

ECOLOGY, SOCIAL STRUCTURE AND AGRARIAN RELATIONS
IN ANDHRA PRADESH : AN EXPLORATORY STUDY .

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DECLARATION

Certified that the material in this dissertation
has not been previously submitted for any other degree of
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PREFACE

This dissertation represents a part of the ongoing research on agrarian relations in Andhra Pradesh. As a groundwork for research at the Ph.D level, here we attempted a preliminary study of the problem.

The dominant tradition of Indian Sociology was excessively preoccupied with studies on caste. Despite the fact that some early initiatives, especially the studies made by Radhakamal Mukerjee and Ramakrishna Mukerjee, were provided to the work on agrarian relations in India, till recently the field was relatively neglected in Indian Sociology. Of late, there has been a revival of interest in the problem and a handful of studies on agrarian relations have been produced.

Some of the agrarian studies, especially those of Epstein, Beteille, Oommen, Mencher and Alexander, have emphasised the role of ecological factors in influencing agrarian relations. However, these studies have not explicitly used ecological theories in their analysis of agrarian relations. Therefore, we attempted a

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critical review of ecological approaches in sociology and anthropology in order to develop an explicit ecological model for the study of agrarian relations in Andhra Pradesh.

Our review of ecological theory in sociology and anthropology, presented in the first chapter, revealed that despite the differences in their orientation and the way in which they operationalised concepts, the ecological approaches have emphasised the interaction between four key variables viz., population, technology, environment and social organisation, the last factor is invariably treated as dependent variable and the other three as independent variables.

In Chapter two, we made an attempt to operationalise the four variables population, technology, environment and social organisation and compare agrarian relations in the two regions viz., Rayalaseema and Coastal Andhra, of Andhra Pradesh. The analysis based on simple statistical correlations demonstrated significant differences in agrarian relations between the two regions. It emphasised the role of environmental factors (irrigation) in explaining agrarian relations. However, it was realised that the production relations in Indian agriculture have significant role to play

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in the development of production forces, in the present case irrigation, themselves. It is therefore proposed that our further research on agrarian relations in Andhra Pradesh should focus on both production forces and production relations.

I am indebted to several persons who have helped me in completing this work. I express deep sense of gratitude to Shri M.N. Panini, my supervisor, for his encouraging guidance and cooperation. I am thankful to Professor T.K. Oommen, Drs. P.H. Reddy, P.N. Mukerjee and S.K. Rao for the helpful discussions I had with them in the early stages of this work. I express my thanks to my friends Promod Goswami, Raj Mohan Reddy, Chalapathi Rao, D.S. Rao and Prakash Rao who have helped me in several ways in connection with this work. I am also thankful to Mr. T.P. Jaya chandran for typing out the thesis.

CHAPTER I

ECOLOGICAL THEORY IN SOCIOLOGY AND ANTHROPOLOGY

I

The ecological approach in sociology was an offshoot of plant and animal ecology. In the early stages, the field was greatly influenced by the perspective and concepts used in plant and animal ecology, the result being the narrow formulation of the subject as the study of sub-social and competitive aspects of human community. Similarly, ecological approach in anthropology started with monistic determinism of either environment or culture. However, later developments gave fresh vigour to the subjects. The perspective on society and its interrelationship with environment was radically altered and the focus came to be placed on the "interaction system" constituting population, environment, technology and social organisation.

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Ecological Theory in Sociology

(A) The Classical Ecology of Chicago School :

Ecology is the study of "the totality or pattern of relations between organisms and their environment".¹ Human ecology² took its birth in the first quarter of the present century in the urban studies of the 'Chicago School', whose leading representatives were Robert E. Park, Earnest W. Burgess and R.D. Mckenzie. They extensively used concepts and principles developed by plant and animal ecologists and focussed their study on spatial aspects of community life. Park, the founder of the Chicago School, regarded human ecology, as the study of "the forces at work within the limits of urban community - within the limits of any natural area of human habitation, in fact, - which tend to bring about an orderly and typical grouping of its population and institutions".³ Thus, human ecology was concerned with

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1. Webster's New international Dictionary, 1950.
 2. The term "human ecology" was first used in 1921 in "An introduction to the Science of Sociology" edited by Robert E. Park and Earnest W. Burgess, Chicago, 1921.
 3. Robert E. Park, Human Communities : The City and Human Ecology. Glencoe, Free Press, 1952, p. 14.

the territorial arrangements that social activities assume in order to discover and explain the regularities which appear in man's adaptation to space.

In the area studies of Chicago School "community" became the central concern. They regarded human community as sub-social and sub-cultural entity, belonging to the "natural order" like biotic plant and animal communities. Also, the emphasis was laid on "competition", as in biological ecology, rather than on "cooperation" among community members. As Park pointed out "the study of community as the natural resultant of the competitive process constitutes the field of human ecology".⁴ Thus, the Chicago School of human ecology limited its theory and investigation to sub-social, spatial and competitive aspects of human society. For these classical ecologists human ecology was "a specialised field of sociological analysis which investigates (1) those impersonal, sub-social aspects of communal structure - both spatial and functional - which arise and change as the result of interaction between men through the medium of limited supplies of environment, and (2) the nature and forms of the processes by which

4. Ernest W. Burgess' unpublished article; quoted in M.A. Alihan, Social Ecology Columbia University Press, New York, 1939; p.11

this sub-social arises and changes.⁵ Thus, upon the foundation of community's ecology, it was assumed, was erected a structure of economic, political and moral life. This view of human ecology proved to be a useful beginning, and an impressive body of field research was conducted on urban settlements. However, as a result, the subject matter of human ecology was defined in residual terms.

(B) Mukerjee's⁶ Social Ecology:

Scholars⁷ credited Mukerjee with having published the first constructive, systematic, theoretical book on social ecology. Mukerjee defined human ecology as a "synoptic study of the balance of plant, animal and human communities, which are systems of correlated working parts in the organisation of the region".⁸

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5. James A. Quinn, "The Nature of Human Ecology : Reexamination and Redefinition" Social Forces, 18 Dec 1939. p. 168
 6. Mukerjee has written number of books and articles on Social Ecology. Unfortunately, our access is limited to The Regional Balance of Man : An Ecological Theory of Population. University of Madras, 1938; Man and His Habitation : A Study in Social Ecology, Longmans Green & Co., London 1940 and the volume brought out in his honour, The Frontiers of Social Science MacMillan & Co., Ltd., London 1955.
 7. For example, James A. Quinn in "Mukerjee. A Pioneer in Social Ecology" in Baljit Singh, *ibid.* p. 270. Mukerjee's constructive systematic, theoretical book "Social Ecology" was published in 1945 by Longman, London.
 8. Mukerjee, 1940. *Op. cit.*, P. VII.

His main ecological thesis is that "the human regions form the proper unit for studying human relations, because, only within the regional area can one best understand the complex interrelations between culture bearing human groups and the plant, animal, and non-living environments with which they interact".⁹ Mukerjee considered the idea of region, as an intricate network of interrelations as his most important contribution to social ecology. The region exhibits a complex pattern of adaptations between the environmental factors and the plant and animal communities including human societies."¹⁰ He tried to interpret 'regional structure' (organisation) and analyse changes in this structure, using concepts such as balance, competition, competitive-cooperation, distribution, organisation, stratification and succession.

Mukerjee's social ecology¹¹ was a radical

9. As summarised by James. A. Quinn, 1955. Op. cit., P. 269.

10. Mukerjee, 1938, Op. cit., Introduction, P. 1.

11. Mukerjee used the designation 'social ecology' rather than human ecology because he wanted to exclude consideration of the relations between the individual organisms and their environment, the subject matter which botanists generally include under autecology as distinct from the study of group relations to environment which comes under synecology. American sociologists use both designations, human ecology and social ecology to refer to the same subject; (adapted from Quinn, 1955, Op. cit., P. 270).

departure from that of Chicago School.¹² First, he did not over emphasise the spatial aspects of regions. Second, he took account of not only competition, but also cooperation. Third, he did not make the erroneous distinction between social and sub-social aspects of human life. Last, he recognised the important role of culture in man's ecological relations. The Chicago Scholars excluded the factor of culture from their conception of ecological relations. For example, Park considered such relations among men as similar to those taking place among plants and lower animals - entirely devoid of the cultural factor, and occurring solely at a sub-cultural level.¹³ Mukerjee, in contrast, recognised clearly that "even though ecological relations among men are similar in several fundamental ways to those among lower organisms, they cannot fruitfully be separated from culture, not even for purposes of scientific abstraction. Cultural norms necessarily affect both, specific ways in which they compete and cooperate with one another."¹⁴

12. In this connection, it is of some interest to note Professor Quinn's observation. Referring to the pre-1945 state of the subject of human ecology, he states, "During this period of early developments of social ecology and its emergence as a somewhat distinct discipline, Professor Mukerjee either preceded or paralleled other pioneer human ecologists in his development of ecological concepts and their application to regional research". Ibid., P. 269.

13. Ibid., P. 272

14. Ibid., P. 272

(C) Hawley's Theory of Community Structure:

Hawley also was dissatisfied with the classical position of human ecology of the Chicago School, its preoccupation with sub-social and spatial aspects of human community and the concept of competition. He found it "incompatible with the fundamental logic of ecological theory", and observed that "probably most of the difficulties which beset human ecology may be traced to the isolation of the subject from the mainstream of ecological thought. The collective life of man, as of all other organisms, revolves simultaneously about two axes, one of which is symbiotic, the other commensalistic... The two types of relationships are in all organised populations. Each represents a peculiar and complimentary integrative force and together, therefore, they constitute the basis of community cohesion. The community is thus a symbiotic commensalistic phenomenon."¹⁵ Thus, we find in Hawley's approach to ecology the inclusion of social aspects of human community, the aspects of both cooperation and competition (symbiotic and commensalistic) and reduced emphasis upon spatial patterns. Another merit of Hawley's theory is his emphasis upon man's

15. Amos H. Hawley, Human Ecology : A Theory of Community Structure The Ronald Press Company, New York, 1950., pp. 69 and 209.

possession of culture. He observed that "each acquisition of a new technique or a new use for an old technique regardless of the sources of its origin, alters man's relation with the organisms about him, and changes his position in the biotic community".¹⁶ [Hawley was concerned with technology and social organisation which he regarded as the aspects of culture. He asserted man's possession of culture and its potentiality to modify the environment, recognising thereby the essential difference between human ecology and biological ecology which his predecessors failed to make out.]

Hawley attempted to present a systematic and comprehensive account of human ecology dealing with its basic assumptions, concepts and hypotheses. He defined the subject "as the study of the form and the development of the community in human population."¹⁷ By 'community' he meant the 'functional system of relationships' of a territorially based population. That is, human ecology deals with the problem of social organisation, its genesis and development, considering it as a property of a population. Thus, unlike earlier theorists who are preoccupied with spatial configurations of a human community, Hawley emphasised social organisation the functional system of relationships of a territorially based human population, that is, a local community.

