

**Towards Accelerated Agricultural
Development in Bihar**

**REPORT OF THE STEERING GROUP
ON
VISION OF AGRICULTURE DEVELOPMENT
IN BIHAR**

2010



**Department of Agriculture
Government of Bihar
Patna**

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Steering Group on Vision of
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VISION FOR AGRICULTURAL DEVELOPMENT IN BIHAR

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I hope that this Report will be of use to the Government of Bihar, the Central Government, development agencies, various stakeholders and all those involved in the development of agriculture and the well-being of the people dependent on it, particularly in Bihar.

V.S. Vyas

Chairman

Steering Group on Vision for Agricultural Development in Bihar

Abbreviations

AgGDP	Agricultural Gross Domestic Product
AgNDP	Agricultural Net Domestic Product
AgNSDP	Agricultural Net State Domestic Product
AI	Artificial Insemination
NAC	National Agriculture Insurance Company
APMC	Agricultural Produce Marketing Committee
ATMA	Agricultural Technology Management Agency
BAMETI	Bihar Agricultural Management and Extension Training Institute
CB	Commercial Bank
CMIE	Centre for Monitoring Indian Economy
CWC	Central Warehousing Corporation
DCCBs	District Central Co-Operative Banks
DM	District Magistrate
EU	European Union
FCI	Food Corporation of India
FIG	Farmers' Interest Group
GCA	Gross Cropped Area
GDP	Gross Domestic Product
GOI	Government of India
GPS	Global Positioning System
GSDP	Gross State Domestic Product
Ha	Hectare
ICAR	Indian Council of Agricultural Research
IIML	Indian Institute of Management, Lucknow
IPM	Integrated Pest Management
IRDP	Integrated Rural Development Programme
ISRO	Indian Space Research Organization
KCC	Kisan Credit Card
KVK	Krishi Vigyan Kendra
MoU	Memorandum of Understanding
MSP	Minimum Support Price
MT	Metric tonne
NABARD	National Bank for Agriculture and Rural Development
NAIC	National Agricultural Insurance Corporation
NAIS	National Agricultural Insurance Scheme
NCEUS	National Commission for Enterprises in the Unorganized Sector
NDC	National Development Council
NDDDB	National Dairy Development Board
NGO	Non-governmental Organization
NPA	Non-productive Asset
NPK	Nitrogen, Phosphorus, Potassium
NPM	Non-chemical Pesticide Management
NREGA	National Rural Employment Guarantee Act
NSDP	Net State Domestic Product
NSS	National Sample Survey
NSSO	National Sample Survey Organization
O&M	Operation and Maintenance

PACs	Primary Agricultural Co-operative Societies
PDS	Public Distribution System
PRI	Panchayati Raj Institution
R&D	Research and
RAU	Rajendra Agricultural University
RBI	Reserve Bank of India
RRB	Regional Rural Bank
SHG	Self-help Group
SLBC	State Level Banking Committee
SPS	Sanitary and Phytosanitary Measures
TE	Triennium Ending

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Executive Summary and Agenda for Action

INTRODUCTION

Recognizing the importance of agricultural development for reversing the decline in Bihar's economy, the Chief Minister of Bihar, Shri Nitish Kumar invited Professor V.S. Vyas to chair a Steering Group on Agriculture 'to articulate a medium-term perspective, which benchmarks the key development imperatives and which can become an Action Plan to achieve these daunting objectives', crucial for achieving growth in a declining economy. Thus, a Steering Group on Medium Term Perspective for Agricultural Development in Bihar was constituted under the chairmanship of Prof. V.S. Vyas with the Commissioner and Principal Secretary of the Agricultural Department as its made Member-Secretary. Professor Alakh N. Sharma and Professor Ravi S. Srivastav were members of the Group.

As rightly emphasized by the Chief Minister, the task of reviving Bihar's economy and ensuring the welfare of its people hinges on agricultural development. The state is richly endowed with fertile soils and ample water resources, which, coupled with a moderate climate that facilitates optimal crop production, provide enough scope for accelerated and sustainable agricultural growth. It is important, therefore, to examine the growth- stimulating and growth- inhibiting factors in this sector, and to prepare a roadmap to ensure efficient, vibrant and ecologically sustainable agriculture within a given time frame. In its report, the **Steering Group on Vision of Agriculture Development in Bihar** has suggested a strategy to achieve these objectives within the next decade, that is , by 2020.

1. ASSESSING PERFORMANCE AND REVIEWING THE CHALLENGES

The Steering Group has assessed the performance and reviewed the main challenges being faced by the agricultural sector in the state which are briefly described below. Bihar's economy started showing a decline in the late 1980s,

and economic growth started decelerating in the next two decades. The only saving grace, however, has been the performance of agriculture. Between 1993 and 2003, the all-India agricultural GDP grew at 2.2 per cent per year. The corresponding figure for Bihar was 2.7 per cent. However, because of the overwhelming dependence of the state's workforce on agriculture, which was growing at the rate of 2.1 per cent per year, the increase in per capita income of the agricultural workers was only marginal.

Agriculture contributes nearly 33 per cent to the state's GDP, but its share in the workforce is 74 per cent (as per 2008 figures). This asymmetry between the SGDP from agriculture and the workforce dependent on it has widened over a period of time, as employment opportunities in the non-farm sector in the rural areas have not increased.

In recent years some major structural changes have been observed within the agriculture sector of the state. The share of the crop sub-sector in the total value of agricultural output was around 66 per cent in TE 2001. It declined to about 48 per cent in TE 2006. On the other hand, there was a steep increase in the share of the livestock during the same period, which increased from about 26 per cent in TE 2001 to 41 per cent in TE 2006. Some increase was also observed in the fishery sector.

The importance of fruits and vegetables is increasing in Bihar's agricultural economy. The share of milk among the livestock products too is increasing. This suggests that over a period of time, there has been some diversification in the state's agriculture. However due to low productivity, which has shown a further decline since 2000, and low value realization, this has not led to any measurable increase in income. The average per worker income in agriculture in Bihar is half of the average income of the agricultural worker in India. The main challenge,

therefore, is to reverse the declining trend in productivity and to boost the growth momentum in some of the sub-sectors, primarily dairying.

The total demand for cereals, pulses, and milk and milk products in Bihar is projected to grow up to 22.5 million tonnes (mt), 1.4 mt, and 5.5 mt, respectively, by 2020-21. The projections for other commodities for the year 2020-21 are as follows: 0.5 mt: meat, eggs and fish; 0.8 mt: edible oil; 18.9 mt: fruits and vegetables; and 0.9 mt: sugar. In order to meet the projected demand, domestic production needs to be increased every year by about 5.4 per cent for cereals, 11.2 per cent for pulses, 22.8 per cent for edible oil, and 4.8 per cent for sugar. However, the situation in the state is not conducive for achieving the targeted increase in the production of major staples, and concerted efforts are required to achieve production levels that are as close to the targets as possible.

The other challenge faced by Bihar's agriculture sector is the rising cost of cultivation and consequently, the falling income of the producers. The marginal farmers are being hit especially hard because of their inability to access inputs at reasonable prices.

2. STRATEGY AND BUILDING BLOCKS

The strategy proposed by the Group is based on enhancing the income and promoting the welfare of agricultural producers in the state. Two mileposts are suggested for growth in the incomes of agricultural producers: in the first five years, productivity in agriculture should reach the average attained by the country, and during the next five years, it should be equal to the best among the states of the country. This enhancement of agricultural productivity is expected to automatically increase the incomes of agricultural producers, which is an essential pre-requisite for economic growth.

Many of the ills afflicting the agriculture sector in Bihar can be cured primarily by addressing the issues concerning the other sectors of the economy, more so than even

implementation of the macro-economic policies at the Central and state levels. The Steering Group has developed a strategy comprising the following building blocks:

- Strengthening the production base of agriculture, that is, development of land and water resources;
- Ensuring fair and just agrarian relations;
- Ensuring value addition in crop production;
- Strengthening the supplementary enterprises of dairying, fisheries, etc;
- Strengthening agricultural research and extension systems;
- Reforming agriculture credit and marketing systems;
- Instituting adequate risk mitigation measures; and
- Ensuring that the government plays a more constructive role, both at the state and Central levels.

The above measures are elaborated in the following sections.

3. STRENGTHENING THE PRODUCTION BASE

3.1 Land

Bihar is endowed with fertile land resources. The area under cultivation as a proportion of the total reporting area is as high as 60 per cent, as compared to only 47 per cent for the country as a whole. However, because of the need to feed its large population, even land that is unsuited for cultivation is being brought under the plough. This necessitates the enforcement of a proper **land use policy** for the state, which should cover the following areas:

- Promotion of agro-forestry by developing miscellaneous trees and groves as community forests could be the best way to augment forest resources in the State;
- Expansion of non-agricultural activity should be undertaken on barren and uncultivable land. Industries can be offered sops like incentives and tax rebates to set up their new units on such lands;
- Cultivable wasteland should be developed as pastures and grazing land; and
- Fallow land should be made cultivable by increasing cropping intensity.

The Steering Group has given estimates of the land use pattern on the above lines for the year 2020-2021. Another issue that needs to be addressed within the given time period is arresting the deterioration of land quality in the state, as evident from the fact that nearly 2.2 million ha. out of the total cultivated land of 9.0 million ha., suffers from mild to serious degradation.

3.2 Water Resources

Bihar is extremely rich in water resources. It has adequate rainfall all over the state, a network of perennial and semi-perennial rivers and an adequate supply of ground water at low depth. The water sector in the state, however, faces the following severe problems:

- The rivers of North Bihar originate in the snow-clad, high rainfall regions of Nepal and Tibet, which leads to recurrent floods in the state;
- South Bihar, with semi-perennial or seasonally flowing rivers and uncertain rainfall, frequently faces drought of moderate to severe intensity;
- All over the state, water for irrigation is used inefficiently, as evident from the low cropping intensity of the state; and
- Most of the groundwater is lifted by using less efficient diesel motors, thereby raising the cost of well irrigation.

The strategy for the water sector should comprise the following measures:

- A crash programme of repairs and maintenance of canals and water bodies;
- Extension of management of water resources by the users to cover at least half of the irrigated area by 2020;
- Promotion of greater coordination between agricultural scientists and irrigation authorities; and
- Implementation of controlled irrigation through drip irrigation and sprinkler irrigation in water-scarce regions.

3.3 Floods

Nearly 40 per cent of the total cropped area of the state gets damaged by floods. In 2008, this damage was particularly severe due to unprecedented floods in Kosi. The state should aim to minimize the loss of life and property, and rehabilitate the flood-affected people by enforcing the following steps:

- Installing reliable early warning systems with the help of ISRO;
- Constructing reservoirs with large storage in Nepal or interlinking of rivers;
- Implementing a properly planned watershed programme integrating farm ponds, village ponds and check dams;
- Mobilizing villagers to remove silt from water ponds and check dams, and for strengthening embankments;
- Developing and popularizing flood-tolerant rice; and
- Enacting a Flood Code on the lines of the Drought Code - the latter is in existence in several states – to give clear directions before, during and after the floods.

3.4 Droughts

While north Bihar is a victim of frequent floods, a significant part of south Bihar witnesses periodic droughts despite getting adequate rainfall. The following measures can help in dealing with this problem:

- Harvesting of rainwater and recharging of wells;
- Encouraging cultivation of low water-using, drought-resistant crops and crop varieties;
- Promoting subsidiary occupations like dairying, poultry, piggery, etc.; and
- Introducing a higher productivity fodder crop like hybrid Napier and the practice of sowing tree crops in the peripheral areas.

4. REFORMING THE AGRARIAN STRUCTURE

Small and marginal farmers, comprising 93 per cent of the state's agricultural community, dominate Bihar's agriculture. The structure is downward sloping as progressively more and more land is cultivated in these holding groups. There are two other handicaps suffered by these farmers. They have an overwhelmingly large share of the leased -in land, which is unrecorded and unregulated. Further, these holdings are fragmented in a large number of parcels. With an average size of holdings of 0.60 ha. there are, on an average, 3.3 parcels per holding.

These holdings do not receive the benefits of various facilities such as subsidized inputs, credit or extension services partly because of the high transaction cost but mainly because of the unhelpful attitude of various functionaries. Despite these handicaps the small farmers are able to hold on to their lands. Thus, graduating from marginal to small holdings and further to medium holdings, is a promising option, which can be achieved through the following measures:

- Legalizing tenancy, within the existing land ceiling provisions;
- Purchasing of land from landholders (who are willing to sell their lands) by the State Land Development and Finance Corporation and selling it to the small and marginal farmers at fair prices;
- Encouraging credit institutions to advance loans to marginal and small farmers to purchase land from various private and government sources;
- Encouraging large farmers to shift to non-agricultural enterprises;
- Distributing government surplus land in viable small holdings;
- Encouraging dairying, horticulture and vegetable growing, particularly on small and marginal farms;
- Promoting contract farming, and ensuring transparent and fair agreements between contracting parties;

- Encouraging the collective organization of farmers with similar economic interests; and
- Drawing road map for consolidation of holdings, but should be done only after creating suitable environment for its implementation and proper training of the officials engaged in land administration.

The pre-condition for fair and just land reforms is reliable land records, which can be formulated through GPS technology and computerization.

5. CROP DIVERSIFICATION AND VALUE ADDITION

Foodgrains dominate the cropping pattern in Bihar. There has not been any substantial change in this regard over the period of last decade or so. However, within the food crops there has been a shift towards maize. Fruits and vegetables are important non-food crops. Bihar's share in the country's rice production is around 6 per cent, for wheat around 5 per cent and maize 9.6 per cent. Dominance of food crops reflects the agrarian structure of Bihar i.e., the preponderance of the small and marginal farmers for whom self-provisioning is an important consideration.

A more important task is to improve the yields of the existing crops by bridging the gap between the performance and potential of the crops grown, and minimizing wastage. A strategy for value addition on farms will have following elements: a) filling productivity gaps in the staple crops, b) adding value to existing crops by primary processing at the farm level, c) scientifically evolved region-specific mixed farming pattern, and d) identifying areas for intensive cultivation of fruits, and vegetables.

The above strategy can be enforced through:

- Proper use of irrigation water;
- Timely supply of the quality inputs, especially seeds;
- Propagation of appropriate practices suited to small farms;

- Investment in rural infrastructure;
- Organizing linkages with agro-processing industries;
- Training of farmers in the modern methods of production; and
- Emphasis on dynamic crops, viz., maize among cereals, lichi among fruits, potato among vegetables.

6. ALLIED ENTERPRISES TO AGRICULTURE

6.1 Dairying

Among the agricultural sub-sectors, dairying is emerging as the most dynamic sub-sector. During the period 2001-2002 to 2006-2007, milk production increased two fold. Nearly 64 lakh households are engaged in this activity and women constitute about 70 per cent of the workforce engaged in dairying. Unlike agriculture, the distribution of assets in this sub-sector is more equitable. All these reasons make it imperative to give a further push to this activity, which will also benefit the poor and the marginalized sections.

Bihar enjoys comparative advantages over other states in this sector, including , a) a proportionately larger number of buffaloes as compared to the country as a whole, b) a larger proportion of dairy cattle in milk , c) ownership of the bulk of cattle by marginal and small farmers, who can devote sufficient labour and time to care for their animals, d) a higher proportion of pasture land and cultivable waste land per animal in-milk, and e) the existence of a fairly efficient apex marketing organization for milk and milk products.

Despite all these advantages, the dairy sector in Bihar has not been able to realize its potential due to: lack of adequate facilities for artificial insemination; poor veterinary services; degradation and encroachment of grazing land; insufficient production of green fodder on farm resulting from small holdings;

insufficient and costly cattle feed; and only a small part of the milk supply having been brought under the fold of organized marketing.

The following steps can help strengthen this sector:

- Evolving a breeding plan with an emphasis on identifying and propagating superior local breeds;
 - Evolving a proper feed supply programme taking into account nutrient deficiency in each region;
 - Strengthening veterinary services by training and involving the rural youth;
 - Organizing dairy producers in reformed cooperatives, new generation cooperatives or producers' companies;
 - Encouraging the apex organization to opt for high value milk products; and
 - Establishing a close liaison with national level organizations, especially the National Dairy Development Board (NDDB).
- 6.2 Fishery
- As mentioned earlier, Bihar is endowed with rich and diverse water resources, which can be optimally utilized for inland fishery. Nearly 4.6 million households in the state are engaged in fishing. In recent years, the fishery sector has been growing rapidly, yet a large part of the growing demand for fish in the state has to be met by importing fish from long distances. In addition, the ordinary fish farmer does not even get remunerative prices for his catch.

The major hurdles facing this sector are: shortage of quality fish seeds; use of only traditional method of fish production; lack of scientific management of water bodies; iniquitous and exploitative arrangements for the management of water bodies; absence of proper marketing and storage; loss of fish due to natural calamities (flood/diseases); and the existence of a number of fake fishermen's societies, which siphon off the resources to the rich and the powerful. These obstacles can be countered by enforcing the following measures:

- Strategic intervention for the development of aqua culture to meet the demand and generate surpluses for the fishermen;
- Renovation and deepening of ponds;
- Determining and adhering to a proper stocking rate and scientific fish production;
- Timely supply of quality fish seeds;
- Construction of at least one fish seeds hatchery in each district; in public-private mode,
- Ensuring the availability of credit and technical support for scientific storage;
- Insurance of fish production;
- Organization of cooperatives of fish farmers;
- Training farmers to undertake scientific fishery; and
- Promotion of paddy-fish combination in areas practising flooded paddy.
-

6.4 Poultry

Poultry has a large and expanding market. At present, poultry farming is pursued only in a small unit in the unorganized sector.

The following strategy can be adopted to develop this sector:

- Introduction of superior breed of birds;
- Ensuring adequate feed production capacity in the state;
- Encouraging poultry-keeping households to organize themselves in groups, and to organize their marketing cooperatives; and
- Establishing links between small poultry keepers and organized poultry marketing firms both within and outside the state.

6.5 Piggery

Piggery is not a significant subsidiary occupation of the farmers in Bihar. Generally, landless labourers and some marginalized poor households in the urban areas are engaged in piggery. The units they work in are small and susceptible to exploitative

marketing arrangements. There is hardly any support from the state institutions. It is envisaged that In order to overcome these hurdles, the households pursuing piggery need to be provided with a minimum viable number of piglets (8 to 10) to make their holdings viable, along with support services for veterinary care and marketing.

7. INSTITUTIONAL SUPPORT TO AGRICULTURE

The Steering Group maintains that growth in small farm agriculture critically depends on the support extended by the institutions of research, extension, credit and marketing. The Group has examined the existing conditions of these institutions and accordingly delineated the requisite reforms.

7.1 Agricultural Research

The growth of agriculture in the future will be largely based on the development of improved technologies and their widespread dissemination among the producers. In this respect, Bihar's record is not very satisfactory. Even the developed technologies have not been widely adopted by the farmers.

In the state, public institutions shoulder the responsibility for agricultural research more or less exclusively. The investment in agricultural research and education in the state is a paltry 0.2 per cent of the state agricultural GDP (as against 0.8 per cent at the national level). While paucity of resources is one handicap, the use of these resources, and the direction and thrust of the research activities must share equal blame for the slow economic growth

The present content and approach of agricultural research in the state leaves much to be desired. The major shortcomings are: a) lack of attention to evolve hardy varieties, which can face floods and droughts that regularly hit Bihar, b) inadequate cultivation of 'poor man's crops' —so- called minor cereals, or pulses, c) neglect of the sub-sectors of agriculture, namely, horticulture, floriculture, sericulture, animal husbandry and fisheries, d) insufficient efforts to economize

costlier/scarce factors such as water, and, e) lack of linkages with farmers in setting the research priorities.

Bihar is also covered by the large national agricultural research network with the Indian Council of Agricultural Research (ICAR) as the apex organization. ICAR has seven research centres/stations to address the specific needs of Bihar's agriculture. There is, however, very little synergy between the Agricultural University and the ICAR institutions and Bihar has not been able to take full advantage of the various schemes offered by ICAR.

7.2 Extension

As in several other parts of the country, the weakest link in agriculture in Bihar too is extension. This is evident from the fact that a dismal 0.4 per cent of farmers in Bihar received information on modern technology from extension agents. This is the lowest percentage among the major Indian states. The main sources of information on technology are the input suppliers and progressive farmers.

There are three main public players for agricultural technology dissemination in Bihar. These institutions are *Krishi Vigyan Kendras* (KVKs), government departments and the Agricultural Technology Management Agency (ATMA). The following measures should be taken to improve the performance of KVKs and Government departments:

- Appointment of technical and non-technical personnel on a priority basis for a fixed and reasonable time period;
- Creation of infrastructure in KVKs and block offices;
- Conduction of refresher courses for existing personnel,
- Proper planning and regular monitoring of their activities by a high level committee.

The extension system, which was largely dysfunctional, may get a lease of life with the introduction of the Agricultural Technology Management Agency (ATMA), with its emphasis on decentralized decision-making, and integration of all related departments. However, the studies conducted by the World Bank and other agencies have also pointed out certain weaknesses in the performance of this model in the state. The following measures thus need to be taken to address this issue:

- State level institutions should play a pro-active role in capacity building, training and mentoring support.
- All technical and non-technical posts should be filled on a priority basis.
- Adequate funding for infrastructure maintenance, supplies, training and capacity building should be ensured.
- Project Directors should be given adequate autonomy.
- Higher authorities should ensure the convergence of different departmental programmes at the district and block levels.
- A co-ordination committee at the state and district levels should be constituted for regular monitoring, evaluation and overall co-ordination among the KVKs, ATMAAs and various government departments.
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7.3 Credit

Institutional credit is a pre-requisite for increasing agricultural production and its value addition. The National Sample Survey (NSS) has shown that only 33 per cent of the rural households have access to credit in Bihar, as against a national average of 48.6 per cent. Only 23 per cent of the borrowing households obtained loans from institutional agencies in the state, and the share of institutional credit in the total borrowings by the farmers was only 24 per cent.

The credit deposit ratio of commercial banks in Bihar is lower than that of most other states in the country. Both the farmer borrowers and the lenders in the

organized sector face genuine difficulties. On the lenders' side, the major difficulty is the high transaction cost, as the demand for credit is for small amounts and that too intermittently. The situation is exacerbated by the low banking density and lack of adequate staff in the rural branches of the commercial banks. On the borrowers' side, the most important reason for them to shun the organized sector is the procedural complexity and high real cost of borrowing. The more discouraging factor for the borrowers, especially the tenant farmers, is the unsuitability of the current nature of loan instruments. The small borrower requires loans for consumption purposes as much as for production purposes. In order to make credit a powerful aid for agricultural development, the following goals will have to be reached:

- Credit dispersal for agriculture has to increase at the rate of 30 per cent per year for the next ten years. This target was already surpassed in the country as a whole during last three years.
- Inclusive banking targets given by the Reserve Bank of India have to be fulfilled in all districts by the next five years.
- Revised form of the Kisan Credit Cards, providing for both production and consumption loans, should be made available to all eligible farmers.
- At least half the cultivators should be members of reformed cooperatives or bank-linked Self-help Groups (SHGs).

For achieving the above objectives, the regional rural banks need to adopt a 'credit plus' approach, which will involve:

- A holistic view of the credit requirements of the poor households, i.e. credit needs for consumption as well as for production and investment;
- Formation SHGs and their linkages with banks;
- Establishment of a rapport with the civil society institutions in the area;
- Decentralization and greater autonomy to the regional offices and local branches;

- Review of the personnel policy in the light of the commitment to ‘inclusive banking’; and
- Ensuring of commitment, involvement and accountability at the top level.

Co-operatives are still considered the most suitable organizations for providing credit to farmers. In Bihar, co-operatives provided 50 per cent of total agricultural credit in the early 1980s, which declined to only 10 per cent in 2007. The Primary Agricultural Co-operative Societies (PACs) are organized at the panchayat/village level, and are federated to the respective DCCBs. There are about 6000 PACs with 38.62 lakh farmer members, but only 1836 PACs were viable in 2007. Hence, the majority of them are not in a position to provide credit to farmers in Bihar.

