Agro-Climatic Regional Planning Project

PLANNING COMMISSION

INDIA

AGRO-CLIMATIC ZONES

1 WESTERN HIMALAYAN
2 EASTERN HIMALAYAN
3 LOWER GANGETIC PLAINS
4 MIDDLE GANGETIC PLAINS
5 UPPER GANGETIC PLAINS
6 TRANS GANGETIC PLAINS
7 EASTERN PLATEAU & HILLS
8 CENTRAL PLATEAU & HILLS
9 WESTERN PLATEAU & HILLS
10 SOUTHERN PLATEAU & HILLS
11 EAST COAST PLAINS & HILLS
12 WEST COAST PLAINS & HILLS
13 GUJARAT PLAINS & HILLS
14 WESTERN DRY REGION
15 ISLANDS

AGRO-CLIMATIC REGIONAL PLANNING UNIT

SARDAR PATEL INSTITUTE OF ECONOMIC & SOCIAL RESEARCH
AHMEDABAD

Agro-Climatic Regional Planning Project
Planning Commission

- A Profile

GS Guha

Agro-Climatic Regional Planning Unit
Sardar Patel Institute of Economic & Social Research
Thaltej, Ahmedabad- 380054, INDIA

September 1995

Acknowledgement

A significant attainment of the Agro-Climatic Regional Planning Project has been the creation and sustenance of an excellent countrywide network of Scientist, Economists, Planners and Experts working together on an innovative philosophy of planning. Since the seven years of its inception, the project has been enriched by extensive research in which Professional Governmental and Voluntary agencies have contributed from all over the country. An effort of this nature required a high order of intellectual and organisational abilities. **Dr. DN Basu** was the prime motivator since the inception of the ACRP project. His meticulous planning, commitment, perception and direction had been the key to the enhancement and the success of the project. He was a binding factor in creating a remarkable network of intellectuals in the country and his sad demise has been an irreplacable loss for the Project.

The Project shall always remain grateful for the encouragement, guidance and support received at policy levels from *Hon'ble* **Shri Pranab Mukherjee**, *Deputy Chairman*, **Dr. YK Alagh**, **Dr. Har Swarup Singh**, **Prof Sher Singh**, all *Former Members* and **Dr. Jayant Patil**, *Current Member (Agri)* Planning Commission, who has truly institutionalised ACRP in India. Also in the Planning Commission, the Project has benefitted at various stages from the support of **Dr. SS Khanna, Mrs. Priya Prakash, Shri K Rajan, Shri Bhaskar Barua, Shri VK Pandit,** *Advisers*, **Dr. MK Mathur,** *Jt. Adviser* **Shri Sudhir Bhandari**, *Director (Finance)*.

The Zonal Planning Teams (ZPT) have been the backbone of the ACRP Project from the outset. Their individual contribution at every stage of this research endeavour has truely been path breaking. The names key resource persons forms an annexure of this report.

The Project has been fortunate to have associated with eminent experts from different specialisations and consultants from different organisations. These organisations have been named in another annex of this report.

A major part of the Agro-Climatic Regional Planning exercise is coordinated by the inputs received by the Central Organisation of the ACRP project namely ARPU and the SPIESR, Ahmedabad. **Prof. RJ Mody**, *Director, SPIESR* and his colleagues have been a constant source of inspiration and encouragement to ARPU, throughout the duration of the project. The consistently high quality of output provided by the team of staff and consultants of ARPU, Ahmedabad collectively is rather impressive.

This paper intends to familiarise the reader with the Project, its current status and the body of research work associated with the ACRP exercise. Any errors/ ommissions are not the responsibility of the sponsoring agency (Planning Commission) and are entirely the author's.

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AGRO-CLIMATIC REGIONAL PLANNING IN INDIA

GS Guha

1. Preamble

It has been often emphasised by scholars that disproportionate efforts are required for obtaining additional outputs from the few regions of high resource concentration. Evidently, newer regions, with inherent and created potentials have to be addressed through planned inputs and technology. The new planning paradigm requires to tackle regional imbalances, the inadequacies in developmental inputs, as also workout longer term solutions to the issue of food securities.

The four-decades of agricultural planning in India had three distinct phases or characters. The pre-green revolution period (1950 through 1965) was the first phase characterized by extensive growth strategy. Output had a significantly greater dependence on area increases, land reforms and expansion of irrigation. About two thirds of the growth in output was due to area increases and only a third could be attributable to yield growth. This was replaced by the emergence of the new intensive strategy of technology led-growth, and characterised by Borlaug-seed-fertiliser technology. The post green revolution period upto the end of 1980s witnessed reliance on high productivity regions and productivity augmenting techniques.

The Agro-climatic Regional Planning (ACRP) Project is an explict recognition of the concern for social and intergenerational equity in resource use. As emphasized by Bhalla "The ACRP brought to light, for the first time, the interface between technology-based growth and natural resource endowments by examining the growth performance from a perspective of agro-climatic regions delineated by the Planning Commission in 1988". This view of development is envisage to ensure consistency between the socio-and eco systems and gives content to the concept of sustainability. In terms of planning tasks this would entail taking stock of resource potentials as well as criticalities to determine ecological boundaries. Efficiencies of resource use, as a result of alternative technologies need to be measured against both spatial and temporal equity.

The message that emerges is that the country is at the threshold of a new development paradigm. In retrospect, it is easy enough to criticize the policies and generic solutions prescribed in the initial phase of planning. But, it is also important to recognize that the overriding consideration at that stage was food security and

hence, the planners were forced to adopt short-term resource exploitation measures. However, after having invested in rural infrastructure and input delivery systems for 40 years, and also in the light of expectations of liberalized trade regimes in the future, it is now necessary to rethink our strategic options. It is obvious, that given the negative long-term manifestations of hitherto adopted technology solutions, generalizations and short-term measures are necessarily to be avoided. Every technical option has to be critically evaluated, both vis-a-vis local suitability as well as for inter-generational equity. Otherwise, instances of problem soils, water-logging and similar resource related problems, resulting from indiscriminate applications of technology, fertilizer and irrigation etc. would increase exponentially.

2. The Essence of ACRP

ACRP, a distinctive planning approach applied to agriculture and allied sectors is essentially resource-based planning. All other parameters or features associated with ACRP are either derived from this essentiality or are incidental to it. The rationale of this approach stems from the significance of long-term resource efficiency (or sustainability). However, it needs mentioning that ACRP is not limited to the dimensions of crop sector alone, but it includes the entire range of land and water resource based activities and is in some sense, subsumed under the broader definition of farming systems.

This brings in the dimensions of technology and sustainability as integral to resource based planning. Technology is a means of utilization of natural resource endowments within the constraints of finance, institutions and social imperatives. In another sense, technology lends an element of dynamism in the changing and more efficient use of land and water resources. Sustainability may be viewed as a subset of this approach with the objective of maximizing growth and long-term efficiency. The logical corollary of this would imply that in the ultimate analysis ACRP approach seeks to achieve the best trade-off between maximization of productive efficiency of given resource endowments through use of appropriate technology and institutions and long-term sustainability of such resource use both in the sense of maintaining inter generational and social equity in the access to resources.

The next important consideration in the ACRP approach is its area spe .city. A holistic approach combining area-based planning, as against a sectoral o nematic approach, characterizes the ACRP exercise. The inherent assumption is that resource-based planning is meaningful only for homogeneous regions with respect to natural resource endowments (specifically, agro-climatic factors) in plan agricul-

ture and allied sectors.

The structural change in our development process embodied through the recently instituted seventy third and seventy fourth Constitutional Amendments, offers unprecedented opportunities for ACRP. Quite distinctively, ACRP approach also provides the desirable interface between macro level, sectoral level and decentralised planning.

In phases the ACRP approach has gone beyond the essential features or dimensions of planning for agriculture and allied sectors. These extensions in the approach centre around two primary considerations namely:

☆ Resource-based planning, which aims at the best trade-off between maximization of productive efficiency and sustainability, should finally be linked to the two intrinsic parameters of national planning, namely income generation and income upgradation (which subsumes poverty eradication).