16. Ibid., P. 59

17. Ibid., P. 68

"Ecological organisation" is the broad and general term used by Hawley to refer to 'the complex of functional inter-relationships by which men live'. But, the community is the basic unit of ecological investigation, for Hawley. For, "community has essentially the same meaning as ecological organisation, the one difference being that the former is applied to a relatively small unit of territory whereas the latter may extend over an area of indefinite scope. Formerly defined, community refers to the structure of relationships through which a localised population provides its daily requirements. In some instances the bounds of ecological organisation and of community are coterminous, in others ecological organisation extends well beyond the limits of a single community embracing two, three, or any number of communities. The chief advantage in dealing with the community is that it offers a relatively small and convenient unit for investigation... There is also further fact that the elaboration and extension of ecological organisation proceeds from a community centre and always has such a centre as its focal point."¹⁸

(D) Duncan's Theory of Ecological Complex:

Duncan's ecology, built primarily on Hawley's theory, is more succinct and larger in scope. His frame of reference of human ecology constitutes four "variable concepts" : population, environment, organisation,

and technology. The focus of interest is on social organisation studied in the context of other three factors. The details of Duncan's general frame of reference of human ecology are as follows.

A spatially delimited human population enters into process of continuous and dynamic interaction with environment, in producing its sustenance. And this interaction of adjustment or adaptation is greatly "facilitated and complicated by man's possession of culture".¹⁹

Like Hawley, Duncan also insisted that human ecology should not be limited to the 'sub-social' only and observed that, "you cannot throw away what is most distinctively human-communication with symbols, customs and the artificial or cultural transformation man makes in his environment and treat the residue as the ecology of the species. There is no need, of course, to adopt such a strategy".²⁰ But, in contrast to the 'culture wholes' of culture theories of anthropology, the concept of culture in the ecological perspective of sociology has limited connotation. It refers to only those aspects of culture which are significant in the adjustment of human population with the environment. In Duncan's frame of reference, the two variables social organisation and technology become the focus of interest as aspects of culture. "The concept of technology in

19. O.D. Duncan, "Human Ecology and Population Studies" in Philip M. Hawser (ed.), The Study of Population, The University of Chicago Press, 1959., P. 683.

20. O.D. Duncan "Social Organisation and the Ecosystem" in R.E.L. Faris (ed.) Handbook of Modern Sociology Rand Mac Nally & Co., Chicago, 1964., P. 77.

human ecology refers not merely to a complex of art and artifact whose patterns are invested, diffused and accumulated (the processes stressed by culturologists) but to a set of techniques employed by a population to gain sustenance from its environment and to facilitate the organisation of sustenance producing activity".²¹ And social organisation is conceived as the one which arises from sustenance producing activities. It is a property of the population aggregate, is indispensable to the maintenance of collective life, and must be adapted to the conditions confronting a population including the character of the environment, the size and composition of the population itself, and the repertory of techniques at its command.

Like Hawley, Duncan also took the territorially delimited population aggregate as the unit of his analysis. Asserting that the existence of a close isolated system of a community is a rare possibility, he pointed out that ecological expansion is taking place on a rapid rate which is explained in the formula "technological accumulation at an accelerated rate; intensified exploitation of environment; demographic transition (now popularly known as 'population explosion'); and organisational revolution... Once the aspect of the expansion of ecological organisation is taken into the analysis, the community as a unit of observation is justified as "it is the most manageable and accessible".²²

21. O.D. Duncan, 1959., Op. cit., P. 682

22. O.D. Duncan., 1964., Op. cit., P. 75

The relationship between culture and environment was one of the oldest concerns of anthropology. The concern was implicit in the studies of early evolutionary theorists. For instance, in Morgan's²³ account of various evolutionary stages of man, such as hunters, gatherers, barbarians, and agriculturists, the interaction of technology, the subsystem of culture and environment forms an explanatory factor. Later culture-environment studies became one of the most important and open concerns of anthropology.

In its early stages of development, the subject was influenced by anthropogeographers and cultural historians, the former explained culture in terms of environment, thus gave negligible place to culture in their explanations and the latter explained ecological adaptations of man in terms of culture and belittled the role of environment.

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Anthropogeography or Environmental Determinism:

The determinist view point was best represented by Elsworth Huntington²⁴. According to him environmental factors determined cultural phenomena. He even sought to explain physiological and psychological development of man in terms of climatological factors. Nevertheless even the staunchest believers of environmentalism included

23. Ancient Society (ed.) E. Leacock, Meridian Books World Publishing, New York, 1963.,

24. Mainsprings of Civilisation Wiley, New York, 1945.

some non-environmental factors such as ethnic or racial traits in their explanation. For example, Huntington attributed some degree of latitude in human culture to 'biological inheritance' such as race.²⁵

Cultural History:

As a reaction against geographical determinism, there developed a cultural historical approach mainly represented by Wissler, Kroeber and Forde. Both Wissler and Kroeber basing their theories on the geographical orientation of Ratzel and Mason²⁶ argued that environmental phenomena have a limiting but not a determining role, that is, 'ecological areas', particularly food producing areas act as limiting or selective factors in the formation of cultural areas. They invoked 'historical or cultural influences' in their explanations of culture. "The influence of environment appears as a passive limiting agency rather than as a causal factor."²⁷

A.L. Kroeber, in his study of cultural and natural areas of native North America rejected environmental determinism and regarded environmental phenomena as merely limiting factors. He attributed explanatory value, primarily to the historical or cultural influences.

25. Ibid. P. 8

26. F. Ratzel, Anthropogeographie Stuttgart. J., Englehorn, 1899., O.T. Mason "Environment" Handbook of American Indians North of Mexico, Part. I. Washington : Bureau of American Ethnology, 1907., Bulletin No. 30, pp.427-30.

27. Clark Wissler, An Introduction to Social Anthropology Holt, New York, 1929., P. 339.

Kroeber stated that "the south-western Indians did not farm because nature induced them to make the invention. They did not make the invention at all. A far away people made it, and from them it was transmitted to the Southwest through a series of successive tribal contacts. These contacts which then are the specific cause of Southwestern agriculture, constitute a human social factor; a cultural or civilizational factor. Climatic or physical environment did not enter into the matter at all except to render agriculture somewhat difficult in the arid Southwest, though not difficult enough to prevent it. Had the Southwest been thoroughly desert, agriculture could not have got a foothold there. But this would be only a limiting condition; the active or positive causes that brought about the Southwestern agriculture are; its invention farther South, the spread of the invention to the North, and its acceptance there".²⁸ Thus, he emphasised historical phenomena such as acculturation and diffusion as causal factors and looked at environment as a limiting condition.

Daryll Forde, rejected the culture-area approaches of Kroeber and Wissler on the reason that the broad general classifications have operational limitations

28. A.L. Kroeber, Anthropology Harcourt's. Brace, New York, 1923., P. 185.

and thus inadequate for the analysis of culture and environment interactions.²⁹ He preferred to take up studies of individual societies.

Criticising the environmental determinists and others for their failure to recognize specific histories of societies in accounting their cultural phenomena, Forde, in his famous comparative study of cultural histories of food gatherers, cultivators, and pastoral nomads of the world, stated that "the differences in character and content between particular cultures have, as has been said, often been ascribed to differences of race and physical environment, or to differences in the alleged stage of social or even psychological evolution. No one of these general factors can alone explain anything, nor can their significance be analysed in isolation; for they do not operate singly nor in a vacuum. They fail both singly and collectively because they ignore the fact that the culture of every single human community has had a specific history. How far that history is known will make all the difference to the degree of our understanding; but unless there is realisation of the existence of that specific history,

29. Daryl Forde, Habitat, Economy and Society Methuen & Co., Ltd. London, 1934., P. 464.,

both of internal change and external contact in one or several specific environments, understanding cannot begin. Physical conditions enter intimately into every cultural development and pattern, not excluding the most abstract and non-material, they enter not as determinants, however, but as one category of the raw material of cultural elaboration. The study of the relations between cultural patterns and physical conditions is of the greatest importance for an understanding of human society, but it cannot be undertaken in terms of simple geographical controls alleged to be identifiable on sight. It must proceed inductively from the minute analysis of each actual society. The culture must in the first place be studied as an entity and as an historical development; there can be no other effective approach to interrelations of such complexity.³⁰ Thus, Forde emphasised unique cultural patterns that develop during the course of long histories.

Thus, environmental determinists and cultural historians constantly looked at environmental phenomena as being opposed to cultural phenomena and vice-versa. This is one of the most severe limitations of these theories; consequently much criticism was levelled by

30. Ibid., pp. 464 -66.

one against the other and also by other social theorists against both of them. And this was one of the major drawbacks that impeded the growth of the subject until Julian H. Steward advocated his 'method of cultural ecology' according to which the two concepts environment and culture are regarded as complimentary rather than contradictory to each other.

Cultural Ecology:

In reaction to environmental determinists and anthropological cultural historians, Steward developed an approach which he preferred to call 'cultural ecology'.

Steward noted that man enters the ecological scene and joins the other biotic communities 'not merely as another organism which is related to other organisms in terms of his physical characteristics but he also introduces the super-organic factor of culture, which also affects and is affected by the total web of life"³¹. In order to give due weight to cultural factors Steward divided the ecology of man into two parts : (1) biological ecology which deals with organic and genetic characteristics of man, and (2) cultural ecology dealing with cultural aspect of man. He asserted that since cultural features are not genetically determined they cannot be studied

31. Julian H. Steward, Theory of Culture Change
University of Illinois Press, Urbana 1955, p. 31.

along with the biological aspects. Further, he pointed out that cultural ecology would be best explained "through use of cultural historical concepts and methods" supplemented with ecological principles. And on these lines he developed his 'method of cultural ecology'.