Serious efforts thus have to be made to strengthen the cooperative credit structure. The proposed measures include:

- Rejuvenating village level societies, by expanding their area of operation and/or including new, profitable, activities;
- Allowing only genuine users of the cooperative services to become members of cooperatives;
- Permitting viable societies to appoint their own secretaries;
- Holding regular elections to the Boards of the societies;
- Encouraging farmers to form New Generation Cooperatives or Producers Companies for specific commodities;
- Allowing Primary Societies the freedom to affiliate with any District Cooperative Bank (DCB) or a commercial bank for their financial transactions;
- Giving one-time subvention to the potentially viable societies;
- Encouraging societies to build their own capital base with members’ contributions;

- Organizing a massive training and orientation programme for both the members and functionaries of the cooperatives, as also the personnel of the cooperative departments of the state at all levels; and
- Requesting NABARD to mount a revitalization programme for DCBs and apex cooperative banks.
-

7.4 Marketing

The existing system of marketing of agricultural output has not proved to be adequate and efficient. Farmers are not able to sell their surplus produce remuneratively and there are widespread distress sales, particularly by marginal and small farm households.

The agricultural markets suffer from some structural weaknesses, such as the existence of unorganized small producers as against organized buyers, weak holding capacity of the small producers, and the absence of any storage infrastructure. The system has undergone several changes during the last five decades owing to increasing commercialization, increase in urbanization and the consequent change in the pattern of demand for marketing services.

More than 90 per cent of the farmers sell their produce in villages, mainly to itinerant traders, at much lower prices than the procurement price of the respective agricultural commodities. There are very few procurement centres and a majority of them do not operate regularly.

In view of the scale and objectives of agricultural growth envisaged in the coming years, the problems afflicting the systems and structures of agricultural marketing have to be addressed on a priority basis. This necessitates the following measures:

- Encouraging the organization of genuine cooperative marketing societies, that should be allowed to function without bureaucratic interference and with professional management;
- Promotion of contract farming through vertical integration with large marketing and agro-processing firms;
- Strengthening of the marketing infrastructure by increasing the number of marketplaces, upgrading the facilities at the designated marketplaces, constructing rural godowns and cold storages, and making arrangements with the credit institutions to honour warehouse receipts and pledges;
- Provision of comprehensive and timely information on agricultural prices by establishing IT-enabled village information kiosks all over the state;
- Removal of policy hurdles by constantly reviewing legislation and government orders to meet exigencies; and
- Launching of an awareness campaign for examining standards and sorting out products according to well-established grades.
-

8. RISK MANAGEMENT

8.1 Climatic Factors

Agriculture in Bihar is subject to a variety of risks arising from rainfall aberrations, temperature fluctuations, hailstorms, cyclones, floods, and climate change. Natural calamities, especially floods and droughts, frequently cripple the state. Further, price fluctuations, a weak rural infrastructure, imperfect markets and the lack of financial services and limitations in the design of risk mitigation instruments exacerbate these risks.

The experience of the last ten years in Bihar's agriculture sector shows that an increase in the real NSDP of agriculture in a year is regularly followed by a decline in NSDP the following year. Further, the magnitude of fluctuation is quite

high; it ranged between (+) 37.2 per cent to (-) 24.15 per cent during the period 1993-94 to 2003-04. This heightens the risk of making investments in farm production.

The fluctuation in area is not as pronounced as the fluctuation in yields, and the fluctuation in farm output is the main contributory factor to the fluctuation of agricultural incomes. It seems that technology has not helped in reducing production risks appreciably; there is thus an urgent need to devise and extend suitable insurance products to neutralize the consequences of instability in agricultural production.

8.2 Crop Insurance:

In the state, crop insurance has helped only to a limited extent. The coverage in terms of area, number of farmers and value of agricultural output is very small, payment of indemnity based on an area approach leaves the affected farmers outside the compensated area, and most of the schemes are subsidy-driven. This calls for renewed efforts by the government and insurance authorities to improve the viability of the insurance schemes over time.

Insurance products for the rural areas should be simple in design and easily understood. Newly launched weather-related insurance schemes can meet these requirements, provided sufficient weather stations are established, and at least a broad correlation is established between the major components of weather and agricultural output in different agro-climatic zones.

The ongoing crop insurance scheme operated by the Agricultural Insurance Corporation can be suitably strengthened to serve its objective. The following measures need to be enforced:

- Crop insurance may be kept distinct from insurance of other assets, as the requirements and protocol for insuring other assets, e.g. animals, are different.

- Taking into account the principle that 'risk spread is risk minimized', the compulsory character of crop insurance for all borrowers from banks may be retained.
- Progressively more and more crops may be brought into the orbit of crop insurance. However, extension of the coverage must be done carefully after collecting long-term yield data and working out the central tendency from relevant data.
- Special instruments should be designed to insure plantation crops (tea) and horticultural crops.
- The long-term objective should be to determine the premium on an actuarial basis. For the next ten years, a subsidy on premium may be continued for the marginal farmers on all crops insured by them.
- The threshold yield for calculating indemnity should be arrived at more carefully, that is, arriving at the central tendency in yields on the basis of long-term data and taking into account the probability distribution.
- Delays in yield determination and indemnity payment should be eliminated. Efforts should be made to obtain yield data at the village panchayat level, by suitably increasing the number of crop cutting experiments.
- The state government should play a more proactive role in the affairs of the Agricultural Insurance Corporation (AIC) by asserting its right as an important provider of subsidies on the premium.
-

8.3 Price Instability

The integration of local markets with regional, national and global markets is one of the alternatives for minimizing the impact of price fluctuations. However, agricultural commodities markets in Bihar are not integrated with the major markets in other parts of the country. This is evident from the fact that the farm harvest prices of maize and paddy in major markets in Bihar were found to be lower than the MSP, which was the ruling price in several other markets.

Efforts should be made to improve the situation by reducing the hegemony of traders and developing countervailing market power. The state should bring about market regulations through cooperative marketing agencies and public agencies, and by providing a conducive environment for contract farming.

Two other instruments that can be used to reduce uncertainty in agriculture produce and to provide a measure of stability are:

- **Minimum Support Prices** at which the government procures all the produce offered for sale. Bihar is not taking full advantage of this scheme. This is in sharp contrast to the agriculturally more advanced states like Punjab.
- The other instrument to 'discover' prices in advance and form a strategy to cope with the likely developments is **Forward Markets**. Small and marginal farmers will find it difficult to operate on the forward markets on their own, as the requirements for successfully operating in these markets are quite stringent. However, efforts should be made to enable organized groups of farmers, as well as the more viable farmers to get acquainted with and make use of the forward markets.

9. ROLE OF THE STATE GOVERNMENT

9.1 Addressing Crucial Issues

The role of the state is critical in small-farm agriculture that characterizes Bihar. For effectively addressing the issues of low productivity and low incomes, the state government has to:

- Formulate relevant policies;
- Enhance investment in agriculture;
- Strengthen supportive institutions;
- Ensure the supply of the quality inputs;
- Partner with the private sector and civil society institutions; and

- Play an advocacy role *vis à vis* the Central government and other relevant agencies.

The following is a proposed action plan for each of the areas identified above:

9.2 Agricultural Policies

Government policies need to be formulated anew or reviewed in certain areas such as addressing the issue of deterioration of land and water resources. There will be mounting demand on these resources with urbanization and industrialization. A clear **Policy on the Land and Water Use** is a necessity.

There is a need to review the **Tenancy Policy**. Contrary to expectations, the present policy of discouraging tenancy has not contributed to the protection of the small farmers. Legally permissible tenancy, with clear rights and obligations on the parts of both contracting parties, registration of tenants, and a fair and expeditious dispute settlement procedure will go a long way towards managing the scarce resource of land productively and equitably. There is need of creating an appropriate environment at ground level for its implementation.

A similar review is needed in the area of agricultural marketing. The state took a positive step in dismantling APMC legislation. But it has not been substituted by any other farmer-friendly legislation. The Government of India has circulated a **Model Bill for Agricultural Marketing**, which, while giving freedom to producers to dispose their produce, also regulates the conduct of the traders. There is a need to adopt an institutional structure at the earliest taking inputs from the model bill.

All legislation pertaining to input supply, land and water use, storage, marketing and movement of agricultural produce too needs to be reviewed and the inhibiting provisions need to be dropped.

9.3 Investment in Agriculture

Public investment in agriculture as a ratio of the agricultural GDP in Bihar is much lower than that obtaining in most of the other states in the country. A stepped up programme is needed for improving social as well as physical infrastructure, and for boosting public investment in the critical areas of the agriculture sector.

An important area for productive investment is the strengthening of the land and water base. Systematic efforts can be made to dovetail NREGA activities with this objective.

Another important area for investment is strengthening market infrastructure for agricultural produce. NABARD's Rural Infrastructure Development Fund can be used for this purpose. Investment in this area is basically a commercial activity. The government can create an enabling environment for private entrepreneurs.

10. STRENGTHENING INSTITUTIONS

As mentioned earlier, in small-farm agriculture, the supportive institutions in research, extension, credit and marketing are of critical importance. Bihar has a network of such institutions, but they are dormant due to various factors such as inadequate financing and interference by politicians and bureaucrats.

In the field of research, strengthening the Rajendra Agricultural University should receive the highest priority. There are parallel extension structures existing in the state. These structures have been inherited from the past, as the extension systems have evolved to meet specific requirements. The extension system needs to be rationalized for effectively reaching out to the farmers. Since the ATMA model has shown good results, this approach should be extended to all the districts.

In the area of marketing, the abolition of the APMC has caused a vacuum in the promotion and regulation of agricultural marketing. This void should be filled a

soon as possible. The state government should set up institutions, which are more promotional than regulatory and are farmer-centric. The Bihar office of the Indian Standards Bureau, and cooperatives should be revitalized. Despite all their failings, cooperatives constitute the main source of credit for the small and marginal farmers. Bihar has a well-functioning marketing society in the dairy sector. This model may be adapted for other commodities and products too. Simultaneously, people should be accorded the freedom to try out various forms of cooperative organizations as long as they are run by the producers and uphold cooperative principles in their essence.

10.1 Supply of Quality Inputs

The government cannot abdicate its responsibility of providing quality inputs to farmers. It should give particular attention to the availability, prices and quality of the major inputs.

The role of quality **seeds** is critical and will continue to remain so. While the private sector may have a role to play in the production of hybrid seeds, mainly for commercial crops, there must be an effective regulatory system to ensure quality and accountability. The state government will have to ensure the supply of seeds of high yielding varieties of crops for foodgrains, which are so important for food security. Public sector investment in seed production and processing needs to be stepped up. The Bihar Rajya Beej Nigam needs to be strengthened to process and market seeds produced by the farmers. There is also a need for the effective enforcement of seed laws and for an elaborate arrangement for seed testing and certification.

- **Fertilizers** will continue to play a significant role in increasing the crop productivity. The state must ensure the adequate supply of high quality fertilizers at the farmer's doorstep and at affordable prices. This also necessitates the strengthening of soil and fertilizer testing laboratories.

Alternatives to chemical fertilizers and balanced use of nutrients will have to be vigorously promoted by the state government. Organic cultivation in niche areas and in niche products should be promoted by the state.

Pesticides Since insects and pests cause huge losses to farmers, the use of pesticides is, to some extent, justified. But these pesticides cause immense harm to our natural environment. The state government should thus encourage the adoption of alternative methods of pest control like IPM and NPM (Non-Chemical Pesticide Management). Pesticide laws should be enforced to keep a check on the quality of pesticides. The use of bio-pesticide and integrated pest management should be encouraged and promoted.

10.2 Irrigation

Bihar has an adequate irrigation potential. But this does not minimize the need for saving water and using it more efficiently. The government needs to support farmers to economize the use of irrigation water by encouraging the use of modern methods of micro-irrigation. Electrification of private tube wells on a massive scale is needed for reducing the cost of cultivation. Ancient systems of irrigation and traditional water bodies viz. *aahar*, *pine*, ponds should be renovated as a part of the programme for soil and water conservation.

10.3 Credit

Farmers have to be assured of agricultural credit at reasonable interest rates. Cooperatives constitute the most important source of farm credit for the small and marginal farmers. The state government must ensure the adequate availability of rural credit through cooperatives, commercial banks and regional rural banks through the aegis of the State Level Banking Committee (SLBC). The state should also play a proactive role in organizing SHGs and micro-credit institutions.

10.4 Reforms in the Department of Agriculture:

The organization and functioning of the state department of agriculture needs to be reviewed to ensure that it has the capacity to fulfil the tasks assigned to it. The key features of the reorganized department should be:

- Arrangement for taking a holistic view of agricultural development, encompassing crop production, horticulture cultivation, animal husbandry sector and fish production;
- Provision of adequate staff, including administrators, agricultural scientists, water management experts and economists;
- Capacity and willingness to work with other knowledge systems, particularly the Agricultural University, other academic institutions and ICAR centres;
- Regular upgradation of skills, not only of the middle and lower level staff, but also the higher-level functionaries, and exposure to new developments in agricultural and natural resource development.

10.5 Partnering with Panchayati Raj Institutions (PRIs), Private Sector and Civil Society Organizations:

Panchayati Raj institutions (PRIs), which have a great stake in agricultural development, should be encouraged and equipped to shoulder increasing responsibilities. Panchayats should manage community assets of pasturelands, community nurseries, farm roads, community irrigation sources, rural godowns, rural *haats* and markets. They should also be provided technical expertise. Gram panchayats should be equipped to act as rural knowledge hubs for technical guidance to the farmers.

Opportunities for public-private partnership should be exploited to the maximum. The private sector has a major stake in agricultural development. Crucial investment in areas of seed development, fertilizer production and distribution, marketing, and agro-processing can come from the private sector. the creation of other extension agencies, particularly IT-enabled rural centres needs to be encouraged and a

synergistic relationship needs to be established to strengthen the public extension system.

A partnership should be forged with other stakeholders including non-government organizations (NGOs), agri-clinics, input supplying agencies and cooperatives, The media—both print as well as electronic—and farmer's organizations. The state should encourage NGOs to play an innovative role while also acting as 'watchdogs'. The role of women in agriculture should be recognised and rewarded.

10.6 Expectations from the Central Government

The state government should establish a rapport with the Central Government and enlist its support for rapid agricultural development in the state. Although agriculture is a state subject, the Central Government still needs to play an important role in catalysing agricultural growth in the country. The Central Government also provides important resources for running the state programmes. Bihar has suffered from a cut in Central allocations. The anomalies in Central share allocation should be corrected during the Eleventh Five Year Plan. The Central allocations should be on the basis of the potential of the state and the developmental deficit that it has suffered. The central government may consider the following recommendations:

- Enhancing allocation under the macro management mode to 100 crore per annum from the present level of 20-25 crore per annum;
- Sanction of work plan for centrally sponsored schemes should be done for five years, and doing away with the present system of the annual sanction process;
- Consider reducing the number of centrally sponsored schemes by merging them without losing the focus;
- Revision of guidelines for the macro management mode of agriculture and addition of new components;
- Sanctioning of all new schemes for the next financial year the 15th of January so that the necessary budget provisions can be made in time;

- Facilitating the supply of seeds of new crop varieties, such as Pusa Gold variety of wheat, and the supply of new farm implements like the Happy Seeder;
- Establishing a Central level research institute for dry land/rainfed farming in the southern part of the state;
- Establishing a Central Agricultural University in South Bihar;
- Helping the RAU establish agricultural/horticultural/ veterinary colleges and enhancing allocation for research;
- Ensuring procurement at minimum support prices;
- Creating storage infrastructure and cold chains through the Food Corporation of India (FCI) and Central Warehousing Corporation (CWC); and
- Undertaking a massive programme of flood control and water management in North Bihar;
- Above all, seeking the state government's views on all important policy matters including prices, trade, credit, etc., and its partnership in some of the central schemes, such as the Agricultural Insurance Schemes should be strengthened.

The Central Government should realize that by assisting the development of agriculture in Bihar, it is also helping to create a granary for the country.

CHAPTER I

INTRODUCTION

1.1 AGRICULTURE AND BIHAR'S ECONOMY

Bihar's journey for accelerated agricultural development begins with a few advantages and a number of handicaps. It has fertile soils, ample water resources and hard-working farming communities. Although there has long been neglect in this area, in recent years, the administration has been geared more towards development. At the national level, it is being recognized that Bihar is a sleeping giant as far as the potential for agricultural growth is concerned. Nonetheless, it has several pronounced handicaps, particularly in terms of inadequate infrastructure, weak support systems, emaciated institutions, and neglected human development.

It is instructive to note that despite severe handicaps, the crop sector, livestock and fisheries in Bihar performed well in the 1990s (see Tables 1.1 and 1.2). This shows the resilience of Bihar's agriculture and provides hope that agriculture can be a driver for the overall economic growth of Bihar. However, since the turn of this century, there has been a slowdown in the crop sector.

Table 1.1: Salient Features of Agriculture in Bihar and India

Indicators	Bihar	All India
Share of AgGDP in GSDP (%) (2005-06)	33.00	18.74
AgNDP/hectare (Rs.) (2005-06)	23,427	23,181
AgNDP/rural person (Rs.) (2005-06)	1778	4137
Compound Annual Growth Rate of AgGDP (1993-2006)	1.8	2.6
Compound Annual Growth Rate of GSDP (1993-2006)	4.8	6.4
Share of Agriculture in Employment (%) (2004-05)	73.4	58.5
Share of Agriculture in Rural Employment (%) (2004-05)	78.0	72.7

Sources: National Accounts Statistics, Central Statistical Organization, Government of India; Decennial Population Census; Agriculture Statistics at a Glance (Various Issues); Different Periods of NSSO Surveys on Employment and Unemployment.

Seen in terms of the overall performance of the economy, Bihar lagged far behind while the Indian economy as a whole experienced accelerated growth. Bihar's economy started slipping down in the late 1980s, and economic growth decelerated during the next two decades. In the 1980s, the growth of the state's Gross Domestic Product (GDP) was 5 per cent per annum as against 5.6 per cent per annum for the country as a whole, that is, more or less equal to the rate of growth in the country. During the subsequent years, the gap in the growth rates between Bihar and the country as a whole widened. During the period between 1993-94 and 2006-2007, the growth rate of Bihar's Gross State Domestic Product (GSDP) was 4.8 per cent as against the national level rate of 6.4 per cent. The picture becomes more disconcerting if one takes into account the rapid growth of the population in Bihar. While the state's population was growing at a rate of 2.8 per cent per year during the period 1991 to 2001 (as against 1.9 per cent for the country as a whole), its per capita income was growing at a snail's pace. Due to a large gap between rural and urban incomes, rural incomes continued to remain lower than the abysmally low average per capita income in the state as a whole.

There were many inter-related reasons for the decline in the economy of the state. Besides a relatively high rate of growth of population, the other reasons include failure of public investment in infrastructure and agriculture, and an all-pervasive decay in important institutions, that is, in education, research, extension, credit, marketing, etc. The seriousness of the economic malaise was reflected in the decline in the share of the industrial sector in the state's economy, virtual stagnation in the per capita income of the agricultural workforce, and the persistence of a high level of poverty.

Agriculture accounts for a substantial proportion of the state's GDP, next only to the share of services. In terms of employment and livelihood, it is the largest sector of the state's economy. Between 1993-94 and 2004-05, the rural employment in agriculture *increased* by 0.85 per cent per annum as against 0.94 per cent in the country as a whole. Thus, as the dependence of the workforce on agriculture continued, the capacity of agriculture to absorb the additional workforce started declining. The place of agriculture in the economy became more prominent after the bifurcation of Bihar and the creation of Jharkhand, as most of the industries and the bulk of the mineral resources went to the latter state. Bihar's economic growth is thus now even more dependent on agricultural growth.

An improvement in the agricultural incomes will have a positive impact on the overall growth in the state's economy. It can contribute, more than any other measure, to the reduction in rural poverty and inequity. This is evident from the fact that the limited reduction in poverty witnessed by the state in the 1990s was mainly because of the somewhat better performance of agriculture as compared to the industry and service sectors.

1.2 STEERING GROUP

Recognizing the importance of agricultural development in reversing the decline in Bihar's economy, the Chief Minister of Bihar, Shri Nitish Kumar invited Professor V.S. Vyas to chair a Steering Group on Agriculture 'to articulate a medium-term perspective which benchmarks the key development imperatives and which can become an Action Plan to achieve these daunting objectives.' Thus, a Steering Group on Medium-Term Perspective for Agricultural Development in Bihar was constituted under the chairmanship of Prof. V.S. Vyas. The Commissioner and Principal Secretary of the Department of Agriculture was made Member-Secretary of the Group. Professor Alakh N. Sharma and Professor Ravi S. Srivastava were its members.

As rightly emphasized by the Chief Minister, at this stage of development, the task of reviving Bihar's economy and enhancing the welfare of the majority of its people hinges on the development of agriculture. Bihar's natural endowment of fertile soils, ample water resources and moderate climate provide enough scope for accelerated and sustainable agricultural growth. It is important, therefore, to examine the growth-stimulating and growth-inhibiting factors in this sector, and to prepare a roadmap to ensure efficient, vibrant and ecologically sustainable agriculture within a given time frame. In this report, the **Steering Group on Vision of Agriculture Development in Bihar** has attempted to suggest a strategy to achieve these objectives in about a decade, that is, by 2020.

[The strategy proposed by the Group is premised on enhancement of the income and welfare of the agricultural producers. Two mileposts are suggested for growth in the incomes of agricultural producers: in the first five years, productivity in agriculture should reach the average attained by the country, and during the next five years, it should be equal to the best among the states of the country. It is postulated that the increase in the income of agricultural producers will be predicated on the improvement in agricultural productivity.

A number of scholars and committees have identified the constraints of agricultural growth in Bihar, some of which are:

- Lack of judicious management of water resources,
- Inadequate rural infrastructure,
- Small and fragmented land holdings,
- Ineffective land reforms and poor land records, and
- Poor connectivity and market access.

Many of the ills of agriculture can be cured only by actions covering other sectors of the economy, as much as the macro-economic policies at the Central and the state level. Within these constraints, there do exist opportunities for agricultural development in the state. Much can be achieved by focusing on the agricultural sector in the state. The Steering Group has developed a strategy comprising the following building blocks:

- Strengthening the production base of agriculture, that is, development of land and water resources;
- Ensuring fair and just agrarian relations;
- Ensuring diversification and value addition in crop production;
- Strengthening supplementary enterprises of dairying, fisheries, etc;
- Strengthening agricultural research and extension systems;
- Reforming agricultural credit and marketing systems;
- Instituting adequate risk mitigation measures; and
- Ensuring a more constructive role of both the Central and state governments.

In the following sections, each of these measures is elaborated. The existing situation in each area, issues that have to be confronted and the steps needed to remove the handicaps in order to ensure the establishment of a vibrant, just and environmentally friendly agricultural sector in Bihar are described in detail.

CHAPTER II

AGRICULTURAL PERFORMANCE AND CHALLENGES

Due to the prominence of agriculture in the state's GDP and employment, its performance remains a central concern for policy and planning in Bihar. Even at the national level, it is now widely recognized that high growth in agriculture is essential for stimulating high productivity of the non-agricultural sector to bring about the desired improvement in the socio-economic conditions of the country's vast population. Therefore, the Eleventh Five Year Plan has emphasized the need to achieve inclusive and higher growth in the agricultural sector. Agriculture assumes added significance in the country for sustaining the food security of a very large and increasing population. This holds even more true for a predominantly agricultural economy like that of Bihar.

2.1 SHARE OF AGRICULTURE IN GSDP AND DEPENDENCY ON AGRICULTURE

Agriculture contributed a little less than half of the total output of Bihar's economy till TE 1995. Its share has steadily declined but it still contributes one-third to the Bihar economy (see Table 2.1). It may be mentioned that the contribution of agriculture to the national economy was only 18 per cent in TE 2006.