☆ Operational feasibility of this approach to be established in relation to the institutional, financial and social parameters as obtained in a specific area or at national level.

This extended ACRP approach is thus not only a logical one but brings it closest to implementation feasibility of the programmes emerging from the ACRP based strategies. Thematic papers and the experimental approaches are two practical illustrations of this extended ACRP approach.

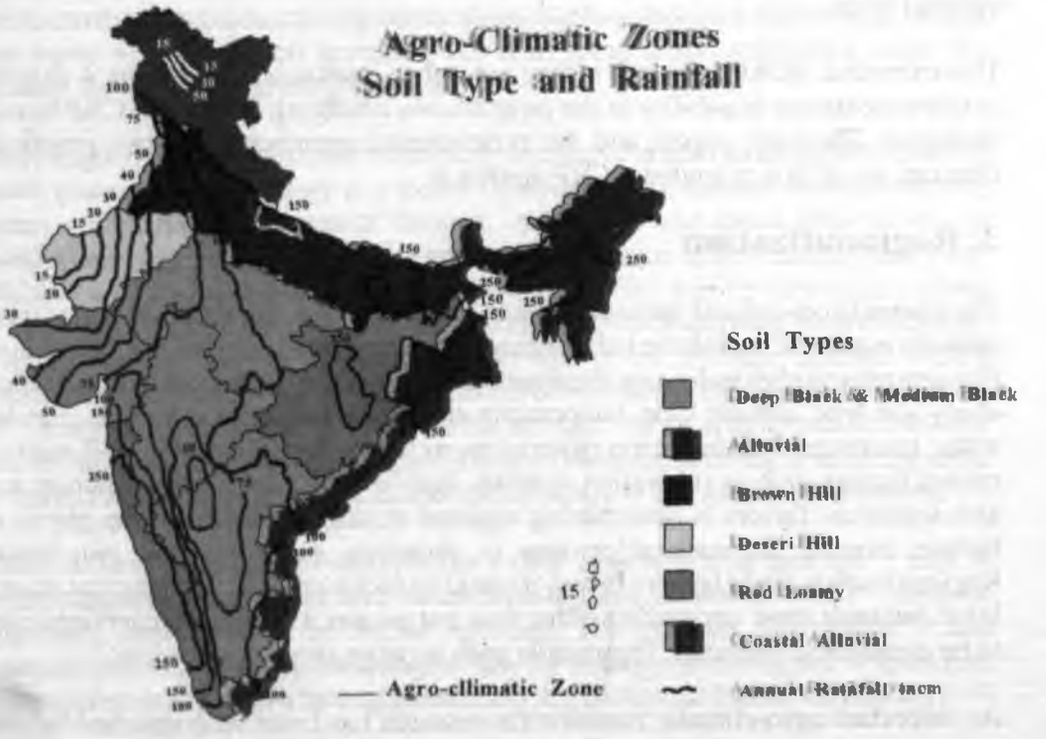
3. Regionalization

The compulsions behind operationalizing agriculture development strategies on a spatially equitable basis have led to regionalisation of Indian agricultural planning. For agricultural regionalisation the determinants are agro-climatic features, particularly soil type, climate type, temperature and rainfall regimes as well as captive water resources. Existing crop patterns as well as other behavioral and market related factors such as cultivation systems, input use, storage and distribution are also important factors in determining regional strategies. However, the physical factors assume the natural priority in dictating strategies and outcomes. Regionalisation could be very broad or could be factor specific and hence at micro level, but both these approaches either lose out on specificities or are too intricate to be considered operable. The middle path is rather more appropriate.

An important agro-climatic zonation for research has been accomplished by the

ICAR through the National Agricultural Research Project (NARP), which was launched in 1979. The NARP zonation extended the ICRISAT pattern by the inclusion of more parameters like temperature radiation, humidity, soil type technology, etc., in refining the agro-climatic zonation. The NARP zonation is arguably the most detailed and sophisticated analysis of its kind. However, the emphasis is on the analysis of agro-ecological situations for upgradation of research and research facilities. It then becomes difficult to stretch the NARP analysis to cover the entire gamut of activities in the rural sector. In that sense it lacks comprehensiveness, although in terms of zonation for crop research the approach could hardly be bettered.

The ACRP approach delineates the country into 15 agro-climatic regions and 73 sub-regions, having a higher degree of commonality. The principles used for this sub-regionalisation related intrinsically with the character of the agricultural economy, namely, soil type, climate, temperature and its variations, rainfall and other agrometereological characteristics, water demand and supply characteristics including quality of water and acquifer conditions.



The approach of ACRP in regionalization is functionally efficient and appropriate. Earlier, attempts were made on the basis of certain factors which could partially describe the regional characteristics. The ICRISAT approach, for example, used soil characteristics or crop growing period and it could discuss crop systems and the related issues of improving its productivity. Similarly one could think of NARP regions by the ICAR which were drawn for the purpose of location based and region specific research in crops and other production related activities. They tend to be partially relevant. When a comprehensive development of regions is considered, it requires a holistic view of system of crops, livestock, fisheries, forestries, horticultural crops and minor non-crop products. This could be facilitated by the ACRP approach which is comprehensive and efficient.

Second, the approach covers not only crops and other sub-systems in terms of output and productivity (all of which influence farm income) but it does also consider comprehensively all aspects of employment, including skill formation. Third, ACRP recognizes the crucial linkage between institutions and farmers, between institutions and development agencies in designing participatory planning and between technologies and infrastructure. Fourth, ACRP seeks to develop the perception of potentials for growth on the basis of resources available and technologies which could be matched and these potentials are presented for consideration and decision. The conventional wisdom of meeting the felt needs through resource use plans and seeking the resources first is replaced by the resource availability related activities and decisions to suit the native resource endowment. When farmers confront the potentialities, these decisions then would become operational. Thus one could note with satisfaction that the ACRP is a functionally efficient approach whose success, however, depends much on information on potentials, options and pay-offs and also on the skills and aptitudes of decision makers to exploit the potentials.

4. Organization

For each of the 15 regions, a Zonal Planning Team (ZPT) was constituted, chaired by a senior Vice-Chancellor of an Agricultural University of the region. The Planning Teams include the agricultural production commissioners,other secretaries concerned, representatives of financial institutions, representatives of Central ministries concerned with agriculture, irrigation, environment and agricultural research. Experts in the field of satellite imagery and cooperation have also been inducted. Care has been taken to have one representative from a voluntary organization in each ZPT. The Directors of regional Agro-Economic Research

Centres (AERC) were co-opted to serve on ZPTs.

The formation of the ZPT represents a significant organisational attainment of the ACRP. In effect for the first time in the country, more than 2000 scientists, economists and planners had been brought together to work on an innovative philosophy of planning.

The Agro-Climatic Regional Planning Unit (ARPU) was set up by the Planning Commission at the Sardar Patel Institute of Economic and Social Research in Ahmedabad, as a central support cell. It was staffed by a senior consultant with specialization in agricultural planning , and a supporting team. The task of this unit was to provide coordination to the activities carried out by the ZPTs. It has also been entrusted with the task of developing an integrated information system and planning models.

The ARPU Information Management System (AIMS) has been developed primarily to serve as a durable knowledge base platform providing area specific information on a variety of subjects, using various analytical techniques. Decision support models have also been evolved based on the AIMS. The Inter-Regional Output Projection Model, using the linear programming framework, is aimed at maximizing returns on land, given regional consumption norms, landuse constraints and the national policy on imports and exports. A micro level simulation model is available for economic appraisal of agriculture programmes, relevant to a region. A Programme Selection Model recommends a programme mix that satisfies the conditions of optimization, specific to an area, without sacrificing equity and operational conditions. A Prototype Expert System (an artificial intelligence shell based model) integrates the ARPU information base and the accumulated knowledge of the experts. It is a valuable tool for the policy makers to diagnose the field level problems in agricultural performance to prescribe cost effective remedies. The prioritization of recommended regional strategies is assisted by the decision support system. A Production Planning Model assists in integrating the sub-regional plans with the National Plan.