Cultural ecology is the study of the processes by which a society adjusts to its environment. It seeks to investigate "whether the adjustments of human societies to their environment require particular modes of behaviour or whether they permit latitude for a certain range of possible behaviour patterns".³² A major break through, and the resultant landmark, was Steward's selection of certain variables from the global concepts of culture and environment. He rejected the holistic view of culture, which regards all the aspects of culture as functionally interdependent, and stated that the degree and kind of interdependence of cultural aspects varies. He preferred to limit his study to those aspects of culture "which are most closely related to subsistence activities and economic arrangements"³³, which he called the "cultural core". His cultural ecology pays primary attention to this core. The rest are secondary features and are

32. Ibid., P 36.

33. Ibid. P. 37;

determined to a greater extent by purely cultural-historical factors - by random innovation or by diffusion . Similarly he delineated only those relevant environmental features "to which the local culture ascribes importance". These two specified categories of environmental and cultural variables constitute an ecologically interacting system. The resources, flora, fauna, climate and many other features of the environment constitute potential factors in one part of the interactions system. The culture, especially its exploitative and adaptive technology and also features of the internal and external social environment, constitutes the other part. Thus, the interaction system involves in its dimensions the social arrangements that are required in land exploitation, population density, distribution, nucleation, permanence and composition of population aggregate, territoriality of societies, intersocietal relationships and cultural values. The adaptive processes inducing the two parts of the system are called ecological. The cultural environmental adaptations involve creative processes, that is, "environment acts not only as a permissive but also as a creative agent". Thus, "societies equipped with bows, spears, surrounds, chutes, brushburning, deadfalls, pitfalls, and other hunting devices may differ among themselves because of the nature of the terrain and fauna. If the principal game exists in large herds, such



as herds of bison or caribou, there is advantage in cooperative hunting and considerable numbers of peoples may remain together throughout the year...If however, the game is non-migratory, occurring in small and scattered groups, it is better hunted by small groups of men who know their territory well.... In each case, the cultural repertoire of hunting devices may be about the same but in the first case the society will consist of multifamily or multilineage groups as among the Athabasleans and Algonkians of Canada and probably the pre-horse plains bison hunters, and in the second case it will probably consist of localised patrilineal lineages or bands as among the Bushmen, Longo Negritos, Australians, Tasmaians, Fuegians and others." 34

Steward gave three fundamental procedures of the research strategy of cultural ecology which, he followed in his substantive studies. First, the interrelationship of exploitative or productive technology and environment must be analysed. Second, the behaviour patterns involved in the exploitation of a particular area by means of a particular technology must be analysed. The third procedure is to ascertain the extent to which the behaviour patterns entailed in exploiting the

34. Ibid., P. 38

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environment affect other aspect of culture.³⁵

Harris³⁶, following Steward developed a strategy of cultural materialism according to which the explanation for cultural differences and similarities between societies, is to be found in the techno-economic processes responsible for the production of the material requirements of bio-social survival. The techno-economic parameters of socio-cultural systems exert selective pressures in favour of certain types of organisational structures and upon the survival and spread of definite types of ideological complexes. It also states that, in principle, all of the major problems of socio-cultural differences and similarities can be solved by identifying the precise nature of these selective parameters. Thus, his principle of 'techno-environmental and techno-economic determinism' developed as a strategy of cultural materialism treats social organisation and ideology as dependent variables and techno-environmental and techno-economic factors as explanatory variables.

Unified Single Ecology :

Vayda and Rappaport³⁷ criticising cultural ecologists for treating human cultural features as something

35. Ibid., pp. 39-42;

36. M. Harris, The Rise of Anthropological Theory, Thomas Y. Cromwell Company, 1968.

37. Andrew Vayda and A. Rappaport, Ecology : Cultural and Non-cultural in James A. Clifton (ed.,) Introduction to cultural Anthropology Houghton Mifflin Co., Boston, 1968.

different from the non-human behaviour of other species, stated that cultural ecological studies have suffered by restricting to cultural orientation and from its isolation from general ecology. Asserting that culture is a means by which a human population maintains itself in ecological system and therefore culture is identical with the mechanisms of survival of infra-human species, they advocated a single general ecological perspective, "which assigns biological meaning, and biological meaning only, to such terms as adaptation, adequate functioning, homeostatis and survival". That is, they emphasised the principles, concepts and laws that apply to both human and non-human organisms. Human populations rather than cultures become basic units of their analysis.

Vayda and Rappaport asserted that their single unified science of ecology has advantages over cultural ecology in making generalisations of much broader scope and applicability, especially in taking up energy studies. To quote : "Human populations as units are commensurable with the other units with which they interact to form food webs, biotic communities, and ecosystem. Their capture of energy from and exchanges of material with these other units can be measured and then described in quantitative terms. No such advantage or commensurability obtains if cultures are made the units, for cultures, unlike human populations, are not fed upon by predators,

limited by food supplies, or debilitated by disease".³⁸

Setting the contribution of ecological approach as the realisation of two goals of cultural anthropology, that are, the elucidation of presence and functioning of cultural traits, Vayda and Rappaport argued that by studying the cultural traits in the same manner as they study of any animal behaviour, in relation to environment, the functioning of "these traits may be made more intelligible through investigation of their role in maintaining within an adaptive range certain variables (such as size or dispersion) pertaining to either particular human populations or the faunal and floral populations upon which these depend"³⁹ And about the study of origin or presence of particular cultural traits, they stated that 'the determinants of cultural traits are to be sought in an interplay of factors that include environmental and behavioural or cultural ones'. The cultural factors are generating influences and the environmental factors represent selecting influences. "The former provide the material for selection, while the latter do the selecting."⁴⁰ Similar selecting influences may produce different results depending upon the material provided for selection.

38. Ibid. P. 494;

39. Ibid., P. 495;

40. Ibid., P. 486

Cognitive Ecology:

Yet another distinctive approach⁴¹ regards ecology as a study of people's perception of environment, it seeks to investigate how people perceive their environment, what meanings they attach to it, what values they see in it and finally how does all this knowledge help people in their behaviour within their ecosystem. According to Frake, the proponent of this approach, "successful strategy for writing productive ethnographies must tap the cognitive world of one's informants..... By discovering what one must know in order to classify plants and other ecological components in Hanunoo fashion, one learns what the Hanunoo (a people of Mindoro Island in the Phillipines) consider worth attending to when making decision on how to behave within their ecosystem (ecological system)... From a presentation of the rules by which people decide upon category membership of objects in their experience, an ethnographic ecology can proceed to rules for more complex trends and behaviour, killing game, cleaning fields - building houses, etc. Determining the requisite knowledge for such behaviour shows the ethnographer the extent to which ecological considerations in contrast, say to sociological ones, enter into a person's decision of what to do".⁴²

41. Charles Frake "Cultural Ecology and Ethnography" American Anthropologist Vol. 64, 1962.

42. Ibid., pp. 54-55.

Thus, in the early stages, the ecological sociology and ecological anthropology were narrowly formulated. The former confined itself to sub-social aspects of community life and neglected cultural aspects in its studies. The latter was pre-occupied with "environment - culture" and "culture - environment" controversies. In the treatment of Hawley, Duncan, Steward and Harris, the subject developed into a systematic study of the interaction between four key variables population, technology, environment and social organisation. Of course, the subject was explicitly formulated as centring around these four variables, by Duncan. However, same four variables were considered by the other scholars also in their studies. Although, they all stressed the interdependence of the four variables, they nevertheless treated social organisation as a dependent of the other three. Their main concern was to study how culture and social organisation develop ecologically. Of late, some scholars have proposed a single unified science of ecology for the study of both plants, animals and human beings. They treat culture at the same level as that of techniques that plants and animals possess.

In conclusion, the brief review of ecological approaches in sociology and anthropology points out at the important role of environmental factors over other aspects of society. We propose to study the impact of environment on agrarians relations in the context of some of the prevailing

studies on agrarin relations in India and a preliminary analysis of the data available on agrarin relations in the two regions of Andhra viz., Rayalaseema and Coasted Andhra.

CHAPTER II

AGRARIAN RELATIONS IN ANDHRA PRADESH : A PRELIMINARY ANALYSIS

I

Despite the early efforts made by Radhakamal Mukerjee¹ and Ramakrishna Mukerjee² to study agrarian relations in India the field remained relatively neglected in Indian Sociology. Though, it is not our concern to discuss the reasons for such neglect, it is sufficient to say that this was due to the primary focus given to caste studies in Indian Sociology. However, recently there has been a revival of interest among sociologists in the study of agrarian relations. A handful of studies are available now. Some of these studies especially those of Epstein, Beteille, Oommen, Mencher and Alexander have dealt with role of ecological factors in influencing agrarian relations, although, they have not explicitly followed any of the known ecological schools. Therefore,

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1. Mukerjee, Radhakamal, Land Problems of India, Longmans, Green & Co., London, 1933.
 2. Mukerjee, Ramakrishna, The Dynamics of a Rural Society Akademik Verlag, Berlin, 1957.

it is of interest to us to review these studies before we set out to analyse our data on Andhra agrarian structure.

II

Epstein studied³ two villages located in an irrigation region, in Mysore (now Karnataka) state. One of them was a dry village (Dalena) and the other, a wet village (Wangale). Dalena, situated on a main highway and near to a railway station was favourably exposed to the wider economy; while Wangala was less fortunate in this respect because it was located on a secondary road. About 25 years before Epstein's field study, Wangala received irrigation facilities and Dalena did not. Since then the two villages witnessed divergent economic changes. In what follows, an attempt is made without mis-interpreting her data, to show the limited role of irrigation in the economic changes that occurred in the two villages.

As the region received irrigation and as a result of the growing prosperity of the region, the Dalena villagers diversified their economic activities.

3. Epstein, T.S. Economic Development and Social Change in South India, Oxford University Press, Bombay, 1962.

They provided transport, processing, middle-men services to their neighbouring irrigated villages. Many of the villagers worked as agricultural labourers in nearby irrigated villages. Dalena villagers also had the advantage of seeking jobs in the nearby Mandya Town. Thus, as Dalena men had alternative employment opportunities the customary ties between farmers and agricultural labourers disappeared. Dalena farmers, who already had or soon bought wet lands in the nearby irrigated villages, as they were more entrepreneurial and experienced atmosphere, started adopting Japanese method of rice cultivation.

By contrast, the Wangala village economy did not show any diversification. It did not immediately respond, as Dalena did, to the irrigation facilities. It remained a wholly agricultural economy. As there were no alternative employment opportunities to Wangala men the customary ties between agricultural labourers and farmers continued. Wangala farmers were less entrepreneurial and did not go for Japanese method of rice cultivation. But later on (as reported in her more recent study) as the Wangala farmers became slowly exposed to the economic activities in the nearby villages and town, the village economy became diversified. The farmers, once the village was provided with electricity, established about eight

power operated crane crushers and they found processing of jaggery, extremely profitable. Moreover, while previously they had sold almost all their cane under contract to the sugar mill in Mandya town, where they had an assured market at a price fixed in advance of planting the cane, the production of jaggery which is sold to wholesale buyers touring the area made villagers more market oriented and forced them to become price conscious : they quickly learned that it was in their interest to sell to the highest bidder. "The buffer which the sugar mill used to provide between the village and the wider economy greatly lost in importance as a result of jaggery production and consequently Wangala farmers at least to a certain extent became also part of the wider market forces".⁴

They also started employing Japanese method of rice cultivation. The customary relationships between farmers and labourers tend largely to continue. Nevertheless, change is noted, "The majority of Wangala's contract servants are keen to leave their employment. As soon as they can find some other income earning opportunity they leave their employees!"⁵ But the alternative

4. Epstein, T.S. A Comparative Analysis of Economic Development and Social Change in South India and New Guinea Villages, Prasaranga, University of Mysore, 1971. p. 6

5. Epstein, T.S. South India : Yesterday, Today and Tomorrow Macmillan, London, 1973, P. 138.

employment opportunities are limited. Therefore, the poor labourers were becoming poorer while the rich farmers were steadily increasing their income.

Thus, the study reveals us that the irrigation was a powerful resource base that made possible the economic changes that occurred in the two villages. At the same time, it also tells us that it was not a sufficient condition for the development of these economic changes. Dalena, since its location favoured its exposure to wider economy and provided the villagers with alternative employment opportunities and since because of the same reason the Dalena farmers also were more entrepreneurial, its economy immediately responded to the irrigation conditions and became diversified. By contrast, Wangala's unfavourable location did not, immediately after receiving irrigation, make it possible for its economy to respond, in the fashion of Dalena, to the irrigation opportunities. But later on, the village became gradually exposed to the wider economic forces and slowly its economy got diversified on the lines similar to that of Dalena. Thus, irrigation acted as a generating agent of the economic changes in the villages. But the proximate causes of these changes lie elsewhere. No doubt, in the absence of irrigation facilities, most of these economic changes could not have occurred at all.

