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An Overview of Socio-Economic Infrastructure in Maharashtra State

K.V. Deshmukh*

Following liberalisation several economic reforms have been carried out in the country. Sustainable economic growth is responsive to infrastructural facilities. The planners of the country are giving paramount importance to this sector. Maharashtra state is leading in providing infrastructural facilities. Here an attempt is made in the paper to quantify certain parameters of infrastructure including the socio-economic aspect. The required data were collected from *Economic Survey of Maharashtra* for the year 2004-05 and *Maharashtra Economy in Figures 2001* published by Directorate of Economics and Statistics, Government of Maharashtra. The data thus collected were analysed by simple tabular method. The study indicates that the state is leading in providing various socio-economic infrastructural facilities like education, transport, per capita electricity consumption, as compared to the national level. It is observed that education has been well developed in the state. Besides the economic infrastructure like roads are also well developed in the state. Power sector indicates that consumption of electricity for agricultural sector is on an increasing trend. Thus the study revealed that the state is well-developed in socio-economic infrastructure. Still there is need to give prime attention towards health, national highways and rails. This may enable the state to uplift the socio-economic status of the people.

Impact of Indigenous Honeybees on Crop Production through Managed Pollination

S.K. Chauhan[†]

The impact study carried out in Apple valley of Kullu, Himachal Pradesh clearly shows that the ICIMOD sponsored implementation of the project on indigenous honeybees has contributed towards empowering the beekeepers of hilly and inaccessible areas in a variety of ways like raising their level of awareness, especially among women, increasing their skills in handling bee colonies during day time and transferring them from wall/log hives to movable frame hives. More importantly, however, all women trainees and three-fifths of men trainees learnt and got convinced about the important role of honey bees in crop pollination. Around two-fifths of the

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sample pollination entrepreneurs had learnt its importance from progressive apple growers of the area. In regard to crop management, about 15 to 20 per cent of the apple growers used honey bees for pollination and succeeded in securing more than one-fourth increase in total production. Further, during the project period while the size of apiary on sample households increased by 19 per cent in the case of men and 12 per cent in case of women, the average yield of honey per colony rose by 90 per cent and 100 per cent respectively. In concrete economic terms, the project activities did make a significant impact on per household production of honey and contributed significantly towards enhancing their employment and income levels. It is evident from the fact that while increase in income varied from 120-132 per cent, the increase in employment ranged from 70 to 118 per cent. More recently, however, the real benefits of the project appeared to have been usurped by large commercial beekeeping firms like Dabur/brbee Pvt. Ltd. who reared exotic honey bees to avail of both the emerging demand for bees for crop pollination and exploitation of the identified sites of natural flora for herbal honey production with negligible organic residue. The increasing competition from migratory bees (*Apis mellifera*) has posed an imminent threat to the survival and sustainability of indigenous honeybees (*Apis cerana*) that are most suited to local conditions, particularly to women beekeepers, since they do not require constant migration and can survive under harsh climate.

Impact of Centrally Sponsored Schemes for Promotion of Farm Mechanisation

B.L. Jangid, S.L. Intodia, and V.P. Sharma*

This study was undertaken in Udaipur district of southern Rajasthan during 2003 with the specific objective as to find out whether or not timeliness achieved in various farm operations and the extent of reduction of labour and time taken in performing various agricultural operations by using improved implements promoted through centrally sponsored schemes (CSS's). The study sample of 180 farmers consisted of farmers who purchased any one of improved iron plough, improved blade harrow, seed-cum-fertiliser drill (all bullock drawn), knapsack hand sprayer or sprinkler irrigation system on subsidised rates promoted under various CSS's during Ninth five-year plan. The data were collected using a pre-tested interview schedule by personal interview technique. Most of the beneficiary farmers opined that all the selected implements promoted through various CSS's have helped them in achieving timeliness in various farm operations. The implements also helped in reducing time (hr/ ha) and labour (man-days/ ha) to the tune of 13 per cent in case of improved iron

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plough to as large as 96 per cent in the case of knapsack hand sprayer. Thus promotion of farm mechanisation had positive impact in the study area, which might have helped the farming community in improving production and productivity of various crops.

Infrastructure, Agricultural Performance and Rural Poverty in India

Madhusudan Ghosh[†]

Using cross-sectional data for 15 major states in India at four time points, this paper examines the influence of rural infrastructure on agricultural development and rural poverty. Since rural infrastructure can influence rural poverty directly and indirectly through agricultural development, the study has examined the effects of selected infrastructure variables on both rural poverty and agricultural development. We have considered three variables representing agricultural development: (i) State domestic product in agriculture per head of rural population at 1980-81 prices (SDPAR), (ii) Average value of output per hectare at 1990-93 prices (YIELD), and (iii) Average value of output per male agricultural worker at 1990-93 prices (LAPRO). We have considered three proxy variables for infrastructure: (a) Percentage of gross cropped area irrigated (IRRI), (b) Rural literacy rate (RLIT), and (c) Institutional credit per hectare in rural area (CREDIT). The regression equations were estimated by the ordinary least squares method using pooled cross-sectional data for the selected states corresponding to four time points (1972-73, 1983-84, 1993-94 and 1999-2000). The results indicate that higher levels of SDPAR, YIELD and LAPRO have been associated with lower level of rural poverty across the states, indicating thereby the existence of trickle-down process in rural India. It is also observed that rural infrastructure represented by IRRI, RLIT and CREDIT has significant positive effects on agricultural development. The estimated results further revealed significant inverse relationship between rural poverty and the infrastructure variables, suggesting that higher the level of irrigation, rural literacy and rural credit, the lower would be the incidence of rural poverty. Rural infrastructure turned out to be an important factor not only for increasing agricultural productivity and output, but also for alleviation of rural poverty. Overall, the evidence from this study confirms that development of rural infrastructure is a necessary condition for agricultural development and alleviation of poverty. The results have important policy implications. It follows that the incidence of rural poverty can be reduced significantly by undertaking investment in rural infrastructure. Inter-state variations in agricultural development and rural poverty can also be reduced by doing so.

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Contributions of Rural Infrastructure to Agricultural Income and Rural Poverty

N.V. Namboodiri*

The specific objective of this study is to examine the relative role of various physical infrastructures in the rural areas on intensive use of land, net value added in agriculture (agricultural income) and rural poverty. The major agricultural infrastructure include rural roads, rural storage and marketing facilities, agricultural extension related facilities, facilities for easy access to agricultural input supply, power supply for operating irrigation pumps, etc., communication infrastructure and so on. The multiple regression approach was followed and the state level data pertaining to 30 states of the country has been collected and the data points relate to early 2000. The agricultural net state domestic product were taken at both constant and current prices, and for the latter an index of inflation was added as one of the additional explanatory variables. The above model was extended to examine the influence of infrastructure on intensive use of land and rural poverty. The study showed that in determining the level of agricultural income, all infrastructure indicators considered here influence positively in determining the agricultural income per unit of land, but only three of the variables, namely, agricultural extension facilities, rural market infrastructure, and rural co-operative godown facilities were statistically significant. As far as the land intensification is concerned, only the irrigation intensity and the density of fertiliser sales points turned out as positive and significant. There was strong influence of infrastructure variables such as agricultural extension facilities, rural road connectivity, and communication facility in determining the level of rural poverty. The strong influence of agricultural extension system could be through the diffusion of new agricultural technologies and increased income of both crop production and alternate employment opportunities and hence income benefits to landless labourers. Similarly better road connectivity opens up employment avenues outside the village that improves the living conditions of the poor. Also better road connectivity reduces the marginal costs of agricultural production through lower transaction costs that has the potential to increase both producer and consumer surpluses which eventually have a positive impact in reducing rural poverty.

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Impact of Investment on Horticultural Research and Development of Konkan Region of Maharashtra

V.A. Thorat, S.N. Tilekar and J.S. Dhekale[†]

The main objective of the paper is to analyse the growth in investment on horticultural research and development in Konkan region of Maharashtra and to ascertain its impact on area, production, productivity of major horticultural crops and employment generation. The Konkan region of Maharashtra state was selected purposively. During the period under study the growth in horticultural research investment among the major horticultural crops varied from 8.04 per cent in coconut to 16.22 per cent in mango in nominal terms, it was 2.27 and 10 per cent, respectively, in real terms. The growth rates of horticultural development investment were 32 and 25 per cent per annum at nominal and real prices respectively. Among the major horticultural crops of the region mango registered the highest growth of 15.23 per cent in the area followed by cashew. A similar trend was observed in the case of production. The direct employment generation through horticultural production has grown significantly at the rate of 10.29 per cent per annum. The growth in employment generation through different economic activities was 16.89 per cent per annum. Among the different economic activities the annual growth rate of employment generation was maximum for establishment of orchards followed by processing and horticultural production. The results indicated that the investment on horticultural research and development has positive impact on area, production and productivity of major horticultural crops and employment generation in Konkan region of Maharashtra.

Building an Infrastructure for Precision Farming in Maharashtra

V.B. Jugale*

The specific objectives of the study are to highlight the fundamental ground realities and the problems of agriculture, to work out the infrastructural needs of agricultural sector for precision farming and to identify the future benefits and outline an adoption strategy designed for long term competitive advantage. An agenda for the overall growth of agriculture and allied sector of the states is implied to have a huge leap of quadrupling the states' performance in various macro-economic variables which can be attained by developing the infrastructure in precision farming. The vision indicates a diversified and structural development processes rather than a mere growth in the present macro economic variables. The existing agricultural challenges however can be converted into opportunities provided the humane face in respect of

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agricultural development is diversified by operationalising the art of precision farming. Land and water resources are the main concerns to agricultural productivity. The land and water use mapping with electronic links for achieving agricultural productivity has to be developed at the community level. Strengthening the ecological foundations for sustainable agricultural development is another area of economic reform. The privatisation of precision technology, its responsibilities and commitments can never exist. The state government alone should sustain the institutional commitments and responsibilities of the Government as a whole.

Market and Processing Infrastructure Development vs. Growth of Henna in Arid Fringes of Rajasthan

Khem Chand, P.K. Roy and Y.V. Singh[†]

An attempt has been made in this paper to study the market and processing infrastructure facilities available for henna in Pali district of Rajasthan and its role in increasing the area under henna cultivation. Pali district of Rajasthan is the leading district for henna production in the country. The henna leaf production in Rajasthan is estimated to be 37,541 tonnes in 2003-04 with Pali district alone accounting for 95 per cent of the produce. For detailed analysis primary data related to marketing of henna leaves were collected from 100 farmers of four villages selected from Sojat and Marwar Jn. tehsils in Pali district. Besides farmers, information from henna market and 45 henna processing units in Sojat city town was also collected. The establishment of market for sole trading of henna leaves in Sojat city of Pali district during 1982 helped in regulating its trade and benefited the farmers. About 70 per cent of henna produce reaches the henna market through village middlemen. Henna trade in this market registered a significant annual compound growth rate of 9.56 per cent during the last decade. Commercial henna leaf processing in the town began way back in 1957 and the industry passed through different stages of development. Presently the major processing units employ the pulveriser for henna processing and around 180 henna processing units exist in Sojat city and provide gainful employment to more than 3000 persons working in this industry. The study indicates rise in henna area in Pali district from 9455 ha in 1980-81 to 34156 ha in 2003-04 with a significant annual compound growth rate of 5.62 per cent. Though failure of arable crops during frequent droughts in this region also helped in shifting area towards henna, but the supporting role played by the development of regulated market and processing industry in this region cannot be ignored. Further, improvement in facilities like better storage, proper valuation of henna leaves in sole regulated market for henna and labs for quality testing in Sojat is required for better returns to the farmers and development of processing industry in this region.

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Rural Infrastructure and Rural Development – Evidence from Major States of India

Kuldip Kaur and Paramjeet Kaur Dhindsa*

The present study intends to examine the nature and extent of relationship between rural infrastructure and rural development of major states of India at three points of time, i.e., for 1980-81, 1990-91 and 2000-01. The indicators of both physical and social rural infrastructure have been considered. Per Capita Net State Domestic Product has been used as an indicator of rural development. Step-wise regression analysis has been used to find out which of the above infrastructural facilities has contributed significantly in rural development. The analysis suggests that growth of rural infrastructure particularly physical infrastructure has a high potential pay-off in terms of increase in per capita net state domestic product. On the basis of the various results of the analysis, the study concludes with various suggestions and policy implications.

Role of Mango and Cashew Processing Units in Employment Generation in the Konkan Region of Maharashtra

S.S. Wadkar and S.R. Bagade[†]

An effort is made in the paper to estimate the total production of mango and cashew crops, production likely to be available for processing, number of processing units required and employment likely to be generated through processing. This would enable us to find out how much extra working population can be absorbed in the processing industry and thereby reduce the pressure of agricultural labour supply on farm operations. There is great potential to increase employment and alleviate poverty through plantation of mango and cashew. A total of 8 lakh hectares of waste land is available in the Konkan region of which 4 lakh hectares area is brought under cultivation in 10 years, therefore the pressure of employment will be reduced drastically without hampering nature. Considering per factory per day employment in case of processing of mango, raw cashewnut and cashew apple, the total employment in terms of number of persons is estimated considering 240 days employment per person per year. The total employment generated in processing of mango and cashew works out 160006 persons with a very high proportion of employment among women than for men. Thus the proposed plantation of mango and cashew undertaken on a

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large scale and their processing would help to reduce the dependence on job opportunities on the farm and reduce the pressure on land.

Role of Marketing, Storage and Processing in Crop Diversification Strategies

Manoj Gupta and K.D. Sharma*

Hill regions have niche for production of many cash crops but for the infrastructural bottlenecks, these crops could not attain the desired position in cropping patterns. Strawberry is one such attractive alternative for diversification in Himachal Pradesh and this study was undertaken to suggest the marketing, storage and processing based interventions so that crop diversification through strawberry cultivation could be made successful. Majority of the sample cultivators had lower strawberry acreage owing to higher labour and capital requirements, risky nature of the crop, and marketing problems. Total cost of strawberry cultivation was Rs.18,312 per bigha (0.08 ha) and the total income from strawberry cultivation was Rs.32,314/bigha while net income was Rs. 14, 003. Sensitivity analysis showed that this crop can maintain its profitability despite rise in costs by 50 per cent and decline in gross income by 30 per cent. Yet strawberry cultivation had not attained the desired position in the state despite being quite remunerative due to inherent constraints such as shorter shelf life and delicate fruit, which in combination with marketing, storage and processing bottlenecks put the farmer in the defensive position. Therefore, the government should take necessary steps to overcome these bottlenecks as this crop has potential for improving the socio-economic condition of the small and marginal farmers in Himachal Pradesh. Area specific approach for production, co-operative marketing system, development of storage facility for export potential realisation and value addition through processing are some of the ways to overcome marketing, storage and processing bottlenecks. The same model can be replicated for popularising this crop in other states of Western Himalayas.