The operationalization of the approach and its integration with the VIII Plan is monitored by the Agricultural Division, Planning Commission, though a high level committee. An attempt has been made to link up the Agro-climatic Regional Planning exercise, with State and District level planning and financial institutions.

5 . Work Sequence

The range of activities and multi-stage outputs, leading to the Agro-Climatic Plan for any given geographic level follows a logical sequence. This sequence may be broadly summarised as :-

PROFILE
ISSUES
STRATEGIES
PROGRAMMES
PROJECT
ACTION PLAN.

This sequence has been largely adhered to at all levels, at which the ACRP exercise has been attempted.

Levels :
- I Zone / Sub-zone
- II Major states and state-sub-regions
- III Selected (pilot) districts

Sample of the output of Zonal Planning Teams is given in the table below, which forms the basis of various activities at different levels.

Zonal profiles included detailed descriptions (both quantitative and qualitative) of land and water resources, population, farming systems, support systems to agriculture and allied sectors. These were supplemented with historical information on development patterns, technological and socio-economic issues relevant to integrated development. These profiles were interfaced with perceived regional needs and priorities to work out broad strategies. The ZPTs then worked out specific action plans and programme outlines respective to the revised strategies giving their financial and organizational implications alongwith the physical targets. The Zonal Planning exercise has been suitably documented in a Planning Commission publication entitled "Agro Climatic Regional Planning - An Overview" as well as the ARPU Working Paper No. 2 entitled "Agro-Climatic Zones: Profiles, Issues, Strategies and Programmes".

Table - Sample of Zonal Level Output

Zone	Issues	Strategies
1.	Steep Slopes, Soil erosion, Low Ground Water	Rational Land Use, Soil & Water Conservation
2	High runoff, Chaur lands, Shifting Cultivation.	Soil & Water Conservation, Settled farming.
3.	Floods & Poor Drainage	Reduced Water Conservation in Low Land through embankments, Gully Controles & runoff diversions
4.	Water logging & Salinity.	Water resource management, Conjunctive use of canal & Ground Water, Soil amendments
5	Saline-alkaline lands, Water Logging in Canal Irrigated areas & Low Cropping Intensity	Land Reclamation through Soil amendmants, Water Scheduling, Introduction of Intensive Cropping Patterns.
6.	Saline Lands & Saline Ground Water deteroirating Soil Health.	Soil & Water Managements, Restriction of heavy duty Crops.
7	Undulating Topography, Poor Ground Water Development, Degraded Tanks	Soil & Water Conservation, Ground Water Development & Renovation of Tanks
8.	Soil erosion, Low irrigation development.	Soil & Water Conservation, Development of irrigation & Waste Land Development
9.	Shallow Soils, Low irrigation potential & Drought prone areas.	Conservation of Rain water in-situ & in farm ponds, Development of irrigation encouraging Dryland horticulture
10.	Waste Lands, Saline Soils, Low irrigation, Reduced Tank potential.	Waste Land Development, Encouraging Horticulture, Soil Correction, Restoration of Tanks.
11.	Soil Salinity, Low ground water, Poor Drainage.	Treatment of soils, Rescheduling Canal water, Irrigation development, Encouraging Brakish Water Fish development.
12.	High runoff & erosion, Large amount of waste lands, Low ground water development	Soil & Water conservation, Horticulture development, Ground water development.
13.	Over exploitation of ground water, Saline soils, Drought prone areas	Rationalisation of ground water, Soil correction, Soil and Water conservation
14.	Irregular Rainfall, Shifting Sand Dunes.	Rain water Conservation, Stabilisation of Sand Dunes, development of Agro-forestry.
15.	Undulating topography, High runoff, Low NSA.	Soil & Water conservation, Rain Water harvesting

The zonal exercise was later translated into state-sub-regional agro-climatic plans. In the ACRP state-sub-regional plan, while the basic profiles and strategies were flowing directly out of the zonal exercise, the programmes were refined by state level priorities. Special studies were carried out to substantiate the ZPT recommendations, and to help in evolution of policy. Instances are studies on employment, land use, horticulture, agro-processing, fishery etc. which in many cases were inter-regional.

The ACRP district projects being implemented during the VIII plan have provided some variations in the basic ACRP model of decentralized planning. Four separate sub-models for operationalization may be mentioned. The democratic decentralization model (district panchayat headed by sabhadhipati) available in the Purulia district exercise in West Bengal. Another democratically decentralized model involving district panchayat and state functionaries is available in the Puri district project in Orissa. The Shimoga district plan of Karnataka gives us the chief secretary model, wherein a government functionary at the district level is designated the chief secretary and has a team of elected representatives and functionaries. Finally, there is the committee model based on the Mehsana district project of Gujarat, which is essentially a district committee comprising of representatives of line departments and local agencies. While it is proposed to discuss the details of these models in a separate paper, it may be mentioned that all these models are part of the innovative experiment by the Planning Commission to combine resource based planning with decentralized planning.

6. ACRP in Action

6.1 Resource Use Strategies

The Zonal Planning Teams having inventorised the resource endowments of sub-zone, looked into distinctiveness of those regions in context of critcalities of use of these resources. The distinctiveness is also by way of long-term strategy for sustainable development through appropriate combination of market technology and institution. These can be classified in the following four groups.

a) The level of utilization of natural resources using main parameters like land available for cultivation (LAC), ground water development and cropping intensity.

b) Problems of environmental deterioration arising out of exogeneous forces/ interventions like unscientific use of land and water.

c) Rationalization of existing land and water use through short term corrections, mainly in crop sector.

d) Trade-off between short-term maximisation of production gain and long-term sustainbility.

6.1.1. Degradation Of Resources

Unscientific use of resource endowments, particular land and water, has led to cases of environmental deterioration. Frequent floods and mindless deforestation on the Himalayan border have caused soil erosion and loss of valuable soil nutrients, siltation of reservoirs down below, and impended drainage which has resulted into various degrees of soil degradation into TAL, CHAUR and DIARA lands.

Due to over exploitation of groundwater in trans gangetic plains to irrigate heavy duty crops of paddy-wheat, salinity has surfaced in water besides deterioration in health of soil giving rise to nutritional deficiencies, as can be seen from detailed analysis of Patiala and Karnal districts.

Considerable areas in some of the states like AP, Tamil Nadu, Maharashtra, W.Bengal, Karnataka and Orissa are under tank irrigation. The irrigation capacity of these tanks is declining due to poor maintenance, siltation and encroachment of foreshore areas. All these problems of resource degradation need to be solved for sustained productivity.

6.1.2 Rationalization of Resource Use

Normally cropping pattern of a region should be a reflection of its topography, soil types, rainfall distribution and temperature regimes. However, in a large number of cases, this rationality is not maintained and many unscientific cropping pattern have been observed. Upland paddy in large high rainfall areas in Bihar plateau, crop cultivation on high slopy lands in Eastern Himalayan Regions, subsistence cropping in shallow soils of drought-prone regions of Maharashtra are some of the examples of irrational land use.

Due to poor and unstable yield of upland paddy and great scope for realising unexploited potential of more favourable rainfed areas, the paddy area should give way to more stable and remunerative crops. Another dimension of rationalization of land use has been studies in terms of appropriate farming system involving both crop and non crop activities under various agro-climatic situations.

6.1.3. Trade-off between Long-Term Sustainability and Short-Term Maximization of Production.

Though land and water are basic resource endowments for agricultural development, in anxiety to expedite development process, higher priority was accorded to technological upgradation including high yielding varieties and input management as a short-term strategy. It is now time to attend to the issue of conservation of resources more so in the light of shirinking land mass that will be available for agricultural production in future (only 0.15 ha/capita by 2000 AD). The problems of inadequate drainage, water logging, flooding in delta regions, problems of acidity, salinity and alkalinity, and soil erosion affecting crop yields in lakhs of hectares need to be given importance.