Another study which examines relationship between ecological factors and agrarian relations is the study of Tanjore district conducted by Beteille.⁶ He compares to broad regions of Tanjore district in the following manner.

TABLE I

Some Features of Agrarian System	Old delta	New delta
I. a. Irrigation facilities.	High	Low
b. Cropping Pattern	Intensive cultivation of paddy	Traditionally dry crops such as Cholam and Kombu
c. Population density	High	Low
II. Modes of production organisation:		
a. Tenancy	High: Brahmin land-owners are very large in number and they avoid cultivation of fields because of its low social evaluation	Low : Brahmin land-owners are insignificant.
b. Based on wage labour	Predominant: Because of predominantly large farms and the commercialisation of agriculture.	Insignificant.

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6. Beteille, Andre. Agrarian Relations in Tanjore District, in Studies in Agrarian Social Structure, Oxford University Press, New Delhi, 1974. pp. 142-70.

Table I (continued)

Some Features of Agrarian System	Old delta	New delta
c. Based on family labour	Insignificant	Predominant: Because of predominantly small farms distributed among large number of peasants.
III. Social stratification	Elaborate : The proportions of both Brahmins and Adi-Dravidas are much higher thus showing the extremes of caste hierarchy.	Less elaborates and less rigid : Higher concentration of middle - level castes.
	Higher proportion of both large land-owners and landless labourers, thus marking sharp distinctions between the two categories.	Very few large land-owners and small proportion of agricultural labourers and thus the distinction between the two categories is less sharp.
	Number of strata; large and small landlords, owner-cultivators, share croppers, and landless labourers.	Mainly small peasants.

The old Delta with high irrigation facilities and intensive paddy cultivation had accommodated a larger population. It had high proportion of agricultural labourers, most of them were drawn from Harijans. Thus, agricultural labourers in Old Delta, especially in its eastern taluks, formed an economically

and culturally homogeneous group. And also the inequalities, in this region, between agricultural labourers and landowners, the majority of the latter group constituting large landowners, were sharper. These circumstances made it possible for Kisan Sabha to build up a powerful organisation among agricultural labourers in this region leading to agrarian conflict.

In contrast, the New Delta with less irrigation facilities and mainly dry crops had lesser population density. The proportion of agricultural labourers was low and also they were drawn from different cast groups. The inequalities between landowners, who were mainly small peasant owners, and agricultural labourers were less sharp. Therefore, there was hardly any organisation among agricultural labourers and the incidence of agrarian conflict was also absent.

Thus, Beteille argued that in a high irrigation area, certain existensial conditions work as necessary conditions for agrarian conflict. And this alone was not a sufficient cause of the phenomenon. These conditions coupled with political organisation among landless labourers can lead to agrarian conflict. "The conflict of classes presupposes at least two sets of factors. (1) a given set of existensial conditions and a given state of consciousness".⁷

7. Ibid., pp. 169-70.

Another irrigated agrarian region studied is Alleppy district.⁸ Alleppy with high irrigation conditions is a predominantly rice growing region. Its population density is the highest in Kerala state. It has high proportion of agricultural labourers. And the district is "notorious for agrarian unrest". Analysing the causes of the agrarian unrest, Oommen also argued that existing economic inequalities are a necessary but not a sufficient condition for agrarian conflict. He has located the proximate causes of agrarian unrest in the changing values and norms of society. In traditional India, "rationalisations such as the theory of Karma and Reincarnation" were effectively utilised to silence the masses and their feelings of deprivation. Now there are certain changes taking place in Indian society and polity mainly the merging egalitarian values and ideology. And "as the values of a system change and promises and hopes are given to the weak and the poor, they start comparing their lot with that of others, and so that searching for the 'why' of their pitiable predicament".⁹ These circumstances coupled with adequate

8. Oommen, T.K. Agrarian Tension in a Kerala District - An analysis, Indians Journal of Industrial Relations, Vol. 7, No. 2, 1971.

9. Oommen, T.K. Green Revolution and Agrarian Conflict. Economic and Political Weekly, Vol. 6, 1971. P.A. -99

"support-structure" provided to the rural poor by political parties result in agrarian conflict.

Mencher¹⁰ has studied a number of villages with high irrigation and intensive paddy cultivation, from central Kerala and southern half of Chengleput District, in Tamil Nadu. In these villages, with increasing agricultural production, economic class differences have increased. Feudal linkages between agricultural labourers and land-owners have mostly broken down. Unlike in the past, people no longer feel to repress their aspirations. There is a tremendous amount of tension, distrust and antagonism between the two classes, the landless labourers and the landowners. But Marxist polarisation of classes has not occurred in Chengleput villages unlike in Kerala. This is attributed mainly to the strong Marxist activity that is prevalent in Kerala. Thus, Mencher also explained the development of agricultural labour movements in terms of political organisation of the labourers.

Alexander¹¹ has done a districtwise analysis of agrarian relations of Tamil Nadu. He noted a close association between good irrigation conditions and paddy cultivation, on the one hand, and high incidence of tenancy, high proportion of agricultural labourers and

10. Agricultural Labour Movements in their Socio-political and Ecological Context : Tamil Nadu and Kerala, in Balakrishna Nair (ed.), Culture and Society, Thomson Press (India), Publication Division, 1975.

11. Alexander, K.C. Some characteristics of the Agrarian Social Structure of Tamil Nadu, Economic and Political Weekly. Vol. 10, No. 16, April, 1975. pp. 664-72.

high proportion of scheduled castes, on the other.

The detailed figures of the analysis are given below:

TABLE 2

Districts	% of area under irrigation (to the total cultivated area)	% of land under Paddy	Popu- lation Density	% of Land under tenan- cy.	% of agri- cults in popu- lation	% of Sc. in popu- lation	Castes among ag. labour ers
Chingleput	61	75	696	7	11	28	61
North Arcot	35	32	671	4	8	20	46
South Arcot	45	37	724	4	13	26	57
Salem	17	11	539	3	7	17	42
Coimbatore	35	12	590	7	8	16	42
Madurai	34	23	660	6	9	15	36
Tiruchirapalli	28	26	579	4	8	17	44
Thanjavur	84	78	868	29	14	23	62
Ramanathapuram	45	34	502	4	7	15	35
Tirunelveli	30	25	619	4	7	16	42

The proportion of gross cropped area under paddy was more in districts with higher percentage of land under irrigation. The population density was higher in the districts

with more land under irrigation and paddy. Land under tenancy was more in districts with more area under irrigation and paddy crop. The proportion of agricultural labourers was higher in the districts with more area under irrigation and paddy. The percentage of scheduled castes in the population and among agricultural labourers was more in the districts with higher percentage of gross cropped area under paddy. Thus, variations in the characteristics of agrarian social structure were found to be associated with irrigation.

However, the association was not explained in terms of environmental (in the present case, irrigation) determinism. "Even though geographical characteristics thus influence certain characteristics of the social structure, its influence is not exerted in a deterministic way. Instead, the influence of the geographical factor is mediated through culture - especially evaluative norms which give meaning for particular geographical characteristics!"¹²

The paddy and paddy fields were highly evaluated, but the tasks connected with paddy cultivation were devalued. Therefore, the high caste landowners avoided cultivation work which led to high amount of tenancy and high proportion of agriculturiers. The majority of agricultural were drawn from scheduled castes.

12. Ibid, P. 672

In another study¹³, Alexander has analysed the causes of agrarian unrest in two taluks, Mannargudi and Mayuram, in East Tanjore. The two taluks had similar social structural and economic characteristics, but the incidence of agrarian unrest was high in Mannargudi and low in Mayuram. He also attributed the cause of this variation in agrarian conflict to the existence of a strong organisational structure built by the communist party among agricultural labourers in Mannargudi.

III ✓

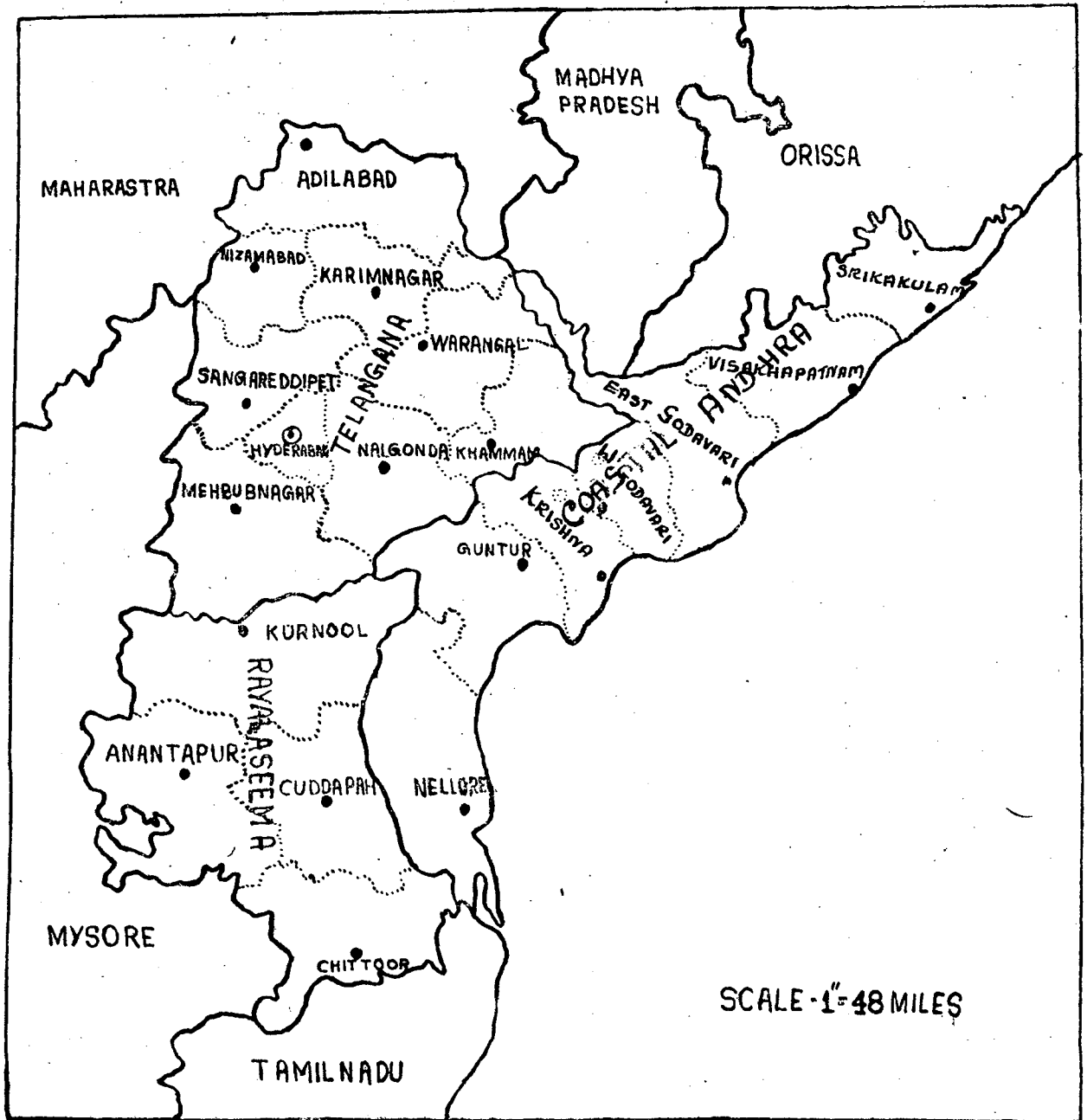
Against the backdrop of the review undertaken in the previous section, we shall proceed now to analyse our data on Andhra. We attempt a preliminary correlational study based on available census material as no agrarian study with specific focus on ecological factors and agrarian relations is available. The analysis here is confined to correlations between environment, population, technology and agrarian social organisation, following the scheme presented by the ecological school in sociology and social anthropology. We take ^{into} account, under each of the factors, only those variables that have a direct bearing on agrarian