Rural Infrastructure Development in Maharashtra

S.S. Kalamkar†

An attempt has been made in this paper to examine the progress in rural infrastructure development in Maharashtra state. As per the CMIE infrastructure index, Maharashtra state has good compatible score, ranks sixth position, but the index has fallen during last two decades. The state has the highest number of primary

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rural markets and second highest regulated markets, however the area covered and population fed by each market is very low as compared to the other states in India. The state lags behind in respect of villages connected with road and railway route length as well as in percentage of regulated markets to total number of markets. The state is far below the country's average in respect of railway route density, due to stagnant growth during last two decades. About 91 per cent of the villages are linked with roads and almost all villages are electrified. But hardly 19 per cent of total electricity in the state was used for agricultural purposes as compared to national average of 25.33 per cent in 2001-02. The existing storage potential in the state is lower by around 20 lakh metric tonnes than the actual needs. There is a strong case for increased investment in rural infrastructure in the relatively backward, neglected area and infrastructurally under developed area like Konkan and Vidharbha region. The total investment requirement for the development of wholesale and periodic rural markets in Maharashtra is Rs. 778 crores which is about 10 per cent of the total investment required at the national level. If a gradual trend towards commercialisation and diversification of agriculture that has merged in the eighties need to be sustained and promoted, rural infrastructure supporting trade in farm products and inputs and processing of the produce must be strengthened with an emphasis on quality.

Watershed Approach: Need for Sustainable Policy in Irrigation Management

B.S. Rao, B.V. Raghavendar and K.M. Kumar*

The main objective of the paper is to analyse the need for sustainable policy approach in watershed management in India. The study provides an overview of watershed experience aimed at isolating the key conceptual, policy and research issues with four central concerns, sustainability, livelihoods, equity and participation. Thus the key contribution of the present paper is in terms of: (a) the adoption of a more comprehensive and rigorous normative framework for evaluating watershed development success, and (b) the identification of key linkages between biophysical and social factors that influence the success through an interdisciplinary approach. Most of the studies showed that there has been a beneficial impact of watershed development on watershed ecosystems: soil erosion has been checked; land cover has improved and groundwater recharge has increased. However, in most places there are no corresponding measures to socially regulate water use, or to prioritise between different uses or regulate extraction from the commons. There is a trend towards bringing non-cropped area into cultivation; within the cropped area, there is a shift

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away from food crops, without an accompanying shift to sustainable crop practices. To conclude what makes watershed development issues in India of crucial importance is the historical conjuncture that we find ourselves in. Watershed development represents a dual possibility in this respect. It may, with the right policies and political will, provide an opportunity to bring more and more of the ecosystem resources under social control, provide preferential access and ensure expanding sustainable livelihood opportunities for the rural poor and lifting them above subsistence.

Changes in Rural Infrastructure Development in Maharashtra

K.S. Birari, M.R. Patil, M.K. Borse and R.R. Chaugule[†]

The paper attempts to examine the changes in rural infrastructure development in Maharashtra. The study is based on the secondary data collected on the aspects of rural infrastructure such as village roads, rail route, consumption of electricity, area under irrigation, and area, production and productivity of selected crops for the decadal period from 1960-61 to 2000-01 and subsequent annual data upto 2004-05 from published sources. The results of the study indicated that the village roads, as means for transportation and access for markets in marketing of a variety of agricultural produce has expanded by 459 per cent over the period under study. The proportion of network of village roads in the total road length was 43 per cent at the end of the study year. The increase in the rail route in the state was only 9.32 per cent. The consumption of electricity by various sectors showed manifold increase over the entire period. The rapid increase in the consumption of electricity by agriculture sector was observed but still it was less than half of the industrial sector. The change in net and the gross area irrigated was 174 and 198 per cent. The irrigation intensity ranged between 122 to 124 per cent. The proportion of gross irrigated area to gross cropped area increased from 6.48 per cent in 1960-61 to 16.39 per cent in 2003-04. A sizeable increase in the area, production and productivity was observed in all the crops under study except area under cereals and foodgrains, area and production in groundnut and productivity in sugarcane. The estimated compound growth rates indicated a significant growth in the aspects of rural infrastructure. The magnitude of change was higher in the consumption of electricity. A highly significant increase was also noticed in area, production and productivity of the crops under study which indicates that the state has achieved progress in rural infrastructure development and in the production and productivity of the crops.

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Role of Irrigation in Agricultural Development – A Study with Special Reference to Karnataka

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The study examines the importance, impact and progress of irrigation, in Karnataka. The study is based on both secondary and primary data. Primary data has been collected by personal interviews from 360 farmers selected randomly in Davangere and Chitradurga districts in 2005-06 using survey method. The analysis of data revealed that irrigation changed the cropping pattern in favour of high valued crops such as sugarcane etc. The small and marginal farmers' income increased by 341 per cent and that of the medium and large farmers by 364 per cent per acre in Davangere block in Davangere district. In Hiriur taluk in Chitradurga district the marginal and small farmers and medium and large farmers earned 348 per cent and 365 per cent more income per acre respectively. Farm employment increased by 120 per cent to 177 per cent. The yield of crop has increased by 100 per cent to 380 per cent. Over 50 per cent of the sample farmers raised two crops while some enterprising farmers also cultivated three crops.

Impact Evaluation of Road Projects in West Bengal

Arobinda Kumar Sarkar[†]

The study of six rural road projects was undertaken in North and South 24 Parganas districts of West Bengal to assess the impact of roads on the living conditions of the benefited villagers. The widening and strengthening of roads resulted in saving on vehicle operating costs, shift in mode of transport, increase in the frequency of travel of rural households, increase in job opportunities of the skilled and unskilled labourers in the nearby towns/Kolkata suburb on daily basis. The comfort levels of the villagers especially students going to colleges or schools outside villages, vegetable growers, patients have been enhanced. The study also highlighted the positive impact on attendance in the government offices, teachers, students due to reduction in impassable days during rainy season. The study indicated that a comprehensive approach for area development need to be adopted and the need for imposition of toll tax to meet part of maintenance expenditure as fund position of implementing department is not encouraging to undertake any kind of maintenance work of roads. The need was emphasised for strengthening the technical and administrative machinery of Zilla Parishads and sensitisation of district level functionaries on implementation of projects.

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Trends in Rural Infrastructures and Growth in Haryana

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The present study analyses the spatio-temporal changes in rural infrastructures and growth in Haryana. The specific objectives of the study are: (i) to examine the trends in transport, market infrastructures, safe drinking water, irrigation and power infrastructures across regions in Haryana, and (ii) to study the spatio-temporal changes in compound growth rates of various determinants of rural infrastructures in Haryana. The secondary data on various determinants of rural infrastructures were collected from the *Statistical Abstracts of Haryana*. All the districts of Haryana state were grouped into north-eastern and south-western regions based on agro-climatic conditions of the state. For analysing the rural infrastructures and growth, three periods, viz, triennium ending 1982-83 (Period I), triennium ending 1992-93 (Period II) and triennium ending 2003-04 (Period III) have been considered. Besides tabular analyses of data, the compound growth rates were worked out in various determinants of the rural infrastructures in Haryana. The analysis of data revealed that almost all the villages have been connected with the metalled (surfaced) roads during the last two decades. However, the annual rate of increase was the highest between Period I and II. The number of regulated markets and sub-yards have also considerably increased during the last two decades in Haryana. However, the net sown area per regulated market, average number of villages served per regulated market, average area served per regulated market has moderately declined. Tremendous growth is also registered in state-owned warehouses and cold storages. These developments have, however, resulted into the greater procurements of rice and wheat to the national food basket. Almost all the problem villages have been provided with the safe drinking water during the last two decades in Haryana. The tremendous progress took place in terms of irrigation infrastructures such as number of tubewells energised, number of tubewells and pumpsets (both diesel and electric), the net irrigated area to net sown area and gross irrigated area to gross sown area during the last two decades. The consumption of electricity in agriculture also increased.

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National Watershed Development Programme and Its Impact on Income and Employment Generation in Chhattisgarh State: An Economic Evaluation

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The paper is drawn from the NATP project “Study of Production Mix, Resource Utilisation, Risk Management and Technological Intervention in Watershed Development Program Under Rainfed Rice Eco-System” carried out in Bagbahara block in Mahasamund district of Chhattisgarh State. It aims to examine the area of investment under NWDPR, to assess the impact of NWDPR on irrigation, occupation, employment generation, migration and to evaluate the total income of farming community. The study is based on primary data collected from 194 and 199 households in watershed (WS) and non-watershed (NWS) area respectively in Bagbahara block. All these households are classified into landless, marginal (below 1 ha), small (1.01 – 2.00 ha), medium (2.01 – 4.00 ha) and large (above 4 ha) based on their land holdings. Different information required for study was collected from these farmers with the help of pre-tested schedule and the analysis is conducted for all categories in WS and NWS areas separately. The study revealed that Rs.17.34 lakh was spent to create the basic activities in the project area which is 37.76 per cent of total investment. An expenditure of Rs. 14 lakh (30.49 per cent) was spent to improve the production system in the arable and non-arable area which included crop demonstration, agro-forestry, dry land horticulture, organic farming system, poultry, piggy, goat rearing, basket and rope making etc. The remaining part of the fund approved was spent to improve the soil and water conservation and livestock management activities. The watershed area has 28.02 per cent irrigation mainly due to relatively more public investment in this area while this figure is only 13.33 per cent in NWS area. The average holding size was 2.57 ha and 2.10 ha in these two areas respectively. The study reveals that the investment to increase the basic infrastructure in agriculture especially in irrigation is the best way to provide the minimum employment to rural people. This will not only increase the employment in agriculture sector by way of adopting the improved technology at farmers’ fields but will also substantially increase the productivity of different crops required for the desired growth rate in agriculture.

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Growth of Some Indicators in Agricultural Development of Maharashtra

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The specific objectives of the paper are to study the percentage change in area and production of different crops in Maharashtra and to study the percentage changes in some of the indicators for agricultural development in Maharashtra. Time series data for the period from 1960-61 to 2003-04 on various indicators on area and production of different crops was gathered from different published sources. The gross cropped area increased by 10.15 per cent and the size of holding in the groups below 0.5 and above 20 hectares of land has increased. The area and production of crops like rice, wheat, bajra, tur, gram, cotton and sugarcane increased during the study period but declined in the case of jowar and groundnut. The share of irrigation projects increased and also the area under irrigation and gross cropped area also registered an increase. A large difference was noticed between total production and consumption of electricity. The various other indicators of economic and agricultural development such as road length, livestock population and co-operative movement increased during the study period. The study concludes that though Maharashtra State was ahead of all other states in respect of other indicators it lagged behind others in respect of production and consumption of electricity.

Economics of Tank Modernisation Projects under RIDF in Karnataka

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The paper attempts to assess the economics of tank modernisation projects implemented under the Rural Infrastructure Development Fund (RIDF) in Karnataka, based on a sample of 11 tank modernisation projects completed during the years 2003-04 and 2004-05 and implemented in four districts of Karnataka, viz., Chitradurga, Davanagere, Kolar and Tumkur. The average cost for modernisation of tank was Rs.33.96 lakh bringing an additional area of 126.83 ha under irrigation. The cost per hectare of incremental area brought under irrigation was Rs.0.48 lakh for the sample and ranged from Rs.0.29 lakh in Davanagere district to Rs.0.60 lakh in Kolar district. The comparatively low cost per ha. in Davanagere district was on account of relatively larger size of tanks benefiting larger area per unit of investment. The projects have generated 785 days of non-recurring employment per Rs. 1 lakh of investment and 75 days of recurring employment per hectare of incremental atchkat. The financial rate of return from sample projects worked out to 20.87 per cent and

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ranged from 15.85 per cent in Kolar to 55.07 per cent in Davanagere. Indirect benefits of modernisation of tanks like recharge of ground water in the area, facilitation of allied activities like animal husbandry, fisheries, contribution to the ecology, etc., would be much more than the direct benefits quantified. Enforcement of water rates would help the state exchequer as well as the farmers for better utilisation of irrigation potential. For proper maintenance of the projects, formation of water users' associations and involvement of local panchayats would be essential. The State Governments should make adequate and specific allocation of funds for the maintenance of tanks with streamlining of financial and administrative procedures.

Development of Lift Irrigation Project for Enhancing Agricultural Production

Vijay K. Choudhary and Prafull K. Katre*

This study seeks to examine the changes in cropping pattern, cropping intensity, crop productivity and resource use with the establishment of lift irrigation project at perennial water reservoir in Chatoud village of Raipur district in Chhattisgarh state. The lift irrigation project was handed over to villagers during 1994 by the State Department of Agriculture. To provide comparative analysis of the study area, data were collected for fulfillment of the aforesaid objectives in two periods, i.e., at the beginning of lift irrigation system and after completion of the system. Farmers have grown second crops in *rabi* like wheat gram, lentil etc. and there was a lot of improvement in productivity of main crop rice during *kharif* while *rabi* season was completely left fallow before establishment of irrigation system. The cropped area, net return, cropping intensity and benefit-cost ratio increased manifold in all the categories of farms. A greater coordination among the farmers has helped in enhancing crop productivity, cropping pattern and farm income. Lift irrigation works quite well under the collective action and active participation by the users.

Rural Infrastructure in Hills of Uttarakhand –Status and Prospects for Rural Growth and Development

K. Srinivas and L.R. Kumar†

In Uttarakhand, out of thirteen districts eleven are hill districts where agriculture is the mainstay of the people. The productivity of main crops of hills like paddy, wheat, finger millet, barnyard millet and lentil are very low. The low productivity of

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these crops is low due to many factors, of which poor physical and social infrastructure is one of the main reason. Lower levels of irrigation facilities in rice (40 per cent), wheat (16 per cent), finger millet (0 per cent), barnyard millet (0 per cent), lentil (8 per cent), mustard (33 per cent) and soyabean (3 per cent) is the major infrastructural hindrance to enhancing agricultural growth. This is followed by disproportionate area owned by different size categories of farmers. Two per cent of large and very large size farm holdings account for 17 per cent of land holdings whereas 90 per cent of marginal and small farm holdings own 60 per cent of total area. Other infrastructure facilities - very low institutional credit availability, meager use of farm implements - are also important factors for low productivity. Other physical infrastructure like input delivery system, storage, rural markets, transportation, communication and energy are also in a poor condition. Uttaranchal is very rich in social infrastructure like research (many central research institutes and a big university like Pantnagar are located in this state), education (72 per cent literacy) and extension infrastructure (KVKs in all districts, line departments in every block and more than 200 NGOs for rural development). But adequate social infrastructure alone will not be able to take the development process forward. It has to be complemented with adequate physical infrastructure. This paper looks into the available infrastructure in the hill districts of Uttaranchal and suggests the need to increase the physical infrastructure so that it can go along with the existing rich social infrastructure to take the states' development to newer heights.