Extensive areas in some states suffer from soil problems. These problems are inherent as well as arisen out of human intervention. All these situations badly restrict the yield levels which otherwise are possible through application of improved technology. The problem of soil correction has been left to the private initiative and individual efforts (with or without subsidy) have not shown any tangible results. Correction of problem soils need to be attended by adopting area approach. This aspect has emerged as priority area in some of the states through ACRP approach and the ZPTs of respective zones/states have emphasised land reclamation strategy as long-term measures.

6.2 Integration of Non-crop Activities in Overall Land use Strategies

Integration of non-crop activities in the overall land use strategies and optimal use of land resource is the heart of the ACRP exercise. Though crop activities form the major portion of land use, other non-crop acitivities like rearing of animals, cultivation of fruits to some extent, and tending to pastures and grazing lands form supplementary or subsidiary activity traditionally. The main focus in resource-based planning of ACRP approach is on comprehensive resource utilization so as to maximise land use through crop as well as non-crop activities working as complimentarity without losing sight of sustainability. The regions which are poor for crop sector alone in terms of land usage can not sustain agriculture to the desired level. Similarly regions having problematic land resource base also are not suitable for crop activity alone. Such areas need to be looked for integration of non-crop acitivities in overall land usage. The integration of crop and non-crop activities can be conceived under broadly following four situations.

a) Non-crop activity works as complementary to crops for better land use and higher income generation.

b) Diversification from crop-activity alone for risk minimization and resource conservation.

c) Sustainability of land productivity so as to maintain properhealth of land resource.

d) Induction of non-crop activities under compulsion for problematic areas where land resource face degradation.

6.2.1 Complementary Land Use and Income Generation

The semi-arid and arid areas as well as hills and plateau regions normally face constraints of moisture which limits productivity of crops. In order to make maximum use of land resource in such regions, livestock rearing activity is commonly associated with croppping. Cultivation of fruits to some extent is seen in hills and plateaus. Such complementary activities to maximize land use are brought out in district plans of Mehsana, West Kameng, Nagaon. In plateau districts like Purulia, cultivation of fruits and normal crop as inter-crop, mulberry for raising silk worms is aimed at land use maximisation. The land around cities are well suited for cultivation of vegetables along with main crops to enhance earning of small land owners.

6.2.2 Diversification and Risk Minimization

Cropping practised on lands of poor fertility having shallow depth, slopy lands having low moisture retention capacity and other lands prone to water starvation is subsistence cropping , barley meeting with the living expenses of farmers. The best option for these lands is to diversify into more meaningful non-crop activities like arid fruit culture, Agro-forestry, silvi-pasture, and like. Large wasteland areas are best suited for such activity mix. Such areas lying unutilized/under utilized in Central and Western Plateau regions can be converted into dry land fruit belts, and silvi-pastoral activity to promote dairy industry.

The districts of Solapur in Maharashtra and Tumkur in Karnataka are two good examples where diversification of crop activity is proposed on large scale, so as to safeguard against risk of crop failures as well as rationally utilize the land resource for better conservation.

6.2.3 Sustainability of Land Productivity

The productivity of land resource needs to be maintained/sustained both under rainfed as well as irrigated situations. The issue of deteriorating soil health has become more pronounced in assured irrigated areas due to multi-cropping and cultivation of heavy duty crops. This situation is amply revealed in ACRP work of regions/districts of Punjab, Haryana and Western UP plains, where large scale nutrient deficiencies in soils, besides build up of pests and diseases are noticed and micro nutrient supplementary is required adding to the cost of crop production.

6.2.4 Induction of Non-Crop Activities

Most of the coastal areas surrounding Bay of Bengal are prone to cyclonic storms with bi-modal heavy precipitation. The delta regions of this coastal area suffer from water congestion resulting in largescale degradation of fertile lands. Crop failures due to land submergence and water logging is a common occurrence. These areas cannot sustain agriculture with cropping activity alone and hence need integration of cropping with other non-crop activities.

Indepth studies of such coastal destricts of Krishna and Puri as well as region of W. Bengal have suggested rearing of fish in paddy fields; rearing of duck-fish along with paddy cultivation for risk minimization due to crop failures and at the same time to increase returns from such problem lands

6.3 Some Experience in Thrust Areas

There have been efforts to operationalize the concept and approach of ACRP and a few interesting experiences indicative of prospective issues and problems in planning are presented in what follows. They are milestones of progress made so far and some base to draw lessons for future programmes and mid-term correction, as the case may be.

6.3.1 Resource Conservation

The ACRP exercises based on indepth analysis of resource endowments, their use and criticalities brought the magnitude of each problem to surface emphasizing their rational use towards long-term sustainability. The problems of land degradation,

depletion of groundwater, unscientific use of canal waters, water congestion depleting crop productivity etc. were examined in detail for their size by each region of the state and strategies suggested along with investment implications and benefits. This detailed examination of resource endowments would perhaps never been attained in sectoral planning process, neither prioritized at regional or district level.

6.3.2 Crop Rationalization/Subsitution

The basic concept of crop rationalization is that under given natural resource endowments it should lead to the best activity mix which is beneficial to farmers, coompatible to the environment, and responsive to market trends. The aspect of ecology preservation is very important as the non-rational cropping would result into degradation of resource endowments. Such degradation has been caused both by externalities (natural and man-made) and short-sightedness in achieving quick gains at the cost of optimum land use. In many cases, in order to ensure food security, farmers have been forced into non compatible cropping in violation of resource sustainability.

Rationalization of cropping pattern need to be done through appropriate strategy formulation, dissemination and adoption. The main elements of strategies could be:

(a) Desired response to climatic factor and resource criticalities where the resource problems are known but adoption of innovative technology can lead to rational cropping.

(b) Maximizing income generation from the existing cropping

(c) Diversifying towards more appropriate farming activities matching to resource availability.

(d) Putting marginal lands otherwise unsuitable for crop activity to more appropriate farming system which would arrest further degradation of resource endowments. The cropping pattern followed in a region should, by and large be a reflection of its topography, soil type, rainfall spread and temperature regimes.

6.3.3 Maximizing Returns.

Another strategy for crop rationalization is to maximize the returns from existing cropping considering the level of resource utilization. Maximization of returns per unit of land and water should be the objective in these regions.

Poor soils having low fertility, slopy lands having low moisture retention capacity, other lands prone to water starvation are of poor crop productivity and the cropping barley meets the living expense of the farmer. Diversification of these areas towards more meaningful activities like dry land horticulture will lead to more rational land use and favourable economics. Diversification from below subsistence level cropping towards semi-arid horticultural activity has proved to be more beneficial to farmers without much of cost or high technological adoption. Moreover, cultivation of fruits linked with processing give large value addition to the product. Further it offers opportunity to take advantage of economic reforms in globalisation.

Regions 2,3 of Maharashtra, 1,2 of Karnataka, 4 of Gujarat, 11 and 12 of Madhya Pradesh have been identified as fruit belts and in fact the state of Maharashtra has already gone in a big way in this direction.

The hills and high plateaus require diversification in favour of crop with non-crop activity in a comprehensive manner for rationalisation of resource use. For example, holistic approach of a production complex with components of land use for crops, horticulture, forestry and livestock is suggested for districts of W.Kameng and Nagaon in eastern Himalayan region. Conjunctive farming of fish in paddy fields in water congested areas of Krishna Delta is suggested.

6.3.4 Marginal Land Usage

Lastly, any cropping on shallow or marginal lands is not likely to generate returns even to sustain farmer and his family. The climatic conditions and limitations of natural resources call for a strategy for adoption of dryland farming practices with appropriate activity mix. Diversification of such areas towards dryland fruits, silvi-pasture, and agro-forestry is the best option.