A comparison of the share of agriculture in the state's GDP and employment shows that the decline in the share of agriculture in the workforce has been much slower than its share in output. Agriculture, with a 33 per cent share in the state's economy, accounted for employment of 74 per cent of the workforce in TE 2006. There is enormous growth of workforce in agriculture. A much higher proportion of the workforce needs to be moved from agriculture to the non-agricultural sector to make agriculture more rewarding and viable for those employed in it. The slow absorption of the workforce in the non-agricultural sector raises concerns when seen along with the change in the structure of the state GDP. The asymmetry between the income and employment shares of the agricultural and non-agricultural sectors implies a decline in the relative productivity of agriculture, and a widening gulf in income between agricultural and non-agricultural workers.

Another disquieting aspect of the structure of the workforce is that 78 per cent of Bihar's rural workforce is still employed in the agricultural sector though it contributes only one-third of the GDP; the percentages in the case of India as a whole are much lower (see Table 2.1 and Figure 2.1). In fact, the low agricultural productivity per

worker is attributed to the large number of people tied to agriculture and the limited opportunities available for rural non-farm employment. The low labour productivity is a major factor contributing to for the high level of poverty in the state.

Table 2.1: Share of Agriculture and Allied Activities in GDP

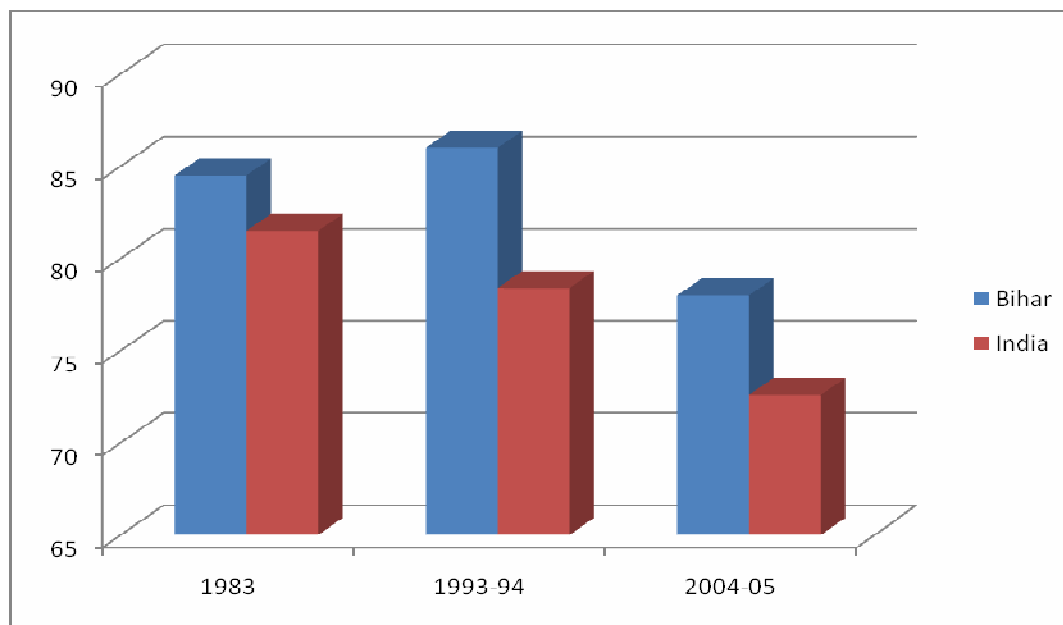
Period	Share in GDP at current prices (%)	
	Bihar	All India
TE 1995	47.2	27.9
TE 2001	38.8	23.8
TE 2006	33.0	18.7

Source: National Accounts Statistics, Central Statistical Organization, Government of India.

It is a matter of serious concern that the decline in the share of the workforce in agriculture has not kept pace with the decline in the share of agriculture in GSDP. This needs to be attended to more seriously in the present context than before. Overall, there are two reasons for this, which are: (i) employment opportunities in the non-agricultural sector have increased at a very slow rate, and (ii) most of these have occurred in urban or semi-urban areas. Rural areas have witnessed very slow growth in non-farm jobs. In order to find employment outside agriculture, in most cases, one is required to migrate from one's rural native place to urban and semi-urban areas (often outside the state), which involves various kinds of socio-economic costs, and causes distress for both the workers and their families. Thus, the non-availability of employment outside agriculture in and/or around rural habitations has been a major factor contributing to the continually high concentration of the workforce in agriculture. This is also one of the important reasons for growing income disparities between the rural and urban population, and between agricultural and non-agricultural workers. The only means of achieving a substantial increase in the per worker income in agriculture is to shift some of the workforce from agriculture to non-farm rural employment. This is possible through the creation of opportunities for the industry and manufacturing sectors in and around rural areas. Some countries in Asia have successfully shifted the manufacturing sector to rural areas, which has thus provided employment opportunities to the rural workforce in the non-agricultural sector without necessitating migration. This strategy has helped countries like Thailand, Vietnam, and Malaysia to reduce rural poverty to a large extent. Bihar too needs to examine these experiences and create conditions under which the rural non-farm sector can grow faster.

Figure 2.1: Share of Agriculture in Rural Employment

(%)



Source: Various Rounds of NSSO Surveys on Employment and Unemployment.

2.2 CHANGING COMPOSITION OF AGRICULTURE

Crops, livestock, fisheries and forestry constitute the core sectors of agriculture. The crop sector is the principal source of output of the agriculture sector, followed by livestock (see Table 2.2). There exists a strong synergy in the crop and livestock sub-sectors, as both are complementary to each other. The importance of fisheries and forestry is growing in the state's agricultural output.

Although agriculture continues to be the main source of livelihood in Bihar, some major structural changes have been observed within the agricultural sector of the state. The share of the crop sub-sector in the total value of agricultural output was around 66 per cent in TE 2001. It declined drastically in half a decade, to about 48 per cent in TE 2006. On the other hand, there was a steep increase in the share of the livestock during the same period, and it increased from about 26 per cent in TE 2001 to 41 per cent in TE 2006, a clear indication of the growing importance of the livestock sector.

Table 2.2: Intra-sectoral Changes in the Value of Output of Agriculture in Bihar and India, 2001 and 2006 (%)

Commodities	TE 2001		TE 2006	
	Bihar	All India	Bihar	All India
Crop Sector	66.3	67.7	47.6	66.7
Livestock	25.5	24.2	41.4	24.9
Forestry	4.4	3.8	5.9	3.7
Fisheries	3.7	4.4	5.1	4.8

Source: National Accounts Statistics, Central Statistical Organization, Government of India.

Fisheries, which accounted for less than 4 per cent of the agricultural economy till TE 2001, witnessed an increase in its share to 5 per cent in TE 2006. The changing composition of different sub-sectors in the value of agricultural output reveals that Bihar's agriculture is gradually diversifying in the areas of livestock and fisheries. These sub-sectors are more remunerative and labour-intensive, which optimally suits the needs of smallholders. This further implies that farmers in Bihar are conscious of the opportunities in the high-value segment of agriculture and are exploiting this by diversifying towards these commodities to reap benefits in the domestic and global markets. The shift towards livestock is particularly important for its high intensity of labour absorption that is also highly desirable to facilitate a shift of the disguised unemployed labour in the crop sector to the more productive livestock sector.

However, one may have to be circumspect about these estimates. There is especially a need for a closer look at the valuation of livestock and fruits and vegetables as much as the relative value of cereals.

2.2.1 Changes in the Composition of the Contribution of the Crop Sector to the Value of Output

Significant structural changes have been observed within the crop sub-sector, which showed a clear pattern of diversification. Cereals continue to dominate the crop-sub sector, though their proportionate contribution to the value of output from crops declined from 40 per cent in TE 2001 to 34 per cent in TE 2006 (see Table 2.3). Among the major cereals, maize showed a marginal increase in share while the share of paddy and wheat together declined from 36 per cent to about 30 per cent. The share of sugar in the value of crop output increased from 2.3 per cent in TE 2001 to 2.8 per cent in TE 2006. The contribution of pulses declined from 4.7 per cent to 3.9

per cent while that of oilseeds remained stagnant at 1.1 per cent between 2001 and 2006.

Table 2.3: Changes in the Composition of Contribution of the Crop Sector to the Value of Output in Bihar and India, 2001 and 2006 (%)

Commodities	TE 2001		TE 2006	
	Bihar	All India	Bihar	All India
Paddy	20.7	18.0	16.6	15.8
Wheat	15.3	11.5	13.1	10.3
Maize	3.9	1.6	4.4	1.7
Cereals	40.1	33.6	34.2	30.3
Pulses	4.7	4.8	3.9	4.6
Oilseeds	1.1	7.3	1.1	10.0
Sugar	2.3	6.8	2.8	6.1
Fibres	1.0	3.1	1.2	3.9
Drugs and Narcotics	1.5	2.8	1.6	2.7
Condiments and Spices	0.2	3.7	0.2	3.4
Fruits and Vegetables	41.1	24.4	47.3	24.9
Others	0.9	6.4	1.3	8.0
By-Products	6.5	6.6	5.9	5.6
Kitchen Garden	0.6	0.6	0.6	0.6

Source: Directorate of Statistics, Government of Bihar; and Agricultural Statistics at a Glance, Ministry of Agriculture, Government of India.

Fruits and vegetables occupy a very important place in Bihar's crop economy. Their importance increased further as their share in the crop output increased from 41 per cent in TE 2001 to 47 per cent in TE 2006. The fall in the share of cereals and increase in that of fruits and vegetables in Bihar during the current decade is especially important in terms of the higher labour intensity of the latter.

2.2.2 Composition of the Livestock Sub-sector

Milk accounts for a major contribution of the livestock output, and its share increased from 54 per cent in TE 2001 to 59 per cent in TE 2006 (see Table 2.4). The share of meat and eggs declined during this period. The share of dung increased from 7 per cent in TE 2001 to 9 per cent in TE 2006. The share of 'others' is unusually high, a reason for which could possibly be the inclusion of hides and skins of not very productive livestock in this category.

Table 2.4: Composition of Value of Output of Livestock Sector in Bihar and India, 2001 and 2006

Commodities	TE 2001		TE 2006	
	Bihar	All India	Bihar	All India
Milk	53.9	68.1	59.2	67.9
Meat	22.8	16.8	18.3	16.9
Egg	1.7	3.4	1.2	3.2
Wool & Hair	0.1	0.2	0.04	0.2
Dung	7.2	7.9	9.1	7.6
Others	14.3	3.6	12.1	4.2

Source: National Accounts Statistics, Central Statistical Organization, Government of India.

2.3 GROWTH IN BIHAR'S AGRICULTURE

2.3.1 Sub-sectoral Growth

The sub-sectoral growth in the agricultural sector exhibits a mixed trend in Bihar. The growth experienced by the crops sub-sector in recent years does not inspire confidence (see Table 2.5). The negative growth in spite of a change in the favour of high-value fruits and vegetables is somewhat puzzling, indicating a mere diversification without higher productivity. The high growth rates of livestock and fisheries also raise questions as to whether they are supplementary or are emerging as substitutes for crop production! Here again, productivity levels matter. Fisheries also show very high growth indicating the potential of this sector for further development. However, the puzzle still remains as to why in spite of negative growth in the crop sector, the overall agricultural growth of the state shows much higher growth than the rest of the country.

Table 2.5: Growth of Value of Output of Agricultural and Allied Activities in Bihar and India (% per annum)

Agricultural Sectors	1999-2006	
	Bihar	All India
Crop Sector	-1.5	1.7
Livestock	11.4	3.6
Forestry	4.0	1.3
Fisheries	8.4	3.1
Value of Agricultural Output	3.1	2.2

Source: National Account Statistics, Central Statistical Organization, Government of India.

2.3.2 Crops

The performance of major crops was impressive during the 1990s. Rice, wheat and maize production grew at the rates of 5, 3 and 2 per cent, respectively (see Table 2.6). Further, this growth came mainly because of an improvement in productivity rather than in area expansion. However, this momentum in growth could not be sustained and during the post-2000 period, the production of these crops witnessed either a deceleration or a decline.

Table 2.6: Growth and Instability of Various Crops in Bihar

Year	Compound Annual Growth Rate						Coefficient of Variation		
	1990-91 to 1999-2000			2000-01 to 2007-08					
	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield
Rice	0.38	5.02	4.61	-1.13	-3.24	-2.13	7.15	20.34	17.56
Wheat	0.81	2.93	2.10	0.38	1.10	0.72	4.65	10.23	8.22
Maize	0.45	2.19	1.65	0.75	1.11	-0.03	14.04	25.08	15.94
Cereals	0.40	3.70	2.57	-0.43	-0.81	0.21	4.96	12.95	10.12
Pulses	-4.42	-3.92	-0.40	-3.07	-4.77	-2.91	19.71	20.01	10.72
Oilseeds	-3.26	-0.89	2.44	-0.60	2.33	3.68	15.56	13.68	21.27
Potato	0.89	0.23	-0.66	0.50	-4.61	-5.48	8.09	10.81	10.68
Sugarcane	-4.02	-4.71	-0.72	1.58	-0.68	-2.26	14.11	21.75	10.91
Other Crops	0.05	2.11	4.42	-2.26	1.85	-0.93	9.38	22.83	40.15

Source: Department of Agriculture, Government of Bihar

The declining trend has to be reversed and growth momentum needs to be further accelerated. However, the performance of crops measured in terms of growth in the value of output depicts a dismal picture (see Table 2.7). This dismal growth in the value of output from the crop sector is mainly attributed to the realization of low price by the farmers, which, in turn, may be attributed to the strong regional concentration of intervention by the Centre, and very poor quality of the rural road infrastructure and other essential agricultural marketing infrastructure in the state. Farmers in Bihar have been exposed to unfavourable prices for their produce in comparison to their counterparts in other agriculturally developed states. The farm harvest prices of major cereals received by farmers in Bihar thus continue to be less than those in states like Punjab, Haryana, Uttar Pradesh and West Bengal.

Table 2.7: Growth in Value of Output of Crop Sector (per cent per annum), Bihar and India

Commodities	1999-2006	
	Bihar	All India
Paddy	-9.0	-0.02
Wheat	-6.4	-1.2
Maize	-0.6	3.8
Cereals	-6.8	-0.2
Pulses	-4.8	1.5
Oilseeds	-0.2	5.6
Sugar	5.9	-3.0
Fibers	1.7	9.1
Spices	-6.1	3.8
Fruits & Vegetables	3.5	2.1
Other Crops	1.6	5.6
By-Products	-1.3	-0.5

Source: National Accounts Statistics, Central Statistical Organization, Government of India.

2.3.3 Livestock

The growth in the livestock sector has been noteworthy in recent years. All components of the livestock sub-sector have been witnessing substantial rates of growth. However, the growth rate witnessed in the dairying sector is exceptional. Milk production has doubled in a few years. Although these figures need to be subjected to greater scrutiny, if the existing growth is sustained, Bihar can emerge as a major supplier of milk and milk products domestically as well as in the international market. Bihar enjoys a strategic advantage for exporting milk products to neighbouring countries like Nepal and Bangladesh, which face a deficit in meeting their domestic requirement of milk and milk products. These countries fall under the purview of the South Asian Favourable Trade Agreement (SAFTA) and, therefore, exporting to these countries would be relatively hassle-free and would not entail the need for additional compliance with rigorous food safety standards.

Table 2.8: Growth in Value of Livestock Sector (per cent per annum), Bihar and India

Commodities	1999-2006	
	Bihar	All India
Milk	14.0	3.2
Egg	4.6	4.7
Meat	4.4	4.2
Wool & Hair	3.6	0.9
Dung	17.7	3.2
Others	8.0	7.8

Source: National Accounts Statistics, Central Statistical Organization, Government of India.

2.4 AGRICULTURAL PRODUCTIVITY

The assessment of agricultural development on the basis of a single crop, group of crops, or even the crop sector can be misleading. There has been progressive diversification towards horticulture, and livestock and fisheries within the agricultural sector, and the exclusion of these sub-sectors in the course of evaluation of performance may not reveal the reality. Therefore, it is important to examine the performance of the agricultural sector on the basis of the net domestic product derived from this sector. Agricultural productivity per unit of land in Bihar is comparable with the national average, and increased from Rs. 19,285 in TE 1995 to Rs. 23,427 in TE 2006, which amounts to an annual growth rate of 1.45 per cent (see Table 2.9). Agricultural productivity has been growing at a faster rate (2.57 per cent per annum) at the national level. But the agricultural income per capita in Bihar is less than half of the national average. This may be attributed to the higher population density of Bihar and it becomes even worse with a relatively higher growth of population. The rate of growth in the rural population masked the performance of agricultural productivity. However, agricultural income in Bihar grew from Rs. 1463 per person in TE 1995 to Rs. 1778 in TE 2006 (see Table 2.9). In recent years, agricultural income per capita has been witnessing stagnation. The slowdown in agricultural growth can be attributed to: (i) declining public investment in agriculture, (ii) deteriorating terms of trade for agriculture, (iii) lack of expansion of agricultural markets and irrigation facilities, and (iv) slow dissemination of improved technologies. In recent years, several initiatives have been taken to accelerate agricultural growth. Greater emphasis is being laid on the implementation of various measures such as increasing investment in agriculture, improving the dissemination of technologies, and increasing the flow of credit to agriculture, among other things. The impact of these measures, if implemented in the right spirit, would be visible after a few years.

Table 2.9: Status and Growth of Agricultural Productivity in Bihar and India

Period	AgNDP/hectare at 1993-94 prices (Rs.)		AgNDP/rural person at 1993-94 prices (Rs.)		Compound annual growth rate (%)			
					AgNDP/hectare		AgNDP/rural person	
	Bihar	All India	Bihar	All India	Bihar	All India	Bihar	All India
TE 1995	19825	17401	1463	3788	-	-	-	-
TE 2001	22292	21044	1697	4101	2.04	3.10	2.62	1.24
TE 2006	23427	23181	1778	4137	0.04	2.15	-0.33	1.09
1993-2006	-	-	-	-	1.45	2.57	1.72	0.64

Source: State Domestic Products, National Account Statistics, Central Statistical Organization, Government of India; Agricultural Statistics at a Glance (Various Issues); Decennial Population Census.

2.5 CHALLENGES OF FOOD SECURITY

Long-term trends in the consumption pattern at the household level in Bihar show that the per capita direct consumption of foodgrains has been declining while that of livestock products and fruits and vegetables has been going up. Despite this shift in dietary pattern, foodgrains are considered to be of paramount importance for household food and nutritional security. This is because: (i) cereals and pulses are staple foods and there is no perfect substitution between staple foods and other foods; (ii) due to the inadequate level of intake of almost all foods, increased consumption of other foods, in most cases, helps meet dietary deficiency; (iii) foodgrains constitute the leading and the cheapest source of energy and protein as compared to other foods, and are thus vital for the food and nutrition security of the low-income masses; and (iv) increased production and consumption of livestock products resulting from rising per capita income require high growth in the use of grain as feed for livestock. Therefore, foodgrains would continue to be the main pillars of food security in the country and any slackness in their production translates into persistent price shocks and adverse impacts on the common people.

Food demand and dietary pattern depend upon several factors. Prominent among them are: (i) changes in per capita income, (ii) changes in preferences due to change in tastes, lifestyle, occupation structure, and (iii) increase in urbanization. Prices constitute the other important factor that affects demand. Demand for foodgrains in Bihar is estimated on the basis of these factors. The year 2004-05, which is the most recent quinquennial survey year of the NSSO on Consumer Expenditure, has been used as the base period for making demand projections.

The total demand for cereals in Bihar is projected to grow to 22.5 million tonnes (mt) by 2020-21 (see Table 2.10). The demand for pulses during the same period would grow to 1.4 million tonnes. The demand for milk and milk products is projected to increase to 5.5 mt by 2020-21. Projections for other commodities for the year 2020-21 are 0.8 mt for edible oil, 18.9 mt for fruits and vegetables, 0.8 mt for meat, egg and fish and 0.9 mt for sugar.

Table 2.10: Present Production (2007), Future Demand (2021) and Required Growth Rate of Food Items in Bihar

Food Items	Demand for Consumption in 2021 (Million Tonnes)	Production in 2007 (Million Tonnes)	Required Compound Annual Growth Rate (% per annum)
Rice	11.1	4.7	6.4
Wheat	8.7	4.5	4.8
Cereals and Substitutes	22.5	10.8	5.4
Pulses	1.4	0.3	11.2
Milk and Milk Products	6.1	5.5	0.8
Edible Oils	0.8	0.05	22.8
Meat, Egg and Fish	0.85	0.44	4.8
Fruits and Vegetables	18.9	17.04	0.7
Sugar	0.9	0.5	4.8

Source: Projections made by the Steering Group based on the inputs from Anjani Kumar.

In order to meet the projected demand, the state's production needs to increase each year by about 5.4 per cent for cereals and 11.2 per cent for pulses, by 22.8 per cent for edible oil, 4.8 per cent for sugar and meat, egg and fish each and 0.8 per cent for milk and milk products (see Table 2.10). The situation in terms of meeting the requirements of major staples is not comfortable. Bihar has to strive hard to meet its consumption requirement, and a multi-pronged strategy needs to be adopted to increase the productivity in the state. The required growth rates are much higher than the growth rates experienced during the last few years in the case of foodgrains, edible oil and sugarcane. On the other hand, the required growth rates for meeting the projected demand for fruits and vegetables, milk and other livestock products are lower than the actual growth rates achieved in the past. This indicates that these commodities have a high potential for export if niche markets are identified and Sanitary and Phytosanitary (SPS) measures are implemented.

2.6 RISING COSTS OF CULTIVATION, FALLING FARMERS' INCOME AND CONSUMPTION

Over the years, there has been a steep rise in the costs of cultivation. Marginal and small farmers, who comprise about 93 per cent of all farmers and operate two-thirds of the land cultivated in Bihar are at a disadvantage in accessing inputs at reasonable prices. For instance, coverage under improved seeds is an important indication of the extent of access to new technological packages and farm productivity.

Table 2.11: Percentage of Farmers Using Improved Seeds

Farm Size	Improved seeds	
	Bihar	All India
Marginal	47.55	50.04
Small	52.6	63.04
Semi-Medium	62.78	65.84
Medium	58.29	73.45
Large	47.13	72.31
All Farmers	49.14	55.41

Source: NSSO (2005).

Table 2.12: Cost of Cultivation (A2) per Hectare of Cropped Area in Bihar (Rs.)

Particulars	Expenses Incurred on Specified Items According to Size Class of Land Possessed					
	Farm Size					All Size
	Marginal	Small	Semi-medium	Medium	Large	
Expenses on Seeds	940.87 (15.10)	818.39 (14.57)	869.98 (15.82)	612.77 (13.30)	834.32 (12.81)	863.34 (14.87)
Expenses on Pesticides	236.41 (3.79)	214.17 (3.81)	236.43 (4.30)	166.54 (3.61)	207.31 (3.18)	223.47 (3.85)
Expenses on Fertilizers	1353.04 (21.71)	1228.2 (21.86)	1206.29 (21.93)	1079.13 (23.42)	1514.48 (23.25)	1275.2 (21.97)
Expenses on Irrigation	1124.94 (18.05)	922.68 (16.42)	922.84 (16.78)	674.66 (14.64)	686.63 (10.54)	979.67 (16.88)
Expenses on Labour	1208.44 (19.39)	1268.17 (22.57)	1314.08 (23.89)	1425.46 (30.93)	1853.3 (28.46)	1285.64 (22.15)
Expenses on Rent for Land Leased	440.8 (7.07)	339.03 (6.03)	194.3 (3.53)	27.58 (0.60)	0 (0)	316.85 (5.46)
Other Expenses	928.06 (14.89)	827.74 (14.73)	756.82 (13.76)	622.48 (13.51)	1416.51 (21.75)	861.17 (14.83)
Total Expenses	6232.56	5618.38	5500.74	4608.62	6512.55	5805.34

Note: Figures in parentheses are percentages.

Source: NSSO (2005).