13. Alexander, K.C. Genesis of Agrarian Tension in Tanjavur : Findings of a Research Study, Economic and Political Weekly Vol. 10 No. 49, Dec 1975.

systems. Thus, the variables considered under the term ecology are : soil, rainfall, temperature and irrigation facilities. Of these, we pay primary attention to availability of irrigation facilities. Population here refers both to the size and density. We take the number of tractors, ploughs and cattle under technology. Lastly, agrarian social organisation is operationalised into proportions of cultivator households, tenant households and agricultural labourers in 100 acres of area cultivated. We have taken district as the unit of the study. In order to minimise, in our analysis, variations within districts, we thought of taking taluk as the unit. But, since the data we need on social organisation was not provided in the census, we had to settle with district as the unit of our analysis.

Historically speaking, Andhra Pradesh has been divided into the following three regions, namely Coastal Andhra, Rayalaseema and Telengana (shown in the map). In its agricultural land setting, Telengana resembles Rayalaseema with less irrigated and less fertile land. Coastal Andhra has agriculturally highly suitable land with high irrigation and fertility. Telengana region is not included in our study as it was under the rule of Nizam before independence whereas Rayalaseema and

Map showing the Three Regions of Andhra Pradesh and the District Boundaries



Coastal Andhra were under the British rule. They differed in their tenurial conditions such as landownership pattern, Telangana had Jagirdari system of land administration whereas the other two regions experienced mainly Ryotwari system of land tenure. Again, two districts Srikakulam and Visakhapatnam which form the northern part of Coastal Andhra are excluded because these districts with large portions of their land under forest and also with large proportion of tribal population, disturb the sample and thus the comparison of the sample district. The remaining five districts of Coastal Andhra viz., East Godawari, West Godawari, Krishna, Guntur and Nellore and all four districts of Rayalaseema - Chittoor, Cuddapah, Anantapur and Kurnool constitute the field of the study.

ENVIRONMENT :

The Coastal Andhra is the most fertile of the three regions. It has an average elevation of less than 1000 feet above sea level and is well served by the Southwest and Northeast monsoons. In this region rainfall is the highest. The richest soil of the State, alluvial is mostly concentrated in this region. Moreover, the major rivers Godawari, Krishna and Pennar flow through this region. The Krishna and Godawari deltas are so close to each other, that they form one homogeneous delta region. With the Kolleru lake in the centre, this delta

is surrounded by well-knit Krishna and Godawari canal system. Unlike Rayalaseema region most of the area in this region is under assured sources of irrigation. Well irrigation is prevalent in the non-deltaic regions and intensive cultivation is widely practiced in these areas.

Rayalaseema lies mostly at an altitude of 1000 to 2000 feet above the sea level. This is a typically dry tract of Andhra Pradesh situated in an unfavourable natural zone which is susceptible to chronic drought conditions. Not only is the rainfall meagre but the fluctuations are wide from year to year. The entire land is mostly undulating and soil erosion is common. The major irrigation in this area is the Kurnool -Cuddapah canal. More than half the area commanded by this canal is cultivated by irrigated dry crops. Wet cultivation is carried on usually by single paddy crop under tanks. Intensive cultivation is, however, carried on with wells in Chittoor district. The major portion of Rayalaseema is, a dry tract depending on ^{an}reliable rainfall. In all dry tracts only one crop a year is cultivated. The frequent failure of monsoon has given this region the reputation as being the stalking ground of famines.

Soils:

The major soil types in coastal Andhra and Rayalaseema regions are red soil, black soil, coastal

alluvium, deltaic alluvium and laterite soil. The great part of Rayalaseema districts and the upland portions of Nellore, Guntur, West Godawari, and East Godawari are covered by the red soils. Most of the tract covered by this type of soil, except where tank or river irrigation is provided, is cultivated by rather poor dry crops which have to depend mostly on the vicissitudes of the monsoons. Portions of Cuddapah, Anaparthi, and Guntur have a fair amount of black soils. These soils are particularly suitable for cotton cultivation. Dry crops like jowar and bajra are also grown in these soils. Tobacco is also grown considerably in this type of soil. All the five districts of coastal Andhra have a narrow belt of coastal alluvium. Casuarina and cashew plantations are raised extensively on this belt. The most important soil, the deltaic alluvium, is found in the delta region of the Godawari and Krishna. Traces of alluvial belt is also found along the Pennar in Nellore district. Paddy is intensively cultivated in these soils. Pockets of laterite soil occur in East Godavari and Nellore districts. These soils are well suited for horticulture and also production of pulses and oil seeds.

Rainfall:

There is much variation in rainfall from district to district. All the five coastal districts, included in our sample, generally receive heavier rainfall. The

five year averages of annual rainfall from 1956-57 to 1960-61 (Table 3) for these districts range from 101.26 cms to 120.74 cms. All the four districts of Rayalaseema are places of precarious rainfall, their five year averages of annual rainfall for the same reference years range from 58.18 cms to 69.34 cms.

Irrigation :-

Irrigational facilities available under different sources are given district-wise in Table 4. Canal irrigation is predominant in East Godavari, West Godavari, Krishna and Guntur districts. Anantpur, and Kumool districts are least facilitated in this respect. Tank irrigation is predominant in the districts Nellore, Chittoor, Godavari and Krishna. Again Kumool, Anantapur and also Guntur have the least tank irrigation. Well irrigation facilities are high in Nellore, Chittoor and Cuddapah districts. In total, East Godavari, West Godavari and Krishna districts have the highest percentage of irrigation to total area ranging from 65 to 75. Guntur, Nellore, Chittoor, and Cuddapah districts have medium irrigation ranging from 25% to 40% of the total area. Anantapur and Kumool are the least irrigated districts with hardly 8% of the total area.

Cropping Pattern:

The cropping pattern has adjusted itself to the

Table 3 : Showing Average Annual Rainfall - Districtwise 1956-57 to 1960-61 (in centimetres)

District	1956-57	1957-58	1958-59	1959-60	1960-61	Total for 5 year (from 1956-57 to 1960-61)	Average for 5 years (from 1956-57 to 1960-61)
East Godavari	123.6	102.4	151.7	130.6	95.5	603.7	120.74
West Godavari	121.2	89.9	132.3	132.7	114.0	590.1	118.02
Krishna	136.6	98.0	130.6	123.9	96.9	586.0	117.20
Guntur	108.5	72.4	128.9	80.1	116.4	506.3	101.26
Nellore	114.8	83.8	108.8	70.6	128.3	506.3	101.26
Chittoor	74.1	54.9	81.1	52.2	82.0	344.3	68.86
Cuddapah	80.4	60.7	80.6	55.0	70.0	346.7	69.34
Anantapur	68.6	56.1	49.6	55.6	51.0	280.9	56.18
Kurnool	91.3	59.4	64.5	60.7	59.6	335.5	67.10

Source : Census of India, 1961, Vol. II, pt. 1.A (1)

Table 4 : Land Irrigated under Different Sources (in acres)
1960-61

District	Govt. Canals	Private Canals	Tanks	Tube wells	Other wells	Other sources	Total area irrigated	Total area cultivated
East Godavari	509,698 (52.05)	375 (0.03)	113,061 (11.54)	3,264 (0.33)	1,312 (0.13)	928 (64.20)	628,683 (64.20)	979,138
West Godavari	526,656 (53.75)	- (-)	166,778 (17.02)	96 (0.00)	14,747 (1.50)	18,500 (.88)	726,777 (74.22)	979,759
Krishna	626,278 (51.31)	2,696 (0.27)	130,954 (10.73)	60 (0.00)	14,967 (1.22)	46,300 (3.79)	821,255 (67.29)	1,220,418
Guntur	580,392 (27.33)	- (-)	29,834 (1.40)	1,292 (0.06)	15,174 (0.71)	3,649 (0.17)	630,341 (29.68)	2,123,357
Nellore	155,674 (9.92)	55 (0.00)	339,739 (21.26)	- (-)	118,920 (7.57)	30,533 (1.94)	638,921 (40.71)	1,569,279
Chittoor	- (-)	- (-)	221,351 (21.16)	461 (0.04)	90,017 (8.56)	38,412 (3.65)	355,241 (33.81)	1,050,580
Cuddapah	87,583 (8.25)	1,219 (0.11)	72,647 (6.84)	379 (0.03)	93,698 (8.82)	5,884 (0.55)	261,410 (24.62)	1,061,594
Anantapur	43,598 (1.72)	695 (0.02)	91,863 (3.63)	6 (0.00)	66,123 (2.61)	4,251 (0.16)	206,536 (8.16)	2,528,539
Kurnool	100,113 (3.72)	61 (0.00)	68,955 (2.56)	- (-)	32,731 (0.26)	7,138 (0.26)	208,998 (7.77)	2,689,482

Note: Figures in brackets indicate percentages in relation to total area cultivated.

Source: Total area cultivated is taken from Census of India 1961. Vol. II, Pt. I-A (1) and the remaining data from Statistical Abstract, 1961.

irrigation facilities, soils, and rainfall. On alluvial soils of delta where canal water is made available for about 8 months in a year a long duration single paddy crop is raised. In the coastal region after the paddy crop has been harvested pulses, greengram, sunhemp and groundnuts are raised in most of the areas. In the deep black cotton soil of Rayalaseema, jowar is cultivated rotated with either cotton or chillies. Of late, groundnut is being grown in the red soils of Chittoor and some parts of Cuddapah. The cropping pattern, that is, the principal crops grown and the percentage of area under each crop is shown in Table 5. Paddy is the major crop with the highest percentage of area under it in the districts of East Godavari, West Godavari and Krishna ranging from 60 to 72. In Guntur, Nellore, Chittoor and Cuddapah districts the area under paddy ranges from 15% to 30%. In Anaparthi and Kurnool paddy is the least cultivated crop with area of hardly 5% under it. Jowar is the major crop in these two districts.

Population:

Under the rubric of population only one factor, the rural population density is considered. Table 6 shows the rural population density district-wise. West Godavari has the highest population density whereas it is the lowest in Kurnool district.