Comparative Economics of Lift Irrigation Schemes Operated in Kolhapur District of Western Maharashtra

N.S. Lohar, R.R. Mane, S.N. Patil and M.B. Nichit*

Lift irrigation schemes are playing an important role in the economy of the cultivators in Kolhapur district. Most of the lift irrigation schemes are installed on the river banks during last 40 years. About 500 lifts are in operation in this district. There are three types of lift irrigation schemes, i.e., co-operative lifts, sugar factory lifts and private lifts. The study was undertaken with the following objectives: to study the management of co-operative, factory and private lift irrigation schemes, to study the corporative investment made in these lifts and to study the comparative economics of the lift irrigation schemes run by co-operative irrigation societies, co-operative sugar factories and private individuals. Four lift irrigation schemes operated by co-operative sector, four schemes operated by the sugar factories and four schemes operated by private individuals were selected for the present study. Those lift

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irrigation schemes which were established before 10 to 15 years were selected. The total sample consists of 12 lift irrigation schemes. The data were collected from the selected lift irrigation schemes during the year 2004-05. In the case of management of sugar factory operated lift irrigation schemes there is a long chain of staff and therefore no quick decisions are taken. On the other hand in the case of private lifts there is personal touch in management. The average capital investment worked out to Rs. 20,60,940, Rs. 27,58,685, and Rs. 8,29,810 per unit irrigation scheme for co-operative, sugar factory and private operated lift irrigation schemes respectively. It was lowest in case of private operated lift irrigation schemes due to limited capital and other resources. The total operating cost was lowest (Rs. 164336.4) in the case of private lift irrigation schemes. Among the three types of lift irrigation schemes, the co-operative lift irrigation schemes were most profitable with the benefit cost ratio of 2.41. In case of lift irrigation schemes operated by the sugar-factories the benefit cost ratio was lowest (1.56). The per hectare cost of irrigation estimated at Rs. 2,746.29, Rs. 5,743.20 and Rs. 3,945.61, in co-operative, sugar factory and private operated lift irrigation schemes respectively. It was the highest in case of sugar factory operated lift irrigation schemes due to the high management cost.

Reservoir Induced Seismicity (RIS)

Sitesh Bhatia[†]

Earthquakes are mostly the result of natural faults in geological makeup of earth. But several have been caused by construction of dams and impoundment of millions of tonnes of water in the reservoirs behind them. Scientific data obtained from various reservoirs establishes beyond doubt that there is a link between filling up of reservoirs and increase in frequency of earthquakes. Dams aggravate the intensity of seismicity by precipitating two possible mechanisms of Reservoir Induced Seismicity (RIS) namely (a) stresses generated due to reservoir load and, (b) crustal readjustment as a result of reduction in effective stress caused by increase in water pressure due to the massive amounts of impounded water. The weight of the reservoir can also force water down micro-cracks and fissures and faults under and near the reservoir till it catalyses an earthquake. Also, the increase in pressure of water in the rocks acts to lubricate faults which are already under tectonic stress but prevented from slipping by the friction of the rock surface. RIS has been observed in recent years in about 100 cases all over the world establishing beyond any doubt the correlation between filling up of reservoirs and increase in seismicity. Koyna dam in Maharashtra, Lake Karibe in Zambia, Lake Kramista in Greece, Lake Mead in USA, Vaiont dam in Italy, Murk dam in USSR and Kuroba dam in Japan are examples of increased seismicity due to

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increased hydro-pressure. Two of the dream river valley projects of India, Narmada and Tehri would be no exception. Both lie in seismic zones, have disturbed, faulted and fissured and fractured basins. The soil in these areas is porous and absorbs moisture thus further compounding the problem. The increase in hydro-pressure with such large dam reservoirs with thousands of tonnes of water storage capacity like Narmada Sagar, Sardar Sarovar and Tehri are certain to have disastrous results. From the various scientific, geological and seismological studies, some conclusions about RIS arrived at, thus, can be enumerated as follows: (1) RIS is mainly from filling of reservoirs and seems to be related to the reservoir filling rate; (The impoundment of water behind Marathon dam, commencing in 1929 and reaching its highest level in 1939 induced earthquakes, the strongest tremors during the period 1931-1966 always being associated with rapid rise in water level.). (2) RIS can both increase the frequency of earthquakes in areas of high seismic activity and cause earthquakes to happen in areas previously thought to be seismically inactive. The latter effect is more dangerous because the structures in areas thought to be quiescent are not built to withstand even minor earthquakes. (3) RIS increases and decreases with water level fluctuations. (4) RIS increases with volume of stored water. (5) It increases considerably with epicentre confined to the vicinity of the reservoir: it is directly related to the stored volume of water. (6) It tends to occur when the water depth is greater than 100 meters. (7) Certain tectonic conditions are related to geological conditions such as high natural horizontal stress values and normal fault planes and apparently are more susceptible to cause RIS.

Rural Infrastructure – Impact of Rural Godown Scheme

M.S. Jairath*

A capital investment Central Sector Scheme for construction/renovation of rural godowns has been introduced in 2001. The scheme aims at creation of scientific storage capacity with allied facilities in rural areas to meet the requirement of the farmers for storing farm produce, processed farm produce and other agricultural inputs, promotion of grading, standardisation and quality of agricultural produce and prevention of distress sale immediately after harvest by providing the facilities of pledge financing and marketing credits. The scheme has 12 objectives. Keeping the above in mind present study has been conducted to assess the extent of distribution of rural godown constructed/renovated, their availability in terms of geographical area as well as production, regional imbalances, utilisation pattern, examine the extent to which the objectives of launching of the scheme in India has been meet and identify

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the reasons for not achieving the objectives of the scheme. The scheme is being implemented by Directorate of Marketing & Inspection, a department of Ministry of Agriculture, Government of India located at Faridabad. The scheme is a credit linked subsidy scheme. The subsidy is back ended and is being released to the units by NABARD and NCDC. Under the scheme a total of 9483 godowns have been promoted up to March 2005. Of these nearly 59 per cent have less than 500 MT capacity, nearly 13 per cent between 500 to 1000 MT, 23 percent between 1000 to 5000 MT and remaining above 5000 MT capacity. More than 53 percent of the godowns have been promoted by farmers, nearly 25 per cent by farmer's cooperatives, 18 per cent by others and public sector agencies accounted for the remaining. The spread of the rural godowns under the scheme were only in 21 states and one Union Territory (UTs) out of 35 states/ UTs. A total of 141.83 lakh tones capacity has been created under the scheme. Fifteen States namely Andhra Pradesh, Karnataka, Tamil Nadu, Maharashtra, Gujarat, Rajasthan, Madhya Pradesh, Chhattisgarh, Orissa, Bihar, West Bengal, Assam, Punjab, Haryana and Uttar Pradesh account for almost 99 per cent of the total storage facilities created in the country under the project both in terms of numbers as well as storage capacities created. Seven states viz., Punjab, Andhra Pradesh, Haryana, Madhya Pradesh, Maharashtra, Uttar Pradesh and Chhattisgarh account for the largest share of the total numbers and storage capacity created across the country. Three States viz. Karnataka, West Bengal and Gujarat accounted for a large share in the number of rural godowns but their share in total storage capacity created was very less. The study indicates uneven growth in terms of number of rural godowns promoted as well as in storage capacity created. Regarding impact of the scheme, the study indicates that the objective of creation of scientific storage capacity was fully met, followed by partial achievement for the objectives of easy procurement, reducing qualitative and quantitative losses, reducing pressure on public storages and reversing the trend of declining investment in agriculture. However at the national level, the scheme could not achieve the objective of promotion of grading, standardisation, quality control of agricultural produce to improve marketability, timely availability of agricultural inputs and introduction of national system of warehouse receipt. The study suggest extension of benefit to more number of farmers, small sized farmers, farmers of hilly and desert dominated areas and also to check the growing imbalance among the regions, states and districts in the construction of rural godowns by (a) Giving of priority in the sanction of rural godown projects among the hilly dominated states and also the states where net-work of rural godowns is poor. Also enhance usage of scientific storage for other commodities by educating farmers about price fluctuation between harvesting to off season and extending facilities of marketing intelligence, (b) Enhancing banking services by on the spot sanction of loan, (c) Expanding the training and awareness about the scheme and importance of construction of rural godowns in the poorly developed areas and also imparting education of know how and do how (d) Involving NGO's in creation of awareness among the entrepreneurs and farmers

about the scheme and facilitating the training programmes, (e) Implementing pledge financing by simplifying procedure and pursuing the banks for advancement of marketing credit to the farmers by organising various awareness programmes (f) Introduction of Negotiable Warehouse Receipt System by drawing time bound implementation plan and promoting accreditation organization having compatibility with future trading and commodity exchanges and also (g) Create effective MIS system for making easy available information to farmers and entrepreneurs.

Rural Drinking Water Supply – Grassroots Realities

Chaya Degaonkar[†]

This is a micro level study of two talukas in Gulbarga district of Karnataka State. The status of water supply is assessed on the basis of some important factors such as existence of water supply schemes, accessibility, adequacy of water supply and regularity of water supply. Suitable indicators related to these aspects were framed to construct in index of water supply. The position of rural water supply is not satisfactory as is observed from the field report. The schemes are not implemented properly and their maintenance is very poor. On an average only 40 to 50 per cent of the rural population is able to have access to drinking water, which is also inadequate and irregular. The major reasons for non-operation of borewells are exhaustion of resource of water and breakage of hand pump. In the case of Mini Water Supply and Public Water Supply (MWS&PWS), the major reasons are the problems of breakage and leakages in pipelines and lack of proper maintenance staff. The recent participative schemes have not received good response from the public, as people are not willing to share the costs.

Infrastructure Development for Horticultural Sector in India: An Ex-Post Evaluation

Deepak Shah*

The study attempts to address various issues relating to horticulture sector of India with particular reference to evaluating diversification of agriculture, marketing of high value crops, and the extent of investment made by various agencies over time towards creation of PHI related facilities for these valued crops across various states in India, aside from assessing strategies, policies and regulations encompassing horticulture sector. The study shows that diversification drive in favour of horticultural crops is chiefly due to economic factors since these crops are not only

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characterised by high productivity per unit area coupled with higher net returns but also in generating substantially high employment and exports. However, poor post-harvest infrastructure (PHI) as characterised by poor post-harvest handling, transportation and storage practices and facilities have denied the Indian horticulture crop growers the opportunity to make substantial presence in world market. Lack of adequate processing infrastructure designed to produce products of international standards have hampered India's net horticultural exports. In spite of the efforts and initiatives undertaken by the NHB, NCDC, APEDA, NABARD, commercial banks, and other funding agencies to create proper and adequate post-harvest infrastructure for horticulture crops, the development of PHI related facilities in horticulture sector is not impressive so far, chiefly because of huge capital investment required to develop this sector and curb the losses emanating from post-harvest operations. The cumulative assistance sanctioned by these agencies for PHI related facilities so far hardly works out to Rs. 3,000 crores, accounting for 10 per cent of the actual investment required to develop PHI related facilities for horticulture sector of India. However, the policies initiated in the early 2000 and various programme initiatives undertaken in more recent times by the NHB, NCDC, APEDA, NABARD, food processing industry, and other agencies engaged in developing PHI related facilities for horticultural crops, and also private sector investment in horticulture have certainly given a fresh fillip not only to the expansion of the horticulture production base of India but also to the exports of these high value products.

Impact of Infrastructural Development Provided by Uttar Pradesh Rajya Krishi Utpadan Mandi Parishad on Agricultural Growth of the State

Brahm Prakash and V.P. Tyagi[†]

The present study aims at examining the impact of infrastructural facilities provided by the regulated markets of the state on agricultural production and marketing. The study is based on the secondary data collected from different sources. There were in Uttar Pradesh 196 main market yards, 75 sub-market yards, 59 fruits and vegetables market yards, 168 haat/*painth* (rural markets) and 5 fish markets which have already been developed and they are functional as well. In order to facilitate storage, about 245 rural godowns with storage capacity of 1.3 lakh metric tones have also been constructed. For providing goods transportation, 6287 kms of *pucca* road and 8192 culverts have been constructed. Several schemes, viz., storage bins scheme for marginal farmers, construction of market yards in each tehsil, adoption of one village by each Mandi Samiti, transportation facility at sortex plants

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establishment of cool chain plants and establishing Agmark grading laboratories are providing incentives to the farmers to increase their agricultural production and sell through regulated markets of the state. The aforesaid efforts have been fruitful enough in increasing the quantum of agricultural production of the state resulting increase in market arrivals by 77.3 per cent and total income by 789.4 per cent during the period 1984-85 to 1999-2000. The quantum of market arrivals of most of the principal agricultural commodities witnessed positive growth. The farmers who are selling their produce through regulated markets of Uttar Pradesh are getting higher prices than procurement/minimum support prices.

Infrastructural Development and Agricultural Production in Uttar Pradesh

S.K. Singh*

The present study attempts to review the infrastructural development and increase in agriculture production over time in Uttar Pradesh. The data were collected from different sources to show the changes taking place in infrastructural development and agriculture production. The availability of fertiliser, implements, irrigated area in ha. and percentage, energy increased from 20500 to 2480971 metric tonnes, 18516 to 1628019, 5209254 to 10715531, 26 to 65.40 per cent, 5698 to 216750 (lakh KWH) between 1951 to 1994-95 respectively. The transport facilities increased from 129266 to 2772331 from 1980-81 to 1994-95. The rail route length has developed from 8619 km in 1970-71 to 8929 km in 1994-95. The road length in the state developed from 13752 to 84789 km. in 1950-51 to 1994-95. The storage facilities has increased from 56010 to 1293000 (metric tonnes) between 1950-51 to 1994-95. The number of regulated markets and telephone connections increased from 165 to 264 and 34130 to 542855 in 1994-95 respectively. The agriculture education, research and extension activities in the state are run by the three agricultural universities, one deemed university, one veterinary university and thirty agricultural colleges affiliated by non-agricultural universities. Besides, Uttar Pradesh Council of Agricultural Research, Lucknow is also contributing to increase agricultural production. Consequently, the agriculture production in the state increased four times after Independence.

