

# Interdisciplinary Training Programme for Human Settlement Managers

## The management and development of the Kolleru Lake

Interdisciplinary Research and Training Seminar  
(Using the Rotational Group Systems Method)  
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Hyderabad, India  
12<sup>th</sup> August, 1987  
Division of ecological sciences 1988 UNESCO Paris

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### Foreword

The Kolleru Lake in Andhra Pradesh, India is a unique fresh water shallow lake, with its own very particular physical and socio-economic characteristics. It provides a classic example of man's attempts to exploit natural resources resulting in the endangering of the local ecosystem. Only by firm and imaginative resource management will the decline be arrested.

The seminar, 'The Management and Development of the Kolleru Lake' was organised with UNESCO's support in cooperation with the National Institute of Rural Development at Hyderabad, part of the Ministry of Agriculture. The aim of the seminar was to provide State administrative officers and researchers with a structure for interdisciplinary learning and exchange which, by focussing on a real case, would provide recommendations for appropriate integrated action.

The engendering of interdisciplinary awareness and integrated action requires the development of new training technologies - capable of synthesizing the range of disciplinary perspectives held by practising professionals. In this way, collaboration between scientists and administrative decision-makers can be promoted which will in due course bear fruit in the form of management policies and initiatives which produce balanced coordinated development of wetland ecosystems such as the Kolleru Lake.

### 1. Introduction

This report follows the interdisciplinary research and training seminar held at the National Institute of Rural Development, Rajendranagar, Hyderabad (Figure 1.1) in August 1987. Hyderabad is India's fifth largest city with a population of almost three million people, and was chosen as the home of the National Institute of Rural Development, a national centre for research and training in rural development activities, allied to the Indian Ministry of Agriculture. It was thus a suitable setting for a multi-disciplinary team (Figure 1.2) to examine problems and issues concerning the Kolleru Lake, a vast wetland providing habitat for over 200,000 people some 350 kilometres to the east in Andhra Pradesh State.

The report is divided into several main sections. Section 2, which follows this Introduction, sets out the main recommendations emanating from group discussion of problems and issues pertaining to the Kolleru Lake. Section 3 then outlines the seminar structure and organisation, whilst section 4 contains some brief concluding remarks.

Finally, the appendices contain details of those participating in the course.