Table 2.13: Receipt from Cultivation* per Hectare across Farm Size in Bihar

Farm Size	Amount (Rs.) per hectare
Marginal	7997
Small	7566
Semi-medium	8580
Medium	8128
Large	8805
All Farmers	8032

Note: Receipt from cultivation = gross value of output per hectare – cost (A2)

Source: NSSO (2005).

Table 2.11 shows that farmers of all classes in Bihar are lagging behind their counterparts in the country in terms of accessing improved seeds. The costs of cultivation of marginal and small farmers are higher for most of the inputs except labour (Table 2.12). Receipts from cultivation for the marginal-small farmers are much lower compared to other classes of farmers in Bihar (Table 2.13). As a result, farm income is not even adequate to meet bare consumption expenditures of marginal and small farmers. Since Bihar agriculture, more than the rest of the country, is predominantly marginal-small farmer based, the great challenge is of how to make agriculture a productive activity for the small peasant community in Bihar.

CHAPTER III

PRODUCTION BASE

Bihar accounts for 2.8 per cent of the country's area and 8.1 per cent of its population. The pressure of population on land is extremely high and hence the per capita availability of land is among the lowest in the country (see Table 3.1; also see App. Table 3.1). Bihar is fortunate in terms of its land and water resources. It has fertile soil with rich soil cover. The soils in the state are mainly alluvial with medium nitrogen, phosphorus and potassium (NPK) content. As a result, the area under cultivation as a proportion of the total reporting area is very high— 60.5 per cent—as compared to the all-India average of 46.4 per cent. In large parts of the state, three crops can be grown in a year.

3.1 LAND USE PATTERN

High rural population density implies intensive land use. Table 3.1 shows that a very high proportion of the land is brought under cultivation. Around 60 per cent of the reporting area is cultivated in the state as compared to 47 per cent in the country as a whole. The area under pastures has declined and so has that under permanent and current fallows. The area under forests is very low as compared to the national average. Marginal lands (culturable and unculturable wasteland under village commons, river and tank beds) have also been brought under cultivation. Vertical intensification is not high and cropping intensity is 135 per cent. Despite the small size of holdings and over-dependence on agriculture, vertical intensification is still lower, indicating the lack of basic infrastructure like roads and markets as well as other agricultural inputs. These pressures pose a long-term threat to the sustainability of agricultural systems and rural livelihoods.

Table 3.1 Existing Land Use Pattern in Bihar and in India (2005)*(Area '000 Hectares)*

Land Use Classification	Bihar	India
Reporting Area	9360	3,05,327
Forests	622 (6.7)	69,745 (22.8)
Area under Non-agricultural Uses	1646 (17.6)	24,816 (8.1)
Barren and Uncultivable Land	436 (4.7)	17,544 (5.8)
Permanent Pastures and Other Grazing Land	17 (0.2)	10,427 (3.4)
Land under Miscellaneous Tree Crops and Grooves	239 (2.6)	3,386 (1.1)
Cultural Wasteland	46 (0.5)	13,139 (4.3)
Fallow Lands, Other than Current Fallows	132 (1.4)	10,811 (3.5)
Current Fallows	603 (6.4)	14,126 (4.6)
Net Area Sown	5619 (60.0)	1,41,334 (46.3)
Gross Cropped Area	7562 (80.8)	1,91,139 (62.6)
Cropping Intensity	134.6	135.2

Source: Land Use Statistics at a Glance, Ministry Of Agriculture, Government of India, 2003-04 to 2004-05.

Table 3.1 shows that in Bihar, there is virtually no scope for bringing additional land under cultivation. The Gross Cropped Area (GCA) can be increased only by enhancing the cropping intensity. Cropping intensity should be increased by undertaking measures like expanding irrigation networks, and developing and disseminating stress-tolerant varieties of crops, among other things. The area under forests is low. The area under non-agricultural use is very high, and is expected to increase further with urbanization and industrialization. The extent of cultivable area, which comprises fallow land, other fallows and the net sown area needs to be kept intact, or, in fact, slightly augmented, by reducing the area under 'Other Than Current Fallows', in view of the low per capita availability of cultivable land.

Taking these features into account, the Land Use Policy should consist of the following measures:

- The area under miscellaneous tree crops and groves should be developed as community forests. Promotion of agro-forestry could be the best way to augment forest resources in the state.
- Expansion of non-agricultural activity should be carried out on barren and uncultivable land to the maximum extent possible. The upcoming industries should be motivated (in terms of the provision of incentives, tax rebate) to locate their units in such lands.
- Cultivable wastelands should be developed as pastures and grazing land.
- Fallow land other than the current fallow area should be made cultivable. Even the land under the current fallow area should be reduced by increasing cropping intensity.

3.1.1 Qualitative Aspects of Land

Apart from the quantitative aspects of land for agriculture, the quality of land also needs to be considered. A substantial part of the agricultural land, that is, nearly 2.2 million hectares out of nearly 9.00 million hectares, suffers from mild to serious degradation. Salinity and alkalinity pose a serious problem in some of the command areas. A large part of the land gets water-logged, especially after the rainy season. Measures taken for land amelioration are insufficient. A determined effort thus needs to be made to meet the deficit in this regard. By 2020, at least half of the affected land should be ameliorated.

Special attention should be given to vast stretches of *tal* (backwater), water-logged areas of *diara* (lands in the flood plains of the rivers Ganga and Ghaghra) and the *chawar* lands (remnants of the old river course). Together these comprise nearly 9 lakh hectares. With proper management, they can be developed for fisheries, while some proportion can be developed for crop cultivation for at least one season.

3.2 WATER RESOURCES

Bihar is extremely rich in water resources. The state has adequate rainfall all over, a network of perennial and semi-perennial rivers, and a sufficient supply of ground water at low depth. In terms of the total water supply, it has a distinct advantage as compared to other parts of the country. Accounting for 8.1 per cent of the population of the country and 2.8 per cent of the country's total geographical area, the state's water flows from its major river networks (excluding the Ganga and Ghaghra rivers) amount to 8.56 per cent of the

total river water flow (1.869 million ha. meter) in the country. In terms of the sown area, the per ha. availability of water from river flows in Bihar is twice that for the country as a whole. Yet the gross irrigated area in Bihar is approximately 60 per cent of the cultivated area, while it is 95 per cent in Punjab and 67 per cent in Uttar Pradesh. Nearly 2.389 million ha. of groundwater is available for irrigation, that is, after accounting for drinking water and other uses. Hardly 40 per cent of the groundwater is developed, leaving a vast untapped potential in this area. If this is developed and used properly, Bihar would be in a position to attain the level of 100 per cent irrigated agriculture.

The water sector in the state, however, faces severe problems. The most important among these are:

- The rivers of North Bihar originate in the snow-clad, high rainfall regions of Nepal and Tibet. In the absence of adequate storage facilities, the occurrence of floods has become a recurrent phenomenon.
- South Bihar, with semi-perennial or seasonally flowing rivers and uncertain rainfall, frequently faces drought of moderate to severe intensity.
- All over the state, water for irrigation is used inefficiently. An indicator of the water use inefficiency is the low proportion of double or multiple cropping, despite abundant water supplies.
- Most of the groundwater is lifted with the help of less efficient diesel motors, thereby raising the cost of well irrigation.

3.2.1 Inefficiencies in the Use of Water for Agriculture

It is clear that Bihar has enough water to irrigate virtually the whole of its cultivable area. Yet the irrigated area is only 49 per cent, of which only 50 per cent of the cultivated area is sown more than once. In several states of India, the proportion of the net irrigated area and the area sown more than once is much higher. The inadequate and inefficient utilization of water resources in Bihar can be ascribed mainly to neglect of the operation and maintenance (O&M) of canals and water bodies. This is caused, among other things, by the consistently falling ratio of expenditure on O&M to the agricultural GSDP. The other important reason is the lack of participation of the farmers depending on irrigation in the management of irrigation resources over large areas. Bihar has witnessed some noteworthy examples of participatory management of irrigation. However, their replication has been slow, partly because water users have not been given the responsibility of managing the water resources.

Another handicap faced by the state in terms of the efficient use of water resources is the lack of adequate extension facilities to inform farmers about proper crops and agronomic practices suitable for the irrigated areas. Finally, with their main recourse being to flood irrigation, farmers are denied the gains in productivity possible through the adoption of precision irrigation methods such as sprinklers and drip irrigation.

The strategy for the water sector should comprise the following measures:

- A crash programme of repairs and maintenance of canals and water bodies should be launched, and should be given higher priority than capital works.
- Management of water resources by the users should be extended to cover at least half of the irrigated area by 2020.
- Greater coordination between agricultural scientists and irrigation authorities should be promoted and scientific watering of crops should be popularized,
- Controlled irrigation through drip irrigation and sprinkler irrigation should be encouraged in the water-scarce regions.

3.2.2 Floods

Nearly 40 per cent of the total cropped area of the state gets damaged by floods. In the year 2008, the damage was particularly severe due to the Kosi floods that brought untold miseries to a large number of people. The state thus needs to better prepare itself to minimize the loss of life and property, and rehabilitate the economy of the flood-affected people. It should install reliable early warning systems with the help of ISRO. It also needs to take the following steps to address the recurrent phenomenon of floods:

- A long-term solution to the problem of floods is the construction of tanks with large storage in Nepal or the interlinking of rivers. However, both these solutions entail a great deal of uncertainty. The Centre thus needs to make a concerted effort at regional cooperation for the optimal management of river waters and flood control.
- Meanwhile, a properly planned watershed programme, integrating farm ponds, village ponds and check dams, may be launched, and encroachments from the riverside need to be removed.
- Villagers should be mobilized to remove silt from water ponds and check dams, and for strengthening embankments.
- Concerted efforts should be made to develop and popularize flood-tolerant rice. The assistance of national and international agricultural research organizations may be sought for this purpose.
- A Flood Code on the lines of the Drought Code—the latter is in existence in several states—should be enacted to disseminate clear directions before, during and after the floods.

3.2.3 Droughts

While North Bihar is a victim of frequent floods, a significant part of South Bihar witnesses periodic droughts. The drought-prone districts, on an average, get adequate rainfall. It is, however, the erratic nature of the rainfall which causes frequent droughts in the southern districts. The country has sufficient experience of fighting droughts, which could be of help to the state. The important measures that may be implemented in this regard include:

- Rainwater harvesting and recharging of wells;
- Encouragement to low water-using, drought-resistant crops and crop varieties;
- Encouragement to subsidiary occupations like dairying, poultry, piggery, etc.; and
- Introduction of a higher productivity fodder crop like hybrid Napier and the practice of sowing tree crops in the peripheral areas.

Appendix Table 3.2: Salient Features of Agro-climatic Zones of Bihar

Zone	Geographical Spread (Districts)	General Features			Land Use Pattern (Area Lakh Ha)			Irrigation Pattern				Soil Texture	Cropping Pattern
		Population (lakh)	Average Rainfall (mm)	Per Capita Land (Ha)	Geographical Area (Lakh Ha)	Net Sown Area	Multi-crop Area	Canal	Tube Well	Others	Total		
Zone 1	W. Champaran, E. Champaran, Siwan, Saran, Gopalganj, Muzaffarpur, Vaishali, Sitamarhi,	349.9 (42.2 %)	1234.7	0.09	32.6 (37)	21.4 (65)	7.9 (37)	1.9 (15)	9.8 (75)	1.4 910)	13.1 (100)	Sandy Loam, Loam	Rice, Wheat, Rice-Rai, Rice-Maize (Rabi) Rice-Lentil, Rice-
Zone II	Purnea, Kishanganj, Araria, Katihar, Saharsa, Supaul, Madhepura	167.4 (20.2%)	1382.2	0.11	19.8 (19)	12.9 (66)	7.4 (57)	1.2 (12)	8.7 (86)	0.22 (2)	10 (100)	Sandy Loam, Clay Loam	Jute-Wheat, Jute-Potato, Jute-
Zone III A	Bhagalpur, Banka, Munger, Jamui, Lakhisarai, Sheikhpura	311.2 (37.5)*	1049.2*	0.12*	11.9 (13)	5.4 (45)	0.96 (18)	1.3 (36)	1.8 (48)	0.64 (17)	3.8 (100)	Sandy* Loam, Loam, Clay	Rice - *Wheat, Rice-Gram, Rice-Lentil,
Zone III B	Patna, Nalanda, Bhojpur. Buxar, Rohtas, Bhabhua, Gaya, Nawada, Aurangawad,				29.2 (31)	17.3 (59)	5.4 (31)	9.3 (49)	8.3 944)	1.2 (6)	18.7 (100)		
All		828.5	1222	0.11	93.6 (100)	57 (100)	21.66 (100)	13.7 (30)	28.5 (63)	3.4 (7.5)	45.6 (100)		

Note: *Figures pertaining to Zone III A and Zone III B are combined.

Source: Based on presentation by the Department of Agriculture before the Steering Group

CHAPTER IV

REFORMING THE AGRARIAN STRUCTURE

4.1 PROFILE OF BIHAR'S AGRARIAN STRUCTURE

Structurally, Indian agriculture is known as essentially being small-marginal farmer based. It is much more so in Bihar. While at the all-India level, marginal and small farmers account for 83 per cent of the farm households and 42 per cent of the area operated, in Bihar, they account for 93 per cent of the farm households with 65 per cent of the area operated (see Table 4.1). In contrast, large farmers comprising only 0.26 per cent of the total land holdings, account for only 4.75 per cent of the area operated in Bihar. Socially, Scheduled Castes (SCs) and Scheduled Tribes (STs) account for a very low population of landholding households, and most of their holdings are in the small-marginal category. For marginal-small farmer households, that is, for 93 per cent of the agricultural households, though agriculture is the main occupation, their livelihood depends on multiple sources like non-agriculture, agricultural labour and other labour (see Table 4.2). This is very well reflected in the average annual income of farm households from various sources across the size classes (see Table 4.3). Only large farmer households depend purely on agriculture. The distribution of operational land holdings as well as trends in the area shows a downward slope in Bihar (see Figure 4.1). Among all categories of holdings, only the small land size groups (one to two hectares) have the most equitable share of land area and holdings. Both the large size holdings as well as area are rapidly disappearing because of the rapid fragmentation of holdings. One major factor that has strengthened the preponderance of marginal holdings in the land ownership pattern in Bihar is the pattern of land tenancy. For marginal landholders, the share of leasing in land to the total leased-in land is very high (around 77 per cent) (see Table 4.4). This can also be seen from the fact that 85 per cent of all leased-in area in Bihar was accounted for by marginal landholders. Medium and large landowners leased-in only a meagre 0.36 per cent of the land.

The predominance of small and marginal holdings clearly indicates that the development strategy for agriculture must be focused on the small farm sector, which is far more dominant in the state than in the rest of the country. Further, land distribution is highly skewed and uneven; the bottom 93 per cent of the landholding population accounts for 65 per cent of the operated area. Such a structure of farm holdings in favour of smaller size necessitates land reforms, which also require massive support systems in favour

of smallholders. Thus the expansion of the non-farm sector is essential for reducing the undue pressure on small farms and for supplementing their earnings.

Table 4.1: Distribution of Farmer Households and Area Operated

Farm Size	% Distribution of Farmer Households		% Area Operated**	
	Bihar	All India	Bihar	All India
Marginal	80.18	65.54	40.40	21.85
Small	13.22	18.10	25.23	20.19
Semi-medium	5.09	10.64	19.16	22.81
Medium	1.25	4.82	10.46	22.09
Large	0.26	0.90	4.75	13.06

Note: ** Area operated = (land own + land leased in) -land leased out.

Source: NSSO (2005).

Table 4.2: Percentage Distribution of Households in Each Broad Size Class of Land Possessed by Type of Households

Farm Size	Self-employed in Non-agriculture	Agricultural Labourers	Other Labour	Self-employed in Agriculture	Others	Total
Marginal	11.73	23.51	1.72	56.67	6.37	100.00
Small	3.46	0.86	0.19	92.23	3.26	100.00
Semi-medium	2.03	0.75	0.00	95.31	1.91	100.00
Medium	2.99	0.00	0.00	94.45	2.55	100.00
Large	0.00	0.00	0.00	100.00	0.00	100.00
All Farmers	10.00	18.99	1.40	63.94	5.66	100.00

Source: NSSO (2005).

Table 4.3: Average Annual Income per Farmer Household from Various Sources across Farm Size Groups (Rs.)

Farm Size	Sources of Income				
	Wages	Cultivation	Animal Farming	Non-farm Business	Total
Marginal	6680 (38.60)	5452 (31.50)	2556 (14.77)	2619 (15.13)	17306
Small	2775 (9.66)	19798 (68.91)	5025 (17.49)	1133 (3.94)	28731
Semi-medium	4474 (9.50)	36957 (78.50)	4014 (8.53)	1634 (3.47)	47080
Medium	3617 (3.98)	68063 (74.98)	12424 (13.69)	6668 (7.35)	90771
Large	482 (0.21)	173703 (77.27)	42203 (18.77)	8414 (3.74)	224801
All Farmers	5995 (27.52)	10173 (46.69)	3182 (14.61)	2437 (11.19)	21787

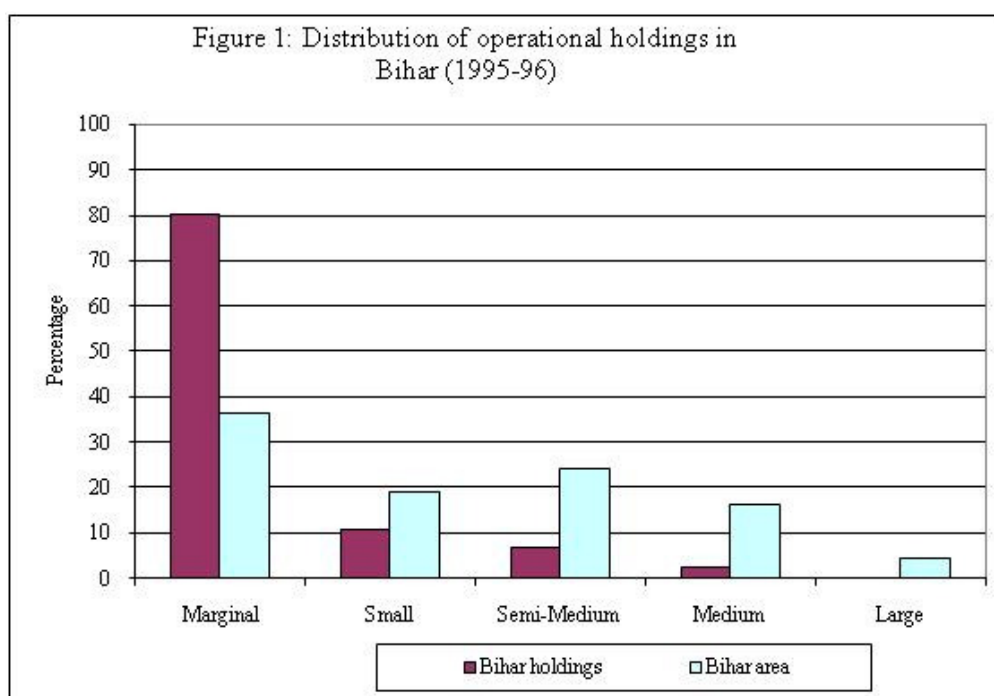
Note: Figures in parentheses are percentages to the total.

Source: NSSO (2005).

Table 4.4: Leased-in Area by Land Size Holdings in Bihar (1991-92)

Land holdings	% to Total Leased-in Area by the Households	% of Leasing-in to Total Leasing-in Land by the Households
Marginal	85.06	77.94
Small	9.96	16.55
Semi-medium	4.09	5.15
Medium	0.89	0.36
Large	0.00	

Source: Srivastava (2000).



Ensuring the sustainability and economic viability of small holders, and improving their competitiveness in production and marketing by facilitating better access to improved technology, inputs, credit and markets should be accorded due priority for achieving higher and inclusive agricultural growth in Bihar. It has been empirically demonstrated that where appropriate institutional alternatives were made available, small holders were as competitive as the large farmers and that the net income across farm size did not differ significantly (see Table 4.5).

Table 4.5: Performance of Marginal and Small Holdings in Bihar**(Amount in Rupees)**

Indicators	Marginal	Small	Bihar Total
Output per hectare	14,230	13,184	13,837
Cost of cultivation per	6,233	5,618	5,805
Net farm income per hectare	7,997	7,566	8,032

Source: NSSO (2005).

Obviously, in any programme of agricultural development, this section of farmers cannot be ignored and agricultural development in Bihar for the coming decade or so will have to be small farm-centric. At present, this category of cultivators does not get much support from the state agencies. This is reflected in the lower use of fertilizers and improved seeds on these holdings.

4.2 TENANCY

The issue of tenancy and antiquated land records has been continuously debated for a long time. The reported incidence of tenancy as per the secondary sources in the state is very low. In 1991-92, only 3.9 per cent of the operated area was reported under tenancy while the corresponding figure was 10.27 per cent in 1981-82. Bihar has legally banned tenancy and, therefore, the official estimates may have a reporting bias. However, micro level studies show a very high incidence of tenancy. According to a survey conducted by the Institute for Human Development (IHD) during the year 1999-2000, about 36 per cent of all rural households and about half of the cultivating households leased-in land and about one-fourth of the cultivated land was tenanted land (see Table 4.4). An overwhelmingly large percentage of the landless and marginal-small landholders leased-in land as compared to the higher land size groups. As can be seen from Table 4.6, as the land size increases, both the incidence and area of leased-in land decreases. The IHD study also shows that between the early 1980s and the late 1990s, the incidence of tenancy declined, albeit only to a very small extent (also see Sharma et al 2002).

Table 4.6: Percentage of Households Leasing-in Land and Area Leased in Bihar, 1999-2000

Land Size (acres)	% of Households Leasing In to All Households	% of Households Leasing In to Cultivating Households	% of Leased In Area to Total Cultivation Area
Landless	34.7	89.7	90.6
Less than 1.0	52.1	56.4	48.0
1.0 – 2.5	41.7	42.9	38.6
2.5 – 5.0	32.6	34.0	17.1
5.0 – 10.0	5.4	5.6	1.0
10.0 – 20.0	10.3	11.1	3.2
20+	0.0	0.0	0.0
Total	36.2	50.1	24.0

Source: Sharma et al (2002).

As the bulk of the leased in land is with the marginal and small holders, the disadvantages of the concealed tenancy, that is, uncertainty of tenure and rack-renting, are more severely faced by these groups. Efforts to provide legal protection to the poor through tenancy legislation, which have been carried out since 1963, have not met with much success. There is a strong case for legalizing tenancy, registering tenants and ensuring fair terms for tenants as well as the land-owners. However, since the issue may lead to tensions in rural areas, it should be kept in mind that congenial ground realities are created for implementing such a radical reform. Further, there is tremendous scope for corruption and high-handedness in the implementation of such a massive programme due to poor land records. As such, there is need to maintain proper land records, as well as campaign for removing the misgivings of the landowners about losing their lands.

Another aspect of the holding structure is fragmentation of holdings, which poses a problem in the optimal use of land and investment in land improvement measures. The ever-shrinking size of landholdings has made many marginal farms economically non-viable and pushed them towards subsistence. Bihar, with an average area of about 0.38 ha per holdings, has an average of close to four parcels per holding. This is in contrast to most of the other states in the country, wherein the average size of the holdings is larger and the number of parcels is fewer. There are several reasons for this state of affairs, with the most prominent among these being a high rate of growth in population in the rural areas and the lack of non-farm employment opportunities. The latter is also, to an extent, an outcome of the low surpluses in agriculture and consequently the low purchasing power of the bulk of the peasantry. The lack of infrastructure in the rural areas aggravates the disadvantages faced by non-farm enterprises.

The state faces a major unfinished task in terms of the consolidation of holdings. The available information reveals that only a small part of the net sown area has been consolidated till date. The main reason for this slow pace of consolidation is the lack of political will, requisite competence and expertise of bureaucracy at the ground level, and outdated land records.