Table 5 : Major Crops and Percentages of Area under Principal
Crops to the Total Sown Area, 1960-61

District	Rice	Jowar	Bajra	Ragi	Major Crops
East Godavari	60.6	3.1	3.6	1.4	Paddy
West Godavari	72.1	3.1	0.3	0.3	Paddy
Krishna	59.8	15.2	0.2	0.1	Paddy and Jowar
Guntur	22.5	19.7	6.2	0.6	Paddy and Jowar
Nellore	31.0	26.0	7.0	4.4	Paddy and Jowar
Chittoor	26.7	5.2	12.5	13.8	Paddy, Ragi and Bajra
Cuddapah	14.1	30.1	9.3	5.0	Jowar and Paddy
Anantapur	5.2	20.4	8.0	6.1	Jowar
Kurnool	4.8	28.5	2.8	6.9	Jowar

Source: Season and Crop Report, 1960-61

Table 6 : Showing rural population density

<u>District</u>	<u>Density per sq. mile</u>
East Godavari	518
West Godavari	564
Krishna	486
Guntur	424
Nellore	229
Chittoor	293
Cuddapah	199
Anantapur	202
Kurnool	170

Source : Census of India, 1961, Vol.II, Pt. II(A)

Technology and Livestock :

Besides tractors and ploughs, we have considered under this heading - the working population of cattle including both bullocks and buffaloes. Bullocks and buffaloes provide the main source of energy in cultivation, besides human labour. The number of tractors, ploughs and cattle in each district, and their percentages to the net area cultivated are given in Table 7. West Godavari District has the highest number of tractors and Cuddapah District has the lowest number of tractors. Heston¹⁴ estimated the optimum acre per plough or per pair of bullocks to be less than 12 acres. That is about 8 ploughs or 16 bullocks per 100 acres of area cultivated. Thus, in East Godavari, West Godavari, Nellore, and Chittoor the ploughs are above the optimum number. In Guntur, Anantapur and Kurnool they are below the optimum figure. And in Krishna and Cuddapah districts they are close to the optimum land. Similarly, in Guntur, Kurnool and Anantapur the cattle figures are below the optimum set. The cattle figure is optimum in Krishna district. All the other districts have cattle above the optimum number.

14. Heston, Alan. An Approach to the Sacred Cow of India, Current Anthropology Vol. 12, No. 2 1971. p. 206.

Table -7 Tractors, Ploughs and Cattle

District	Tractors (both govt. & private)	Ploughs (both wooden & iron)	Cattle (working population)	Net area sown
East Godavari	16.2 (0.02)	184,603 (18.90)	317,893 (32.38)	979,138
West Godavari	319 (0.03)	153,754 (15.71)	373,588 (38.10)	979,759
Krishna	310 (0.02)	98,811 (7.70)	194,782 (15.98)	1,220,418
Guntur	80 (0.00)	131,182 (6.17)	271,593 (12.81)	2,123,357
Nellore	236 (0.01)	165,687 (10.58)	280,581 (17.96)	1,569,279
Chittoor	140 (0.01)	211,267 (20.08)	205,592 (19.60)	1,050,580
Cuddapah	20 (0.00)	99,072 (9.32)	301,572 (28.44)	1,061,594
Anantapur	43 (0.00)	163,535 (6.48)	362,591 (14.35)	2,528,539
Kurnool	66 (0.00)	140,032 (5.21)	265,560 (9.89)	2,689,482

Note: Figures in brackets show percentages to the net area sown

Source: Indian Livestock census, 1961.

SOCIAL ORGANISATION :

Under this heading, the proportions of cultivator households and tenant households, and agricultural labourers in 100 acres of area cultivated (Table 8) are considered. The data on cultivator households, and tenant households is computed from the data collected from Census of India, Vol. II, Pt. III-Kurnool has the lowest percentage of cultivator households to the net area sown with 6.72. Anantapur with 7.46% stands next lowest. For the remaining districts, the percentages of cultivator households range from 13.76 to 22.43. Similarly Kurnool with 1.36 shows the lowest percentage of tenant households to the net area sown. Again the next lowest is Anantapur with 1.43%. For the remaining districts the percentages range from 2.45% to 7.85%. The percentage of agricultural labourers to the total cultivated area is the lowest in Anantapur, that is, 8.96. The next lowest is Kurnool with 11.68%. For the remaining districts the percentages are in the range of 18.19 to 43.65.

Now from the data presented, we would attempt to analyse the systematic interrelationships between the four factors environment, technology, population and social organisation. A few correlational propositions are inferred. Some of the correlations drawn here are reciprocal, that is, they represent the equations both the ways. Therefore, some of the arguments presented here

Table 8 : Cultivator Households, Tenant Households and Agricultural Labourers

District	Net area sown	Total cultivator households.	Total tenant house holds	Total agri. cultural labourers	Percentages to the net area sown		
					Cultivator households	Tenant house holds	Agricultural labourers
East Godavari	979,138	201,260	76,700	427,466	20.55	7.85	43.65
West Godavari	979,759	177,205	56,605	377,072	18.09	5.80	38.47
Krishna	1220,418	187,365	34,950	357,350	15.35	2.77	29.28
Guntur	2123,357	311,015	78,630	430,175	14.65	3.70	20.26
Nellore	1569,279	221,705	49,905	305,081	14.13	3.18	19.44
Chittoor	1050,580	235,615	54,010	244,193	22.43	5.14	23.24
Caddapah	1061,594	146,115	26,025	193,185	13.76	2.45	18.19
Anantapur	2528,539	188,775	32,480	226,688	7.46	1.48	8.96
Kurnool	2689,482	180,830	36,435	314,266	6.72	1.36	11.68

* These figures give the distribution of cultivator households, tenant households, and agricultural labourers in 100 acres of area sown.

Source: (a) Data on agricultural labourers is collected from Census of India, 1961, Vol. II. Pt. IIA
 (b) Data on tenant households and cultivator households is taken from Census of India, Vol. II, Pt. III (based on 20% sample households)

are circular. And it is difficult to trace cause and effect features to different variables given in the equations. The summary of the propositions with their correlation co-efficients is given in Table 9. The details are as follows:

The amount of area under paddy cultivation is positively correlated to the amount of area under irrigation. That is, the more the area under irrigation, the more the area under paddy cultivation. A close correspondence is found between the two figures (Table 9). This is because irrigation favours, to a great degree, paddy cultivation. West Godavari district with the highest percentage of land under irrigation (74.22) shows the highest amount of land under paddy (72.1%). Kurnool district with the lowest percentage of land under irrigation (7.77) shows the lowest amount of land under paddy (4.8%). Similarly, for other districts also, we find the two variables being closely related to each other.

The amount of land under irrigation and paddy crop is positively related to the degree of tractorisation. The districts with good irrigational facilities and paddy cultivation are also the districts with advanced agricultural technology, in the present case, tractors. The figures for percentage of area under irrigation and

Table-9 Results of the Correlation Tests

Correlation Series XY	Observations									Correlation Coefficient
	1 EG	2 WG	3 KR	4 GR	5 NR	6 CR	7 CP	8 AR	9 KL	
I. % of area under irrigation (X)	64.20	74.22	67.29	29.68	40.71	33.81	24.62	8.16	7.77	0.9921
% of area under paddy (Y)	60.6	72.1	59.8	22.5	31.0	26.7	14.1	5.2	4.8	
II. % of area under irrigation (X)	64.20	74.22	67.29	29.68	40.71	33.81	24.62	8.16	7.77	0.8887
Population Density (Y)	518	564	486	424	229	293	199	202	170	
III. % of area under paddy (X)	60.6	72.1	59.8	22.5	31.0	26.7	14.1	5.2	4.8	0.9108
Population Density(Y)	518	564	486	424	229	293	199	202	170	
IV. % of area under irrigation (X)	64.20	74.22	67.29	29.68	40.71	33.81	24.62	8.16	7.77	0.8694
Number of Tractors(Y)	162	319	310	80	236	140	20	43	66	
V. % of area under paddy(X)	60.6	72.1	59.8	22.5	31.0	26.7	14.1	5.2	4.8	0.8296
Number of Tractors(Y)	162	319	310	80	236	140	20	43	66	

Table-9 (continued)

Correlation Series XY	Observations									Correlation Coefficient
	1 EG	2 WG	3 KR	4 GR	5 NR	6 CR	7 CP	8 AR	9 KL	
VI. % of area under irrigation (X)	64.20	74.22	67.29	29.68	40.71	33.81	24.62	8.16	7.77	0.5433
% of ploughs to the net sown area (Y)	18.90	15.71	7.70	6.17	10.58	20.08	9.32	6.48	5.21	
VII. % of area under paddy (X)	60.6	72.1	59.8	22.5	31.0	26.7	14.1	5.2	4.8	0.5492
% of ploughs to the net sown area (Y)	18.90	15.71	7.70	6.17	10.58	20.08	9.32	6.48	5.21	
VIII. % of area under irrigation (X)	64.20	74.22	67.29	29.68	40.71	33.81	24.62	8.16	7.77	0.6585
% of cattle to the net sown area (Y)	32.38	38.10	15.98	12.81	17.96	19.60	28.44	14.35	9.89	
VIII(a) % of area under paddy (X)	60.6	72.1	59.8	22.5	31.0	26.7	14.1	5.2	4.8	0.6774
% cattle to the net sown area (Y)	32.38	38.10	15.98	12.81	17.96	19.60	28.44	14.35	9.89	

Correlation Series XY	Observations									Correlation Coefficient
	1 EG	2 WG	3 KR	4 GR	5 NR	6 CR	7 CP	8 AR	9 KL	
IX. % of area under irrigation (X)	64.20	74.22	67.29	29.68	40.71	33.81	24.62	8.16	7.77	0.6969
% of cultivator households (Y)	20.55	18.09	15.35	14.65	14.13	22.43	13.76	7.46	6.72	
X. % of area under paddy (X)	60.6	72.1	59.8	22.5	31.0	26.7	14.1	5.2	4.8	0.6656
% of cultivator households (Y)	20.55	18.09	15.35	14.65	14.13	22.43	13.76	7.46	6.72	
XI. Population density (X)	518	564	486	424	229	293	199	202	170	0.6220
% of cultivator households (Y)	20.55	18.09	15.35	14.65	14.13	22.43	13.76	7.46	6.72	
XII. % of area under irrigation (X)	64.20	74.22	67.29	29.68	40.71	33.81	24.62	8.16	7.77	0.7127
% of tenant households (Y)	7.85	5.80	2.77	3.70	3.18	5.14	2.45	1.48	1.36	

Continued.....

