistics due to specific features of the area and absence of regular reporting agency altenative method of data collection needs to be explored. The methodology of satellite based remote sensing technique could be a better alternative having established its credibility through various pilot projects. Govt of India has of late extended the scheme of EARAS in four north eastern states viz. Arunachal Pradesh, Nagaland, Sikkim and Tripura through which data is being collected with the help of sampling procedure. However, the system is yet to be stabilized in these states. It is therefore suggested that a Technical Committee headed by Director, IASRI with members from North eastern states, DES m/o Agriculture, NSSO and Planning Commission and other related organizations could look into the whole gamut of the problems of Agriculture Statistics in the area and suggest suitable system for reliable data collection.

Resource Inventory Needs for Uttaranchal

O.P.S. Bana
G.B. Pant University of Agriculture & Technology, Pantnagar

Resource inventory has to be integral and a continuous process of effective planning, execution, evaluation and monitoring of policies and developmental activities in any of the management unit, be it as large as universe or as small as farmer's field. The peculiar resource basis stakeholders and relationship between them of newly born state of Uttaranchal exaggerate further the importance of ever lacking resource inventory for any developmental activity. The management of watershed, sub-and/or micro watershed as a unit has been emphasized and considered better preposition for development of a region, state and/or nation. The State of Uttaranchal has been delineated first into 26 watersheds of eight catchments and further into 116 sub-watersheds comprising 1116 micro watersheds. Whatever is the management unit, the following inventories may be prerequisite for planning and execution of developmental activities for maximum biological, ecological and socio-economic benefits.

1. Available land resource with characterization like land capability classification, existing land uses and mapping

2. Available plant resources with their potential uses and spread

3. Existing farming and cropping systems/situations with technologies used, diversity (ecosystem, species and gene levels)

4. Available animal resource with species and genetic diversity with the production potentials and production constraints

5. Socio-economic needs – food, fodder, fuel, employment/income with gaps in their demand and supply

6. The choice(s) of potentially available interventions and scope of development in accordance with the socio-economic needs without affecting diversity, socio-political structures, cultures including food habits etc.

7. Impact assessments and sustainability of on going activities and suggested alternatives/interventions in bio-ecological and socio-economic terms

8. Existing and potential income generating activities (i.e. enterprises, post harvest processing, value addition etc.) along with the raw material availability and scope of development in harmony with the general features of the region

9. Market : structure available and needs

10. Possibilities and extent of ecotourism

11. Non-renewable natural resources and their possible utilization like wind, water, minerals etc.

Linkage of Agri-informatics with Simulation Models to Assess the Productivity of Crops

Naveen Kalra, Subhash Chander, H. Pathak, M. S. Narang[1],
Naresh Katoch, U.A. Soni, H.K. Rai, A. K. Mishra and Monica Jolly
Indian Agricultural Research Institute, New Delhi-110 012

There exists large temporal and spatial variability in the bio-physical and socio-economic aspects, which greatly influence agricultural productivity over a region. Simulation models, developed for understanding of growth and yield of crops, are based on calibration and validation of the models on the basis of research farm field results. There is a need to link geo-variability of the management inputs and other bio-physical and socio-economic aspects with the simulation models, to have an accurate estimate of the production over a region. The components of agri-informatics used are soil texture, organic carbon, water availability, fertilizer and pesticides applied, seasonal climate and cultivar characteristics. The characterization of variability in the growth conditions of crops over a region can be done either through surveys in the representative

farmers' fields or through remote sensing image at a specific growing period. This paper deals with the methodology of linking relational database layers with crop models to estimate the agricultural production over a region.

Agricultural production systems are characterized by large variability in soil health, climate, crop management practices, pest dynamics and socio-economic factors. It is an important document of variability in terms of databases for their subsequent linkages with crop growth simulation models in order to evaluate the crop productivity in various agro-ecologies.

There is a need to prepare soil databases based on primary soil characters, moisture retention, release and transmission characteristics, soil fertility evaluation and trends, organic carbon budget, its dynamics and sequestration potential. Basic soil characters, such as soil texture and organic carbon, which are usually available, at most of the locations can be utilized to assess soil moisture constants and soil fertility by using pedo-transfer functions.

Documentation of databases capturing the variability in agricultural systems and its linkage with crop growth models would facilitate the estimation of crop productivity in a comprehensive manner. Simulation results can be used for developing decision support system for online agro-advisory on crop management and adaptive measures for efficient use of bio-physical and socio-economic resources.

---

[1] Indian Agricultural Statistics Research Institute, New Delhi-110012