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Role of Agricultural Produce Market Committee, Washim in Maharashtra

M.N. Waghmare, V.G. Pokharkar and A.V. Deogirkar[†]

The present study was undertaken to study the market structure and performance of the Agricultural Produce Market Committee (APMC), Washim in Vidarbha region of Maharashtra. The study emphasised the following points in order to provide better price to the producers: (a) structure of the APMC market (b) physical marketing facilities (c) performance of APMC market. The data on market arrivals and prices of agricultural commodities were collected from the official records of the market committee. Trends in arrivals and prices, seasonal fluctuations were estimated by using appropriate statistical techniques. In the APMC Washim, farmers constituted 56 per cent of the total representation. All the infrastructure facilities are made available to market users. The method of sale, other market practices and market charges were found to be fair in the market. Storage facilities were inadequate as compared to the total arrivals in the market. The analysis of trends in arrivals and prices revealed that arrivals of jowar, paddy, red gram, green gram and safflower had decreased, while that of wheat, black gram and soybean had increased during the period under study. Prices of all the selected commodities were found to have increased over the entire period. The arrivals of all the commodities were characterised by sharp seasonal fluctuations. There was a glut in the market during the immediate post-harvest period. There was an inverse relationship between arrivals and prices of nearly all the selected commodities excepting wheat, gram and soybean.

Rural Infrastructure: A Micro Study of Agro-Climatic Sub-Zones of Bihar and Jharkhand

R.P. Singh*

An attempt has been made in this study to examine the existing social and economic infrastructure facilities in villages located in different agro-climatic sub-zones of Bihar and Jharkhand states. The social and economic infrastructure analysis revealed that the average population covered by a primary/middle school in Bihar is 2206. Still 20 per cent villages are not having primary school in their villages. Similar situation was also observed in all zones of Jharkhand and nearly 17 per cent

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of the villages do not have a primary school in their villages. More than 53 per cent of the villages do not have civil dispensary facilities and approximately 3500 population is covered by one dispensary while in Jharkhand state only 5 per cent villages are having civil dispensary. Banking facilities was created in 20 per cent villages in Bihar through opening of rural branches but none of bank branches was operating in the selected villages in Jharkhand state. There was no credit co-operative society in all villages of all zones of both the states. Similar situation was also observed in agro-service centre. All the selected households/farmers of all zones of both states did not have such facilities in their villages. Although the villages were fully connected with transport facilities in Bihar nearly 28 per cent villages in Jharkhand state were not connected with transport facilities. Machines like tractors in agricultural operation and tubewells in irrigation are intensively used in all zones of Bihar but its application was very low in Jharkhand. There is need to popularise biogas plant in the rural areas of Bihar and Jharkhand states.

An Appraisal of Required Demand for Tractors Power Energisation in India

R.B. Singh[†]

An attempt has been made to examine the factors responsible for enhancing tractorisation alongwith estimating the future demand for tractors in the country. The study revealed that the tractors in India increased at the rate of 17.06 per cent per annum in period I (1974-75 to 1983-84) but the growth rate declined to 10.41 per cent per annum in period II (1984-85 to 1994-95). The growth rate was maximum in Haryana (24.13 per cent) in period I but during period II, Rajasthan attained the maximum growth rate (19.42 per cent). The tractor population per thousand hectares of net area sown increased from 1.19 in 1974-75 to 4.96 in 1984-85 and 10.64 tractors in the year 1992-93. The interstate tractor concentration revealed that tractor population per thousand hectares of net area sown in different states was quite skewed and it varied between 2.16 and 78.36 tractors in Tamil Nadu and Punjab respectively. The regression analysis indicated that gross irrigated area, demand for tractors in the previous year and real price were significant variables which positively influenced the demand for tractors in India during period I (1966-67 to 1979-80) whereas in period II (1980-81 to 1992-93) the area under high-yielding varieties also found out to be significant variable alongwith gross irrigated area. Thus the following observations emerged from the study. Firstly, the rate of growth of tractors was observed to be higher in those states where there was low level of tractors in the base period. Secondly, the growth of tractors, in general, was higher during the first period

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which could be attributed to the Green Revolution which started in the mid-sixties but spread during this period. Thus it was the impact of green Revolution and new technology that contributed significantly and positively towards the demand for tractors during these years. The study also revealed that when the energy requirements from different sources were converted into standard H.P. hours, the share of mechanical power was the highest and the share of human power the least, even on the bullock operated farms in the existing situation. However, on the tractor operated farms, the share of mechanical energy was as high as the share of animal energy. The demand projections showed that the total demand for tractors in India in the coming years would vary between 17,01,465 tractors in 1997-98 to 22,58,023 tractors in 2024-25.

Rural Development in Haryana: Some Reflections

R.S. Nandal and Ram Singh*

The paper tries to assess the progress of rural development in Haryana after its separation from Punjab in November 1966. The state was considered as economically a poor and backward state in its rural infrastructure development in the country. But soon Haryana made such a tremendous progress not only in agriculture sector but in the development of rural infrastructure also, that it became the second richest state of the country after Punjab. In case of its rural development progress, there were only 19.49 villages in the state which were having the facilities of electrification in 1966-67 and the state achieved 100 per cent electrification in 1970-71. Thus within a short period of five years all the villages were electrified and connected to metalled roads and within a period of 25 years all the 6759 villages were supplied with the facilities of safe drinking water. In case of medical facilities to the rural people though a large number of medical centers have been opened in the rural areas, the rate of infant mortality in rural areas is higher when compared with the urban areas. Thus Haryana made tremendous progress in agriculture and rural development infrastructure and set an example for other states of the country for this growth and development in a very short period. However the state has not been successful for controlling its population growth. The birth rate in rural areas is still very high. If the state successfully controls the high birth rate in rural areas and its population growth also, then Haryana can emerge as the richest state of the country.

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State of Rural Infrastructure in Andhra Pradesh: 2000-2005

Sneha Nalla[†]

The paper analyses the state of rural infrastructure in the three regions of Andhra Pradesh based on the developments after globalisation. They include irrigation, technology, credit, roads, electricity, communications and education. Irrigation is the most important of all these. Rural infrastructure has a positive impact on the gross domestic product. Imbalance in economic development between urban and rural areas can be solved through the development of rural infrastructure. The public sector's role is felt necessary in increasing the availability of the infrastructure thereby encouraging the badly needed private investment.

Economic Return from Investment on Minor Irrigation Project under Rainfed Farming Situation of Raipur District in Chhattisgarh State

A.K. Koshta and M.R. Chandrakar*

The farmers under rainfed situation invest own funds for installation of tubewell irrigation by availing the subsidy facilities under Kishan Samriddhi Yojana, Sakambri Yojana and Minor Irrigation Projects. The present study therefore seeks to examine the: (i) pattern of investment in on-farm infrastructure, (ii) income derived from on-farm and non-farm activities, (iii) expenditure and savings of the sample farmers in rainfed and tubewell irrigation situations and (iv) to suggest the policy implications. A study was conducted purposively in Raipur district of Chhattisgarh because most of the schemes on minor irrigation sources are running successfully in the district. Out of 15 blocks of Raipur district, Tarpongi and Raveli villages were identified and selected from Tilda and Abhanpur blocks for the rainfed and tubewell irrigation situations. The small and large farm size groups were categorised as 2-4 ha and above 4 ha cropped area. The proportionate sampling was undertaken for selection of 58 farmers, under rainfed and tubewell irrigation situations. The primary data were collected on the respective economic parameters for the year 2005-06. The empirical findings envisaged that farmers under tubewell irrigation followed cropping pattern as Paddy + Vegetables – Vegetables– Paddy + Vegetables (summer). The farms under rainfed situation followed Paddy (kharif) – Wheat + Gram + Lathyrus + Lentil (rabi)- fallow (summer). The cropping intensity was significantly high under the farms of tubewell irrigation as compared to farms under rainfed situation. The gross investment in on-farm infrastructure under small and large farms of tubewell

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irrigation situation was Rs. 87,801 and Rs. 2,30,118 as large as 235.55 and 60.89 per cent compared to respective farms under rainfed situation. Despite the other investments in on-farm infrastructure in addition to availing the subsidy facilities under the schemes of Kishan Samriddhi Yojana, Sakambri Yojana and Minor Irrigation Projects, small and large farmers under tubewell irrigation invested 54.60 and 35.21 per cent from their own funds to promote personal investment in on-farm infrastructure. The policy implications suggested on the basis of empirical results of the study are that the state goal of crop diversification can be achieved under rainfed farming situation with the introduction of tubewell irrigation facilities (assured irrigation) because of low cropping intensity under small and large farms of rainfed situation. It is suggested that the policy makers can promote long-term schemes for minor irrigation to achieve the state goal of crop diversification. The cultivation of summer paddy allowed over-exploitation of ground water in tubewell irrigation situation and needs to be banned or discouraged by introducing high value crops in place of summer paddy for optimum use of ground water. It is being suggested to the state government that the amount may be subsidised if the water current is not available for digging of tubewell to the farmers. In case of success in digging of borewells, a minimum subsidy should be provided to the farmers for their encouragement. Electricity Board of Chhattisgarh should review the fixation of electricity charges for 5 HP and beyond 5 HP tubewell to minimise the wastage of energy and water. The public investment should be made available for strengthening the tubewell source in favour of marginal and small farmers on co-operative basis managed by Village Panchayat.

An Analysis of Outlay for Research and Development in Agriculture

B.V. Pagire, G.G. Joshi and D.B. Yadav[†]

Agricultural research has played a crucial role in growth and development of rural India in a way to increase agricultural production by evolving high-yielding, pest and disease resistant varieties of crops and improved crop production technologies. The New Economic Policy since 1991-92 and the globalisation of the Indian economy has created a changed atmosphere in the agricultural sector. Following the changes in policy, agricultural research requires to be reoriented on priority basis to meet the new challenges. The expenditure on research and development activities in the country, though had not kept pace with time, but the positive impact on establishing the research institutes, centres has been witnessed gradually. The Indian Council of Agricultural Research (ICAR) is giving real boost for agricultural research in the country, in addition to state agricultural universities.

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With the massive efforts of ICAR and SAUs, though not having consistency in their outlays and expenditure, the positive impact of this on total increase in the agricultural production and productivity of major crops could be seen. Therefore, year to year monitoring, evaluation and critical appraisal of the outlays and expenditure on agricultural research and development activities both of Central and state governments are of vital importance.

Status of Storage Structures with Special Reference to Maharashtra

H.R. Shinde and B.K. Mali*

Storing of the food materials in good condition is tantamount to addition to the production of more food. Therefore, the storage facilities at large and at producing centers should be our concern. Maharashtra state even though being an advanced state in the production of foodgrains, fruits and vegetables, the storage facilities even for the foodgrains seem to be very inadequate. The total storage capacity of the central and state warehouses created was 1,331 and 1,158 thousand tonnes by the end of the year 2004. Through the Centre Sector Scheme 'Gramin Bhandaran Yojana' an amount Rs. 16.08 crores for the construction of godowns and Rs. 1.28 crores for renovation were sanctioned for Maharashtra. Under the renovation and upgradation programmes of storage structures through internationally-aided funds, the NCDC proposed 1243 and 723 as rural and marketing godowns, respectively with the release of an amount of Rs. 5656 lakhs by the end of 2003. However, the storage structures in the state of Maharashtra have not kept pace with the agricultural production. Both, the State and Central Government have great scope to initiate the work in this regard on priority basis for food security, for the safety of the food and bring down the huge post-harvest losses because of handling, storage, etc.

Economics of Processing of Kokum Fruits in South Konkan Region of Maharashtra State

A.C. Deorukhakar, M.M. Gawas and M.B. Nikam[†]

The present study was conducted in Sindhudurg district of Maharashtra state to study the cost and returns structure in kokum processing units and to estimate value addition as well as employment potential in kokum processing units. The data from 30 kokum processing units were collected with the help of specially designed

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schedules. The data pertain to the production season of 2003-2004. The study revealed that the total cost of processing of one quintal fruits for kokum syrup was Rs. 2441/-, for agal Rs. 868/- and for kokum rind it was Rs. 1102/-. The gross returns obtained after processing one quintal kokum fruits into kokum syrup was Rs. 3780/-, where as gross returns from kokum agal and kokum rind amounted to Rs. 1344/- and Rs. 1707/- respectively. The net returns obtained were Rs. 1340/-, Rs. 476/- and Rs. 605/-, respectively, from kokum syrup, kokum agal and kokum rind. The employment generation was more due to the seasonal nature of work.

Rural Sanitation and Drinking Water Supply with Special Reference to Kanyakumari District

J. Cyril Kanmony*

Even though, the Government expenditure on drinking water supply and sanitation increases from plan to plan and budget to budget, these facilities have not reached the regions and houses where poor people reside. The people of Kanyakumari District also are no exception to this. They face all types of hardships in getting the required quantity of drinking water. The water supplied by the local bodies is not safe as it is taken from open wells and not treated properly. The percentage of households depending on piped water has just increased from 27.61 in 1991 to 33.33 in 2001. The percentage increases from 32.68 to 38.89 respectively if the households having hand pump/tube well are included. The quantity of water supplied by local bodies is also not adequate and even. The water supplied is only 7.50 litres per capita per day (lpcd) for the people who depend on public tap in the rural coastal area. The overall supply of drinking water is only 4.01 lpcd in the rural hilly areas. The factors which affect the consumption of water positively are income and water sources within premises and the negative factors are total membership and the level of dependence on surface sources. The factor, plinth area of the house is insignificant. With the availability of medicines and the steps taken by the Government to improve the drinking water supply and sanitation facilities, there is a considerable reduction in the occurrence of important water-related diseases.

Lift Irrigation and Water Management for Poverty Alleviation: A Case Study

R.D. Khodaskar[†]

An attempt is made to evaluate the performance of “Sri Chintamani Sahakari Pani Puraotha Sanstha, Maryadit, Avasari Budruk” village in Ambegaon taluka of

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Pune district of Maharashtra which is purposively selected for this study. The scheme is on the Ghod river with culturable command area of about 28 ha. An open well has been dug on the banks of the river and two electric pumpsets of 20-HP each have been installed for lifting water. The cost of this construction was Rs.2,24,000. The study pertains to the year 2005-06. Fifteen farmers (case studies) grouped under small, medium and large size categories, were selected randomly from the study area. The village is progressive, with the population having better educational status. The land is irrigated. Credit facility is available to farmers who use improved seeds, apply chemical fertilisers and protect the crops from pests and diseases. Overall, the average size of holding was 3 ha and average size of family was 4.7 adult units. It has been found that with the installation of lift irrigation project, the productivity of principal crops, income and employment have increased significantly. The sample farmers cultivated vegetable crops in both the seasons (*kharif* and *rabi*). On an average the profit on cost A basis for tomato, potato, onion and cauliflower was Rs.30,764, Rs. 12,699, Rs. 10,090 and Rs. 8,723 per ha respectively, whereas the per ha profit on cost A basis for bajra, groundnut and wheat was Rs. 3,524, Rs. 6,523 and Rs. 7,541 respectively. Thus farmers could take advantage of more profitable crops grown in the area. The project has been able to prevent out-migration and disintegration of the families. It has provided better infrastructural facilities like health, education, roads, etc., improved the living conditions and promoted the development of livestock in the village.