6.3.5 Sound Economic Basis

The ACRP approach bring in the dimensions of technology and sustainability as integral to resource-based planning. Technology lends an element of dynamism in changing and more efficient approach with an objective of maximising growth and long-term efficiency. The long-term programmes of resource conservation like problem soil correction, wasteland development, tank renovation, etc. apart from aiming at resource sustainability have sound economic base as direct and indirect benefits and long term social gains. This aspect has been lucidly brought out in strategies and programmes formulated by various ZPTs.

The outcome of ACRP exercises identifying broad issues and strategies is presented in the Maps, attached.

7. Institutionalization and Replicability

The logical extension now would be how to internalize ACRP approach into the existing planning and development system. Thus the thrust of the institutional phase of ACRP exercise would be to work within the existing/ emerging system of planning rather than to impose from outside the system. The institutional phase primarily aims at bringing in innovations in planning concepts and practices, as developed through the earlier phases of the ACRP project, closest to the institutions and people . This should not imply a static scenario of institutional development while internalizing ACRP approach, rather institutional changes should be natural and responsive to socio-economic and political environment. This new planning innovation has to find its proper place. The way to achieve this process of internalization has to be necessarily innovative as it seeks to achieve the difficult trade-off between need for bringing about radical changes in planning approach and the imperative of minimizing imposition of new system from outside.

The classical way of dealing with such an issue of bringing about significant changes in the existing system of planning and development would be to develop appropriate training modules. Notwithstanding the conventional wisdom of training as a mechanism for bringing about changes, it would appear that something more basic and sustainable needs to be attempted as a part of institutionalization exercise of ACRP. The basic premises underlying the logic of ACRP approach which needs to be kept in view in formulating the tasks of the institutional phase are as follows:

a) The planning and programme formulation approach pertaining to land and water resource activities at any level has to move away from the budget oriented, target based and scheme driven process to a strategy driven process. Technology and institutional dimensions would have to be given a key role in this task.

b) The focus of the planning methodology has to be area based intersectoral plans in a sustainable frame for a sufficiently homogeneous resource region.

c) Linkages of local area based plans with availability of financial resources and planning and budgeting process at a higher level (district or state) and also with rest of the system investable resource need to be explicitly taken into account so that area based plans are implementable.

Two important and logical extensions of the current phase of institutionalization exercise that need to be accomplished shortly related to (a) integration of ACRP plan with infrastructure (other than those to land and water based activities) development plan (b) convergence of ACRP plan with the poverty eradication and social development programme of the state and the centre.

8. APIB and ADDC

During the Sixth Annual Meeting of ACRP at Shimla, May '94, it was decided that a large part of the new work agenda should consist of experiment in finding out effective methods of disseminating the ACRP paradigm of developmental planning. The ACRP project which was activated more than six years back has generated a high quality research and knowledge base, besides being instrumental in formulating integrated and sustainable land and water resource development plans at various levels. The core strategies of ACRP are being tested out at ground level through a set of experimental projects. The ARPU at Ahmedabad has also evolved an impressive interactive database, which is regularly updated and enhanced.

It is necessary to (a) collate and synthesis the data and knowledge base available from the various facets of the ACRP project, and (b) to work out efficient instrument for presenting, communicating and disseminiting the same. Given the new research agenda it was realised that the style and content of the disseminition effort would have to be specific to the target audiences. The first step in this direction was taken with the launch of the Agro Planning and Information Bank on a pilot basis at ISRO, Bangalore during the last financial year.

8.1 APIB

The APIB has been conceptualised to address the following issues:

- Access information/ knowlege base for effective planning to diverse actors in the agriculture economy, from farmers to the Government.
- A single window presentation of this information/knowledge base.
- The creation of information access at local levels in a progressively decentralising economy, for planning in hierarchical form.
- Keeping the above in view such an information bank needs to be comprehensive,

Based on a series of debates over past planning experiments both as a part of ACRP project and other parallel exercises,it would appear appropriate at this stage of development to consider district as the most appropriate and operationally feasible unit at which ACRP approach can be institutionalized in the current phase of exercise.

In the light of the basic rationale and thrust of the institutionalization exercise, the current phase of work planned in this selected states of the country consists of the following major components:

a) Policy level assessment and commitment to adopting ACRP approach in planning for agriculture and allied activities for the entire state. This requires orientation of the policy makers and heads of the department to the concept and implications of adopting ACRP approach.

b) Setting up necessary interface among various departments in the state (eg. agriculture, forestry, minor irrigation, planning) and also between the state departments and district functionaries.

c) Training/ orientation of the state departmental personnel and district functionaries.

d) Setting up core planning teams from among the existing district functionaries, faculties of state agricultural university, NGOs, local institutions to work on a continuing basis on plan formulation process with required financial and organizational integration with the existing planning and development administration.

e) In view of the significant changes taking place in the composition and functioning of the district planning organization which is now mandated under 73rd/74th Constitutional Amendment, establish appropriate institutional mechanisms so that the ACRP core planning team at district level becomes an integral part of the district planning process.

f) Experimenting with the emerging concept of planning and information bank which may be set up at regional level the access to which will not be restricted to the district or state planning system but extend to other main actors of the system namely banking and financial institutions, corporations, industry, trade associations and also progressive farmers.

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flexible and capable of adjusting its technological orientation through the demands of socio-economic change.
The APIB would address the above through the following :

- Compilation of information from multiple agencies
- Computerised storage and retrieval systems
- Multiuser dissemination tools
- Special studies
- Specific planning services
- Integration with existing planning exercise
- Training and awareness workshops

8.2 ADDC

There is a district need to orient Goverment functionaries, who are the biggest facilitators in the agriculture economy. Such orientation, directed at policy makers of both centre and states would be intense and personalised. The ADDC attempts to address this concept. There is a need to explore all possible ways on packaging information including on latest technolgies like multimedia technology.

A sample study of the nature of information, that is currently available at ARPU would be undertaken. An attempt would be made to develop an understanding of the clientele to which the information needs to be disseminated. It will examine the feasibility of using various technologies for converting and disseminating the information in the most effective form supported by the currently available hardware and software. An evaluation of the alternative operational models for adopting facilities for the required technologies would be done.