4.3 LAND REFORMS IN BIHAR

Land Reforms in Bihar, which started in the 1950s with the legislation on the abolition of intermediaries, had no perceptible impact on the holding structure. The Land Ceiling Act of 1961, which was directly addressed to the redistribution of land, was a failure. Only 1.5 per cent of the cultivable land was acquired and distributed by 1986, of which the ceiling surplus land meant for redistribution accounted for only 20 per cent. Due to demographic changes over time, the size of land ownership has become much smaller, and now except in a few districts, only a meager amount of surplus land may be available for redistribution. However, besides legislative measures, there has been improvement in land acquisition by the landless and small-marginal farmers through markets. Considerable land acquisition by the poor through earnings from migration is noticed in the state. High market rates for land suggest that a state agency may acquire land from those who want to dispose off land, and credit agencies could be offered inducements to advance loans to small and marginal farmers to purchase land from such an agency at reasonable rates. Even some subsidy in the interest rate offered by the state government would go a long way towards transferring the land into the hands of the actual tillers.

4.3.1 Objective and Strategy for Land Reforms

The state should ensure the viability of marginal, small and medium farms. The strategy to usher in the desired agrarian structure would involve the following measures:

- Legalizing tenancy within the existing land ceiling provisions, and registering tenants and tenancy agreements, after creating a congenial atmosphere.
- Purchasing land from landholders (who are willing to sell their lands) by the State Land Development and Finance Corporation at fair prices;
- Encouraging credit institutions to advance loans at reasonable rates to marginal and small farmers to enable the latter to purchase land from large, especially absentee landlords, and from the State Land Development and Finance Corporation, thereby encouraging and facilitating large farmers to shift to non-agricultural enterprises;
- Distributing government surplus land in viable small holdings;
- Encouraging dairying, horticulture and vegetable growing, particularly on small and marginal farms, and especially those with good connectivity;

- Encouraging contract farming, particularly through farmers' own organizations and by ensuring transparent and fair agreements between contracting parties;
- Encouraging the collective organization of farmers with similar economic interests in the form and manner agreeable to them; and
- Drawing up a plan of action for land consolidation by creating a suitable ground atmosphere and training of the personnel involved in land administration.

The pre-conditions for fair and just land reforms are reliable land records, and their easy access to all interested parties. Several states in the country are moving in these directions by making use of GPS Technology and computerizing land records. Bihar too should not lag behind.

CHAPTER V

CROPPING PATTERN, CROP DIVERSIFICATION AND VALUE ADDITION

5.1 CROPPING PATTERN IN BIHAR

5.1.1 Size Class and Cropping Pattern

The cropping pattern in Bihar shows a heavy bias in favour of foodgrains across all size classes (see Table 5.1). About 94 per cent of the crops grown by all size holdings belong to the foodgrains category. Rice and wheat, which together account for about 83 per cent of the cropped area, dominate the cropping pattern. Among the non-foodgrains, fruits and vegetables stand out as the most important, especially for marginal and small farmers.

Table 5.1: Cropping Pattern in Bihar across Farm Size Groups, 2003

Crops	Area under Different Crops as % of Total Cropped Area					
	Farm Size Groups					
	Marginal	Small	Semi-medium	Medium	Large	All Size
1. Foodgrains						
a. Rice	44.63	47.29	47.44	43.45	54.15	46.09
b. Wheat	39.18	35.72	35.89	32.11	27.16	36.62
c. Other Cereals (Mainly Coarse Cereals)	5.46	3.09	3.38	8.44	2.15	4.59
d. Pulses	5.68	7.61	7.19	10.26	11.70	7.08
Total Foodgrains	94.95	93.71	93.89	94.26	95.16	94.38
2. Total Non-foodgrains	5.05	6.29	6.11	5.74	4.84	5.62
a. Oilseeds	0.66	2.00	0.86	1.26	2.50	1.17
Groundnut	0.06	0.04	0.00	0.00	0.00	0.04
Mustard and Rapeseeds	0.42	0.71	0.69	1.26	2.50	0.70
b. Sugar cane	0.32	0.63	0.78	1.29	0.82	0.59
c. T .Fibre Crops essentially Jute and Mesta	0.95	1.34	1.63	1.10	0.47	1.17
d. Fruits and Vegetables	2.21	1.57	1.24	1.61	0.70	1.75
e. Remaining Cops	0.92	0.75	1.60	0.48	0.34	0.94
Total Cropped Area	3.62*	2.22*	1.56*	0.73*	0.30*	8.43*

Note: Total cropped area in million hectares.

Source: Computed from NSSO (2005).

During the last one decade, there has not been any significant change in the area under food and non-food crops (see Tables 5.2 and 5.3; also see App. Table 5.1 and App. Table 5.2 for details). However, within the foodgrains sector, significant changes have taken place. An important change is the substantial growth of maize in terms of production and productivity. Bihar produces 6.09 per cent of the total rice produced in India and 5.23

per cent of the total wheat. Its share in the country's maize production is 9.60 per cent, which is progressively increasing.

**Table 5.2: Cropping Pattern in Bihar Agriculture (1993-94 and 2006-07):
Area, Production and Yield of Principal Crops**

Particulars	Rice	Wheat	Maize	Sugarcane
1993-94				
Area	3321	2012	598	120
Production	4749	4265	1113	4291
Yield	1430	2120	1861	35758
2006-07				
Area	3571	2151	646	119
Production	4409	5019	1515	4083
Yield	1235	2333	2343	34353

Note: Area: 000 hectares, Production: 000 tonnes, and Yield: Kg\ha.

Source: CMIE (2007); Agriculture Statistics at a Glance, Government of India.

**Table 5.3: Percentage Change in Area, Production and Yield of Major Crops
in Bihar(1993-94 To 2006-07)**

Particulars	Rice	Wheat	Maize	Sugarcane
Area	7.53	6.91	8.03	-0.83
Production	-7.16	17.68	36.12	-4.85
Yield	-13.64	10.05	25.90	-3.93

Source: CMIE (2007) and Agriculture Statistics at a Glance, Government of India.

The dominance of foodgrains, mainly rice and maize, is not a disadvantage *per se*. The main argument in favour of moving towards a non-foodgrains economy in Bihar is the changing pattern of the consumer demand, with progressively smaller amounts being spent on foodgrains. However, the demand for foodgrains is also expected to increase over a period of time, though at a slower pace, and Bihar needs to augment its foodgrain production in order to ensure its food security. According to the Working Group on Crop Production for the Eleventh Five Year Plan, India's demand for foodgrains is likely to increase by 2.3 per cent over the next five years. Besides, the prices for these commodities are hardening all over the world, including in India. Bihar can take advantage of this situation by improving its grain production. There is, however, scope for diversification in the cropping pattern at the margin towards non-foodgrains, particularly in favour of horticulture crops, to augment the incomes of the cultivators.

The emphasis on foodgrains has another positive implication for Bihar. As reported earlier, a large proportion of its cultivated land is concentrated in small and marginal holdings, and foodgrains occupy a significant portion of the land under these holdings. An emphasis on foodgrains will also help them meet their goal of food security. In addition, even the foodgrain crops have ample scope for value addition. The use of maize used for producing bio-fuel or starch and for other industrial uses is an excellent example of this.

The scope for value addition by substituting more suitable crops in different agro-climatic regions needs to be exploited. For example, upland paddy can be replaced by *arhar* or *urad*. Wheat can be replaced by winter maize. With the extension of irrigation, current fallow land can be brought under pulses. The indicative targets for the proposed changes in the cropping pattern in foodgrains, fruits and vegetables, along with their production, are provided in Tables 5.5 to 5.7.

Apart from the fact that dairying is already a widely practised enterprise diversification strategy (there is more on this in the next section), small patches of land even on the small holdings can be devoted to non-foodgrain crops. This is what the farmers in several areas are doing to generate cash incomes. It is important to advise and help them select appropriate non-foodgrain crops. Crops which can contribute to value addition even on the small holdings are maize, horticulture crops and vegetables.

The main reason for adopting a cautious approach to large-scale crop diversification is the risk involved in the latter. Even for a limited extent of crop diversification, it is important to strengthen marketing linkages as also to ensure easy access to and reasonable prices of staple foodgrains to the small and marginal farmers. There are numerous examples of farmers being pushed to grow some unfamiliar crop and then left to themselves to find markets. Similarly, with inadequate and unsatisfactory functioning of the Public Distribution System (PDS) in foodgrains, the farmers may have to face double jeopardy if they abandon foodgrains.

5.2 STRATEGY FOR VALUE ADDITION ON SMALL FARMS

A multi-pronged strategy for value addition on the farms, especially on small farms, needs to be adopted and the following sub-sections detail the important aspects of the proposed strategy.

5.2.1 Filling-in Productivity Gaps in the Staple Crops

The main thrust of policy should be to increase the productivity of the principal crops of Bihar. Except for a few crops such as maize and pulses, the yield per hectare of the principal crops in Bihar is way below that which is achievable (see Table 5.4). Even compared to yields in other important states producing the same crops, the yields are lower in Bihar. There is, therefore, a definite target to meet, that of bringing yields to the level of the principal producing states and then reaching the full potential. With the help of agricultural scientists and irrigation experts, specific measures need to be taken to enhance productivity in different crops. The preliminary ideas in this regard are given in Table 5.5.

**Table 5.4: Crop-wise Performance and Potential in Bihar
(Yield: Kg/ha, 2002-03 to 2004-05)**

Crops	Improved Practice (I)	Farmer Practice (F)	Actual 2003-04	Yield gap I and F	% between I and A
Wheat	3651	2905	1783	25.7	50.5
Rice	4883	4158	1516	17.4	222.1
Maize	3719	-	2374	-	56.6
Sugarcane	74420	49440	40990	50.5	81.6
Mustard	1385	942	830	47.0	66.9

Note: I: Improved Practice; F: Farmer's Practice.

Source: Planning Commission (2008).

There is need for augmenting foodgrain production on the existing area. For the next ten years, a growth of 5 per cent per year may be targeted to raise the present level of foodgrain production from about 119 lakh MT to 222 lakh MT. Major contributions to an increase in foodgrain production can come from rice, maize and pulses (see Table 5.6). However, a time-bound strategy would be needed for meeting the requirements of high-yielding seeds, development of sustainable small-scale irrigation projects, strengthening the appropriate marketing set-up in a public-private mode and fulfilling the farmers' demand for other inputs like fertilizers.

Table 5.5: Suggested Measures to Improve Productivity in Principal Crops, Fruits and Vegetables

CROPS	MEASURES
RICE	♦ Use of SRI Technology ♦ Propagation of hybrid varieties ♦ Propagation of Boro rice supported by Strong Seed Programme ♦ Propagation of fine/scented variety of rice for raising income ♦ Replacement of long duration varieties with short and medium duration varieties ♦ Upgradation and strengthening of milling facility and strong procurement
MAIZE	♦ Popularization of hybrid varieties supported by strong seed programme ♦ Encouraging rabi maize ♦ Encouraging baby corn, pop corn, sweet corn and quality protein maize varieties for raising income ♦ Proper storage (including drying) and procurement of Minimum Support Prices (MSPs) ♦ Promotion of maize-based processing industry (animal feed, corn oil, starch, ethanol, etc.)
WHEAT	♦ Timely sowing and harvesting ♦ Development of short and medium duration varieties ♦ Encouraging cultivation of short and medium duration varieties of rice ♦ Mechanization (combining harvesting and zero tillage sowing)
OILSEEDS	♦ Area expansion ♦ Replacing lathyrus and low yielding wheat with <i>rai/sarson</i>, sunflower ♦ Popularization of high yielding varieties supported by strong seed programme ♦ Popularization of inter-cropping of mustard ♦ Use of sulphurous fertilizers
FRUITS	♦ Rejuvenation of old orchards ♦ Area expansion ♦ Assured supply of quality planting material ♦ High density planting ♦ Irrigation with drip and micro sprinklers ♦ Mechanization of harvesting, grading and packing ♦ Processing and cool chains
VEGETABLES	♦ Area expansion ♦ Use of hybrid seeds ♦ Integrated pest management ♦ Use of growth promoters ♦ Irrigation with drip and micro sprinklers ♦ Mechanization of harvesting, grading and packing ♦ Processing and cool chains

Source: Presentation by Agricultural Scientists and Officers of the State Agricultural Department, Government of Bihar before the Steering Group.

Table 5.6: Indicative Targets of Production of Principal Crops in 2020 (Area in Lakh Ha, Production in Lakh mt, Productivity in Q/ha.)

Particulars	Rice	Wheat	Maize	Pulses	Total Foodgrains	Oilseeds
Area	33.98	20.00	8.65	9.70	72.33	2.00
Production	100.98	61.00	45.00	15.00	221.98	2.20
Productivity	29.72	30.50	52.00	15.40	27.00	11.00

Note: Upland paddy may be replaced by *arhar* and *urad*; wheat may be replaced by winter maize. Additional area for pulses will come from current fallow land with additional source of irrigation.

Source: Presentation before the Steering Group by Agriculture Department, Government of Bihar.

5.2.2 Adding Value to Existing Crops

Given the abundance of labour, and small size of the holdings, there are many crops, especially among fruits, vegetables, and spices wherein Bihar can emerge as an important player. With proper quality control, farmers producing the traditional foodgrains should be helped to exploit the niche markets. Efforts could also be made to add value to the byproducts, such as chaff, and also to encourage on-farm primary processing of crops.

5.2.3 Propagating a Mixed Farming Pattern

In moving towards high value crops, small-marginal farmers face high risks. One of the ways of mitigating the risk is to adopt a mixed cropping strategy. As in other parts of the country, in Bihar also, small farmers always follow a mixed farming pattern on their land. However, there is no systematic planning of the crops. Efforts could be made to encourage farmers to reserve a small area for non-foodgrain crops suited for different agro-ecological zones of the state.

5.2.4 Identifying Areas for Intensive Cultivation of Fruits

Although Bihar has tremendous potential for the production of fruits and vegetables, the state lags far behind other states such as Bengal and Maharashtra in this regard (see Box 5.1). As the Horticulture Mission is covering substantial parts of the state, systematic efforts could be made to identify areas for special attention in terms of the growing of fruits. The necessary infrastructure to ensure profitable cultivation of fruits needs to be provided. The indicative targets for fruit production are suggested in Table 5.7.

Figure 5.1

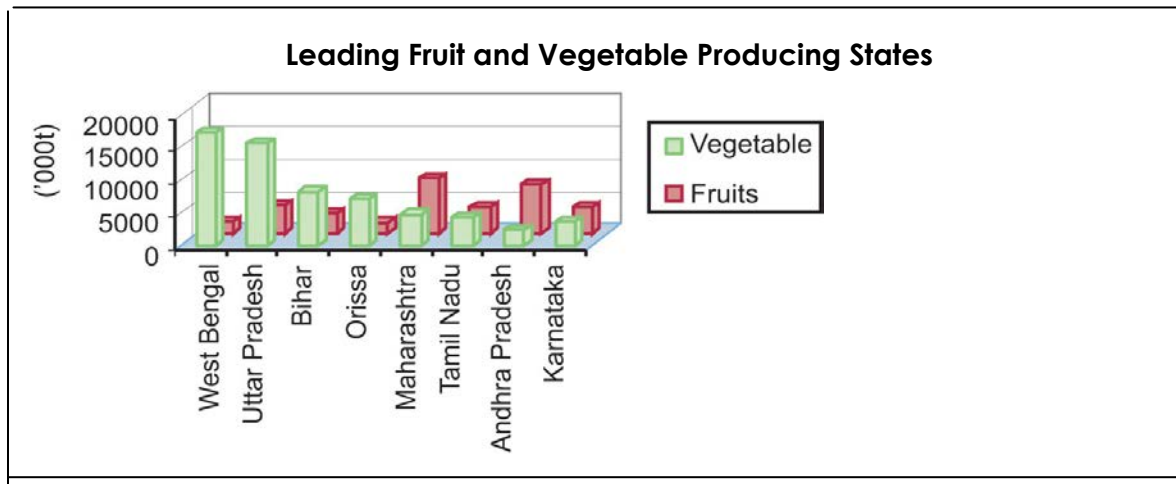


Table 5.7: Targets of Production of Fruits in 2020 (Area in Lakh Ha, Production in Lakh MT and Productivity in Quintal)

Particulars		Mango	Banana	Guava	
Area	0.38	1.60	0.48	0.30	0.50
Production	5.00	30.00	24.00	4.5	3.00
Productivity	13.16	18.75	50.00	15.00	6.00

Notes: (i) Additional area will come from diversification of cereals particularly rice and wheat
(ii) (projected rate of growth @10%).

Source: Presentation by Agricultural Department, Government of Bihar before the Steering Group.

5.2.5 Areas with Advantages in Vegetable Production

The areas on the periphery of the cities and towns can be profitably devoted to vegetable cultivation. For fully exploiting these opportunities, it is imperative to provide the necessary infrastructure of roads, communication and cold storage facilities. The indicative targets for vegetable production are provided in Table 5.8.

Table 5.8: Target of Production of Vegetables in 2020

Particulars	Cauliflower	Brinjal	Okra	Potato	Tomato	Total
Area	0.70	0.65	0.65	1.50	0.55	4.05
Production	14.00	16.25	11.05	30.00	13.75	85.05
Productivity	20.00	25.00	17.00	20.00	25.00	21.00

Note: Additional area will come from increase in cropping intensity due to increase in area under assured irrigation (projected rate of growth @6%).

Source: Presentation by Agricultural Department, Government of Bihar before the Steering Group.

5.2.6 Encouragement to Agro-processing

Bihar has a very low level of agro processing and there is tremendous potential for its development (see Box 5.2). For the introduction of the new 'commercial crops' as well as for exploiting the full value of the existing commercial crops including fruits and vegetables, processing industries need to be located near the producing areas. Contract farming with proper safeguards may be encouraged to facilitate production and larger value retention by the producers.

BOX 5.1: Potential for Food Processing in Bihar

The value addition in Fortune Product International (FPI) in India is estimated at about 20 per cent. The level of processing varies across segments and states. Given the current low level of processing in the state, there exists a tremendous potential for this, if the right management, operating environment and policy impetus are provided for the sector. The emerging retail boom provides another big opportunity for the establishment of food processing industries in the state.

Bihar already has a few agricultural commodities to cater to the niche markets. For a gainful utilization of the existing potential, infrastructure creation and institutional development hold the key.

A decrease in post-harvest losses by just one per cent will result in a value addition of Rs. 80 crore to the GSDP by foodgrains and about Rs. 120 crore by the fruit and vegetable sector. Thus, the total value addition to the state GSDP that can be achieved simply by minimizing losses by 2 per cent in foodgrains and 15 per cent in fruits and vegetables, would lead to a value addition in the GSDP by approximately Rs. 2000 crore.

5.3 PROGRAMMES TO ACCOMPLISH STATED GOALS

- **Ensuring proper use of irrigation water:** As observed earlier, Bihar has a higher proportion of area under irrigation as compared to the national average. Also, the main crops of the state, that is, rice, wheat and maize, have a higher percentage of area under irrigation. Yet the yield of these crops (except for maize) is lower than the average yield of the same crops for the country as a whole. There could be several factors responsible for low yields, but the inefficient use of water is certainly one of these. Efforts thus need to be made to ensure the proper use of water. For example, there are good prospects of introducing pulses and oilseeds in rice fallows with supplementary irrigation facility.

- **Timely supply of the quality inputs:** Bihar has a higher use of fertilizers per ha, but the response seems to be below average. There are problems with the timing of the application as well as the quality of the inputs. In the case of seeds, adequate supply of the quality seeds seems to be the problem. Steps should be taken to ensure timely and assured supply of quality inputs. In the case of fertilizers, there is also a problem of improper mix of various nutrients. At a recent meeting of the National Development Council (NDC), the implementation of site-specific nutrient management on 0.5 millions hectares of land was suggested. By itself, this programme may produce an additional 2.6 MT of foodgrains. The government should encourage a mix of N, P and K as well as micro-nutrients after taking into account the advice of the agricultural scientists.
- **Self-provisioning of inputs, and appropriate practices on small farms:** For small farm agriculture, self-provisioning of inputs is always advantageous, provided the productivity of these inputs is comparable to the purchased inputs. Modern methods of seed propagation, selection and preservation on farms should be popularized. Organic manure and vermiculture offer great promise for boosting production. Efforts are being made in different parts of the country to improve their productivity and reduce costs. Full advantage needs to be taken of the research being conducted within the state and elsewhere to popularize improved quality inputs. Similarly, practices which reduce costs without sacrificing productivity, such as no-tillage cultivation, may be popularized. It was suggested during a meeting of the NDC that zero tillage on 1.5 million hectares of land having excess soil moisture after rice harvest could enhance rice production by 0.45 metric tonnes.
- **Investment in rural infrastructure:** Rural infrastructure is woefully inadequate in Bihar. As a result, extension, input supplies and marketing of produce suffer. This handicap is particularly severe in the case of roads and electricity. High priority should, therefore, be accorded to overcome this deficit. The Centrally-sponsored Prime Minister's Village Roads Programme has started making a mark in the state. Wherever feasible, labour-intensive methods should be used to build roads, especially village and farm roads. The existing National Rural Employment Guarantee Act (NREGA) could be exploited for this purpose. Similarly, alternative sources of energy, such as wind power, solar power, and small hydal power projects could be exploited to supplement the generation of energy by conventional sources.

- **Encouraging organizations of the farmers:** With the preponderant share of the small farmers in the agrarian structure, it is difficult to ensure that the benefits for which they are entitled accrue to them without organizations of their own. Bihar's record in this respect is very poor. Cooperative organizations were encouraged in the rural sector to enhance the bargaining capacity of the small farmers. Unfortunately, a large number of cooperatives have become defunct. Efforts should thus be made to revitalize them. Other forms of farmer organizations from cooperative companies to Self-help Groups (SHGs) should also receive equal encouragement. A cue should be taken from Maharashtra where farmers' organizations like *Mahagrapes*, *Mahabanana* and *Mahamango* have become big export houses in themselves. Apart from strengthening the bargaining power of the producers, these organizations will also help in reducing the transaction cost of the institutions dealing with credit, marketing and input supplies.
- **Organizational linkages with processing industries:** Universal experience suggests that there are no economies of scale in agricultural production. But there are distinct advantages of the larger scale in marketing and processing. There are examples in the milk and sugar sectors wherein the integration of the small producers with larger marketing and processing entities has proved to be beneficial for all concerned. Cooperatives in these sectors are largely farmer-owned enterprises. In several parts of the country, such integration with private firms has also proved to be fairly advantageous for the producers. Such arrangements have been successful to the extent that the following conditions are fulfilled: a) there is no asymmetry in information, b) there are effective arrangements to protect the weaker parties, that is, the producers, and c) there is an effective dispute resolution arrangement in place. Keeping these lessons in the forefront, the integration of producers with the marketers and processors should be encouraged.
- **Training of farmers in modern methods of crop production:** Inadequate attention has been placed on training the farmers in the scientific methods of cultivation under the mistaken assumption that 'the farmers of forty centuries', which our cultivators are, do not need any training. Due to this notion, agricultural producers have been denied the benefits of agricultural sciences in their farming operations. Proper instructions need to be given to the producers in farmers' field schools to enable them to understand modern methods of production and to practise them in the field conditions. Lessons learnt in our country and in other

similarly situated countries in the content as well as in pedagogy should be disseminated after proper adaptation.

- **Emphasis on dynamic crops:** As per past records, certain crops emerge as the dynamic crops of Bihar: maize among cereals, *litchi* among fruits, and potato among vegetables. These crops also have better prospects for value addition, and these are neutral to scale. Therefore, they can be cultivated even by the small farmers wherever the conditions are favourable.
- **Location-specific crop planning:** The specific features of different agro-climatic zones in the state have been recorded earlier. The potentiality of different zones should be carefully examined and farmers should be advised accordingly. An illustrative example of the zone-wise crop planning is provided in Appendix Table 5.9. More details need to be acquired and used for this purpose.