Dynamics of Information and Communication Technology for Rural Development

V.P. Mehta, J.C. Karwasra and C.L. Shiv Kumar*

In the study several initiatives providing ICT-based services in rural India were analysed. A broad overview of the economic impacts of ICTs has been provided and issues relevant to service providers (government or private), project partners and end-users. It has been worked out that there is a long list of services that can be provided to a section of rural households, even at relatively low levels of income. This creates challenges for implementation by posing choices for organisations, but also the opportunities for creating social impacts. Finally, three such ICT-based projects namely, Gyandoot, Nai Disha and Drishtee have been discussed. All the organisations discussed here face common issues of implementation, but differ in terms of how they have been handled. There are differences in scale, connectivity technologies, services offered, ownership, revenue models, organisational structures,

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and so on. Clearly, focused efforts with substantial financial and organisation backing have a good chance of success. However, even startups that have put together the required competencies and resources through partnerships and slow organisation building appear to have room in this market. There appears to be enough evidence now that it is commercially feasible to use ICT to deliver services to the rural population either at cost that are lower than previous delivery methods, or in ways that make it possible to achieve delivery where none was earlier cost effective or feasible. In the long run, bringing rich information to the population of rural India, whether in the form of education, market prices, market opportunities, and more, can only have positive impact on the material well being of rural masses.

Impact of Infrastructure on Agricultural Productivity and Poverty in India

P. Nasurudeen and N. Mahesh[†]

The findings of the present study indicated that the growth rate of both gross capital formation and agricultural gross capital formation was lower during pre-liberalisation period as compared to post-liberalisation period. The growth of AGCF was higher during (2.33 per cent) post-liberalisation period when compared to the pre-liberalisation period (0.41 per cent). It might be due to sustained investment by private sector during post-liberalisation period. The effect of infrastructure in the agricultural sector on the productivity was measured by a translog production function. It was higher during post-liberalisation period, with an estimate of 0.69 as compared to the pre-liberalisation period (0.35). The results further indicated that the higher the per capita expenditure, the more the supply of money in the financial markets. And investment on rural infrastructure were the highly responsible for the income disparities in the country. In recent years, there has been growing recognition for investment in infrastructure and the development of the financial markets to stimulate the agricultural growth in the country.

An Economic Performance of Tank Irrigation under Different Management Regimes in Madurai District

J.S. Amarnath and P. Karthik Raja*

The objective of the study is to analyse the performance of tank irrigation, to study the productivity and to assess the investment on tank rehabilitation. The productivity analysis revealed that rehabilitation leads to increased irrigation intensity, as the variable was significant in all management regimes and less

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significant in non-rehabilitated tank. The investment analysis showed that net present worth is positive in all the three rehabilitated tanks. The B-C ratio was 6.93 in panchayat tank rehabilitated with community well management regime (PTC), 6.23 in PWD tank rehabilitated and 5.23 in Panchayat tank rehabilitated (PT). The internal rate of return was 26.96 per cent in PTC, 39.10 per cent in PWD and 34.90 per cent in PT.

Agriculture in Coastal Eco-System: An Inventory

Amit Kar, Sant Kumar, Shiv Kumar and Puran Chand[†]

This paper attempts to provide information on infrastructure and the profile of coastal areas. Such information is important for understanding the problems and in designing suitable programmes. The study is based on district level information. A comparison of the coastal and non-coastal districts of the country revealed that there exists a clear differences between coastal and non-coastal districts on certain characteristics. The differences observed were subjected to statistical test and found to be significant for population dependent on services between coastal and non-coastal region, while other demographic features have not shown significant difference. With regard to land use pattern, outlay on net cropped area has shown significant difference. Significant differences have also been observed for area under cereals and oilseed between coastal and non-coastal region. The significant difference for cereals may be due to area under coarse cereals. This is because rice area has not shown difference between coastal and non-coastal region. For infrastructural parameters, except bank branches per lakh of population, the other parameters have not shown any significant difference. Productivity levels have shown significant difference for sorghum, oilseeds, pulses, between coastal and non-coastal districts. Source wise irrigation facility, modern inputs used and relative development index have not shown any significant difference between coastal non-coastal districts.

Agricultural Infrastructure and Its Impact on Economic Growth of Haryana

R.S. Tripathi, Ram Suresh and D.V. Singh*

The study is based on time series data of Haryana state collected from 1966-67 to 2004-05 on infrastructure development and economic growth. It is evident from the data that the average annual growth rate of the gross cropped area was 0.53 per cent during the last 25 years from 1980-81 to 2004-05. Irrigation facilities have

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increased at an average annual rate of 0.49 per cent covering 85 per cent of the net area sown, out of which canals and tubewells covered 50 per cent each. The density of tubewells has reached at 0.22 per ha in rice-based cropping areas of the state. So far, nearly 282 thousand ha salt affected land has been reclaimed and the remaining 190 thousand ha saline and 330 thousand ha alkali lands are under process of reclamation. The underground water of about two-third part of the state is of poor quality causing salinity and waterlogging. Haryana has made remarkable progress in mechanisation of agriculture during the last 25 years. A remarkable increase in food grains production was recorded in Haryana since 1966-67 when it formed as a new state. Now Haryana, together with its neighbouring state Punjab, is the largest contributor to the central pool of the food security. The production of food grains in the state was 2592 thousand tonnes in 1966-67 has increased to 13811 thousand tonnes during the year 2005-06, indicating 26.51 per cent average annual growth rate during the year 1980-81 over the year 1971-72 and 58.29 per cent in 1990-91 as compared to 1980-81. The rate of growth of food grains increased by 39.07 per cent from 1990-91 to 2000-01 and 3.59 per cent during the last 25 years from 1980-81 to 2004-05. As a result of improved and efficient veterinary services, milk production in the state has increased to 5472 thousand metric tonne in 2004-05 from 2187 thousand metric tonne in 1980-81, showing 4.18 per cent annual average rate of growth. Haryana state has witnessed huge amount of gross fixed assets and capital formation in terms of buildings, roads, bridges, plant machineries, farm implements and tools, transport equipments, etc. The statistical analysis depicted that out of 38 selected infrastructure items 27 were highly correlated with the food grains production, capital formation, gross state domestic product (GSDP) and per capita income of the state and had remarkable influence on economic growth as indicated by regression analysis. Some of these important factors are net irrigated area, number of tubewells, length of canals, power availability, fertilisers consumption, storage facilities, number of bank branches, number of Krishi Vigyan Kendras, number of regulated markets and number of health and educational institutions functioning in the state. The results proved that the basic infrastructure developed in the state has crucial and significant influence on the economic growth of Haryana. Thus, Haryana has made remarkable progress in developing the basic infrastructure required for over all economic growth of the state by managing its land resources, enhancing irrigation facilities, mechanisation of farming at the highest level, increasing power and energy availability, raising consumption of fertilisers, strengthening storage and marketing facilities, intensifying credit and input supply services, creating strong network of transport and communication, providing good connectivity to rural areas and electricity to all the villages, strengthening village institutions, improving educational and health services and creating effective veterinary services in the state. As a result of strong and intensified infrastructure, a remarkable economic growth has been achieved in Haryana particularly in respect of food grains and milk production, gross fixed assets, capital formation, gross state domestic product and per capita income.

Growth of Agricultural Commodity Markets in Haryana

R.K. Grover, Puran Mal and R.S. Chauhan[†]

The present study is based on secondary as well as primary data collected from various published sources. To capture the effect of recent past on pattern of growth, the data were analysed for three time periods, viz., Period I (1986-87 to 2004-05), Period II (1986-87 to 1995-96) and Period III (1996-97 to 2004-05). The results of the study revealed that over the years a significant growth in the infrastructure facilities required for orderly marketing of agricultural produce has been attained. However, there has been an emphasis on vertical expansion of the markets than horizontal expansion in the recent past in Haryana. This seems to be quite relevant also in the present day context keeping in view the increased and efficient means of transportation and telecommunication and development level of basic market infrastructure in the state. With regulation of agricultural commodities markets along with the increased production, the volume of market arrivals has also increased in the markets of Haryana. The negative growth observed in the arrival of some of the commodities is on account of drastic reduction in their production. Consequent upon the increased arrivals, the income of market committees has also increased significantly which is being ploughed back for further expansion of infrastructure facilities including development of rural roads conducive to the interest of primary producers and ultimate consumers. It is encouraging to note that all the infrastructure facilities available in the regulated market of Hisar fulfill the requirement of the market regulation act.

Status of Contract Farming for Agricultural Diversification in Agricultural Development in Uttar Pradesh: A Study of Performance and Problems

Ram Bhushan Trivedi, Mahichan and Vinod Kumar*

The paper examines the role of contract farming in agricultural diversification and development in terms of its practice and implications for the producers and the local economy in the most agriculturally developed state of Uttar Pradesh. It explores the nature of contracts, studies the farmer and his perceptions on the working of the contract system and problems, if any; and examines the effect of contract system on the local economy. The studies of contract farming show that the farmers agreed that

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contracting helped them become better farmers, gave more reliable incomes, generated employment for women, provided new skills of farming, and did away with patron-client relationship between the large and small producers. But the farmers generally find that the contracting firms provide poor extension service, over-price their services, pass on the risk to the producers, offer low prices for the produce, favour large farmers, delay payments, do not provide compensation for natural calamity loss and do not explain the pricing method. One of the major issues in the farming sector of the state has been that of the farmer participation in agro-industrial development as it is believed that the capitalist farmers have accumulated, under the green revolution regime, significant investible surpluses which need to be given an outlet for investment. It is important to recognise that what is needed is not less of state intervention but better state intervention for promotion and regulation of economic activities, and organisations and institutions for sustainability. The non-governmental and community organisations which can play a role in providing information and in monitoring and regulating the working of contracts, are unfortunately missing altogether. In fact that was cited as one of the reasons for the farmers' suicides due to crop failure and indebtedness in the state. A legal protection to contract growers as a group is a must to protect them from ill-effects of contracting. There are cases of legal protection given to sub-contracting industries in Japan in their relations with large firms. This set of laws specify the duties and forbidden acts for the large parent firm. The forbidden acts include refusal to receive delivery of commissioned goods, delaying the payment beyond agreed period, discounting of payment returning commissioned goods without good reason, forced price reductions and forcing sub-contractors to pay in advance for materials supplied by the parent firm. These provisions are monitored by the fair trade commission. Interestingly, most of the violations by parent firms were on the written form of contracts and clear terms of the contracts. If contract farming is nothing but the flexible production systems prevalent in industry applied to farm production, then it is logical to extend such legal provisions with necessary modifications to farming contracts.

Small Scale Irrigation Project for Sustainable Agricultural Development – A Case Study of Chikkapadasalagi Barrage in Karnataka

R.S. Poddar[†], G.K. Hiremath*, H. Basavaraja, L.B. Hugar** and Ashok Dalvai[‡]**

A co-operative organisation called Krishna Theera Ryot Sangha (Krishna Basin Farmers' Organisation) constructed the Chikkapadasalagi irrigation project across

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Krishna river during 1987-89. The conception of idea of the project, organisation farmers, mobilising men, money and materials, management and supervision of the project are unique achievements. The present study was taken up to document the different aspects of this agricultural infrastructure project in terms of financing, construction and maintenance and financial implications and its impact in terms of employment generation and secondary benefits. The economic implications of the project were studied with the help of project appraisal tools such as Benefit-Cost Ratio (BCR), Net Present Value (NPV), Internal Rate of Return (IRR) and Pay Back Period (PBP). Linear programming technique was used to develop optimum farm plans and assess the impact of the project. In view of the short pay back period, positive BCR, high NPV and high IRR values, it could be concluded that investments in Chikkapadasalagi barrage were economically feasible. With regard to the employment generation in the irrigated region optimum plan for a large farm with reorganisation of existing technology and abundant capital supply created additional demand for labour. Per hectare net returns obtained in the various plans in the irrigated and unirrigated regions brought out the difference in the farm incomes due to influence of irrigation. Agricultural infrastructure development showed substantial positive growth. The state/central Government can commission survey of the river valley in the state/country to identify the possible projects and sites to encourage participation of local farmer-beneficiaries to execute the project.

Need to Refurbish Information and Communication Technology in Agriculture in the Changing Economic Scenario

Veena Goel*

The study reviews the need to revamp the information and communication technology for a shift from mass production to a differentiated production system to cope up with a highly dynamic fast changing economic scenario. It is based on primary data taken from 142 farmers selected from six villages in two (one each from the more and less developed) blocks in the Ludhiana district of Punjab. The study pertained to the year 2005-06. The study indicated that during the *kharif* season growers concentrate upon mass production due to the existence of public procurement system that ensures easy market access at minimal price risks. For this only a limited market information such as timely announcements of the minimum support prices, market entry of public agencies, produce lifting, etc., accessible easily through the mass media strives the growers' needs while sales are managed through personal links with the commission agents. However, to address the concerns for depleting water levels and realise higher returns it requires adjustments in the

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cropping patterns for a shift to the differentiated production system. To do so growers need an access to a customised commodity and market-specific comprehensive market information for market sales, making intra- and inter-season adjustments in supplies/production to the potential market demand and strengthen market competency individually/collectively in a fast emerging highly risky market environment. To build up the adequate learning capacities of the growers based upon the mutual trusts of the chain partners appropriate communication technologies need to be developed for the various farmer size categories.

An Assessment of Different Sources of Irrigation in Rural Infrastructural Development in Uttar Pradesh

T.R. Singh, Sant Ram, Rajesh Kumar and M.P. Khanna[†]

The paper attempts to compare the operation and performance of different farm categories operating under various degrees flexible and reliable water supply. During the last two decades, irrigation potential has significantly increased in Uttar Pradesh. It has increased from 1.34 lakh hectares in 1960-61 to 2.85 lakh hectares in 1979-80 with an compound growth rate of 2.54 per cent which is significant at 1 per cent level. During the same period, the proportion of gross cropped irrigated area to the total gross cropped area has increased from 7.26 per cent to 13.68 per cent. Under the situation one expects significant positive impact of increased irrigation water on increasing and stabilising productivity, yield per hectare of important crops grown in the state. All the different sources of irrigation are constrained by some or the other limiting sources that gives the sources various degrees of reliability and flexibility. In so far as effectiveness in concerned the growing need of irrigation water has given rise to new sources of irrigation i.e., as a result of non-availability of canal water in desired amount and at desired time, it led to the installation of tunewells, as these were thought to be more reliable and flexible sources of water use. Frequent break down of electric supply turned the electric tubewells unreliable. A shift from electric to diesel operated tubewell brought in another ray of hope for making the system more reliable and flexible. The analysis indicate the positive relationship between the degree of water supply flexibility, and reliability, and use of fertiliser, and other variable inputs. The yields and economic returns were also higher at flexible resources of irrigation. The performance of farmers having diesel plus electric alternative was much better in all respects compared with all other categories. Indications are that they operated at higher production frontier as a result of assured irrigation. Contrasting diesel and electric sources, the latter was found to be superior to the former.