Annex I

ZONAL PLANNING TEAMS

Associated Universities	Resource Persons
ZONE 1	
Himachal Pradesh Krishi Vishwavidyalaya, **Palampur** University of Horticulture & Forestry, **Solan**	A Ahmad, MM Dhar, AL Nadda, T Raman, BR Sharma, BK Sikka, YS Parmar Harbans Singh, Y Singh, Kirti Singh, CS Vaidya.
ZONE 2	
Assam Agricultural University, **Jarhat**	BC Bhowmick, PC Bora, HP Khound, PD Saikia, UC Upadhyay.
ZONE 3	
Bidhan Chandra Krishi Vishwavidyalaya, **Nadia**	S Chowdhury, DK Dasgupta, AK Mohra, AK Mukhopadhyay, MG Som
ZONE 4	
Rajendra Agricultural University, **Pusa**	KS Chouhan, PN Jha, RP Roysharma, Gopalji Trivedi
ZONE 5	
Chandrashekhar Azad University of Agriculture, **Kanpur**	NN Goswami, DC Kulshrestha, SS Khanna, GN Singh, BVS Sisodia, & Technology, RK Singh, UB Singh, Ram Iqbal Singh, IPS Yadav
ZONE 6	
Haryana Agricultural University, **Hissar** Punjab Agricultural University, **Ludhiana**	SN Arya, AL Choudhary, SS Garewal, KS Gill, AS Khehra, AJ Singh, Baldev Singh, IJ Singh.
ZONE 7	
Orissa University of Agriculture & Technology, **Bhubaneswar**	SL Bose, B Bhuyan, RK Mishra, R Kerketta, IC Mahapatra, K Pradhan, N Patnaik, PC Senapati
ZONE 8	
Jawaharlal Nehru Krishi Vishwavidyalaya, **Jabalpur**	MC Athawale, KS Johar, DK Marothia, DK Sharma, SK Sharma
ZONE 9	
Marathwada Agricultural University, **Parbhani** Mahatama Phule Agricultural University, **Rahuri** Punjabrao Krishi Vidyapith, **Akola**	PW Amin, Bathakhal, RS Deshpande, Ulemale,SL Deshpande, SP Kale, GJ Malewar, PV Salvi, HS Nandagavali, YK Patil, Shelke.
ZONE 10	
University of Agricultural Sciences, **Dharwad**	S Bislaiah, RK Hegde, NL Maurya, M Mahadevappa, P Vithal Rai, HG Shankaramurthy
ZONE 11	
Andhra Pradesh Agricultural University, **Hyderabad** Tamil Nadu Agricultural University, **Coimbatore**	KR Choudhury, M Chinnadurai, TVK Raaju, RK Krishnamurthy, S Ramapandu, A Appa Rao, Madhusudan Rao, MV Rao, TVS Rao, S Sankaran,SR Subramanian
ZONE 12	
Konkan Krishi Vidyapith, **Dapoli**	SG Borude,KC George, HG Hanumappa, SB Kadrekar, Karmathullah, AM Micheal, SB Kadrekar,
ZONE 13	
Gujarat Agricultural University, **Sardar Krishi Nagar**	K Janakiraman, VM Jhala, Mahesh Pathak, GK Shekhda, AP Vyas
ZONE 14	
Rajasthan Agricultural University, **Bikaner / Udaipur**	SS Acharya, SR Choudhury, Rakesh Hooja, SL Mathur, KN Nag, RK Patel, SN Saxena, PM Sharma, HG Singh
ZONE 15	
Central Agricultural Research Institute, **Port Blair**	IP Abrol, AK Bandhopadhyay

Annex II

ORGANISATIONS / INSTITUTIONS ASSOCIATED WITH ACRP

Administrative Training Institute, **Calcutta**

Agricultural Finance Consultants, **Ahmedabad**

All India Institute of Hygiene & Public Health, **Calcutta**

Association of Metropolitan Development Authorities, **New Delhi**

Central Administrative Tribunal, **New Delhi**

Centre for Applied Systems Analysis in Development, **Bombay**

Centre for Development Studies & Activities, **Pune**

Centre for Science & Environment, **New Delhi**

Consulting Engineering Services, **New Delhi**

Dalal Consultants, **Ahmedabad**

Gandhi Labour institute, **Ahmedabad**

Gujarat Institute of Development Research, **Ahmedabad**

Himachal Pradesh Institute of Public Administration, **Shimla**

Indian Council of Agricultural Research, **New Delhi**

Indian Institute of Management, **Ahmedabad**

Indian Space Research Organisation, **Bangalore**

Institute of Economic Growth, **Delhi**

Institute of Rural Management, **Anand**

Institute of Social & Economic Change, **Bangalore**

JNU, Centre for the Study of Regional Development, **New Delhi**

National Bank for Agriculture & Rural Development, **Ahmedabad**

National Board for Soil Survey & Landuse Planning, **Nagpur**

National Informatics Centre, **Gandhinagar / New Delhi**

National Institute of Applied Manpower Research, **New Delhi**

National Remote Sensing Agency, **Hyderabad**

Operations Research Group, **Baroda**

Pranava Industrial Services (P) Ltd., **Ahmedabad**

School of Planning, CEPT, **Ahmedabad**

Space Applications Centre, **Ahmedabad**

SEARCH India, **Bombay**

STEM, **Bangalore**

Systems Research Institute, **Pune**

Annex III

REPORTS PREPARED BY ZONAL PLANNING TEAMS

The Zonal Planning Teams have prepared the **zonal profiles, revised strategy papers, papers on action points/project outlines and development strategies** for states for all the zones. In addition special papers have also been prepared by certain zones, which are as follows-

ZONE 1 WESTERN HIMALAYAN REGION

Sikka,B.K., and T.R.Sarma. April 1990. *"Prospects of agro-processing industry in Himachal Pradesh"*. Himachal Pradesh University,AERC,Shimla.

ZONE 2 EASTERN HIMALAYAN REGION

Saikia,P.D. March 1990. *"Report on the survey of agricultural employment in Assam"* Assam Agricultural University,AERC,Jorhat.

Saikia,P.D. March 1990. *"Report on the survey of iron toxicity problems of ground water in crop production"*. Assam Agricultural University,AERC, Jorhat.

Saikia,P.D. July 1990. *"A study on land tenure system in tribal areas of north-east India"*. Assam Agricultural University,AERC,Jorhat.

ZONE 3 LOWER GANGETIC PLAINS REGION

. June 1990 *"Final report of special study on augmenting income and employment of rural households in Nadia district of West Bengal"*. Bidhan Chandra Krishi Vishwavidyalaya,P.O.Kalyani,Nadia.

July 1991. *"Integrated watershed development in the district of Purulia,West Bengal"*.Bidhan Chandra Krishi Vishwavidyalaya,P.O.Kalyani, Nadia.

ZONE 5 UPPER GANGETIC PLAINS REGION

"Status paper on animal husbandry programmes for Eighth Five Year Plan".Animal Husbandary Department,Lucknow,Uttar Pradesh.

ZONE 6 TRANS-GANGETIC PLAINS REGION

Nandal,S.S.,and K.N.Rai. October 1990.*"Status and prospects of agro-processing industries in Haryana"*. Haryana Agricultural University, Department of Agricultural Economics,Hissar.

ZONE 7 EASTERN PLATEAU & HILL REGION

Bhuyan,B. September 1990. *"Study on employment situation in agricultural sector on Zone-7"*. Orissa University of Agriculture and Technology, Bhubaneswar.

ZONE 8 CENTRAL PLATEAU & HILL REGION

Gupta,S.R. November 1990."Prospects of changing cropping pattern in favour of pulses and oilseeds in Madhya Pradesh".J.N.Krishi Vishwavidyalaya,AERC,Jabalpur.

ZONE 9 WESTERN PLATEAU & HILLS REGION

Salvi,P.V. June 1990. "Agro-processing development for Western Plateau & Hills Region'

ZONE 10 SOUTHERN PLATEAU & HILL REGION

Arputharaj,C."Brief report on the special study and evaluation of a dry land watershed in Dharmapuri district,Tamil Nadu".University of Madras,AERC,Madras.

Karamuthullah,N., Y.S.Ramsha, & S.Bisaliah. March 1990."Techno-economic evaluation of Kabbalnala Watershed Development Programme, Bangalore district".University of Agricultural Sciences,Bangalore.

ZONE 15 THE ISLAND REGION

Chandra,S.N. 1992. "Rapid rural appraisal for evaluating the socio-economic feasibility of the Integrated Village Development Project". C.A.R.I, Port Blair.

Annex IV

DISTRICT REPORTS RECEIVED AT ARPU

ANDHRA PRADESH **Krishna District Coordinator:Dr.T.V.S.Rao**
Institution:Andhra University,Waltair

Rao,T.V.S. February 1991."Agricultural development planning for Krishna district,Part 1,Profile of Agriculture"
Rao,T.V.S. December 1991."Strategy for agricultural development in Krishna district".
Rao,T.V.S. February 1992."Towards district planning for agricultural development-An exercise in ACRP,Case of Krishna district in A.P.".

Rangareddy District Coordinator:Dr.K.R.Chaudhary
Institution:A.P.Agricultural University,Hyderabad

. February 1991."Agro-Economic profile of Rangareddy district".
. March 1991."Agricultural development planning for Rangareddy district,Part 1,Profile of Agriculture".
. October 1991."Operationalization of strategies for the development of Rangareddy district: A report on watershed development".
. March 1992."Operationalization of strategies for the development of Rangareddy district: A report on minor irrigation development".
. April 1992."Operationalization of strategies for the development of Rangareddy district: Supplement to watershed development".