Appendix Table 5.1: Cropping Pattern in Bihar Agriculture (%)

Crop	TE 1991	TE 2001	TE 2007
Rice	45.08	46.80	46.65
Wheat	24.02	26.98	30.03
Maize	7.02	8.00	8.78
Other Cereals	1.86	0.75	0.68
Total Cereals	77.98	82.53	83.28
Gram	1.70	1.08	0.86
Arhar	0.56	0.55	0.51
Other Pulses	11.33	7.61	6.96
Total Pulses	13.58	9.24	8.34
Groundnut	0.00	0.02	0.02
Sesamum	0.05	0.11	0.05
Rapeseed and Mustard	1.11	1.28	1.19
Linseed	0.82	0.54	0.40
Niger seed	0.38	-	-
Total Oilseed	2.36	1.93	1.94
Jute	1.67	1.80	1.77
Mesta	0.30	0.32	0.17
Sanhemp	0.03	0.03	0.04
Total Fibers	2.00	2.14	1.99
Chilies	0.05	0.06	0.04
Ginger	0.01	0.01	0.01
Turmeric	0.04	0.04	0.04
Coriander	0.04	0.03	0.03
Garlic	0.03	0.04	0.03
Potatoes	1.57	1.84	2.04
Onions	0.15	0.19	0.23
Sweet Potato	0.20	0.10	0.07

Banana	0.15	0.33	0.22
Sugarcane	1.68	1.31	1.55
Tobacco	0.17	0.20	0.20

Source: Directorate of Statistics, Government of Bihar.

Appendix Table 5.2: Zone-wise Cropping Pattern

Zones	Rice			Wheat			Maize			Gram			Lent	Rapeseed and Mustard			Sugarcane		
	A	P	Y	A	P	Y	A	P	Y	A	P	Y	A	A	P	Y	A	P	Y
Zone I	13.4 (37)*	17.8 (33)	13.3	8.6 (41)*	17.1 (40)	19.9	2.3 (38)	5.4 (37)	23.5	0.02 (3)	0.02 (3)	10	0.40 (23)	0.44 (47)*	0.34 (45)	7.7	0.93 (89)*	40.8 (88)	43.8
Zone II	8.2 (23)	9.4 (18)	11.5	4.4 (21)	7.9 (18)	17.9	2.9 (48)*	6.98 -48	24.1*	0.04 (6)	0.03 -4	7.5	0.15 (9)	0.30 (32)	0.26 (34)	8.6	0.04 (4)	2.1 (5)	52.5
Zone III A	2.8 (8)	3.6 (7)	12.9	1.5 -7	2.6 (6)	17.3	0.8 (13)	1.6(11)	20	0.14 (21)	0.11 (15)	7.8	0.17 (10)	0.05 (5)	0.03 (4)	6	0.03 (3)	1.6 (3.4)	53.3*
Zone III B	11.5 32)	22.7 (44)	19.6*	6.6 (31)	15.2 (36)	23.0*	0.3 (13)	0.5 (3)	16.7	0.52 (72)*	0.56 (78)	10.8 *	1.0 (57)*	0.15 (16)	0.14 (18)	9.3*	0.04 (4)	1.5 (3.2)	37.5
Total	35.99 100)	53.52 (100)	14.87	21	42.8	20.4	6.06 (100)	14.43 (100)	23.81	0.72 (100)	0.72 (100)	10	1.74 (100)	0.93 (100)	0.76 (100)	8.2	1.04 (100)	46.2 (100)	44.4

Note: A=Area (lakh hectare), P= Production (lakh MT), Y=Yield.

Source: Presentation by Agricultural Scientists and Officers of the State Agricultural Department, Government of Bihar before the Steering Group.

CHAPTER VI

AGRICULTURE—ALLIED ENTERPRISES

6.1 DAIRYING

During the last decade or so, the country has witnessed a 'White Revolution', and India has emerged as the largest producer of milk in the world. Prospects for further dairy development in the country are quite promising. The favourable factors include vast cattle wealth, large pasture lands, and abundant labour. Dairying is ideally suited as a supplementary activity for small-marginal farmer households. There is sufficient technical know-how, and it holds the potential for a flourishing cattle feed industry and, above all, an expanding market for milk and milk products within the country and abroad. It is one area wherein the organizations of the producers is quite strong. As a result, there is scope for a large portion of the consumers' rupee going to the producer.

In Bihar, milk production was estimated to be 1.57 million tones in 1951, which contributed 9.24 per cent of the total milk production in the country; and the per capita per day milk availability was also higher in Bihar (153 gms) than at the national level (124 gms). Ironically, even as production was increasing in the state, Bihar's share in national milk production continuously declined from 9.24 per cent in 1957 to 3.12 per cent in 2002. This was largely due to the fact that the pace of progress in the 'White Revolution' was much faster in the rest of the country than in Bihar. However, the silver lining is that Bihar as a latecomer has picked up a much faster growth rate in dairy development in recent years. Milk production increased two-fold from 2.63 million tones in 2001-02 to 5.45 million tones in 2006-07. During the last three years, the rate of increase in milk production in Bihar has been much higher than at the national level.

Presently, Bihar accounts for nearly 5 per cent of the country's milk production. Nearly 64 lakh households in the state are engaged in this activity. Of those employed in the livestock sector, women constitute 70 per cent of the labour force. The distribution of livestock is more equitable than that of land, and livestock also serves as an insurance mechanism for poor farmers (see Table 6.1). Livestock emerges as one of the high potential avenues of public intervention for more inclusive and equitable growth in Bihar. A close analysis of the relationship between the size class of landholdings and livestock ownership demonstrates the critical role

of the landless and marginal farmers, that is, those holding less than one hectare in the livestock economy of Bihar. More striking is the case of ownership of sheep and goats. While landless and marginal farmers holding less than one hectare of land, together account for 91 per cent of the total sheep and goat ownership, as many as 69 per cent of the households still do not have these assets. Given the proven capacity of this class of rural poor households to effectively manage animal husbandry, there is a huge potential not only for the development of the livestock economy but also of reaching the poor in the process. What is needed is not a mere increase in the access to these assets but a substantial increase in public investment towards a network of veterinary hospitals, and research and development facilities for developing regionally appropriate breeds and improving milk collection, chilling and processing facilities.

Table 6.1: Livestock Ownership and Size of Operational Holdings in Bihar, 2003

Size/Class of Operational Holdings (ha)	% of Households Having			% Distribution of Livestock		
	Cattle	Buffalo	Sheep & goat	Cattle	Buffalo	Sheep and Goats
<=0.04	14.9	8.4	14.7	18.8	17.8	42.7
0.04-1	45.3	26.9	16.1	58.7	58.7	48.2
1-2	65.9	43.5	13.1	15.4	17.1	7.1
2-4	68.0	34.8	9.6	5.5	4.8	1.8
>-4	82.4	46.9	6.1	1.6	1.6	0.3
All	34.6	20.6	15	100	100	100

Source: Land and Livestock Holdings, 2003-04, NSSO, Government of India.

Recent trends in the growth of livestock in the state suggest that both absorptive capacity and the demand side situation are conducive for faster development. Bihar has a huge livestock population, including 105 lakh cattle, 58 lakh buffaloes, 96 lakh goats and 3 lakh sheep in 2003. The state has a higher proportion of buffaloes in total livestock population than the corresponding population at the national level (see Table 6.2). The increase in buffalo population was higher (60.18 per cent) than the corresponding increase at the national level (37.46 per cent) during the period 1982-2003. A desired change in the composition of milch animals has been observed in Bihar, which is befitting in a situation of increasing demand for milk and decreasing demand for draught animals.

**Table 6.2: Changes in Major Livestock Population (lakh) in Bihar
and India: 1982-2003**

Livestock	1982		2003		Decrease/Increase (%)	
	India	Bihar	India	Bihar	India	Bihar
Cattle	1924 (47.84)	94 (44.70)	1789 (40.27)	105 (40.06)	-7.2	11.49
Buffalo	670 (16.86)	36 (17.12)	932 (20.98)	58 (22.00)	37.46	60.17
Goat	932 (23.17)	77 (36.62)	1146 (25.80)	96	22.96	24.67
Sheeps	488 (12.13)	3.30 (1.56)	575 (12.90)	3.50 (1.32)	17.83	2.75
Total Livestock	4022 (100)	210.30 (100)	4445 (100)	262.5 (100)	10.44	24.66

Source: Livestock Census (1982 and 2003).

Table 6.3: Quality of Livestock Population (000) in Bihar and India, 1992 and 2003 ('000)

Livestock (Type)	1992		2003	
	Bihar *	India	Bihar*	India
Crossbred Cattle	191	15215	1419	22073
Indigenous Cattle	21963	189369	16968	156685
Buffaloes	5352	84206	6529	93225
Ovines and Caprines	20275	166062	17485	176101
Pigs	1127	12788	1780	13571
Poultry	17655	307069	28340	489012

*including Jharkhand.

Source: Same as in Table 6.2.

Bihar enjoys the following comparative advantages in this sector, which need to be further exploited:

- > There is a larger number of dairy cattle in-milk per 100 households (108.6) in Bihar as compared to the country as a whole (104.5).
- > The rate of growth of the cattle in-milk per 100 households, during the period 1991-92 to 2002-03 was faster (27.76 per cent) as compared to that in the country as a whole (17.42 per cent).
- > A large bulk of cattle is owned by the small and marginal farmers, who can devote enough labour and care to their dairy enterprises (see Table 6.1).
- > The proportion of pasture land and cultivable wasteland per milch animal is higher as compared to that of the country as a whole.
- > There is a fairly efficient apex marketing organization for milk and milk products.

Despite these advantages, the livestock sector has not flourished well in Bihar. Both qualitatively and quantitatively, this sector in the state is not in good shape. Keeping the present status and the potential for growth in view, the National Dairy Development Board (NDDB) has selected the state for accelerated dairy development. Twenty districts, which have a good potential for dairy development, have been identified, and another eighteen districts will need greater efforts to exploit their potential. It is suggested that with proper supportive steps, that is, institutional reforms, adequate investment and, wherever essential, grants and subsidies, the growth in milk production in the state can be raised from the level of 138 lakh kgs of liquid milk per day to 172 lakh kgs during the Eleventh Five Year Plan period. NDDB's plan envisages that it is possible to reach this target. However, in order to participate in and gain from the fast-growing market for dairy products, the state will have to address some of the disadvantages that it faces.

6.1.1 Artificial Insemination

Artificial insemination is a pre-requisite for the genetic improvement of animals. The existing animals need to be improved genetically so that the level of milk production is increased. During the last 15 years, the Government's artificial insemination system collapsed and only 400 artificial insemination (AI) centres are currently operational, most of which do not have the required staff and resources. Presently, they are performing about 20 lakh AI activities and covering about 29 per cent of the breedable bovine population in Bihar. The availability of AI services can be improved by strengthening public-private partnership in the delivery of these services.

6.1.2 Animal Health Services

The number of functional hospitals declined from 904 in 1991-92 to 852 in 2003-04. The number of veterinary doctors working in the department of animal husbandry also declined from 1312 in 1991-92 to 912 in the year 2003-04, but the number of livestock increased from 241 lakh to 270 lakh during the same period. The per hospital livestock population increased from 26.66 thousand in 1991-92 to 31.69 thousand in 2003-04. The per veterinary doctor livestock population also increased from 10.37 thousand to 29.61 thousand during the period, which is much higher than the norm of one veterinary doctor for 10 thousand livestock. However, there is a shortage of medicines and appliances in veterinary hospitals. Infrastructure, including hospital buildings which are in bad shape, require heavy investment for

rejuvenation and remodelling. The other principal constraints for dairy development in the state are:

- > Most of the grazing land is encroached upon or degraded, due to which availability of fodder is inadequate.
- > Due to the extremely small size of agricultural holdings, the availability of green fodder is scanty.
- > The availability of cattle feed in the state is inadequate and is relatively more costly.
- > Veterinary services are inadequate and not easily available to the small cattle breeders.
- > Only a small part of the milk supply, that is, less than 8 per cent, has been brought under the fold of organized marketing.

In our vision of agriculture in Bihar, dairying will play an important part as a supplementary enterprise to agriculture. Specialized dairy enterprises will emerge once the farmers find that the profit from such enterprises is higher than that obtained from mixed farming. For the next ten years or so, dairy development will largely remain a supplementary occupation to crop production.

In order to make dairying a profit-making enterprise, the following steps need to be taken:

- ❖ **Breeding policy:** There should be a breeding plan designed by the experts. Attention should be focused on identifying superior local breeds and propagating improved breeds rather than bringing in exotic breeds. Professional AI service providers should be encouraged to expand and provide quality AI at the producers' doorsteps. The breeding policy being finalized by the state government is a step in the right direction.
- ❖ **Feeding policy:** Enough supply of green and dry fodder has to be ensured. Concerted efforts need to be made to reclaim degraded lands and to make them more productive. Improved seeds for green fodder should be multiplied and distributed. Deficiency in nutrition in each region should be identified and nutrient supplements should be provided.
- ❖ **Veterinary services:** Rural youth can be trained and encouraged to provide veterinary services at the farmers' doorsteps. High quality veterinary colleges should be established with a number of extension centres. Veterinary hospitals should be rejuvenated and veterinary doctors should be appointed in hospitals. The veterinary services have been improved in several states by

engaging and encouraging para-vets (popularly known as *Gopalmitra*). In Bihar also, there are some success stories in this sphere, which need to be replicated on a wider scale.

- ❖ **Marketing services:** Utilizing the expertise of national bodies like the NDDB, quality input supply arrangements and remunerative markets for milk should be ensured. Dairy farmers should be encouraged to strengthen existing cooperatives, and to organize new generation cooperatives or producers' companies where these institutions are weak,. The apex organizations of these societies/companies should be encouraged to go in for high value milk products, after satisfying the liquid milk requirements of the local population.
- ❖ **Liaison with national institutions:** A Close liaison needs to be established with the national level institutions, especially the NDDB, for bringing about a White Revolution in the state with their expert advice and material support.

6.2 FISHERY

Bihar is a land-locked state but it is endowed with rich and diverse water resources, with a network of rivers in both North Bihar and South Bihar, a large number of ponds and tanks and a few reservoirs, ox-bow lakes, *chaurs* and flood plains. It offers immense opportunity for practising inland fisheries. There is also a large scope for paddy-fish combination in some parts of the state—a practice largely prevailing in similar areas in China. There is tremendous scope for fish production in Bihar, especially in the north-central and north-eastern parts of the state. If proper technical and extension support is provided in fish production, the benefits can be very large (see Box 6.1). The state, which already produces 7 per cent of the country's inland fish production, can further increase it substantially.

Fish production is growing at the rate of over 8 per cent per annum and its share in the agricultural GDP has doubled in ten years. Nearly 4.6 million rural households in the state are engaged in fishing. There are abundant water bodies available for fishing. There are 500 fishermen's cooperatives. It is paradoxical, therefore, that the state has to depend on large imports, to the tune of 50 per cent, from the other states for meeting its limited demand of 4.5 lakh tonnes in fishery. In the coming years, the demand for fish will increase significantly. At the national level, the demand for fish is estimated to increase at the rate of 4 per cent per year. In the case of Bihar, it is likely to be higher, in view of the large fish-eating population, higher rate of population growth and higher per capita income in the state.

The major constraints faced by fish producers are:

- Shortage of quality fish seeds;
- Use of traditional methods of fish production;
- Lack of scientific management of water bodies;
- Iniquitous and exploitative arrangements for the management of water bodies;
- Absence of proper marketing and storage;
- Loss of fish due to natural calamities (floods/diseases); and
- Existence of a number of fake fishermen's societies, which pre-empt the resources in favour of the rich and the powerful.

Strategic intervention for the development of aqua culture to meet the demand and generate surpluses for the fishermen would include the following measures:

- Renovation and deepening of ponds;
- Determining and adhering to proper stocking rate and scientific fish production;
- Timely supply of quality fish seeds;
- Construction of fish seeds hatcheries, including at least one in each district, in public-private mode;
- Credit availability and technical support for scientific storage;
- Insurance of fish production;
- Organization of genuine cooperatives of farmers;
- Training of farmers in scientific fishery; and
- Encouragement to paddy-fish combination in areas practising flooded paddy.

Box 6.1: Prospects for Technical Skills and Fisheries in Bihar

Mr. Bipin Kumar, a fish farmer in Madhuban village in Bihar, suffered heavy losses when he started on his own. A well-wisher directed him to the Deputy Director of Fisheries, Darbhanga, to seek technical help. He was put under the guidance of an Extension Officer. Under this technical guidance, his income from fisheries increased from Rs. 4 lakh in 2005 to Rs. 15 lakh in 2009. Now, with three breeding tanks, three hatching tanks, ten cemented cisterns for nursing the spawn, and a sale counter, his fish farm capacity has reached nearly 15 million fries. Fish seeds have a good demand in Bihar. Buyers from the Muzaffarpur, Samastipur, Rusora, Chapra, Siwan, Begusarai, Vaisati (North Bihar) areas come to Darbhanga to buy the seeds.

Source: Based on a report in The Hindu, 5 February 2009.

6.3 POULTRY

Poultry farming is not an important enterprise in Bihar but the poultry population more than doubled from 58 lakh to 140 lakh during the period 1982 to 2003. Bihar's share in the total poultry population in the country also increased from 2.79 per cent to 3.26 per cent during the period.

Poultry has a high and expanding market. At present, poultry farming is pursued in small units in the unorganized sector. This is simultaneously a disadvantage as much as an advantage. The disadvantage is in terms of the dependence on local varieties and low yield. The composition of the poultry population is changing, with the number of fowls increasing and number of ducks going down. Besides the low poultry population, the negligible population of improved layers and low per poultry egg production are the main reasons for low egg production in Bihar. There is almost a complete absence of organized poultry production and the majority of poultry production is practised as a backyard production, particularly by households of the weaker sections. The advantage of the small scale is its contribution to the poorer households' income, which could increase considerably if proper varieties, care and marketing networks are provided. Presently, small-holders neither own improved breeds nor practise scientific methods for poultry production. There is thus a great deal of scope to expand the poultry keeping in small poultry farms (with a minimum of twenty birds) in the household sector, and larger flocks in the organized sector. The strategy to develop this sector may include:

- Undertaking special efforts to introduce superior breed of the birds;
- Organizing adequate feed production capacity in the state;
- Encouraging poultry-keeping households to organize themselves into groups;
- Organizing poultry-keepers' marketing co-operatives;
- Establishing links between small poultry keepers and organized poultry marketing firms both in the state and outside the state.

These measures are necessary to sustain past trends in the increase in poultry and to maintain a growth rate of over 7 per cent for the next ten years or so.

6.4 PIGGERY

Piggery is not a significant subsidiary occupation of Bihar's farmers. Generally, landless labourers and some marginalized poor households in the urban areas are engaged in piggery. The units are small, and faced with exploitative marketing arrangements. There is hardly any support from the state institutions. The market for pig meat is limited, though its byproducts have some demand. It is envisaged that wherever piggery is pursued by the households, they will be provided with a minimum viable number of piglets (8 to 10) to make their holdings viable, and support services in veterinary care and marketing.

Thus, Bihar has tremendous scope for the development of allied enterprises in agriculture, particularly in dairy and fisheries, which could substantially enhance the incomes of the rural poor. The critical elements in these areas are technical support and extension services, which need to be strengthened. The required steps delineated above are not very resource-intensive but need to be implemented in mission mode.

CHAPTER VII

INSTITUTIONAL SUPPORT TO AGRICULTURE

The fact that growth in small farm agriculture critically depends on the performance of the supportive institutions has been repeatedly emphasized in this report. In this section, reforms in the institutions responsible for agricultural research, extension, credit and marketing are suggested, in order to enable them to perform their expected roles and contribute to the growth of the income and welfare of the farming community.

7.1 AGRICULTURAL RESEARCH

Future growth in agriculture will be largely based on the development of improved technologies and their widespread dissemination among the producers. Agricultural research and transfer of technology has to be a prime growth provider for ensuring sustainable growth in the future. In this respect, Bihar's record is not very satisfactory. Even the developed technologies have not been widely adopted by the farmers. This is clearly proved by the yield gaps in different crops in Bihar discussed earlier.

In the state, public institutions more or less exclusively shoulder the responsibility for agricultural research. The investment in agricultural research and education in the state is a paltry 0.2 per cent of the state agricultural GDP (as against 0.5 per cent at the national level). While the paucity of resources is one handicap, the use of these resources, and the direction and thrust of the research activities are equally to be blamed. About 95 per cent of the expenditure on agricultural research and education is incurred on salaries, while the bulk of the remaining amount is earmarked for establishment expenses, leaving hardly any funds for operational expenses. The insufficient research and extension are attributed to both the dearth of manpower and lack of professionalism and accountability among the existing manpower. There are about 300 technical persons employed in the agricultural department and more than 50 per cent of the positions are lying vacant. A similar situation is prevailing in the animal husbandry and fisheries department. There is a need to assess the quality of the personnel in the government departments of agriculture, animal husbandry, and fisheries and co-operatives, and above all, on their priorities for agricultural development work.

Agricultural research and training in the state is spearheaded by the Rajendra Agricultural University (RAU). This University was once considered a premier institution of its kind in the country, with a strong human resource base developed over the decade of the 1970s. But it became largely dysfunctional by the mid-1990s. At present, a large number of posts of scientists in the University are lying vacant. The same is true of the state Agricultural Department and the state Animal Husbandry Department. An army of officers, clerks and 'class IV personnel' is no substitute for well-qualified and well-trained scientists. Apart from the erosion of manpower, these institutions also suffer from dilapidated infrastructure.

The present state of the content and approach of agricultural research in the state leaves much to be desired. The major shortcomings in this area are delineated below.

- Little attention has been paid to evolve hardy varieties that can face floods and droughts, which are regular occurrences in Bihar.
- Very little work has been done on the poor man's crops—the so-called minor cereals, or pulses.
- The sub-sectors of agriculture, namely horticulture, floriculture, sericulture, animal husbandry and fisheries are largely neglected. Very little attention has been paid towards economizing costlier/scarcely factors such as water resources.
- The management of natural resources is neglected in the prioritizing of research activities.
- Little attention has been paid to the demand, domestic as well as international, and there is hardly any linkage with farmers in setting the research priorities.

The organization and content of research should be suitably modified to address these concerns. Public spending on Research and Development (R&D) activities, which at present is abysmally low at 0.2 per cent of the agricultural GDP, needs to be raised to at least 0.5 per cent—the average for the country—in the first phase, and to 1 per cent in the second phase.

Bihar is also covered by a number of national agricultural research networks with the Indian Council of Agricultural Research (ICAR) as the apex organization. There is, however, very little synergy between the Agricultural University and the ICAR/research centres/stations located in the state. Besides, the ICAR supports State Agricultural Universities in a major way. Bihar has not been able to take full advantage of the various schemes offered by ICAR. This situation should be changed. The following steps should be taken for strengthening agricultural research in Bihar:

- Major attention should be paid to strengthening scientific manpower. As a supplementary measure, a flexible system of hiring scientific personnel on a contract basis or as guest faculty should be introduced.
- The state should provide reasonable support to RAU to enable it to take advantage of Central support.
- RAU as well as agriculture-related departments should develop expertise in project preparation, and should keep a shelf of projects ready for outside funding.
- RAU should prepare a roadmap for the next decade and select two or three niche areas wherein it should aspire to excel at the country level.

The role of the state government in strengthening RAU is discussed in a later section.

7.2 EXTENSION

As in several other parts of the country, the weakest link in agriculture is extension. This is evident from the fact that a nation-wide survey of farmers conducted by the NSSO in 2003 reported that only about 5.7 per cent of the farmers, and a dismal 0.4 per cent of them in Bihar, received information on modern technology from extension agents. This is the lowest percentage among the major Indian states. The main sources of information on technology are the input suppliers and progressive farmers (see Tables 7.1 and 7.2).