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Rural Development in Andhra Pradesh with Special Reference to Women Self-Help Groups – An Impact Analysis

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An attempt has been made to study the impact assessment (ex-ante and ex-post) of DWCRA (Development of Women and Children in Rural Areas) in Andhra Pradesh in terms of productive assets, income and employment and also to analyse the decomposition of total change in income between two periods. From the study, it was found that the increase in productive assets was highest for small business followed by tailoring and embroidery and hotel industry as the returns were found to be immediate and continuous. The impact assessment of DWCRA on additional income generation has shown that hotel business contributed significantly with 54.89 per cent increase in income over the pre- DWCRA period. It was followed by small business and tailoring and embroidery. The additional employment generated was the highest in case of the activity hotel with 96.08 man-days/year followed by tailoring and embroidery and small business. A decomposition of the change in the income between the two periods, indicated that the income of the beneficiaries increased by 33.86 per cent. The number of days of employment per family emerged as the single largest contributing factor towards the growth in income accounting for around 8 per cent. On the contrary, per capita expenditure on food, clothing and shelter has negative effect on the gross income. DWCRA groups experience problems like lack of awareness about development programmes, inadequate training for improving awareness and skills, lack of competencies/skills to run the enterprises, societal or community pressure for participating in group activities, etc. To overcome these problems, training for improving knowledge and skills, timely and adequate supply of information and resources creating awareness about other opportunities, etc., should be followed by the government.

An Economic Inquiry into the Impact of Rural Water Supply in Karnataka

M.B. Belavatagi, B.S. Naregal and S.C. Matapati[†]

The study attempts to make an economic assessment of rural water supply schemes in Karnataka during the period 1991-92 to 2002-03 and thereby to provide a policy framework for the rural water supply schemes. There exist three important programmes for supply of safe drinking water to the rural population: (i) piped water

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schemes (pws), (ii) mini water supply schemes (Mws) and (iii) borewells fitted with hand pumps (BWS). Bore wells constitute the most important source of rural water supply covering 50 per cent of the requirements in rural Karnataka. Mini water supply schemes show a remarkable progress in the entire coastal area, Malnad and Northern Plains, whereas piped water schemes are dominant in Belgaum, Tumkur, Gulbarga, Kolar and Bangalore (Urban) districts. The sustainability and operation and management of water supply systems play a vital role in the State. The maintenance of all hand pipes should be given to taluk panchayats. In order to create sense of ownership, the assets created by the Government for water supply in rural areas and to make the grassroot level Panchayatraj institutions and user communities responsible for organisation and management, Government should transfer them to Gram Panchayats. Moreover, care should be taken to provide water of quality conforming to the standards prescribed by the Government from time to time. Bore wells fitted with handpumps being a safer means of rural water supply in terms of quality and sustainability, the Government should provide more borewells and encourage local levels organisations to manage them.

Impact of Bhakra Dam Project on Haryana Agriculture Development

R.K. Khatkar, V.K. Singh, A.K. Narang and Kapil*

The net area irrigated has increased from 8 lakh ha in 1953-54 to 29 lakh ha in the year 2001-02 constituting 28.49 per cent and 82.40 per cent to net area sown respectively. Food grains production has increased from 5.39 lakh tonnes in 1950-51 to 139.7 lakh tonnes during 2001-02. The electricity consumption in agriculture sector has increased at a faster rate from 985.07 lakh Kwh in 1966-67 to 50318.48 lakh Kwh during the year 2002-03 accounting for 22.68 per cent and 42.93 per cent to total power consumption in the state respectively, mainly due to increase in number of tubewells. With the dawn of green revolution the area under wheat and rice has increased manifold owing to supply of additional irrigation water and power after implementation of Bhakra project while the area under pulses and coarse cereals has declined drastically. The development and dissemination of new input intensive agricultural production technology accompanied by the development of required infrastructure in terms of irrigation, power, roads and market resulted in increase in the productivity of different crops. The water and power supplied by the Bhakra system has changed the lifeline of the people of Haryana in general and the farmers in particular. The rate of increase in electrically operated tubewells was higher than the diesel operated pumpsets. The number of tractors also has increased at a faster rate. The fertiliser application and the pesticide use in the agriculture sector has increased

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at a faster rate owing to adoption of new agriculture technology after the commencement of Bhakra project. Electric power consumption in agriculture sector has also increased at a faster rate. The development in agriculture has also resulted in increase in the opportunity cost of the land (rental value) as well as increase in the returns over variable cost from different crops over the years. The gross state domestic product from agriculture and animal husbandry sector has increased from Rs. 162 crores in 1960-61 to Rs.16852 crores in 2001-02, recording a jump by 104 times. Due to development of state economy following the implementation of Bhakra project, on the social domain the per capita per day availability of cereals, pulses, total foodgrains, oilseeds has also increased. But the indiscriminate allocation of canal water and non-judicious land use planning in the eastern part of the state has blocked the natural recharging of aquifer which has resulted into sharp decline in the water table in the region. Similarly, over-exploitation of canal irrigation and blockade of natural drainage system through faulty development activities has resulted in faster rise in water table in the south-western part of the state.

Performance of Regulated Markets in Chhattisgarh

A.K. Gauraha[†]

The present study aims to examine the improvement in regulated market infrastructure in the state of Chhattisgarh after its formation. The secondary data pertaining to a number of regulated markets and sub-yards, income, expenditure, arrival of agricultural commodities and the amenities available were collected for the years 2000-01 to 2005-06 from the Office of Chhattisgarh State Agricultural Marketing (Mandi) Board. Chhattisgarh state adopted Madhya Pradesh Krishi Upaj Mandi Act, 1972 in the year 2000. Under this act, all the markets have been regulated. The transaction in these regulated markets are conducted under set rules and regulations. There has been slow growth in the infrastructural facilities which are required for effective marketing of agriculture produce in Chhattisgarh. The number of regulated markets and sub-yards increased from 152 in 2000-01 to 179 in the year 2005-06. The financial performance of regulated market in Chhattisgarh during the period under investigation has been satisfactory indicating healthy growth of agricultural markets. The expenditure pattern shows an increasing trend for the various activities mainly construction, establishment expenses and other developmental works. The overall expenditure increased about 63 per cent in 2005-06 over 2001-02. After the formation of the new State there has been expansion of basic amenities alongwith expansion of market arrivals showing healthy signs of

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proper development of agricultural marketing system in the state. The study concluded that over the years it was not only the number of regulated markets that has increased but the infrastructure facilities required for orderly marketing of agricultural produce has also increased. Over the years with an increasing trend in arrivals, the income from regulated markets has also increased which is being ploughed back for further expansion of infrastructure facilities including development of rural roads conducive to the interest of primary producers and the ultimate consumers. The state has recently designed the market network scheme to cover rural areas with collection centers for grains. The scheme has yet to see the light of the day.

Impact of Irrigation Infrastructure on Water Use Efficiency in the Tank Commands of Northern Karnataka – A Case Study of Drip Irrigation in Sugarcane Cultivation

S.M. Mundinamani, G.S. Dasog, B.K. Naik, S.V. Jahagirdar, Gireeshayya Udagatti and R. Prakash*

The present study attempts to analyse the impact of different methods of irrigation on water use efficiency in sugarcane cultivation in Shedol tank command of Bidar district in northern Karnataka. The data required for the study was obtained from the water management demonstration reports of Community Based Tank Management Consultancy Project, University of Agricultural Sciences, Dharwad for the years 2004-05 and 2005-06. The results of the study revealed that sugarcane is the major crop grown under irrigation in the selected tank command, which occupied nearly 40 per cent of the gross cropped area. Almost all the farmers follow all-furrow irrigation method in sugarcane cultivation, which is excess water consuming and unscientific method. To educate the farmers regarding the most efficient method of irrigation in sugarcane cultivation, the demonstration was conducted on four methods of irrigation namely, alternate furrow, paired row, drip method and paired row with drip method of irrigation considering all-furrow irrigation method as control/check for comparison. The demonstration results revealed that paired row with drip method of irrigation was found to be the most efficient and economical method in sugarcane cultivation. In this method sugarcane crop consumed only 16.10 lakh litres of water followed by drip method of irrigation. The maximum quantity of water was applied under all-furrow method of irrigation (53 lakh litres) but utilised only 45.05 lakh litres incurring 15 per cent loss in conveyance. An additional investment of Rs. 36,250 per ha spent for installation of drip irrigation system has enhanced the area under irrigation by 0.92 ha by saving nearly 30 per cent of water when compared to

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all-furrow method of irrigation. The total cost of cultivation and net returns per ha of sugarcane cultivation worked to be the highest in paired row drip method of irrigation followed by drip method. Creation of drip irrigation infrastructure increased the yield of sugarcane as well as covered more area under irrigation by enhancing water use efficiency. The net returns realised per ha of sugarcane cultivation under paired row drip and drip irrigation methods were Rs. 1,07,4442 and Rs. 85,065, respectively whereas net returns realised per hectare of sugarcane cultivation under all-furrow irrigation method was Rs. 36,016. The results of water management demonstration conducted on different methods of irrigation in sugarcane cultivation showed that the drip method of irrigation not only enhanced the productivity and income of the sugarcane growers but also increased the water use efficiency, which promotes optimum utilisation of nutrients applied to the crop besides overcoming environmental problems.

Rural Housing Programmes in Karnataka

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The objectives of the study are to analyse the government programmes/schemes for rural housing in Karnataka, examine the trends in budgetary funds allocated for housing in Karnataka, to examine the pattern of sites distributed to the poor in Karnataka, to analyse the pattern of houses constructed in the rural areas through the various schemes in Karnataka and to provide policy suggestions for proper implementation of the rural housing schemes. Housing for less poor is considered an important component of the package of basic minimum services in India. Karnataka has made considerable progress in rural housing. Budgetary allocations on housing have increased significantly since Independence. On the other hand, distribution of number of sites were lower in late 1970s, very high in the 1990s and very low in 2000 and onwards. It means the sites were distributed to maximum number of the poor. On the other hand there are complaints relating to the quality of houses, size of the houses, and the other infrastructures like bad roads, lack of electricity, water and sanitation facilities. Corruption is rampant at every stage of the schemes. The schemes are often misused (more than one person benefiting in a family), so the government has to take serious steps to eradicate corruption and misuse in the schemes.

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Flow of Benefits from Tubewell Irrigation: A Study in West Bengal

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Extension of irrigation with financial assistance from banks has been the policy option since last few decades. As a result, sufficient development has taken place in the field of drafting ground water potentials through tubewell. At present, the privately owned tube wells have occupied the pre-eminent position among the sources of irrigation. Tubewell irrigation is being utilised by two types of irrigators: owners of tubewell and purchasers of irrigation through water markets. The irrigation benefits flow equally to either group. The objectives of the paper are (i) to identify the incidence of owners and purchasers of irrigation with their land endowment in the command area of tube wells; (ii) to study the nature of crop pattern, allocation of irrigation, input use and yield rates of crops; (iii) to workout the gross and net returns from cultivating crops; and (iv) to suggest the policy implications. The paper reveals that the small and marginal farmers from either group are the main beneficiaries of tubewell irrigation. The *kharif* and the summer paddy dominate the crop pattern in the irrigated areas of both the owner and purchaser cultivators. However, the shares of the *rabi* crops in the net cropped area are about 44 to 45 per cent. The nature of input use and cost of cultivation for the crops are more or less same between the owners and the purchaser farmers. However, the owners have the tendency for over irrigation, while the non-owners have achieved the efficiency in irrigation by some adjustment and alteration in frequencies of watering. The average yield rates (quintals/hectare) of the crops, are more or less the same between the two groups. Thus, it is suggested that the purchasers of irrigation should be encouraged to construct the irrigation structures of their own. Farmers may be educated to adopt a suitable crop pattern with high, medium and low water intensive crops. Since the non-owning purchasers of irrigation from tubewell are equally efficient to utilise irrigation water, suitable policies are required for the smooth functioning of water markets. Water use efficiencies are often hampered by the irregular supply of electricity and non-availability of diesel and other spare parts. So, arrangements in this spheres, are essential to maintain undisrupted supply of water for irrigation.

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A Study of Changing Pattern of Grower's Share in Consumer's Rupee and their Storage Cost of Potato in Indore District of Madhya Pradesh

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The present study aims to examine the changing structure of marketing costs and margins and the potato grower's share in the consumer's rupee, marketing efficiency of potato and to work out the cost of storage per quintal of potato in district Indore in Madhya Pradesh. The study was conducted on the same sample farms during the years 1991-92, 1997-98 and 2005-06. The study is based on the data collected by survey method from randomly selected 60 potato growers from six villages in Indore block arranged in the descending order of the proportion of area under potato to gross area sown. The Indore block was selected purposively as it had the highest area under potato in the district. Five per cent of the market functionaries in Indore "Vegetable Mandi" were interviewed personally for the collection of information on the marketing of potato. It is a secondary market and a regulated one. The data regarding cost of storage in Indore district were obtained from six cold storages selected randomly. The primary data were collected by direct personal interviews with the respondents. The marketing cost per quintal of potato in Indore vegetable mandi came to Rs. 32 in 1991-92, Rs. 65 in 1997-98 and Rs. 76 in 2005-06. The increases in the marketing cost during recent years are associated with the increase in transport cost, commission charges, loading and unloading charges and bardana (gunny bags) cost, etc. The producer's share in consumer's price at Indore vegetable mandi in the marketing of potato worked out to 70.62 per cent in 2005-06 as against 67.32 per cent in 1991-92 and 65.22 per cent in 1997-98. These variations in the grower's share in different years were mainly due to change in marketing costs. The low producer's share was mainly due to higher marketing and transport charges, on the one hand, and higher middlemen's, on the other. For increasing the producer's profit margin there is need to increase the efficiency of the marketing system by enforcing the regulations and by strengthening the co-operative marketing society so that it can effectively compete with traders. The results of the study indicated that to reduce the price spread, the potato growers should be encouraged to sell their produce through co-operative marketing societies. The processing unit based on potato can play a significant role in fetching reasonable prices if fast foods like chips and papad are prepared rather than selling the potato as such in the market. It is, therefore very essential to establish processing units in rural areas. Although reliable information on village level potato processing is not available thus needs to be streamlined through small scale industries, co-operatives, village panchayats, NGOS, etc. A variety of dehydrated potato products such as papads, potato dice, flakes, chips, potato

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flour/granules etc. can be produced in these small units for local consumption. To improve the marketing system for potato, it has been suggested that the facility of cold storage should be extended at the farmers' level at cheaper rates. The Government should establish adequate cold storage and processing units at the village level for the purpose of orderly marketing of potato to benefit both consumers and producers. The distribution of cold stores in the country needs to be monitored and permission granted for starting new ones in the deficient areas. As the potatoes and potato products are semi-perishable, a strict quality control needs to be enforced. There is need for a firm potato export policy with export incentives.