Table-19 (continued)

Correlation Series (XY)	Observations									Correlation Coefficient
	1 EG	2 WG	3 KR	4 GR	5 NR	6 CR	7 CP	8 AR	9 KL	
XIII. % of area under paddy (X)	60.6	72.1	59.8	22.5	31.0	26.7	14.1	5.2	4.8	0.7239
% of tenant households (Y)	7.85	5.80	2.77	3.70	3.18	5.14	2.45	1.48	1.36	
XIV. Population Density (X)	518	564	486	424	229	293	199	202	170	0.7298
% of tenant households (Y)	7.85	5.80	2.77	3.70	3.18	5.14	2.45	1.48	1.36	
XV. % of area under irrigation (X)	64.20	74.22	67.29	29.68	40.71	33.81	24.62	8.16	7.77	0.9223
% of agricultural labourers (Y)	43.65	38.47	29.28	20.26	19.44	23.24	18.19	8.96	11.68	

Continued.....

Correlation Series (XY)	Observations									Correlation Coefficient
	1 EG	2 WG	3 KR	4 GR	5 NR	6 CR	7 CP	8 AR	9 KL	
XVI. % of area under paddy (X)	60.6	72.1	59.8	22.5	31.0	26.7	14.1	5.2	4.8	0.9330
% of agricultural labourers (Y)	43.65	38.47	29.28	20.26	19.44	23.24	18.19	8.96	11.68	
XVII. Population density (X)	518	564	486	424	229	293	199	202	170	0.8874
% of agricultural labourers (Y)	43.65	38.47	29.28	20.26	19.44	23.24	18.19	8.96	11.68	

Note: EG = East Godavari; WG = West Godavari; KR = Krishna; GR = Guntur;
NR = Nellore; CR = Chittoor; CP = Cuddapah; AR = Anantapur; KL = Karnool.

for the number of tractors in each district show a positive correlation. Only two out of nine districts, Chittoor and Kurnool, are exceptions. These deviations are to be explained by other factors about which we do not have any knowledge from the available data.

^{14a}
Parthasarathy and Abraham also noted that the density of tractors per unit of land is the highest in the delta districts of Andhra Pradesh. They also observed that the high degree of tractorisation in coastal districts is associated with intensive cultivation that is prominent there. Similarly we find close association between ploughs and cattle, on the one hand, and irrigation and paddy cultivation, on the other.

Population size of a region is positively related to the amount of area under irrigation in that region. Highly irrigated areas are densely populated whereas lowly irrigated or dry lands are sparsely populated. The figures for population density and for percentage of irrigation show a positive correlation in the case of East Godavari, West Godavari, Krishna and Kurnool districts. West Godavari district with the highest amount of land under irrigation has the highest

14a. Parthasarathy, G. and V. Abraham. Impact of Tractorisation on Agriculture, ICSSR Research Abstracts Quarterly Vol. 4, No. 182, 1975, p.65.

population pressure (564 persons per square mile) and Kurnool district with the lowest percentage of area under irrigation shows the lowest population density (170 persons). The lack of close correspondence in the case of the other districts may be accounted to by some disturbing factors which we cannot specify unless we make field investigation. But still the fact that a close and positive correspondence exists between the two variables for above 50% of the districts, indicates that the equation good association between irrigation and population density. The correlation between the two variables, irrigation conditions and population density should be explained by the intervening variable, paddy crop. The amount of land under paddy cultivation is positively correlated to the population size in a given region. The regions with high amount of land under paddy are densely populated. West Godavari district with the amount of area under paddy cultivation (72.1%) shows the highest population density (564 persons). Kurnool district which has the lowest percentage of land (4.8) under paddy shows the least population pressure (170 persons per square mile). Geertz¹⁵ explained the relationship between paddy and population density with the help of two facts. Firstly, paddy is one of

15. Geertz, Clifford. Agricultural Involution, University of California Press, Berkeley, 1963, pp. 29-32.

the most stable crops, that is, it can yield year after year virtually undiminished quantities of food-grain. Secondly, as the population increases, the increased population can be absorbed into the agriculture by intensifying the paddy cultivation. Thus, on account of these two facts, paddy has high carrying capacity. It can accommodate large population. This appears to be the reason for the irrigated areas with paddy cultivation to be densely populated.

The amount of area under irrigation, paddy crop and the number of cultivator households are positively correlated. Similarly, population density and the number of cultivator households are also positively correlated. The paddy areas, being densely populated and because of high demand and competition for scarce land, have large number of cultivator households. The districts, other than Kurnool and Anantapur, being densely populated and having relatively larger amounts of land under irrigation ranging from 24.62% to 74.20% have relatively larger number of cultivator households, ranging from 13.76% to 22.43%. Whereas the districts, Kurnool and Anantapur being sparsely populated and with very small proportion of land under irrigation (7.77% and 8.16% respectively), have relatively smaller number of cultivator households, 6.72% and 7.46% respectively.

The amount of area under irrigation, the amount of land under paddy crop and the population density, on the one hand, and the number of tenant households, on the other, are also positively correlated.¹⁶ This is because, in the densely crowded areas which are at the same time highly irrigated with intensive paddy cultivation, the land is scarce, highly valued, and also the competition for land is high. The rents are also high because of scarcity of land and its greater demand. The land owners may also be prompted to lease out the land because of high rents. On the districts which have high amount of land under paddy crop and are densely populated, the number of tenants is relatively high, the figures ranging from 2.45 to 7.85 tenants per 100 acres. This is the case with all the districts except Kurnool and Anantapur. The latter being sparsely populated and less irrigated have relatively smaller number of tenants 1.36% and 1.48% respectively. Some other scholars¹⁷ also have explained tenancy by the proportion of irrigated area.

16. Clark and Haswell have found a direct relationship between population density and high rents in a number of countries both historically and in the contemporary world. They concluded that rents are the highest on the crowded land, provided tenants have nowhere to go, that is, either to move to fortunately situated agricultural land or to industry. Clark, Collins, and M.R. Haswell, The Economic of Subsistence Agriculture St. Martins Press, New York, 1967.

17. Rao, C.H. Hanumantha, Agricultural Growth and Stagnation in India, The Economic Weekly Feb, 1965. pp. 407-11.

The amount of area under irrigation, the amount of area under paddy and the number of agricultural labourers are positively correlated. Similarly, the two variables population density and the number of agricultural labourers are positively correlated. The rice growing regions have large number of landless agricultural labourers. This is because of population pressure and high man - land ratios. All the districts, except Anantpur and Kurnool, being well-irrigated and densely populated, have large number of landless labourers ranging from 18.19% to 43.65%. Anantapur and Kurnool which are poorly irrigated and sparsely populated have relatively smaller number of agricultural labourers, 8.96% and 11.68% respectively. Another important feature is that in rice growing coastal districts the proportion of scheduled castes (Table 10) is higher than in Rayalaseema districts. Because of high labour requirement in the intensive cultivation of paddy and scheduled castes being traditional labour class, are more concentrated in coastal region of Andhra.

This is not a complete explanation of agrarian relations of Andhra. Such an exercise was not possible because of certain limitations. And also the propositions made, show less than a perfect correlation. Nevertheless, the fact that they explain a large portion of the features of agrarian systems, it signifies that the framework used has potential utility of explanation.

Table 10

Percentages of Scheduled Castes in Population and Among
Agricultural Labourers

District	% of Scheduled Castes in Population	% of Scheduled Castes among Agricultural Labourers.
East Godavari	19.46	45.15
West Godavari	16.80	37.57
Krishna	12.44	27.99
Guntur	5.75	12.98
Nellore	17.57	37.50
Chittoor	19.16	49.42
Cuddapah	11.95	30.85
Anantapur	14.64	31.31
Kurnool	10.84	20.93

Source: Census of India, 1961, Vol. 11, Part V -A.

Within the structure obtaining in the rural areas before the introduction of institutional and technological changes, poverty and exploitation co-existed with a certain framework of security for the masses...., no doubt, the tenant or the share cropper had to pay exorbitant rents and the agricultural labourer was a semi-serf both being subject to exploitation and surviving at a low level of subsistence. But the fact remains that the tenant was assured of a pice of land for his livelihood and the agricultural labourers of some employment and protection by the employers. There existed numerous customary ties and bonds between "landowning patrons" and landless "clients" which enabled the rural poor to tide over times of distress caused by natural and social calamities.... profound disturbance has been caused in this low-level equilibrium mainly by two major events, viz. (1) piece-meal land reform and (2) the new technology.... The fear of permanent rights on land accruing to tenants drove the majority of landlords to transform tenants with de-facto security into tenants at will, or large-scale eviction of tenants in the name of resumption of land for self-cultivation. And then came the benefits of new technology which pushed up the rate of returns from agriculture as never before".²¹ Thus, the growing disparity coupled with

21. Ibid, p. 34.

growing insecurity "are forcing the peasantry to shake off its attitude of resignation and to adopt the attitude of resistance".^{21a}

We have noted, in the previous section while discussing agrarian relations in Alleppy, Tanjore and other regions, that agrarian conflict is concentrated mainly in the irrigated paddy growing areas. Gough²² has also pointed out that, certain areas especially rice growing regions of West Bengal, Andhra Pradesh, Kerala and Tamil Nadu have a strong tradition of agrarian unrest. Thus, while the causes for the occurrence may be traced to a variety of factors, as it was done by the above discussed scholars, ecological variables do have a significant place in explaining the occurrence, in some cases, the non-occurrence of agrarian unrest. Certain ecological conditions are more favourable for conflict than others. In the following pages, an attempt is made to study the implications of irrigation for agrarian conflict in Andhra.

In her survey Gough²³ reported a long tradition of agrarian conflict in coastal districts of Andhra

21 a. Ibid. p. 34.

22. Gough, Kathleen, Indian Peasant Uprisings Economic and Political Weekly Special Number 1974.

23. Ibid.

Pradesh. In a study²⁴ brought out by the Research and Policy Division of the Home Ministry, Government of India incidents of agrarian unrest for the year 1967 were reported againⁱⁿ the coastal districts of the State. And Rayalaseema region in the State is relatively a quiet place. In order to understand this phenomenon of occurrence and non-occurrence of agrarian unrest in coastal region and Rayalaseema region respectively, we looked into certain ecological and social structural variables of these regions (Table 11). The results of the ecological analysis show that a few of the variables particularly those having to do with rural population density and land tenure patterns - are significantly associated with agrarian conflict.

In coastal Andhra we find a close association between paddy cultivation, on the one hand, and heavy rural population concentrations, high rate of tenancy large proportion of agricultural labourers and dwarf holdings, on the other. Rice growing areas in addition to being densely populated, also have tendencies towards high tenancy, huge armies of agricultural labourers and dwarf holdings. Because land is scarce and valuable in these regions, a rentier class emerges and land is rented

24. Op. cit.,

Table 11

Ecological and social Structural Variables.	Coastal Andhra	Rayalaseema
% of area under irrigation	55.20	18.59
% of area under paddy	49.20	12.70
Population density	444.20	216.00
% of tenant households (% of tenancy)	4.66	2.61
% of agricultural labourers	30.22	15.52

out at exorbitant rates. Also, the tenant often has no security of tenure. He is a tenant at will who can be evicted from the land any time the owner wishes. It is reported that the most common tenancy arrangement in the delta districts is the fixed share system. Under this scheme, rents are set at a fixed amount of paddy per acre, regardless of actual output. And in every year there is increase in the rate. Thus, the economic conditions of poor peasants in densely populated coastal region may be very bad because of the scarcity of land and the existence of large section of landless competing for that land.