Table 7.1 Access to Extension Service Workers as a Source of Information on Modern Technology for Farming by Size of Holdings (% of Farmers hhs), 2003

	Bihar	India
Marginal	0.4	4.1
Small	0.6	8.1
Medium and large	0.3	10.1
Total	0.4	5.7

Source: NSSO (2005).

Table 7.2: Sources of Information on Seeds and Technology Provision (Bihar)

(% households)

Category	Agri. Univ./Extension Department	Private Companies	Seed Vendors	Other Farmers	Any Other	Total
Source of information						
Marginal	0.3	1.9	34.8	60.4	2.7	100.0
Small	0.4	1.7	40.9	53.6	3.4	100.0
Medium	0.0	0.6	41.1	54.4	3.8	100.0
Large	0.0	5.4	52.7	39.3	2.7	100.0
Total	0.2	2.0	39.9	54.8	3.1	100.0
Source of technology provision						
Marginal	0.6	1.4	36.5	56.0	5.5	100.0
Small	0.0	2.3	43.8	49.8	4.1	100.0
Medium	0.0	0.7	55.6	38.4	5.3	100.0
Large	1.0	2.9	58.8	33.3	3.9	100.0
Total	0.4	1.7	44.8	48.3	4.9	100.0

Source: Institute for Human Development, 2007.

There are three main public players for the dissemination of agricultural technology in Bihar. These institutions include the *Krishi Vigyan Kendras* (KVKs), government departments and the Agricultural Technology Management Agency (ATMA). In Bihar, KVKs have already been established in all the 38 districts—30 by RAU, one each by the ICAR and Sone Command Development Authority, and six by different NGOs.

The KVKs of RAU are under-staffed. Despite 100 per cent financial support by the ICAR, the University has failed to fill even 50 per cent of the technical positions in KVKs. Funds for creating infrastructure like buildings, farmers' hostels and laboratories are not being utilized by the University, which has adversely affected the functioning of KVKs, particularly in organizing training and disseminating modern agricultural technologies in Bihar. As mentioned earlier, there is a shortage of technically trained personnel in the government departments. The existing officials are engaged either in non-technical work or in the implementation of various programmes. The following measures should be taken to improve the performance of KVKs and Government departments:

- Appointment of technical and non-technical personnel on a priority basis for a fixed and reasonable time period;
- Creation of infrastructure in KVKs and block offices;
- Conduction of refresher courses for the existing personnel; and
- Proper planning and regular monitoring of their activities by a high level committee.

The extension system, which was largely dysfunctional, may get a lease of life with the introduction of the Agricultural Technology Management Agency (ATMA), with its emphasis on decentralized decision-making, involvement of the stakeholders, and integration of all related departments while keeping in view specific features of the selected districts. The World Bank, which had introduced this model all over the country, got it evaluated through the Indian Institute of Management, Lucknow (IIML). The IIML study concluded that:

- ATMA mobilized farming communities and developed public-private partnerships.
- ATMA have improved interaction among farmers, extension workers, and researchers.
- ATMA have promoted the diversification of farming systems and adoption of new technologies.
- Productivity and farm incomes have increased in the areas covered by ATMA.
- ATMA have facilitated the development of supply chains in a number of commodities.

These findings have been corroborated by another in-depth study of the ATMA in Patna district. The Government of Bihar has established ATMA in all the 38 districts. However, the studies referred to above have also pointed out certain weaknesses in the performance of this model in the state. All the ATMA do not have the desired number of offices/staff, including the Project Director and Deputy Project Director, which has adversely affected their performance. Accordingly, the following measures should be taken to improve the performance of ATMA:

- State level institutions should play a pro-active role in capacity building, training and mentoring support. Full-time staff representing relevant disciplines should be deputed for a fixed and reasonable time period.
- All technical and non-technical posts should be filled on a priority basis.
- Adequate funding for infrastructure maintenance, supplies, training and capacity building should be ensured.
- Project Directors should be given adequate autonomy.
- Higher authorities should ensure the convergence of different departmental programmes at the district and block levels.
- With support from the Government of India and apex training institutions, measurable impact indicators should be developed, concurrent monitoring by independent agencies should be organized, and mechanisms should be developed to address the identified weaknesses.

There is a lack of co-ordination among different extension agencies, that is, the KVKs, ATMAAs and government departments. Co-ordination committees should be constituted at the state and district levels for the regular monitoring, evaluation and overall co-ordination of these three institutions. Further, ATMAAs in each district are headed by the District Magistrate (DM) to ensure better co-ordination. However, the DM has to spend considerable time in general administration and governance; the issues related with ATMAAs generally take a backseat in his priorities. This arrangement, therefore, needs to be reworked.

7.3 CREDIT

Institutional credit is a pre-requisite for increasing agricultural production and its value addition, particularly in Bihar, because more than 90 per cent of the farm households belong to marginal and small categories (owning <2 ha of land), whose income is not even sufficient to meet their consumption requirements. But the institutional agricultural credit flow has been inadequate and farmers depend more on non-institutional sources for meeting their credit requirements. Marginal and small farmers, who have no collateral to offer for mortgage, and tenant farmers who have no title to land, and are incapable of following the required procedural formalities to access formal sources, prefer to approach the easily accessible non-institutional sources such as moneylenders and traders, who charge high interest rate (50 to 120 per cent/per annum).

The 59th Round of the NSS Survey has shown that only 33 per cent of the rural households have access to credit in Bihar, as against a national average of 48.6 per cent. Only 23 per cent of the borrowing households obtained loans from institutional agencies in the state, and the share of institutional credit in total borrowings by the farmers was only 24 per cent.

The credit-deposit ratio of commercial banks in Bihar in 2005-06 was 30 per cent as compared to 42 per cent in Uttar Pradesh, 65 per cent in Orissa, 102 per cent in Maharashtra, and 106 per cent in Tamil Nadu. A low credit-deposit ratio provides more reasons for the commercial banks to disperse larger credit in Bihar. However, both the farmer-borrowers and the lenders in the organized sector face some genuine difficulties. On the lenders' side, the major difficulty is the high transaction cost, as the demand for credit is for small amounts and that too intermittently. The situation is exacerbated because of low banking density (with one branch catering to 13 villages) and understaffed rural branches of the commercial banks. The cooperatives, which have a larger

presence than banks, are in bad shape, though attempts are being made to revive them. Table 7.3 gives details of the institutional credit structure and agricultural credit flow in Bihar.

**Table 7.3: Institutional Credit Network and Agricultural Credit Flow in Bihar
(as on 31 March 31 2006)**

Agency	No. of Banks	No. of Branches	Rural Branches	Total Deposits (Rs. Lakhs)	Total Advances (Rs. Lakhs)	CD Ratio (%)	Recovery position (%)
CBs	30	2059	1228	39177	11988	30.60	46.53
RRBs	5	1475	1276	6182	2225	35.98	69.40
Co-op Banks	22	279	NA	775	595	76.70	34.60
Total	59	3987	2504	46134	14808	32.10	47.24

Note: CB—Commercial Banks; RRBs—Regional Rural Banks; Co-op Banks—Cooperative Banks.
Source: NABARD (2008).

7.3.1 Kisan Credit Card

The Kisan Credit Card (KCC) has emerged as an important means of increasing short-term agricultural credit in Bihar. Bihar lags far behind the national average and that of most of the states in the country. Only 18 lakh KCCs were issued in Bihar up to 2006 whereas the number was about 96 lakh and 56 lakh, in Andhra Pradesh and Maharashtra, respectively (see Table 7.4).

**Table 7.4: Number of KCCs Issued up to 31 August 2006
(No. in lakh)**

State	Cooperative Banks	RRBs	Commercial Banks	Total
Bihar	7.75	2.89	7.40	18.05
Andhra Pradesh	35.92	12.49	47.90	96.32
Maharashtra	41.05	1.93	13.32	56.29
Rajasthan	27.24	2.93	8.75	38.92
All India	313.43	75.34	218.03	606.81

Source: Agricultural Statistics at a Glance, Government of India, 2006.

The number of KCCs increased from 14.5 lakh in 2005-06 to 20.5 lakh in 2007. The Government of Bihar launched a mega camp for providing KCCs to farmers in all the 534 blocks from December 2008 onwards, and such camps are slated to be organized in the future also. However, even if the target of

distribution of KCCs is achieved, only about 35 per cent of the farm households would get KCCs in Bihar, which would still be lower than the national average of 70 per cent and much lower than the corresponding figures of Andhra Pradesh and Kerala (90 per cent).

The main reasons for the tardy progress in KCC distribution in Bihar are outdated land records, slow progress in the mutation of land ownership, large-scale prevalence of unrecorded tenancy, and an unfavourable mindset of bankers and government officials working in rural areas.

The other difficulty faced by the banks is the perceived high risk. Although the norm of collateral free lending for small loans is propounded at every level, in practice, the rural branch manager is always afraid of defaults in repayment. The earlier experience of lending to the poorer sections under the Integrated Rural Development Programme (IRDP) and other government-sponsored schemes with very poor recovery has strengthened this perception. The recent move by the Government of loan waivers has further discouraged the bankers from aggressively pursuing rural lending. Besides, the poor quality of lending is also responsible for low repayment of loan in Bihar.

On the borrowers' side, the most important reason for them to shun the organized sector is the procedural complexity. The transaction cost of borrowing from the banks is high because the borrowers have to incur an indirect cost in transport, loss of working days and unauthorized expenses for obtaining loans. An even more discouraging factor for the borrowers, especially the tenant farmers, is the unsuitability of the current nature of loan instruments. The small borrower requires loans for consumption purposes as much as for production purposes. The short-term loan should be designed to meet this requirement. Further, the policy decisions taken at the higher level are often not implemented easily at the lower level. In this context, implementation of the recommendations of the Khan committee set up by the RBI and the recommendations of the National Commission for Enterprises in the Unorganized Sector (NCEUS) need to be vigorously pursued by the state government.

7.3.2 Micro Finance

Self-help Groups (SHGs), Joint Liability Groups and Farmers' Clubs facilitate the disbursement of trouble-free loans to the weaker sections of society. These

organizations are gaining ground in other parts of the country. Andhra Pradesh accounts for about 50 per cent of the SHGs organized in the country but Bihar's share is less than 2 per cent. In 2007-08, about 5.5 lakh SHGs were organized in India but only 21,000 SHGs were organized in Bihar. During the year, loans worth Rs. 4.2 thousand crore were sanctioned through SHGs in the country, but Bihar lagged much behind and sanctioned loans worth only Rs. 104 crore through SHGs, accounting for only 2.5 per cent of the credit sanctioned through SHGs in the country. There has also been slow progress in linking SHGs to banks in Bihar.

The impact of Joint Liability Groups and Farmers' Clubs has yet to be felt in Bihar. These organizations should be promoted for the benefit of tenants and small-marginal farmers, who constitute substantial proportions of the peasantry in Bihar. These organizations of farmers are likely to mitigate some of the apprehensions of the lenders, and meet the requirements of institutional borrowing to a large extent. In Bihar, the credit transactions of SHGs are still mainly for consumption purposes. There are major difficulties for SHGs and other micro-credit institutions in graduating from obtaining consumption credit to credit for livelihood activity investments.

In order to make credit a powerful aid for agricultural development, the following goals need to be reached:

- Credit disbursal for agriculture has to increase at the rate of 30 per cent per year for the next ten years. This target was already surpassed in the country as a whole during the last three years.
- Inclusive banking targets given by the RBI have to be fulfilled in all the districts of the state by the next five years. The leading banks have to play a major role in reaching this goal.
- The revised form of the KCCs, providing for both production and consumption loans, should be made available to all eligible farmers.
- At least half the cultivators should be members of reformed cooperatives or bank-linked SHGs.

In order to reach these objectives, important changes need to be introduced in the functioning of CBs and RRBs. They will also need to adopt a 'credit plus' approach, which will entail the following measures:

- Adoption of a holistic view of the credit requirements of the poor households, that is, credit needs for consumption as well as for production and

investment;

- Institution of monthly mega KCC camps for the next five years;
- Encouragement to the formation of SHGs and their linkage with banks;
- Establishment of a rapport with the civil society institutions in the area;
- Establishment of a relationship with the knowledge centres in the area;
- Ensuring strong ground level presence;
- Decentralization and provision of greater autonomy to the regional offices and local branches;
- Reviewing the personnel policy in the light of the commitment to 'inclusive banking'; and
- Ensuring commitment, involvement and accountability at the top level.

The state government should press for these in the State Level Bankers' Committee (SLBC). There is evidence on the ground that with proper organization and support, SHGs can do well in Bihar and can contribute to not only credit needs but also the empowerment of women (Tiwari, 2009).

7.3.3 Co-operatives

Co-operatives are still considered as the most suitable organizations for providing credit to farmers. The states with strong co-operative institutions are still excelling in providing agricultural credit to farmers. In Bihar, co-operatives provided 50 per cent of total agricultural credit in the early 1980s, which declined to only 10 per cent in 2007. There are two apex co-operative organizations in Bihar: the Bihar State Land Development Bank and the Bihar State Co-operative Bank. The former organization disburses medium- and long-term loans but has been almost defunct for the last 14 years due to poor repayment of loans and huge losses. The Bihar State Co-operative Bank is an apex organization of a three-tier co-operative organization. It has been making continuous losses and is carrying a large amount of Non-productive Assets (NPAs). There are 25 District Central Co-operative Banks (DCCB) but these DCCBs are defunct. Presently, only 22 DCCBs are functional; a majority of them have accumulated huge losses and are, therefore, denied fresh loans from NABARD and the Bihar State Co-operative Bank.

Primary Agricultural Co-operative Societies (PACs) are organized at the *panchayat*/village level, and are federated to the respective DCCBs. There are about 6,000 PACs with 38.62 lakh farmer members, but only 1836 PACs were viable in

2007. Hence, a majority of them are not in a position to provide credit to farmers in Bihar.

The government of Bihar has taken several initiatives to revitalize the co-operative institutions, which include a membership drive, organization of new PACs, and the establishment of an organization for elections in co-operative institutions. The government has already implemented the recommendations of the Vaidyanathan Committee for revival of co-operatives in the state. However, the process of implementation has been slow during 2008-09, and needs to be accelerated for the early revival of co-operatives in Bihar.

Serious efforts have to be made to strengthen the co-operative credit structure. The following measures have been recommended:

- The primary focus should be on rejuvenating village level societies, by expanding their area of operation and/or including new, profitable, activities.
- Only genuine users of the co-operative services should be allowed to be the members of the co-operatives.
- Viable societies may be permitted to appoint their own secretaries.
- Elections to the Board of the societies should be held regularly.
- Farmers should be free to become members of the traditional societies or form new generation co-operatives or producers' companies for specific commodities.
- Primary societies should be free to affiliate with any District Cooperative Bank (DCB) or a commercial bank for their financial transactions.
- One-time subvention may be given to the potentially viable societies by the state.
- The societies should be encouraged to build their own capital base with members' contributions.
- A massive training and orientation programme should be organized not only for the members and functionaries of the co-operatives, but also for the personnel of co-operative department at all levels.

As far as DCBs and the Apex Cooperative Banks are concerned, NABARD may be requested to mount a revitalization programme on the lines undertaken by it for RRBs.

7.4 MARKETING

In Bihar, there are two main reasons for the low income of the farmers. These are: (a) low productivity, and (b) low prices for their produce. The problem of low productivity has been addressed in the earlier section. The Steering Group considers improvement in marketing as equally important for realizing fair prices for agricultural produce. The

experience of agricultural development in Bihar has shown that the existing system of marketing of agricultural output has not been adequate and efficient in reaching the benefits of technology to all sections of farmers. Farmers are not able to sell their surplus produce remuneratively and there are widespread distress sales, particularly by marginal and small farm households.

There are some structural weaknesses of agricultural markets like unorganized small producers pitted against organized buyers, weak holding capacity of the small producers, and the perishable nature of the produce in the absence of any storage infrastructure in Bihar. The current agricultural marketing system in Bihar is the outcome of several years of government interventions. The system has undergone several changes during the last five decades owing to the increased marketed surplus, increase in urbanization and income levels, and the consequent change in the pattern of demand for marketing services, and increase in linkages with distant markets.

An important characteristic of agricultural produce markets in Bihar has been the dominance of private trade. In Bihar, the small size of land holdings and low quantity of surplus agricultural produce are the main constraints to the realization of remunerative prices. More than 90 per cent of the farmers sell their produce in villages, particularly to itinerant traders, at much lower prices than the procurement price of the respective agricultural commodities. In 2007-08, paddy was sold at less than Rs. 700 per quintal and a majority of the farmers failed to get the procurement price for paddy in 2008-09 also.

The number of procurement centres is much fewer than the requirement and a majority of them do not operate regularly. Bihar is not taking full advantage of this scheme mainly due to the small quantity of surplus produced on marginal and small farms, which cannot afford to transport their produce to the procurement centres.

In addition, there are other factors such as density of markets, road connectivity, number of godowns and cold storage facilities (see Table 7.5) that increase market imperfections and inefficiencies.

Table 7.5: Characteristics of Agricultural Marketing System in Bihar and India

Market Infrastructure	Bihar	India
Density of markets per million hectare of sown area	7	-
Villages connected to roads (%)	48	57
Surfaced roads as percentage of total road mileage	44%	-
Number of rural godowns	160	9483
Capacity of the godowns (MT)	17,000	14.2
Capacity of FCI, Central and State Warehousing Corporations' Godowns (MT)	1.35	71.6
Total number of cold storages	238	4748
Capacity (lakh tonnes)	9.1	195.52

Source: NABARD (2008).

Keeping in view the scale and the objectives of agricultural growth envisaged in the coming years, the problems inherent in the systems and structures of agricultural marketing have to be addressed on a priority basis. In order to ensure efficient marketing, the following steps need to be taken:

- ❖ **Encouragement to the organization of genuine co-operative marketing societies:** Except for the dairy sector, there are no genuine co-operative marketing societies. Various models of the traditional as well 'new style' co-operatives need to be encouraged, and be allowed to function without bureaucratic interference and with professional management.
- ❖ **Encouragement to contract farming:** Vertical integration with large marketing and agro-processing firms should be encouraged. Care has to be taken to keep all such contacts transparent and fair. Dispute settlement arrangements should be in place at the local level.
- ❖ **Strengthening marketing infrastructure:** The number of marketplaces should be increased to bring it close to the all-India level. Facilities at the designated marketplaces should be upgraded and made more attractive. A massive programme of construction of rural godowns and cold storages should be undertaken. Private sector participation in these investments should be encouraged either independently or as part of supply chains. Arrangements

should be made with the credit institutions to ensure that they honour warehouse receipts and pledges.

- ❖ **Comprehensive and timely information on agricultural prices:** The producers should be provided relevant and accurate information on prices and market arrivals, by establishing IT-enabled village information kiosks all over the state. Forward markets need to be made operative with the overall guidance of the Forward Market Commission.
- ❖ **Removal of policy hurdles:** Legislation and government orders impinging on agricultural marketing should be constantly reviewed and amended to meet exigencies. The Bihar government has taken a major step by repealing the Agricultural Produce Marketing Committee (APMC) Act, but the impact of such a repeal of the growth of organized markets and infrastructure should be assessed.
- ❖ **Encouragement to adherence to standards and grades:** In order to make this possible, an awareness campaign should be launched, and facilities should be created for examining standards and sorting out products according to well-established grades.

7.5 CROP INSURANCE

In a state such as Bihar where there is wide volatility in crop output due to natural disasters, crop insurance should be given due priority. Unfortunately, this is a very neglected aspect in the state. The nature of agricultural risk, status of crop insurance, and measures to improve performance are discussed separately in the next chapter.

CHAPTER VIII

RISK MANAGEMENT IN AGRICULTURE

As in other parts of the country, agriculture in Bihar is subject to a variety of risks arising from rainfall aberrations, temperature fluctuations, hailstorms, cyclones, floods, and climate change. Natural calamities, especially floods and droughts, frequently cripple the state. These risks are exacerbated by price fluctuations, a weak rural infrastructure, imperfect markets and the lack of financial services including limitations in the design of risk mitigation instruments such as credit and insurance. These factors not only endanger the farmers' livelihoods and incomes, but also undermine the viability of the agricultural sector's emergence as a solution to the problem of endemic poverty of farmers and agricultural labour.

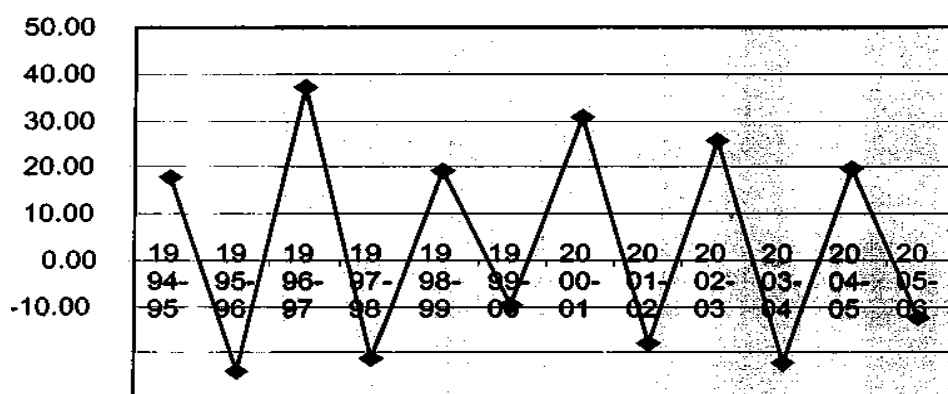
The management of risk in agriculture is one of the major concerns for the future development of agriculture. Instability in farm output could be considered as the primary cause for the low level of farm level investments and agrarian distress. Both, in turn, have implications for output growth. Systemic risks such as droughts and floods need to be addressed through special measures, as discussed earlier. The output risks and the price risks, which should, and in some measure can, be mitigated by policy and institutional mechanisms, will be discussed here. In order to develop mechanisms and strategies to mitigate risk in agriculture, it is imperative to understand the sources and magnitude of fluctuations involved in agricultural output.

8.1 RISKS AND FLUCTUATIONS IN BIHAR'S AGRICULTURE

Agricultural output in Bihar is subject to extreme fluctuations. The experience of the last ten years shows that an increase in the real NSDP of agriculture in a year is regularly followed by a decline in NSDP the next year (see Figure 8.1). Further, the magnitude of fluctuation is quite high; it ranged between (+) 37.2 per cent to (-) 24.15 per cent during the period 1993-94 to 2003-04. The lowest decline observed in agricultural income was close to 10 per cent. With this magnitude of fluctuations in farm incomes, it becomes very risky to make investments in farm production, and farmers are forced to follow a conservative approach.

Figure 8.1: Instability at the Crop Level

*Deviation in Growth Rate of Agriculture in Bihar at 1993-94 prices



Source: Computed by Ramesh Chand for the Steering Group

The time series annual data for the period 1980-81 to 2003-04 for six major crops, viz. rice, wheat, groundnut, rapeseed and mustard, and sugarcane has been used to estimate instability in the crop area, production and yield for the following two periods: Period 1—1981-82 to 1992-93 and Period II—1992-93 to 2003-04. The risk associated with various crops was estimated by using an instability index as an indicator of risk. The risk revealed by the instability index of output, area and productivity of selected crops is presented in Table 8.1.

Table 8.1: Instability in Area, Production and Yield of Selected Crops in Bihar

State	Period	Area	Yield	Production	% Irrigated Area
Rice	1981-93	7.5	20.3	26.3	35.3
	1993-2004	10.2	15.9	21.6	44.0
Wheat	1981-93	6.2	4.9	8.5	80.6
	1993-2004	2.1	8.8	9.8	89.4
Rapeseed/mustard	1981-93	9	29	27.8	2.2
	1993-2004	4.3	17.8	18.7	5.1
Sugarcane	1981-93	8.7	13.2	17.3	0.6
	1993-2004	9.4	11.5	18.2	5.1

Source: Directorate of Statistics, Government of Bihar.