Sanitation Facilities at High School Level – A Case Study of Malshiras Tehsil

H.S. Nanaware[†]

The present paper attempts to examine the sanitation facilities at high-school level for teachers and students (both boys as well as girls) in Malshiras tehsil in Solapur district of Maharashtra. The study is based on both primary and secondary data. The primary data are obtained from 110 persons, i.e. one teacher, two boys and two girls of each high-school (i.e., 22 teachers, 44 boys and 44 girls) who were selected randomly with the help of pre-prepared questionnaire. The secondary data are obtained from Malshiras Panchayat Samiti Office. The study revealed that the non-grantable high-schools have no sanitation facilities available for teachers, boys or girls. They go home or use open space for toilets or latrines. It is found that majority of the students are ignorant about the importance of sanitation facilities. It is also found that in majority of the aided high-schools toilet facilities were available for girls, but a few girls use this facility. As per 'Likert Scale' the average mean of the teachers, boys and girls responses to toilet is (-) 0.57575 and S.D. is 2.61215. It means toilet facility was found to be very weak and limited at high-school level in the study area.

Economics of Adol Irrigation Project in Washim District of Maharashtra

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A study was undertaken in Malegaon and Risod tehsils of Washim District of Maharashtra state to assess the economics of Adol irrigation project which was completed in the year 1987. The investigation was based on a sample of 60

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beneficiary and 60 non-beneficiary farmers. The data were collected for the year 2003-04 and were tabulated and analysed by using appropriate tools and standard cost concepts. The average family size of beneficiary at overall level was 5.93 while it was 5.98 for the non-beneficiary farmers and the percentage of illiteracy were less in beneficiary than the non-beneficiaries. The cropping pattern followed in the study area was diversified in nature. Soybean, jowar, green gram and black gram are the important crops in *kharif* season grown by beneficiaries and non-beneficiaries. Gram and wheat were the major crops of beneficiaries grown in *rabi* season while gram was the major crop of *rabi* season for non-beneficiaries. The area of soybean increased tremendously and due to this, the area of other *kharif* crops decreased on both farms. Input-output ratio which shows return over investment was found to be higher in the beneficiary farmers than the non-beneficiaries for all crops. Per capita per annum average consumption of food items were found to be more in all size-groups of beneficiary farmers than the non-beneficiary farmers while the average total consumption expenditure at the overall level was Rs. 21, 131 in beneficiary and Rs. 17890 in non-beneficiaries. The highest human labour utilisation was observed on beneficiary farms. Saving at the overall level in case of beneficiaries was Rs. 47, 046 and Rs. 30, 482 of non-beneficiaries. The constraints faced by the beneficiaries are that the irrigation water is not available at proper time and the water losses due to cracks and damage to the canal walls.

Rural Infrastructure and Growth

Swami Prakash Srivastava*

The paper attempts to evaluate the significance of infrastructure in rural economy of India. Recognising the conscious need for creation of basic infrastructure to support agriculture, the rural infrastructure development fund was created within National Bank for Agriculture and Rural Development in 1995-96. According to the Economic Survey 2005-06, the emerging areas which have a high potential for growth in agriculture are horticulture, floriculture, organic farming, genetic engineering, food processing, branding and packaging and futures trading. Indian agriculture is facing demand problems in the form of stagnant per capita consumption of many commodities and a slowdown in agricultural exports. There is a need for some demand side initiatives by increasing rural incomes and diversifying cropping patterns. Adequate insurance is also needed for those carrying out diversification within agriculture or from agriculture to non-agriculture. Diversification itself may increase employment and wages. Also, flagship programmes like the National Rural Employment Guarantee Scheme and the programmes on health and education may increase employment and incomes of the rural people. It may, however, be noted that supply side measures like public investment in irrigation and Bharat Nirman and credit improvements can tackle some of the demand problems by generating employment and wages.

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Infrastructure Development in Vidarbha vis-à-vis Maharashtra

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An attempt is made in the paper to study the extent of infrastructure development in Vidarbha vis-à-vis Maharashtra state. The secondary data have been collected from the published sources. For the purpose data was considered at two points of time, viz., 1990 and 2004. Simple tabular analysis was used for drawing inferences. The study clearly indicates that though the number of irrigation projects increased in Vidarbha and Maharashtra, they were mostly incomplete and hence the irrigation potential could not be exploited. The number of primary agricultural credit societies during 2004 in Vidarbha and Maharashtra were 5169 and 21091, respectively which provided loans to farmers to the tune of Rs. 303 crores and Rs. 37,691 crores, respectively. The number of Government warehouses and regulated markets registered an increase in Vidarbha and Maharashtra. The primary health centres in Vidarbha and Maharashtra were 510 and 1807. It is concluded from the present study that though the number of projects sanctioned have increased, they are incomplete and hence the irrigation potential could not be exploited. Growth of infrastructure such as electricity, primary agricultural credit societies, warehouses, regulated markets, primary health centres, communication and transportation in Vidarbha vis-à-vis Maharashtra is satisfactory.

An Economic Analysis of Fish Production in Agricultural Development in Uttar Pradesh

Jag Mohan Singh Katiyar*

An attempt is made in the paper to study on inland fish breeding farms of Indian major carps in the coastal district of Uttar Pradesh with a view to evaluate the productivity and resource use efficiency. Cobb-Douglas production function analysis revealed that the water spread area on large farms and proportionate cost of breeders on small farms exhibited negatively significant production elasticity since the increase of these resources decreased the gross returns, their use may be curtailed. But human labour and manure and feeds showed positively significant elasticity in both the size groups with a one per cent increase in these inputs, the increase in the gross returns was by 1.25 per cent and by 0.97 per cent in respect of human labour and by 1.12 per cent and by 0.54 per cent in respect of manure and feeds on small and large farms respectively; increasing returns to scale operated on small farms while

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constant returns to scale operated on large farms. The marginal value product to opportunity cost ratios suggest that more profits can be obtained by increasing the size of small farms and the resource use by way of expenditure on breeders on both size groups may be curtailed. In 1976, under revised fisheries policy, a marketing co-operative federation was set up at Baruwa Sagar reservoir to remunerate the fisher's catch through better fish procurement prices and efficient fish marketing. The federation paid remunerative prices and made immediate payments for the fisher's catch, but on marketing front it failed to yield the desirable results. It incurred heavy losses due to inefficient marketing and infrastructure management; the organisational structures and working, particularly on disposal of fish catch at local and terminal markets were highly inefficient. The study clearly indicated that fish marketing process of federation was highly inefficient and at low ebb.

Perspective on Social Infrastructure and Economics of Marketing and Processing of Mint Oil in Barabanki District of Eastern Uttar Pradesh

J.P. Singh, J. Singh, B. Lal and A.K. Singh[†]

An attempt is made in the paper to study the socio-economic status level of mentha growers, economics of processing of mint oil, assess the marketing cost and margins, price spreads in different marketing channels, problems in processing and marketing and also to suggest suitable policy implications. In the light of specific objectives, a sample of 100 mentha growers were interviewed from two blocks, i.e., Banikoder and Puredallai of Barabanki district of eastern Uttar Pradesh. The primary data were collected from the sample mentha growers using pre-tested schedule pertaining to the year 2000-01. The average operational area was 1.17 ha on lower farms and 2.03 ha on the upper farms. The overall results reveal that family occupation, family education, household assets, farm assets, type of houses, and land holding were significant variables which contributed to the socio-economic status level of lower and upper group of mint growers. In view of overcoming the bottlenecks, the following policies are suggested: (i) Foreign trade to derive the indigenous production of menthol. (ii) Encouraging financial assistance for setting up most efficient and cheap field distillation units at the farmers' field for recovery of high quality mint oil. (iii) Stabilisation of prices of mint oil and menthol in the Indian market through setting up nodal marketing outlets in each mentha growing areas of Uttar Pradesh. (iv) To establish effective measures to regulate depression of prices in the local market and diminishing the interest of farmers and (v) Menthol manufacturers and user industries are to be taken into account for production and supply of adequate quantity of mint oil and menthol.

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Awareness of Government Programmes and Perception of People: A Case Study of Three Districts of Maharashtra

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The Maharashtra government has increasingly adopted demand driven approach to development in sectors including water and sanitation. While substantial amounts have been earmarked for development projects, data collected by National Sample Survey Organisation reveals that there are large variations in the proportion of villages covered under different government development programmes and schemes. The present paper has reported the findings of a survey on willingness of rural households to participate in community-driven and community-based development activities. The survey was conducted in 18 villages from the districts of Latur, Nagpur and Raigad. The survey, which was conducted in 2004, covered 540 rural households. We find that there is lack of awareness in the people for the development projects especially drinking water project. On an average only 45.5 per cent of the households are aware of such initiatives for drinking water despite government spending substantial amount of money on such programmes. Although people are willing to participate in programmes relating to health and cleanliness improvement, employment generation and development of primary facilities they have expressed their inability to participate in development programmes and schemes primarily on account of lack of integrity among stake holders, indifferent attitude, and lack of awareness stemming from illiteracy and finally lack of economic resources.

Impact of Women Dairy Project- A Micro-Level Study in Orissa

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The paper is based on evaluation study of “Women Dairy Project-Balasore and Bhadrak districts of Orissa” sponsored by Ministry of Women and Child Development, Government of India in the year 2005. The Women Dairy Project funded under STEP envisaged formation of women dairy co-operative societies and supporting the societies and members by way of creating marketing infrastructure, supplying physical inputs for dairy development and arranging training for office bearers and members. The project created a good impact on dairy sector as a whole and on cross section of beneficiaries. It provided an assured market to milk producers, released them from the clutches of unscrupulous middle men by offering them a fair and transparent deal. The project, thus, created a favorable environment for higher production of milk. During two years period the milk production increased

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by 81 per cent with the average daily production per pourer increasing from 2.6 litres to 4.7 litres. However, the impact was differential on different categories of farmers with big farmers gaining the maximum. The project also introduced several technological changes such as artificial insemination, fodder cultivation, urea treated straw, improved health care and dairy management in the dairy sector, the adoption of which is likely to pick up in coming days. Similarly, the project contributed to the capacity building of members in terms of awareness generation, gain in knowledge, skill development through orientation and training albeit to a varying degree. The project has created a motivating and enabling environment for the members to move ahead and for women leadership to grow.

Infrastructure for Rural Development: An Impact Evaluation of Investments in Rural Roads under RIDF

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The paper is based on the field study conducted in four states, i.e., Gujarat, Punjab, Rajasthan and Tamil Nadu with an overall objective of evaluating the impact of rural roads financed under RIDF on the actual cost of investment, changes in economic benefits in terms of changes in income and employment in the benefited villages in farm, non-farm activities, etc. The study observed that investment in rural road is economically viable with a positive net present value in all the states covered under the study. The economic rate of return (ERR) of the investment calculated on discounted cash flow technique ranged between 20.3 per cent in the case of Tamil Nadu to 36.8 per cent in the case of Gujarat with an overall ERR at 26.1 per cent. Net benefit per km. was in the range of Rs.2.08 lakh in Gujarat and Rs.2.87 lakh in Tamil Nadu per year at reference year's price. Employment generation was uneven not only across the states but also across the sub-sectors, depending upon the level of investment, potential available in the study area, availability of linkages, etc. The percentage of man-days of employment increase ranged from 35 in the case of Punjab to 8 in the case of Rajasthan. The study suggests that in order to accentuate/sustain the results and also to smoothen the implementation of the works, an integration of investment on road with programmes like watershed/waste land development would further consolidate the benefits. After the road projects are completed, additional resource allocations for supplementary infrastructure supports, like, expansion/upgradation/setting up of primary health centers (PHCs), schools, rural drinking water units, veterinary-care/cold-chain units, agri-clinics/agri-business centers, etc. as "RIDF-plus" approach need to be adopted for allround development of villages.

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Rural Infrastructure and Agriculture Growth – A Study in Chhattisgarh

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The paper is based of a study on the roads and bridge projects financed under Rural Infrastructure Development Fund (RIDF) at Abhanpur and Rajim blocks in Raipur district. The paper attempts to study the impact of these projects on the poor, marginal, small farmers of the project area in terms of employment, income and changes in livelihood patterns together with changing pattern of benefits among various stakeholders. The study also looked at the sustainability of investment in these projects and nature of returns against the backdrop of the hypothesis, that is, infrastructure leads to expansion of markets, economies of scale and improvement in market operations, particularly factor markets. Large employment creation was expected in the case of RIDF through the projects implemented and irrigation potentials to be created and production to be reaped. The indirect impact, a priori, seems to be more than the direct impact in consonance with the nature of projects funded under RIDF. The income levels of households have improved by and large because prices of agricultural commodities have gone up.

Financing Post-Harvest Infrastructure for Horticultural Crops: Experiences and Lessons from the National Horticultural Board Soft Loan Schemes

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Development of adequate post-harvest infrastructure (PHI) for horticultural crops is crucial for India to curb huge losses and to facilitate domestic and overseas trade. The National Horticulture Board (NHB) implemented soft loan schemes (SLSs) from 1993-94 for developing PHI for horticultural crops. However, in a short span of five years of implementation of these schemes, a sizeable number of projects entered into depression. This necessitated a review of the SLSs. Therefore, this study was undertaken to examine the performance of SLSs with respect to prime issues such as distribution of projects, infrastructure created, adequacy of loans, time required for loan processing/disbursement and repayment of loan, and to suggest policy measures to improve the SLSs for the development of PHI in the country. The major findings of this study show that the distribution of projects and created infrastructure under SLSs were largely concentrated in Andhra Pradesh, Maharashtra, Haryana,

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Karnataka, Gujarat and Punjab. The extent of financing under SLSs was very inadequate at Rs. 29.70 lakhs per project, far below the ceiling amount of Rs. 1 crore per project. The NHB financed only 26 per cent of the total cost of the project, but were successful in alluring about three times additional private investment for PHI development. The time taken to process and disburse the soft loan varied between 12 to 24 months creating hurdles in effective implementation of projects. On an average, only 6.89 per cent of the total dues were repaid by the PHI units indicating a very poor repayment performance. Finally, the study suggests several policy measures worth considering by the NHB and other stakeholders for the success of SLSs and other similar schemes for the development of PHI for horticultural crops in India.