Landless agricultural labourers in densely populated coastal region may be much worse off than their counterparts in sparsely settled Rayalaseema districts even though the coastal Andhra is a fertile region. This may be because of, as pointed out by Donald Zagoria²⁵, high population pressure and high unemployment rate in coastal districts which result in a very low standard of the living of the poor in that region.

Donald Zagoria^{25a} has also pointed out that the landowners in crowded areas are relatively small and therefore do not command the political or social resources to

25. Zagoria, Donald S. The Ecology of Peasant Communism in India, American Political Science Review, Vol. 65, No.1 1971.

25 a. Ibid.

dominate the landless. And this may be the case in the coastal districts of Andhra, where there is much greater population density than in dry, sparsely populated Rayalaseema.

Yet another factor of agrarian conflict is that in the fertile region of coastal Andhra, there may be large surplus resulting in strong penetration by the market than in dry Rayalaseema region with little surplus in agricultural production. Thus, commercialisation of agriculture might have resulted in the erosion of traditional relations. Mencher²⁶ has observed that the duration of the period during which specific agricultural operations must be conducted, affects the strength of agrarian agitations. It is possible to delay agricultural operations for some time only for crops like Jowar, pepper but not paddy. Thus, the extent to which paddy cultivation dominates the agricultural scene, is an important factor. The coastal region with its 50% of land under paddy is more favourable to agrarian unrest than Rayalaseema which has only about 12% of its land under paddy cultivation.

Thus, no doubt, economic disparity, socio-economic insecurity, and egalitarian values act as proximate causes for agrarian unrest; but certain ecological conditions provide base for it.

26. Op. cit.

IV

Thus, from our analysis as well as from the review studies undertaken, we may note broad similarities between irrigated areas and differences between irrigated and unirrigated or lowly irrigated areas. This observation is broadly in line with the generalisation made by Steward in his study of five hydraulic civilisations viz. Mesopotamia, Egypt, China, the Central Andes and Meso-America. He stated that, "In the irrigation areas environment, production and social patterns had similar functional... interrelationships".²⁷

Irrigated agrarian regions are characterised with large populations, high amount of tenancy and large proportion of landless labourers. These regions are noted for development in their forces of production such as Japanese method/^{of}rice cultivation as found in Wangala and Dalena and also increasing tractorisation. There is high penetration of market economy in these areas because of large surplus produced. These regions with sharper inequalities have also witnessed agrarian unrest.

We have also noted certain other factors which have a significant bearing on the function and

27. Steward, J.H. Cultural causality and Law : A Trial Formulation of Early Civilisation, American Anthropologist Vol. 51, No. 1, 1949. p. 17.

development of agrarian structure. This gives us an indication about the limited influence of environment on agrarian relations.

Although, irrigation had provided a powerful resource base for the development of certain changes in the agrarian economy of Wangala and Dalena, certain wider economic forces have acted as stimulating agents for this change.

In the irrigation regions, because of high rents, tenants are economically in a more disadvantage position. And also the share tenancy, the most common form in these regions is economically highly insecure to the tenant. In the irrigation areas, economic class differences have increased also because of increasing agricultural production. The customary patron-client relationships between farmers and landless labourers have broken down. Thus, in the irrigation areas there exist certain conditions favourable for agrarian conflict. However, it was argued that these conditions are necessary but not sufficient to cause agrarian unrest. The perception of these conditions in the changing value system, coupled with adequate political support have led to agrarian conflict. It was also argued that certain technological and institutional changes have given rise to increased economic disparities and socio-economic insecurity, respectively, resulting in agrarian conflict.

Thus, we conclude that environment has a powerful but limited influence on agrarian relations. We may also note that some scholars have even attempted to provide culturological explanation for the association between environment and agrarian social structure.

CHAPTER III

C O N C L U S I O N

In this chapter, we attempt to look at some of the problems in conducting further research on agrarians relations in Andhra. While doing so, we try to pave the way for pursuing further research by proposing a broad research strategy. This would also enable us in selecting appropriate tools for our further research.

From the review of the ecological thought in anthropology and sociology, it is clear that the theoretical models, proposed by human ecologists, have emphasised the role of environment in influencing social organisation. Following the four fold scheme viz. population/technology/environment/social organisation, of the ecological school, we made a preliminary analysis of agrarian relations in Andhra, by using census data. From our analysis as well as from the review of the agrarian studies undertaken, we noted certain relationships between irrigation and agrarian relations.

To the extent that there exists an association between irrigation, on the one hand, and agrarian social organisation, on the other, our study reinforces the thesis of the human ecologists that environment strongly

influences social structure. However, we have also noted that there are certain features of agrarian structure which cannot be explained by irrigation in particular and environment in general. Explanation of this features was sought from certain other factors such as political, cultural (ideology) and institutional (land reforms). This points out at the limited role of environment in explaining social organisation.

It is appropriate to refer to a study made by Djurfeldt and Lindberg,¹ which has some bearing on the relationship between environment and social organisation. These authors in their study of Thaiyur village in Chengleput district of Tamil Nadu, argue that it is production relations which affect agrarian ecosystem. Thaiyur irrigation system consists of two lakes (reservoirs) plus a number of small tanks, and ponds in addition to wells. Thus, there are no ecological barriers to an expansion of the production forces in Thaiyur agriculture. But the yield remains poor from Thaiyur agriculture. It is 350-400 Kgs. of rice per acre in a normal year, much below the average annual yield of rice per acre in the state. This is because of the negligent

1. Djurfeldt, Goran and Staffan Lindberg. Behind Poverty: The Social Formation in a Tamil Village Oxford & IBH Publishing Co., New Delhi, 1976.

maintenance of irrigation system together with inefficiency use of irrigation water. The reservoirs need to be emptied of silt each year, if their storing capacity is not to be impaired. But this is never done. And whatever limited supply of irrigation water is there, it is primarily the big and influential landowners who exploit it.

The responsibility of maintaining and expanding irrigation works lies with the State. But the state is unable to appropriate the surplus product and thus does not command the surplus labour that is needed for the purpose. The big landowners who appropriate the surplus product and can command surplus labour, can take up the task. But they don't. Instead, they may invest in private wells. Thus, an expansion of well irrigation simultaneous to the deterioration of public irrigation works is rational with the present relations of production. Thus, they identify a crisis in the agrarian eco-system of Thaiyur, attributed to the relations of production that exist in the village. "Nature is running amok, but as a result of social crisis".² This is a persuasive argument highlighting the role of organisation of production in influencing the eco-system.

2. Ibid. P. 118

It was observed that even the private investment by big landowners, in the development of forces of production (such as irrigation and technology) is contained by the organisation of production. Amit Bhaduri³ has argued that under semi-feudal relations⁴ of production, the big land owner may not prefer private investment to usury. Even if the former is more profitable than the latter, the landlord may not undertake the private investment because of the fear that he would lose economic and political control over the sharecropper which is more valuable in view of his political and social status. Thus, the organisation of production in Indian agriculture seems to be an important factor in influencing the expansion of production forces.

How significant are relations of production in influencing agrarian relations may also be judged from a typology of regional agrarian system, constructed by Joshi⁵. He constructed a typology of regional agrarian

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3. Bhaduri, Amit. A. Study in Agricultural Backwardness under Semi-Feudalism, Economic Journal, March 1973.
 4. Semi-feudal relations are characterised by significant sharecropping, perpetual indebtedness of the sharecropper, dual exploitation by the same class through usury and property rights, and the non-accessibility of the market to the sharecropper. Amit Bhaduri, Ibid.
 5. Joshi, P.C. Agrarian Social Structure and Social Change, in Mathew Kurian (ed.) India - State and Society, Orient Longman, Madras, 1975. pp. 200-22.

social structures, Type I and Type II, mainly based on land tenure systems that existed in India during the British rule. Under the Type I sub-system are included mainly the former Zamindari areas and the Type II includes mainly the former Ryotwari regions. He presented a list of agrarian social structural features, both of pre-independence and post-independence times of these two types of sub-systems. Type I, in the British India, was characterised by the predominance of landlords also acting as userers, tenancy (self-cultivation on leased lands) landlords mainly hailing from upper castes and the peasant producers (tenants) coming from low castes and also with parasitic landlordism. The Type II was characterised by the predominance of money-lender class, self-cultivating peasant owners, both owners and actual producers coming from peasant castes and in the place of parasitic landlordism, the production-oriented peasantry was prominent. After independence, the Type II is pronouncingly experiencing, the change from feudal to capitalist production with its production now mainly based on wager labour and also the class formation among the labourers "as a distinct interest group" is more pronounced, whereas in the case of Type I, the change in this direction is less pronounced.

Thus, from the typology, we understand that there exists a relationship between agrarian social structure and change on the one hand, and land tenure patterns, on the other. It is thus, seen that the relations of production are as significant as the forces of production such as irrigation and technology, that are emphasised by the human ecologists, in influencing agrarian relations. It is through forces of production and relations of production that the rationality of ecological selection operates in the function and development of agrarians system. It also therefore, follows that an undertaking of agrarian relations should consider both these aspects. Thus, we follow Godelier⁶, who provides a framework which combines both forces of production and relations of production. He defines formal model of structures of production as combining, in accordance with certain technical rules (T), resources (R), instruments of labour (I) and men(M) so as to obtain a product (P) that can be used socially. The three factors of production (R- I-M) are combined in two types of structures viz., the forces of production and the relations of production.⁷

6. Godelier, Maurice. Rationality and Irrationality in Economics, Monthly Review Press, New York, 1972.

7. Ibid. pp. 262-79.

The forces of production constitute the totality of operations involved in the production process combining the three factors of production, resources, technology and labour. The combining of the factors production is subject to the technical rules of production and to the social rules governing appropriation of the factors of production.

The relations of production determine in a given society the forms of appropriation and use of the conditions of production and of its outcome, the social product. The first category of rules governing appropriation and use relates to the factors of production (R-I-M). The second category of rules of appropriation and use concern the product.

One of the merits of Godelier's model is that it provides a subtle articulation of the relations between the economic, the structural and the super-structural aspects such as kinship caste, religion and politics. Godelier views the economy as both a domain of specific activities (production, distribution consumption of material goods) and a specific aspect of all the human activities that are now within this field but whose functioning, involves exchange and

and use of material means.⁸ Therefore, the economy is a specific field of relation both external and internal to other fields of social activity. Given this framework, our task would be to analyse the external and internal aspects of agrarian economic relations so that we are led to other social realities that give economic phenomena meanings that are not discernible apart from their socio-cultural context.

In order to pursue research on the lines proposed, we need to take up two villages to make a comparative study. One wet village say from West ^Godavari district in Coastal Andhra and another dry village from a district with poor irrigation conditions, say Anantapur in Rayalaseema region. The selection of two villages from different regions would facilitate us in making generalisations concerning these two regions. The study will be placed in a diachronic perspective, that is, in its evolutionary setting, by resorting to works of economic historians of Indian agrarian system.

If this broad strategy is accepted work needs to be done on the details of procedure that is to be followed in our research. Such a task is best undertaken as a first step in the Ph.D. research programme.

8. Ibid. P. 257

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