The area under rice cultivation showed an average deviation of 7.5 per cent from the trend during the period 1981-1993, which further increased to 10.2 per cent during the period 1993-2004. However, rice yield and production showed a decline in instability over time. The opposite results were observed in the case of wheat. The rapid extension of irrigation to rapeseed and mustard helped in reducing instability in the area, yield and production of these crops. There was not much change in the production risk for sugarcane. Its production showed an around 18 per cent deviation from the trend.

Despite the progress of irrigation and improvement in infrastructure and communication, the risk in agriculture production has increased over a period of time. It was noted that the fluctuation in area was not as pronounced as the fluctuation in yields, and the fluctuation in farm output is the main contributory factor to the fluctuation in agricultural incomes. It seems that technology has not helped in reducing the production risk appreciably. As such, there is an urgent need to devise and extend suitable insurance products to neutralize, to the maximum extent possible, the consequences of instability in agricultural production.

Despite various schemes launched from time to time, agricultural insurance has helped only to a limited extent. The coverage in terms of area, the number of farmers and value of agricultural output is very small, the payment of indemnity based on an area approach leaves out the affected farmers outside the compensated area, and most of the schemes are subsidy-driven. This calls for renewed efforts by the government and insurance authorities, the latter for designing appropriate mechanisms and the former for providing financial support. Private sector insurers also need help for increasing insurance coverage and improving the viability of the insurance schemes over time. Insurance products for the rural areas should be simple in design and presentation so that they are easily understood. Newly launched weather-related insurance schemes can meet these requirements, provided there are an adequate number of weather stations, and at least a broad correlation is established between the major components of weather and agricultural output in different agro-climatic zones. It will take some time to popularize more sophisticated instruments such as rainfall derivatives.

8.2 CROP INSURANCE IN BIHAR

Since the implementation of the National Agricultural Insurance Scheme (NAIS) in 1999-2000, only about 27,00,000 farmers (2.4 per cent of all the farmers covered in India) have been covered with about 32,00,000 hectares (2.7 per cent of the area insured in the country) of the crop land being insured. Crop insurance is necessary in the event of regular floods in Bihar and droughts in certain districts. Marginal and small farmers benefit significantly in terms of the subsidy involved in payment of premium and also claims paid in lieu of crop failure.

The ongoing crop insurance scheme operated by the Agricultural Insurance Corporation can be suitably strengthened to serve its objective. The following measures would help in this regard:

- Crop insurance may be kept distinct from the insurance of other assets, as the requirements and protocol for insuring other assets (for example, animals) are different. For the latter, other suitable schemes may be introduced.
- Taking into account the principle that 'risk spread is risk minimized', the compulsory character of crop insurance for all borrowers from banks may be retained. Further, for certain crops such as food crops, insurance may be made compulsory for non-borrowers as well. With the successful implementation of a policy of inclusive banking, the number of non-borrowers will, hopefully, shrink.
- Progressively, more and more crops may be brought into the orbit of crop insurance. However, extension of the coverage must be done carefully after collecting long-term yield data and working out the central tendency from relevant data.
- Special instruments should be designed to insure horticultural crops.
- The long-term objective should be to determine the premium on an actuarial basis, and a beginning can be made by raising the premium for high-value commercial crops. For the next ten years, a subsidy on premium may be continued for the marginal farmers on all the crops insured by them.
- The threshold yield for calculating indemnity should be arrived at more carefully, that is, arriving at the central tendency in yields on the basis of long-term data and taking into account the probability distribution.
- Delays in yield determination and indemnity payment should be eliminated. Efforts should be made to obtain yield data at the village *panchayat* level, by suitably increasing the number of crop-cutting experiments. The data should be brought into the public domain as soon as possible.

- The state government should play a more proactive role in the affairs of the National Agricultural Insurance Corporation (NAIC) by asserting its right as an important provider of subsidies on the premium. A state level coordination committee may be set up comprising representatives of the state, NAIC, the banking sector and farmers.

8.2.1 Coping with Price Instability

The integration of local markets with regional, national and global markets is one of the alternatives for softening price fluctuations. Some studies based on advanced time series tools demonstrate that the major markets in Bihar are, by and large, integrated with the major markets in other parts of the country. These studies estimate integration on the basis of wholesale prices. This is sometimes wrongly used to infer that farm harvest prices are also integrated across the country, which is not correct. This is evident from the fact that farm harvest prices of maize and paddy in the major markets in Bihar were found to be lower than the MSP, which was the ruling price in several other markets.

The price for farm products for producers is determined in the primary market wherein the produce shifts from the hands of the farmer to commercial entities like traders, wholesalers, millers, etc. These markets satisfy some important conditions of competitive markets, particularly on the seller's side. There are a large number of sellers and buyers. Farm product is produced/supplied by innumerable small producers who do not have control over the aggregate supply and market. This is generally not true on the buyer's side. Even if there are a large number of buyers, competitive markets for farm produce may not exist. This can happen if single buyer or a group of buyers exercise market power, or if there is some sort of collusion among the buyers.

Because of all these various factors, the markets for the sale of farm produce are not perfectly competitive. Efforts should be made to improve the situation by reducing the concentration of traders and developing countervailing market power. This is especially true for Bihar, wherein most of the agricultural products are sold through intermediaries in the absence of well-furnished regulated markets in many other states. The state should respond to this need by introducing effective market regulations, by encouraging alternative marketing opportunities through co-operative marketing agencies and public agencies, and by providing a conducive environment for the setting up of contract farming.

There are two other instruments for reducing uncertainty in agriculture produce and for providing a measure of stability. These are detailed below.

1. The first instrument is the MSP at which the government procures all the produce offered for sale. As mentioned earlier, Bihar is not taking full advantage of this scheme primarily because the produce, mainly foodgrains, of individual farmers is meagre in quantity. This is in sharp contrast to the agriculturally more advanced states like Punjab. However, there have been significant improvements, particularly in rice procurement, in recent years, thanks to the efforts by the state government. However, a lot still needs to be done. This aspect was discussed in the previous section and various measures were suggested to improve the situation.
2. The second instrument that may be used to 'discover' prices in advance and form a strategy to cope with the likely developments is 'forward marketing'. Small and marginal farmers would find it difficult to operate on the forward markets on their own, as the requirements for successfully operating in these markets are quite stringent. However, efforts should be made to enable organized groups of farmers as well as the more viable farmers to get acquainted with and make use of the forward markets. Even if small and marginal farmers do not directly participate in the forward market, if the latter exists and other functionaries like traders participate effectively in it, its advantages will percolate down to the small farmers in terms of a stable price in the long run.

CHAPTER IX

ROLE OF THE GOVERNMENT

According to the Indian Constitution, agriculture is a state subject. However, over the years, the Central Government has started playing an important role in agricultural planning and development. Major policies, that is, those pertaining to prices, trade and credit, are decided by the Centre. There are a large number of Central and Centrally-sponsored schemes for agricultural development. But this does not minimize the role of the state government. The policies pursued and programmes sponsored by the state government can make a major difference to the income and well-being of the farmers. In small farm agriculture, as in Bihar, the role of the state is all the more important. For effectively addressing the issues of low productivity and low incomes, the state government has to play an important part in the following areas:

- Formulating relevant policies;
- Enhancing investment in agriculture;
- Strengthening supportive institutions;
- Ensuring the supply of the quality inputs;
- Partnering the private sector and civil society institutions; and
- Playing an advocacy role *vis à vis* the Central Government and other relevant agencies.

The following is an outline of the action plan that needs to be implemented in each of the areas identified above.

9.1 AGRICULTURAL POLICIES

There are a few areas wherein the government's policies need to be formulated anew or reviewed. The deterioration of land and water resources has been discussed. There will be mounting demand on these resources with an increase in urbanization and industrialization. Thus, both qualitative as well as quantitative aspects need to be examined in this context. The denunciation of a clear *Policy on Land and Water Use* is a necessity. If Bihar can formulate a policy on the development and management of natural resources of land and water, it can set an example for other states to follow, as all of them are facing similar problems in these areas.

There is a need to review the *Tenancy Policy*. Contrary to expectations, the present policy of discouraging tenancy has not contributed to the protection of small farmers. On the

contrary, it has only led to a large extent of concealed tenancy, rack-renting and lack of initiative to improve land productivity on the part of the tenants as well as the landlords. It has also discouraged farmers from migrating from agriculture to other professions, even for better opportunities. Tenancy legislation needs to be changed drastically. Legally permissible tenancy, with clear rights and obligations on the parts of both the contracting parties, registration of tenants, and a fair and expeditious dispute settlement procedure will go a long way in facilitating the productive and equitable management of scarce land resources. In order to ward off the possibility of tenancy reforms being used for defeating the provisions of the ceiling legislation, it may be postulated that the total operated area of any household should not exceed the ceiling limits.

A similar review is needed in the area of *Agricultural Marketing*. The state took a major step in dismantling APMC legislation. Under the provisions of this legislation, village sales were prohibited and regulated markets were established for the sale and purchase of agricultural produce. It was feared that in the village sales, the farmer was always a loser; since the practices were opaque, the producer had no knowledge of the prevailing prices and the farmer's bargaining power was limited. In reality, none of the handicaps could be removed. As the farmers did not perceive any benefit by incurring the additional cost of transport and other related transactional costs, the arrivals in the markets remained insubstantial. The APMC Act also came in the way of contract farming, which could enable the small producers to take advantage of better technology, input supply and assured market with a minimum of price uncertainty. In a bold measure, the state government has repealed the original Act, but the latter has not been substituted by any other farmer-friendly legislation. The Government of India has circulated a *Model Bill for Agricultural Marketing*, which, while giving freedom to producers to dispose their produce, also regulates the conduct of the traders. There is a need to adopt an institutional mechanism for agricultural marketing in Bihar as well.

There is need for a review of all legislation pertaining to input supply, land and water use, storage, marketing, and the movement of agricultural produce, and the inhibiting provisions need to be dropped. The state government has already initiated some reforms in this direction, such as the leasing policy for water bodies used for fisheries. A comprehensive review of such legislations should be undertaken and expeditious correction of anomalies should be initiated.

9.2 INVESTMENT IN AGRICULTURE

As mentioned above, public investment in agriculture as a ratio of the Agricultural GDP in Bihar is much lower than that in most of the states in the country. Agricultural

development will not come cheap. And it is only after public investment in critical areas is made that private investment will follow. In the present state of agricultural development and in the context of predominance of small holders, the trigger will be provided by government investment. A renewed programme is needed for improving social as well as physical infrastructure. The state should reach the average availability in the country in the areas of primary and secondary education, and health facilities in the rural areas. Road connectivity and power supply are the two other critical areas in which the state needs to make massive investment. Fortunately, there have been substantial improvements in road connectivity in recent years and continuous improvements are taking place in this regard, but the situation in terms of the power supply has not improved much. The lack of power is one of the most important factors hindering the agricultural development of the state. The extensive use of expensive diesel pumps has considerably raised the production cost of farmers in Bihar. For the next five years, if the state can attain the goals in these four sectors, the ground will be prepared for accelerated growth in agriculture and a substantial improvement in the quality of life of the rural people.

The other area for productive investment that needs attention is the strengthening of the land and water base. There has been serious deterioration in these resources over time. As the activities entailed in this purpose are largely labour-intensive, systematic efforts need to be made to dovetail NREGA activities with this objective. The capital part of the programme can be funded to a large extent by making a determined effort to achieve convergence of various on-going programmes. There is an urgent need to make suitable investment for flood management and control. This is a serious issue for tackling which the state will need to make a big investment that cannot be achieved without the support of the Central Government.

Another important area for investment is that of strengthening market infrastructure for agricultural produce. There is a woeful inadequacy of godowns and warehouses. Given that Bihar is a prominent producer of fruits and vegetables, the cold chain for perishable produce is grossly inadequate. A comprehensive plan for the development of the rural market should be prepared. The huge infrastructure inherited from the market committees should be gainfully utilized. The state government should facilitate investment in modern marketing. The support of NABARD's Rural Infrastructure Development Fund could be availed of for this purpose. Investment in this area is basically a commercial activity. The major initiatives should come from private business interests. The government can create an enabling environment for private entrepreneurs to take over from where the regulated

agriculture committees have left. This activity is eminently suited for public-private collaboration.

9.3 STRENGTHENING INSTITUTIONS

As mentioned earlier, in small farm agriculture such as that prevails in Bihar, the supportive institutions in the areas of research, extension, credit and marketing are of critical importance. Like other states in the country, Bihar has a network of such institutions, but they are dormant due to serious limitations. Inadequate financing and interference by politicians and bureaucrats are largely responsible for this state of the institutions. In the field of research, strengthening the RAU should receive the highest priority. Along with adequate and assured funding, a culture of academic autonomy should be encouraged. The University, in turn, should be advised to lay down definite norms of productivity with client orientation and set up a transparent monitoring system for mid-season corrections. It should contribute to the transfer of agricultural technology from research institutions to farmers' fields.

Parallel extension structures exist in the state. These structures have been inherited from the past, as the extension systems have evolved to meet specific requirements. The package programme was successfully implemented during the 1960s. Similarly, the 'training and visit' system of the 1970s contributed significantly to ensuring food security in the state. ATMAAs and KVKs are now contributing to the transfer of technology. Each of them has been co-existing along with the parent extension set-up of community development blocks. Despite the fact that these systems played a positive role when they were launched, they have now become irrelevant. Therefore, rationalization of the extension system needs to be made to facilitate realization of the objective of effectively reaching out to the farmers.

The ATMA model has shown good results. This approach should be extended to all the districts. The state government has distinct role to play in strengthening ATMAAs. The state should depute qualified and motivated officers in executive positions and give them sufficiently long tenures. The funds earmarked for ATMAAs should be released in time and in full. Elements of decentralized decision-making and participatory functioning of the projects in-built in this approach should be duly respected. The extension functionaries will need to be exclusively spared for agricultural work. Renewed focus on agricultural works has to be restored. Extension workers also need technical and managerial training. Independent institutions should periodically evaluate performance in the agricultural sector.

In the area of marketing, the abolition of the APMC has created a vacuum in the promotion and regulation of agricultural marketing. This void should be filled as soon as possible. The state government should set up institutions, which are more promotional than regulatory and which are farmer-centric. There is need for the development of marketing through the creation of a skeletal marketing structure, which caters to the orderly development of the market and allows a greater role for the private sector. Such a skeletal structure could be an Authority or a Society within the administrative control of agricultural development. In order to imbue Bihar's agriculture with the advantages of standardization and branding, the government should revitalize the Bihar office of the Indian Standards Bureau and supplement its efforts by starting state level institutions in different regions.

The other institutions which need to be revitalized are the co-operatives. Despite all their failings, co-operatives constitute the main source of credit for the small and marginal farmers. The Vaidyanathan Committee has suggested a package for rehabilitating credit co-operatives. The government has already accepted the terms of this committee but the implementation of its recommendations is slow. This needs to be accelerated to make co-operatives a vibrant entity. As in credit, co-operatives offer a better alternative for the marketing of agricultural produce. Bihar offers an example of a well-functioning marketing society in the dairy sector. With suitable adaptation, this model should be tried for other commodities and products too. It is equally important to discourage bogus societies, as for example, in the fisheries sector. The government should not insist on a particular form of co-operative society. People should be free to try out various forms of co-operative organizations as long as they are run by the producers and they uphold co-operative principles in their essence.

9.4 SUPPLY OF QUALITY INPUTS

In the prevailing situation in Bihar, the government cannot abdicate its responsibility of providing quality inputs to farmers. The state government should continue to provide key support to small and marginal farmers in this respect. It should give particular attention to the availability, prices and quality of the major inputs listed below.

9.4.1 Seeds

The role of quality seeds is critical and will continue to remain so. While the private sector may have a role to play in the production of hybrid seeds, mainly for commercial crops, there must be an effective regulatory system to ensure quality and accountability. The state government must ensure the supply of seeds of high-yielding varieties of crops for foodgrains, which are of crucial importance for food security. The requirement of a

minimum of a 30 per cent seed replacement rate for self-pollinated crops should be attained at the earliest and maintained throughout the decade. Public sector investment in seed production and processing also needs to be stepped up. Simultaneously, there is need for more direct action in the following areas of primary importance:

- Breeder seed production by RAU and its regional research stations;
- Foundation seed production on government farms; and
- Certified seed production by farmers.

The Bihar Rajya Beej Nigam (Bihar State Seed Corporation) needs to be strengthened to process and market seeds produced by the farmers. The state has to ensure that the suitable seed varieties are bred and that the seeds of standard quality are accessible to the farmers at the right time and at affordable prices. High standards of seed quality will have to be ensured through the effective enforcement of seed laws as also an elaborate arrangement for seed testing and certification. The state will also have to make adequate arrangements for meeting the seed requirements in contingent situations like floods and droughts by establishing a seed bank in the public sector and promoting community nurseries in the farmer's fields.

9.4.2 Fertilizers

Fertilizers would continue to play a significant role in increasing crop productivity. The state has an important role to play in ensuring the supply of fertilizers of the right quality at the right time, at the farmer's doorstep and at affordable prices. The supply of a standard grade of fertilizers needs to be ensured through effective quality checks. This also envisages strengthening of soil and fertilizer testing laboratories. Soil testing facilities should be made accessible to all the farmers. Alternatives to chemical fertilizers and the balanced use of nutrients will have to be vigorously promoted by the state government. Organic cultivation in niche areas and in niche products should be promoted by the state. The state government will also need to ensure institutional arrangements for organic certification. The state government thus needs to take the following steps in this regard:

- Ensure timely supply of various types of fertilizers, both organic as well as chemical;
- Ensure elaborate quality checks and stringent enforcement of fertilizer laws;
- Strengthen soil testing facilities and ensure fertilizer application on the basis of soil test reports; and
- Make institutional arrangements for organic certification.

9.4.3 Pesticides

To the extent that insects and pests cause huge losses to farmers, the use of pesticides is justified. But these pesticides cause immense harm to our natural environment. It is, therefore, expedient on the part of the state government to encourage alternative methods of pest control like IPM and NPM (Non-Chemical Pesticide Management). Pesticide laws should be enforced to keep a check on the quality of pesticides. The use of bio-pesticides and IPM should be encouraged and promoted.

9.4.4 Irrigation

Bihar fortunately has adequate irrigation potential. But this does not minimize the need for saving water and using it more efficiently. The government will have to support farmers to economize the use of irrigation water by encouraging the use of modern methods of micro-irrigation. Electrification of private tubewells on a massive scale is needed for reducing the cost of cultivation. Ancient systems of irrigation and traditional water bodies, viz. *aahar*, *pine* and ponds should be renovated as a part of the comprehensive programme for soil and water conservation.

9.4.5 Credit

Farmers need to be assured of agricultural credit at reasonable interest rates. Co-operatives constitute the most important source of farm credit for the small and marginal farmers. The state government will have to ensure the adequate availability of rural credit through co-operatives, CBs and RRBs. The institution of the SLBC should be used for this purpose. The state should also play a proactive role in organizing SHGs and micro-credit institutions such as what several other states, most notably Andhra Pradesh, are doing.

9.5 REFORMS NEEDED IN THE DEPARTMENT OF AGRICULTURE

A review needs to be undertaken of the organization and functioning of the state department of agriculture in order to ensure that it has the capacity to fulfil the tasks assigned to it. Some of the features of the re-organized department could be as follows:

- Arrangement for taking a holistic view of agricultural development, encompassing crop production, horticulture cultivation, the animal husbandry sector and fish production;
- Provision of a full complement of staff, including administrators, agricultural scientists, water management experts and economists;
- Capacity and willingness to work with other knowledge systems, particularly the Agricultural University, other academic institutions and ICAR centres;
- System of regularly upgrading skills, not only of the middle and lower level staff, but

also of the higher level functionaries, and providing them exposure to new developments in agricultural and natural resource development.

9.6 PARTNERING WITH PANCHAYATI RAJ INSTITUTIONS, PRIVATE SECTOR AND CIVIL SOCIETY ORGANIZATIONS

Panchayati Raj Institutions (PRIs) should be encouraged and equipped to shoulder increasing responsibilities. The PRIs have great stake in agricultural development. Community ownership by *panchayats* of important agricultural infrastructure should be encouraged. *Panchayats* should also manage community assets of pasture lands, community nurseries, farm roads, community irrigation sources, rural godowns, and rural *haats* and markets. They should be provided technical expertise. *Gram panchayats* should be equipped to act as rural knowledge hubs for offering technical guidance to the farmers.

Opportunities for public-private partnership should be optimally exploited. The private sector has a major stake in agricultural development. Crucial investment in the areas of seed development, fertilizer production and distribution, marketing, and agro-processing needs to come from the private sector. In order to strengthen the public extension system, the existence of other extension agencies, particularly IT-enabled rural centres, will have to be encouraged and a synergistic relationship will have to be established.

A partnership should be forged with other stakeholders including Non-governmental Organizations (NGOs), agri-clinics, input supplying agencies, co-operatives. Media—both the print as well as electronic media—and farmers' organizations will have to play an important role in disseminating technology and market information to the farmers. The state should encourage this innovative role, which the NGOs are capable of playing, and also recognize and appreciate their 'watchdog' function. Women play an important role in agriculture and their role should also be recognized and rewarded.

9.7 EXPECTATIONS FROM THE CENTRAL GOVERNMENT

The state government should establish a rapport with the Central Government and enlist the latter's support for ensuring the rapid agricultural development of the state. Although agriculture is a state subject, the Central Government still has an important role to play in catalysing the agricultural growth in the country. Agricultural growth has been stagnating for some time in the country, but it has witnessed a revival in the last few years, and the foodgrain production has reached a new peak. Among other reasons, this has been attributed to the lack of technical innovations in recent years. However, the existing yield

gaps indicate the existence of a major problem in the technology delivery mechanisms. The Central Government could offer assistance by enhancing allocation for research in the frontier areas. The Central Government also provides important resources for running the state programmes. Bihar has suffered from a cut in Central allocations, the reasons for which have been many but the eventual sufferer has been the farmer of Bihar. The anomalies in Central share allocation should thus be corrected during the Eleventh Five Year Plan. Central assistance should be allocated on the basis of the potential of the state and the developmental deficit that it has suffered. The Central Government may consider implementation of the following measures:

- Allocation under the macro management mode may be enhanced to Rs. 100 crore per annum from the present level of Rs. 20-25 crore per annum.
- Sanction of the work plan for Centrally-sponsored schemes should be done for five years, and the present system of annual sanction process should be dispensed with.
- The Government of India (GOI) may also consider reducing the number of Centrally-sponsored schemes. The Government could still guide the priorities without losing the focus and save the wasteful exercise entailed by the multiplicity of schemes.
- All new schemes for the next financial year should be sanctioned by January 15 of each year so that the necessary budget provisions could be made in time.
- The GOI may help in the supply of seeds of new crop varieties, such as Pusa Gold variety of wheat.
- The GOI may also help in the supply of new farm implements, for example, Happy seeder, etc.
- The GOI may establish a central Agricultural University in the southern part of the state.
- The GOI may establish a Central level Research Institute for dryland/rainfed farming in the southern part of the state.
- The GOI may help RAU to establish agricultural/horticultural/veterinary colleges and enhance allocation for research.
- The GOI may ensure procurement at MSPs in which the FCI could play a proactive role.
- The GOI may help in creating storage infrastructure and cold chains through the FCI and Central Warehousing Corporation (CWC).
- Most importantly, Bihar needs significant investment in rural and agricultural

infrastructure, a part of which should be made by the Central Government. A massive programme of flood control and water management in North Bihar (in fact, eastern UP and North Bengal too should be undertaken by the Central Government exclusively which could add significantly to the food security of the country.

- The GOI should step up efforts for regional co-operation with neighbouring countries for flood control in the Bihar plains.
- Above all, the state government's views should be sought and carefully considered on all important policy matters, for example, price policy, trade policy, credit policy, etc., and its partnership in some of the Central schemes, such as the Agricultural Insurance Schemes should be strengthened.

The Central government should realize that by assisting the development of agriculture in Bihar, it is also helping create a granary for the entire country.

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