Impact of Market Infrastructural Development on Market Arrivals in Uttar Pradesh: An Economic Analysis

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An attempt has been made in this paper to examine the development of regulated markets and its impact on market arrivals from the selected markets of major commodities, namely, cotton, wheat, paddy, sugarcane, groundnut from the different markets. The rate of growth in the production of selected commodities in the selected markets during pre- and post-investment period was mainly due to significant growth in area rather than growth in productivity. It might be due to the non-adoption of package of practices, on account of non-availability of required inputs at their door step and lack of knowledge about improved package of practices whereas, during post-investment period, the rate of growth in production was mainly affected by growth in productivity. This might be due to the investments in development of marketing system for inputs as well as outputs and creation of awareness among the farmers about the improved technology of production made available at the market yard resulted in increase of the production and market arrivals. Therefore, investments in the development of markets had positive impact both on productivity well as on arrival. Hence more number of markets can be taken up for development and simultaneously better extension activities are to be carried out in the hinterlands of the market. The rate of growth in market arrivals are marginal in markets where heavy investments were made as compared to low investment markets. This is being confirmed by the fact that already developed market had received higher investment, the impact was not so encouraging by way of attracting more market arrivals. With respect to low market investments, they were considered for investment for the first time and the impact of investment was observed by way of enhanced market arrivals. Therefore there is need to give to priority for less developed or under developed markets for investment purpose.

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Impact of Infrastructure on Agricultural Development in Uttar Pradesh – A Case of Rural Roads

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The study attempts to assess the socio-economic impact of rural roads in the road influence areas. For the purpose, the study has concentrated specially on the impact of rural roads on agricultural development. Road communication plays a crucial role in promoting agricultural development because it has been considered as an essential component of agrarian change. In rural areas agricultural development goes with expansion of roads. Roads links the villages with market or urban centres which results in availability of agricultural inputs such as high-yielding variety seeds, fertilisers, pesticides, etc. at a cheaper price due to easy access to the market as well as reduction in transport cost. Agriculture moves with subsistence farming to commercial farming due to increased facilities. Thus, changes in cropping pattern take place. Farmers in areas with improved access receive higher farm gate prices for their crops. Road improvement also encourages establishment of financial institutions and provide easy access to agricultural credit. Development of rural road network is thus most essential because these roads serve as arteries of the rural economy. It is through the roads that men and materials, and ideas and innovations move in between villages as well as between in villages, markets and urban centres in the rural areas. Improvement of rural road networks will accelerate agricultural as well as other socio-economic transformations of the rural society provided necessary institutional facilities and infrastructure for rural development are also created simultaneously.

Assessment of Minor Forest Produce through Co-operative Societies in Agricultural Development in Tribal Belts of Bundelkhand Region of Uttar Pradesh - A Microlevel Study

Mahesh Singh[†]

The paper attempts to examine the assembling and marketing of minor forest produce in Bundelkhand region of Uttar Pradesh. Bundelkhand region is an important agricultural region in Uttar Pradesh and 36.42 of the area is covered with forest. The region accounts for 17 per cent of total state population and ranks eighth in position in terms of population in the state. Bundelkhand region accounts for 10.8 per cent of the total forest area and ranks first in terms of forest area of the state. Some of the important forest produce in this region are bamboo, babool, tendu leaves, sal seeds,

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tasser cocoon, sowai grass, salai, kusum, pier, assam, etc. These forest produce do not suffer from lack of demand but the complete marketing process is being controlled by middlemen. The importance of the marketing of minor forest produces in this region is also revealed by the fact that many small and cottage industries are dependent on these products. The study presents a dismal picture in the collection, storage and marketing of valuable minor forest produces in the Bundelkhand region. It is evident that efficient tapping of valuable forest produces will not only augment the revenue from forest produce available in this region, but also provide gainful employment and better income to local tribals and other weaker sections of the society. The main task of the co-operative societies has been creation of employment for the local people by way of collecting and pooling of minor forest produces. It would have been better if the cooperatives had provided remunerative returns depending upon the marketing price of minor forest producers to both mates and assemblers who belong to the peasantry class of the tribal area.

Roads and Road Transport in India: Progress, Problems and Remedial Measures

Arjun Singh*

An attempt has been made to analyse the growth performance, financial aspects, problems and remedial measures of roads and road transport in the country. India has a gigantic road network largest in the world aggregating 3.32 million kilometers at present. The National Highways(NHs), State Highways(SHs) and rural roads are basic constituents of the road network. The compound growth rate calculated was 4 per cent annually during 1951-2005 of total road length. The growth of road freight and passenger traffic expanded at the rate of approximately 10 per cent per annum during 1951 to 2001. Similarly good growth rate of registered motor vehicles has been noticed. Since the beginning of the five year plans the per cent outlay of 6.7 per cent in the First Five Year plan has continuously decreased in the subsequent plans. However it has received attention again during the Ninth and Tenth Plans, a 3.9 per cent of the total expenditure has been observed during the Tenth Plan. National Highway Development Project has received great attention during Ninth Five Year Plan and the task is being accomplished during Tenth Plan at a rapid pace. Rural roads have become a central point under National Common Minimum Programme (NCMP) of UPA government and every village of population 1000 (500 in hilly/tribal areas) has been promised connectivity of all weather roads.

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Infrastructure and Agricultural Development in Haryana

K.N. Rai, S.P. Singh, A.K. Dahiya and S.N. Singh[†]

The paper surveys the progress made in developing infrastructure since the inception of Haryana state and relate it with the increase in agricultural production and overall development of the state. Haryana has a well-knit network of inputs distribution. The farm inputs distribution is organised through private traders, co-operatives, agro-industries corporation and Haryana Seeds Development Corporation. All these agencies, both institutional as well as private, have grown over years in length and width. However, the private agencies witnessed phenomenal increase in their sale points as compared to the institutional agencies. The number of sale points of institutional agencies also increased but at a much lower pace than the private agencies. The state has adopted a multi-agency approach consisting of co-operatives, commercial banks and regional rural banks – known as institutional credit finance to provide cheaper, adequate and timely credit to the farmers. Transport, warehousing, marketing and post-harvest management facilities have also witnessed remarkable expansion. Haryana has well-developed road network and is one of the few states in India achieving cent per cent success in rural electrification. All the villages were electrified as early as in 1970. With the commercialisation of agriculture and increased use of processed products which is likely to increase further, the future of agricultural development seems to be closely linked with the development of agro-industries. Agro-industries create both forward as well as backward linkages which hastens the pace of development. Agro-industries in Haryana have impressive growth in terms of number, turnover and human labour employment. The findings of this study lend enough support to the hypothesis that the infrastructure such as tubewells and pumpsets, village credit societies, electricity connections for agriculture purposes, linking villages by roads and opening of organised agricultural markets are a pre-requisite for agricultural growth and development of the state. The regression model used in this paper can also be used to predict agricultural production resulting from changes in the infrastructural variables.

Financing Road and Power Infrastructure in Rural India: Options and Emerging Issues

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Rural roads and electrification are two most effective physical infrastructure components for agricultural development. The paper presents a brief overview of the

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status of road and power infrastructure in India, at the sub-national level; delineates the financing of rural roads and electrification in recent years, discusses the critical issues in current pattern of financing and future approaches in raising funds from alternate sources for further development of these infrastructure facilities. The access to rural roads and power is far from universal and regionally balanced although, undeniably, there has been substantial development of these infrastructural facilities in India over the 58 years since Independence. In general, the agriculturally backward eastern states, have the poorer status of infrastructure while the economically progressive states of Punjab, Haryana, Gujarat, Maharashtra, Kerala and Tamil Nadu are relatively better endowed. The financing of rural road and electrification from public funds is plagued with a plethora of problems like, shortage of funds, non-utilisation of available funds in some states, overlapping of various financing schemes, regional imbalances in fund allocation etc. To reduce the burden on the state exchequer and implement efficiency in operation of the projects alternative modes of mobilising and managing finances have to be facilitated. Relaxing the financial sector regulations for encouraging private flow of capital in infrastructure development is certainly a welcome step in this direction, but the extent to which rural infrastructure sector, characterised by low and uncertain economic returns, stands to benefit from this remains to be seen. The other institutional alternatives for promoting rural infrastructure financing such as, income tax incentives, output based aid schemes, additional sources of revenue etc., need to be explored. Taking the cue from the experiences of other developing countries like China, Lesotho etc., the tapping of non-governmental sources through greater community participation can also be instrumental in improving rural infrastructure. Without adequately addressing the myriad issues in rural infrastructure financing the objective of providing universal access and achieving cross-state parity in infrastructural development will remain a distant dream.

An Ex-Post Analysis of Micro Watershed: A Case Study of Chhattisgarh

K.N.S. Banafar and Rajveer Singh[†]

An attempt has been made in this study to analyse the impact of watershed on cropping pattern, status of income and employment pattern of the selected respondents of command area of watershed. Primary data were collected by personal interview method with the help of pre-tested questionnaires. The information was collected for the pre-project period (1995-96) and post-project period (2003-04). The primary data regarding the farm size, input use, cropping pattern, irrigation facilities,

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crop production and productivity, returns from crop and livestock enterprises, income and employment from different sources etc. were collected from selected households. A sample of 60 respondents was selected for detailed economic analysis. The selected beneficiaries households were classified based on their land holding into different categories, viz., Category-I marginal (0-1 ha.), Category – II small (>1-2 ha.) and Category – III large (above 2 ha.). The study reveals that the total cropped area has increased during the post-project period (2003-04) in all farm size groups. New crops like mustard, lentil and pigeon pea were adopted by the sample farmers resulting in increase of the cropping intensity during post-project period. Non-farm sector consisting of service, business, construction work and allied sectors contributed the major source of employment of selected respondents in the study area. The income from dairying has decreased particularly during post-project period over pre-project period mainly due to decrease in population of milch animals as well as total population of livestock. Decrease in livestock population was because of partial mechanisation in the study area. It was also observed that the area under *rabi* crops has increased to the tune of 98.21 per cent as compared to *kharif* crops (9.78 per cent) in the post-project period over the pre-project period. The employment opportunities in non-farm sector increased tremendously due to urbanisation in surroundings area which creates demand for labour. The findings of the study suggests that allied sectors like sericulture, fisheries, poultry and piggery should be strengthened through various developmental programmes which generate more employment opportunities among the villagers for subsidiary income throughout the year. Water saving irrigation system such as sprinkler and drip irrigation system should be promoted to utilise water efficiently during critical stages of crops. Extension programmes on different crop improvement should be strengthened so that farmers of the study area can adopt high-yielding varieties programme of the different crops. The management of watershed development programme should be in the hands of local governance for better and fruitful results.

Factors and Constraints Affecting Adoption of New Agricultural Technology in Assam with Special Reference to Barpeta District: An Empirical Study

Aftab Uddin Ahmed and K.K. Bagchi[†]

The paper presents an empirical investigation on the determinants and constraints of adoption of new agricultural technology in Assam with special reference to Barpeta district. Specifically it aims to identify the factors which influence the adoption of new technology in agriculture in the study blocks and to find out the constraints in adoption of new agricultural technologies by different categories of

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farmers i.e., large, medium and small farmers, the ultimate unit of sample. The study is based on a farm level primary data collected personally from 10 Community Development Blocks (CD Block) out of 12 blocks of Barpeta District of Assam. The results of the study have identified certain constraints due to which the process of adoption of new agricultural technology in Barpeta district has been slow and interrupted.

Economic Appraisal and Feasibility of the Investment on Tubewell Irrigation in Canal Command Areas of Totlavalluru Mandal in Krishna District of Andhra Pradesh

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The study was undertaken in canal command areas of 'Totlavalluru' mandal in Krishna district of Andhra Pradesh to examine the economic appraisal and feasibility of the investment on tubewell irrigation. All the villages of the mandal were arranged in descending order of net area irrigated by groundwater and three villages, namely, Totlavalluru, Yakamuru and Badrirajupalem were selected randomly. A sample of 30 farmers was selected from each village based on probability proportion to well owners as well as non-well owners, thus making a total sample size of 90 farmers. The reference period for the data collection was 2002-03 agricultural year and field study was conducted during the month of April-May 2004. Data were collected and analysed by employing discounted cash flow techniques like benefit-cost ratio, net present worth, internal rate of return and undiscounted cash flow techniques like pay back period to appraise the feasibility and economic viability of the investment on tubewell irrigation. The benefit-cost ratio was 2.56 while internal rate of return was 28.78 per cent and net present worth was Rs. 91,038, considering an investment of Rs. 35562 per tubewell at current prices with zero marginal cost towards electricity on flat rate basis. The pay back period was 2.65 years. The sensitivity analysis of these project appraisal techniques also proved the financial feasibility and economic viability of the investment on tubewells.

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Privatisation and Regulation of Veterinary Services in India: Some Issues and Implications

Shalander Kumar and N.P. Singh[†]

Economic liberalisation together with increased demand for livestock products in domestic as well as international markets has opened up significant market opportunities for the livestock sector in the country. Nevertheless, the sector's ability to capitalise on the new market opportunities is constrained by the availability and quality of support services. On the health side, the focus all through the past planning periods has been on enhancing the supply of veterinary services. However, all this investment has covered mostly curative services. Preventive veterinary care received scanty attention and coverage of animals has been below the level of effective protection since more than 10,000 animals are covered by a veterinary institution in the major livestock producing states. There is also little emphasis on extension, training, feed, and fodder resource development. The price has not been observed to be an important determination of the decision to use veterinary services especially for large ruminants. Therefore, there is an urgent need to re-evaluate and re-orient the Government's current strategy for delivery of livestock services. The rising demand for livestock products would translate into a similar sharp increase in demand for livestock services by farmers in the decades to come. Given the significant positive willingness to pay for veterinary services by all income groups it opens a critical window of opportunity for the Government to share the responsibility of delivering livestock services with private providers. Complete privatisation of service delivery in the immediate future may, however, not be a feasible option or even desirable. For a long time to come, therefore, presence of the Government in livestock service delivery is inevitable. Private delivery of those services that are private goods, however, should be the goal. Introduction of partial cost recovery is the first step towards creating a level playing field for private practitioners. However, the next essential step would be to restrain Government veterinarians and inseminators from engaging in private practice. In the longer term, as the private livestock services sector develops and takes over, the Government could dedicate itself to the 'public good' tasks such as policy development and other services that has tended to be neglected due to limited budgetary resources. These include disease surveillance, sanitary control, disease prevention, food hygiene and other development tasks, such as technology generation and dissemination to the extent not carried out by the private sector and natural resource management related activities. The non-governmental organisations and co-operative societies working in the livestock sector may also play a significant role in providing livestock services to the farmers.

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