ASSAM **Nagaon District Coordinator:Dr.P.D.Saikia**
Institution:Assam Agricultural University,Jorhat

. January 1991."Agro-climatic regional planning for agricultural development in Nagaon district".
March 1991."An outline of the development strategies for Nagaon District based on Agro-Climatic Planning".
. August 1991."Agro-climatic planning in Nagaon district: Operationalization of strategies".
. January 1992."Feasibility and feedback report on operationalization of ACP in Nagaon district".
. April 1992."Feasibility and feedback report and action plan on operationalization of agro-climatic planning in Nagaon district".

ARUNACHAL PRADESH **W.Kameng District Coordinator:Dr.P.D.Saikia**
Institution:Assam Agricultural University,Jorhat

March 1991."Agro-climatic regional planning for agricultural development in W.Kameng district".
. November 1991."Agro-climatic regional planning in W.Kameng district : Operationalization of core strategies"

BIHAR **Samastipur District Coordinator:Dr.R.P.Roy Sharma**
Institution:Rajendra Agricultural University,Pusa

April 1991."Agricultural development perspective of Samastipur district,Parts 1&2: Profiles and Strategies".
Jha,R.P.,and R.P.Roy Sharma. May 1992."Status,issues and operationalization strategies for agricultural development".

GUJARAT **Amreli District Coordinator:Mr.Bhatnagar**
Institution:Agricultural Finance Consultants Ltd.,Bombay

April 1991."Study on land and water resources development programmes-Amreli district".

Mehsana District Coordinator:Dr.K.Janakiraman
Institution:Gujarat Agricultural University,Ahmedabad

"Decentralised planning for Mehsana district: Diagnostic phase".
"Development and operationalization of major constraints in Mehsana district".
November 1992."The Agro-climatic plan for Mehsana District". Government Of Gujarat.

HIMACHAL PRADESH **Shimla District** **Coordinator:Dr.B.K.Sikka**
Institution:Himachal Pradesh University,Shimla

Sikka,B.K., T.R.Sharma,and Kirti Singh. March 1991."Decentralized planning for Shimla district: Diagnostic phase
Sikka,B.K., T.R.Sharma,and Kirti Singh. 1992."Agro-climatic regional planning at district level: Operationalization of strategies in Shimla district".

HARYANA **Karnal District** **Coordinator:Dr.I.J.Singh**
Institution:Haryana Agricultural University,Hisar

Singh,I.J. April 1991."Perspectives of agricultural development in Karnal district".
Chaudhary,A.L.,and I.J.Singh. February 1992."Operationalization of development strategies for the district of Karnal"

KARNATAKA **Tumkur District** **Coordinator:Dr.D.V.N.Sarma**
Institution:STEM,Bangalore

---. January 1991."Agro-climatic regional planning for Tumkur district: A report on diagnostic phase"

Bijapur District Coordinator:Dr.H.G.Shankaramurthy
Institution:University of Agricultural Sciences,Dharwad

---. December 1990."Diagnostic Report- Bijapur District".
. March 1991."Strategies & Programmes for development- Bijapur District".
. April 1991."Summary of strategies and programmes for development-Bijapur District".
. August 1991."Operationalisation of strategies and programmes for development- Bijapur District"
. September 1992."Diagnosis,development issues and strategies for improvement of agriculture and allied sectors in Bijapur district,Volume 1".
September 1992."Programmes and operationalization plans of key strategies for the development of agriculture and allied sectors in Bijapur, Volume 2".

Shimoga District **Coordinator:Dr.N.L.Maurya**
Institution:University of Agricultural Sciences,Dharwad

April 1991."Diagnostic report: Shimoga district".
January 1992 "Agricultural development perspective of Shimoga district: Strategies and programmes".
Shankaramurthy,H.G. (ed). September 1992." Diagnosis,development and strategies for improvement of agriculture and allied sectors in Shimoga district, Volume 1".
Shankaramurthy,H.G. (ed). September 1992."Programmes and operationalization plans of key strategies for development of agriculture and allied sectors in Shimoga district,Volume 2".
Shankaramurthy,H.G. November 1992."Diagnosis,development issues and operationalisation plans of key strategies for improvement of Agriculture and Allied sectors during Eighth Five Year Plan in Shimoga District"

KERELA **Trichur District** **Coordinator:Dr.K.C.George**
Institution:Kerela Agricultural University,Trichur

Hanumappa,M.G., and K.C.George. January 1991."Agricultural development of Trichur district, Problems and prospects: A diagnostic study".
Hanumappa,M.G., and K.C.George. April 1991."Development strategies for Trichur district".
George,K.C. August 1991."Trichur district study: Data base".
Hanumappa,M.G., and K.C.George. November 1991."Trichur district study, Phase 2: Operationalization of strategies"
Hanumappa,M.G., and K.C.George. February 1992."Agricultural development of Trichur district: Operationalization of strategies".

MADHYA PRADESH **Bastar District** **Coordinator:Dr.D.K.Marothia**
Institution:Indira Gandhi Agricultural University,Raipur

Marothia,D.K. December 1990."Diagnostic phase of Bastar district study".

Jabalpur District **Coordinator:Mr.M.C.Athawale**
Institution:Jawahar Lal Nehru Krishi Vishwavidyalaya,Jabalpur

Sharma,D.K."May 1991."District planning of Jabalpur district".

Jhabua District **Coordinator:Mr.K.R.Date**
Institution:Centre for Applied System Analysis in Development,Bombay

April 1991."Jhabua district study: Extending agro-climatic regional planning approach to district level planning".

May 1991. Volume 2.

. December 1991."Jhabua district study: Extending agro-climatic planning approach to district level planning-An extended summary".

MAHARASHTRA **Sindhudurg District** **Coordinator:Dr.S.B.Kadrekar**
Institution:Konkan Krishi Vidyapith,Dapoli

. April 1991. "Diagnostic study of Sindhudurg district,Phase 1: Preliminary strategies".
. "Note on district level study of Sindhudurg district".

Aurangabad District **Coordinator:Dr.G.U.Malewar**
Institution:Marathawada Agricultural University,Pharbani

. February 1991."Agricultural development planning for Aurangabad district: District profile".
. April 1991."A brief note on agricultural development on development perspectives,core strategies and development issues".
. May 1992."Note on implementing of strategy -Horticulture development of Aurangabad district"

Solapur District **Coordinator:Dr.S.P.Kale**
Institution:National Agricultural Research Project,Solapur

Kale,S.P., P.M.Kapase, C.B.Gaikwad,and R.S.Deshpande. November 1990. "Agricultural development perspective of Solapur".
. April 1991."Development strategies for Solapur district-Preliminary paper".
Kale,S.P., P.M.Kapase, C.B.Gaikwad,and R.S.Deshpande. "A note on operationalization of strategies,Phase 1&2".
Kale,S.P., P.M.Kapase, C.B.Gaikwad,and R.S.Deshpande. "A note on implementation of strategy".

Yavatmal District **Coordinator:Dr.P.W.Amin**
Institution:Punjabrao Krishi Vidyapeeth,Akola

.February 1991."Agricultural development perspective of Yavatmal district".
.April 1991."Outline of development Strategies for district of Yavatmal".
. March 1992."Document of operationalization of key strategies in Yavatmal district".
.May 1992."A note on the implementation of watershed development strategy in Yavatmal district".

ORISSA **Puri District** **Coordinator:Dr.B.Bhuyan**
Institution:Orissa University of Agriculture & Technology,Bhubaneswar

Bhuyan,B. December 1990."Agro-climatic zonal planning at district level and further down: Puri district".
Bhuyan,B. April 1991."Agro-climatic zonal planning at district level: Puri district".
Bhuyan,B. April 1990."Outline of development strategies for the district of Puri".
Bhuyan,B. January 1992."Operationalization of strategies of Puri distrit".
Bhuyan,B. April 1992."Operationalization of strategies of Puri district".

Koraput District **Coordinator:Dr.B.Bhuyan**
Institution:Orissa University of Agriculture & Technology,Bhubaneswar

Bhuyan,B. April 1991."Agro-climatic zonal planning at district level:Koraput district".

PUNJAB **Patiala District** **Coordinator:Dr.Baldev Singh**
Institution:Punjabi University,Patiala

Singh,Baldev. April 1991."Agro-climatic regional planning: Patiala".
Singh,Baldev. November 1991."Agro-climatic regional planning for Patiala district: Profiles,issues and strategies".
Singh,Baldev. April 1992." Issues and operational strategies,ACRP,Patiala".

Bhatinda District **Coordinator:Dr.Khem Singh Gill**
Institution:Punjab Agricultural University, Ludhiana

Gill,K.S . and A.J.Singh."Report on the diagnostic survey of Bhatinda district".

Hoshiarpur District Coordinator:Dr.Khem Singh Gill
Institution:Punjab Agricultural University,Ludhiana

———."*Report on the diagnostic survey of Hoshiarpur district*".

RAJASTHAN **Barmer District** **Coordinator:Dr.P.M.Sharma**
Institution:Rajasthan Agricultural University,Udaipur

Sharma,P.M., and A.S.Solanki. October 1990."An exercise on extension of agro-climatic zonal planning to micro level".
Sharma,P.M. March 1991."Agricultural developrgent perspectives of Barmer district".

TAMIL NADU **Tiruchirapalli District** **Coordinator:Dr.S.R.Subramaniam**
Institution:Tamil Nadu Agricultural University,Coimbatore

——.—. January 1991."Agro-climatic regional planning at district level: Tiruchirapalli district".
— —. April 1991."Agro-climatic regional planning exercise at district level: Tiruchirapalli district,Phase 2.Development strategies and operationalization".
—— —. 1991."Operationalization of strategies for Tiruchirapalli district"

UTTAR PRADESH **Almora District** **Coordinator:Dr.Y.Singh**
Institution:University of Agriculture & Technology,Pantnagar
Singh,H.G. January 1991."District profile and development strategies for Almora".

Etawah District **Coordinator:Dr.G.N.Singh**
Institution:CS Azad University of Agriculture & Technology,Kanpur

Singh,U.B. March 1991."Agricultural development planning for Etawah district".
Singh,U.B., G.N.Singh, and R.I.Singh."Agro-climatic regional planning for Etawah district: Strategies and their operationalization".
Singh,U.B. 1992."Agro-climatic planning for Etawah district: Strategies and their operationalization and implementation".

Bulandshahr District **Coordinator:Dr.G.N.Singh**
Institution:CS Azad University of Agriculture & Technology,Kanpur

Singh,U.B. March 1991."Agricultural development planning for Bulandshahr-Zone 5"
Singh,U.B., G.N.Singh, and R.I.Singh."ACRP for district Bulandshahr: Strategies and their operationalization"

WEST BENGAL **Purulia District** **Coordinator:Prof.A.K.Mukhopadhyay**
Institution:Bidhan Chandra Krishi Vishwavidyalaya,Nadia

—. January 1991."Agro-climatic zonal planning at district level Purulia district".
—. February 1991."Agro-climatic zonal planning at district level-Purulia district: Profile and approach to strategy for agricultural development".
. February 1991."Outline of development strategies for Purulia district".
. July 1991."Integrated watershed development in district of Purulia".
. January 1992."Operationalization of land and water management strategies in Purulia district"
. May 1992."Implementation manual for integrated watershed development in district of Purulia".
-. July 1992."Detailed workplan on integrated micro-watershed development in district of Purulia".

Midnapur District **Coordinator:Prof.A.K.Mukhopadhyay**
Institution:Bidhan Chandra Krishi Vishwavidyalaya,Nadia

. March 1991."Agro-climatic zonal planning at the district level-Midnapur district: Profile".
-. March 1992."Operationalization of integrated watershed development in the district of W.Midnapur".

Annex V(a)

ARPU PUBLICATIONS

LIST OF PUBLICATIONS BY AGRO-CLIMATIC REGIONAL PLANNING UNIT, AHMEDABAD

Working Papers

1 *Zonal Profile* April 1989
2 *Agro-climatic Zones Profiles & Issues* July 1989
3 *Constraints Strategies and Programmes for State Level Agricultural Development (A Short Summary)* January 1991
4 *Extension of Agro-climatic Regional Planning to District level & below (Background note & summary of first phase exercise for twenty-eight districts)* May 1991
5 *Agro-climatic Regional Planning at State level Profiles Issues Strategies & Programmes* July 1991
6 *Agro-Climatic Regional Planning at District & Sub-District level (Executive Summaries of 10 districts)* February 1992
7 *Agro-climatic Regional Planning -District Level* March 1993
8 *Crop Output Projections for States by Agro-Climatic Subregions (Based on an Inter-Regional Area Allocation Model)* January 1994

Technical Papers

1 Desai Rohit D February 1989 *The state of Agro-Processing industries in Agro-Climatic Zones A case study of Gujarat Agro-industries*
2 Jhingram V G July 1989 *Proposed Fishery Development in VIII Five Year Plan*
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Annex VI

COMPUTERISED DATABASE OF ARPU

Data Class	Topic	Source	Available upto
AGRICULTURE			
a) Land use	Ninefold Classification	MOA/ZPT	1992-93
b) Crop Data	Area, Production, Yield	MOA/ZPT	1992-93
	Cropwise area irrigated	MOA/ZPT	1992-93
	Area under Fruits and Vegetables	MOA	1991-92 1991-92
c) Irrigation	Irrigated area by sources	MOA	1992-93
	Groundwater Potential and use	CGWB	1984-85
d) Prices	Wholesale Prices	API(MOA)	1992-93
e) Livestock	Category-wise No of farm animals and poultry	MOA	1992-93
INPUTS & CONSUMPTION			
a) Fertiliser	Fertiliser Consumption	FAI	1991-92
b) Other Inputs	Tractors Tubewells Bank Credit	MOA	1984
c) Crops	Per capita annual consumption of major crop sector commodities	NSSO	1987-88
LAND AND WATER RESOURCES			
a) Rainfall	Average of 50 years	IMD	1901-50
b) Rainfall	Station-wise Monthly Rainfall	IMD	1901-87
c) Soils	Texture depth stored soil moisture water availability period	NBSS ICRISAT	
d) Climate	Type Potential Evapotranspiration	ICAR	
DEMOGRAPHY			
a) Population	Urban and Rural, Density Sex Ratio	Census	1991
b) Workers Classification	Agri., Main/Marginal Rural/Urban	Census	1991
c) Literacy	Male/Female Rural/Urban	Census	1991
d) SC/ST	Sex-wise Population	Census	1981
e) Poverty	Poverty ratio Urban & Rural	NSSO	1983
f) Projections	State level Total Population	CMIE	1993-2001
EMPLOYMENT STRUCTURE			
a) Employment	Age-wise distribution of persons by usual activity	NSSO	1983-84
b)	Activities distribution by Sex and Education		
c)	Worker composition by categories		
d)	Employment Intensity		
LANDSYSTEM			
a) Holdings	Average size of Land holdings	Agn Census	1980-81 1985-86
b) Tenure	Tenure system		
OTHERS			
a) Programmes	Development strategies & Programmes for state/subregions and Pilot districts	ZPT	

Note - Most of the data is for time series and at a disaggregate level, which can be aggregated for state/subzonal levels

ARPU TEAM

Ahmedabad Unit

GS Guha
Project Director

Niti Mathur *Regional Planner*
YS Swaroop *Geologist*
SJ Dave *Systems Executive*
CV Singh *Systems Executive*

Jolly Dave, **AD Mukherjee** **Hetal Pandya** *Technical Statistical Assistants*

SN Joshi **DG Faldu** **UK Mandavia** **V Rajagopalan**
Consultants

Delhi Unit

OP Grover
Senior Consultant