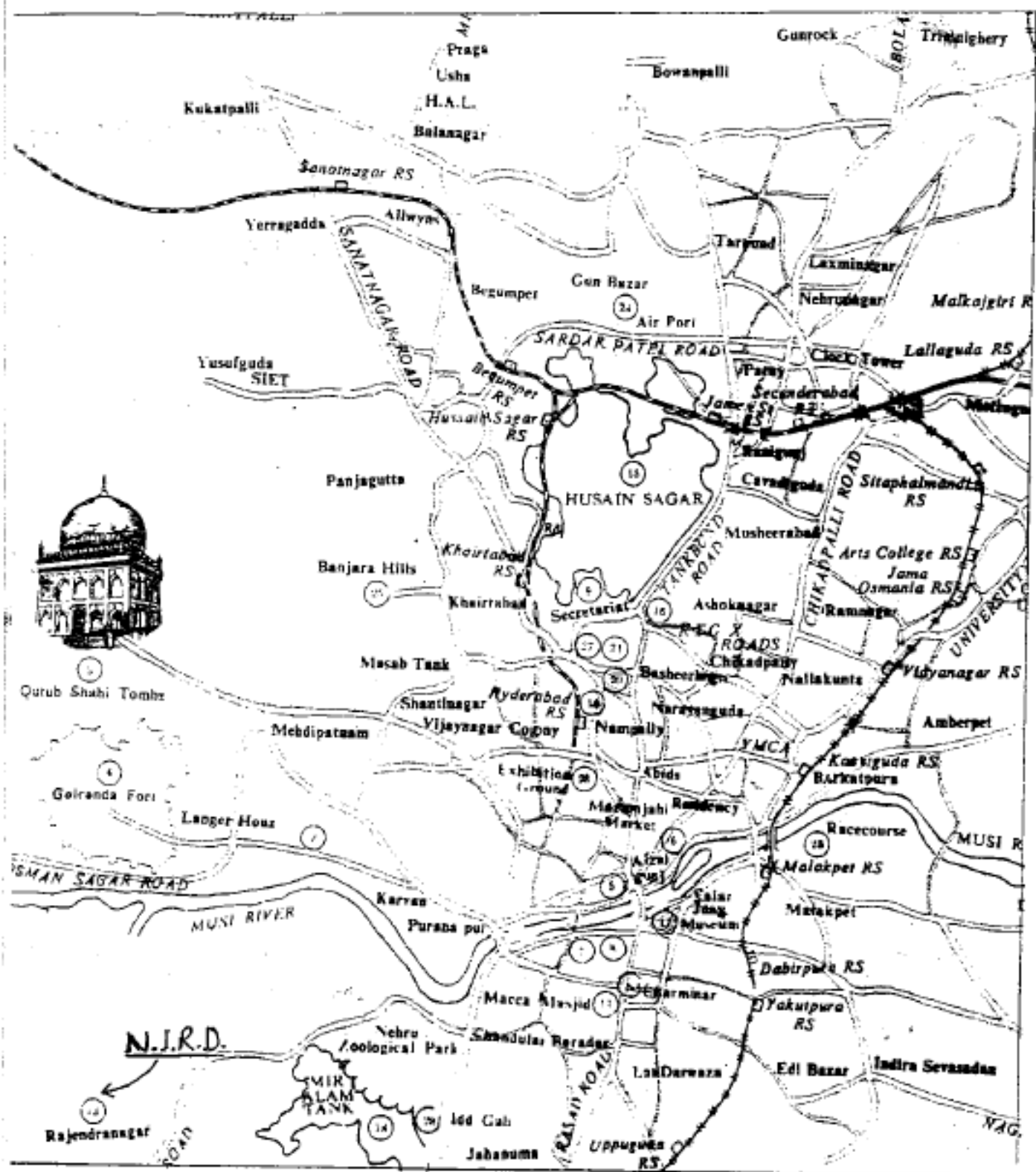
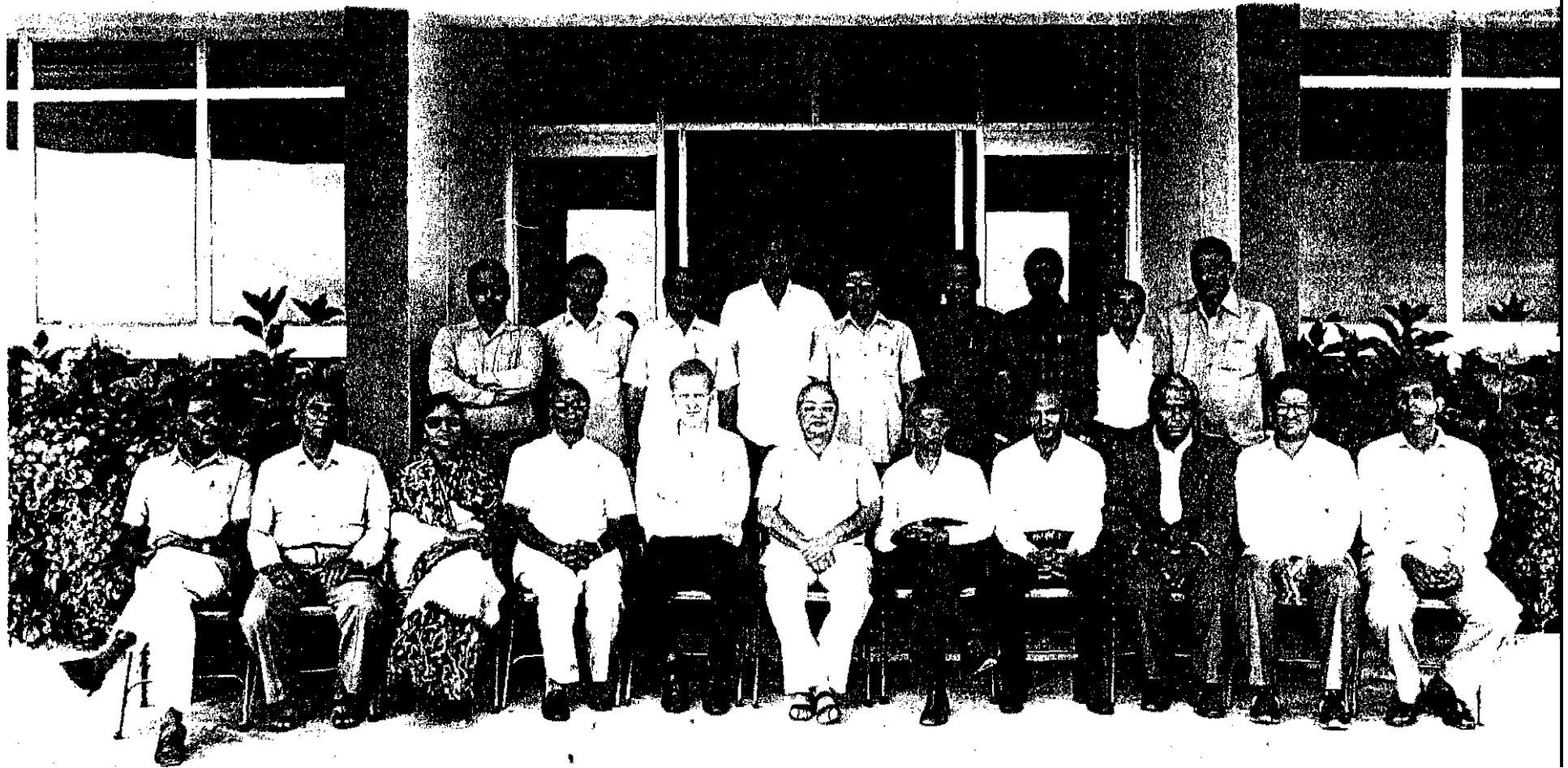


Figure 1.1 Location of the Institute of Rural Development, Hyderabad



**Figure 1.2** Conference participants

Back row (left to right): Mr Mangapathi Rao, Mr G Prasad, Mr P V K Raju, Mr Anjani, Kumar Singh, Mr PK Goel, Mr M Srinivasa Rao, Mr D Shanthudu (N.I.R.D. Research Associate), Mr H Roy, Mr P Gopal Reddy. Front row: Mr Janardhana Rao, Mr D S Gangakhedkar, Dr M Thaha (N.I.R.D.), Mr Md Kadir Zaman, Dr Martin Wynn (UNESCO representative), Mr Kapoor (N.I.R.D. Director-General), Professor: L Vagle (speaker), Mr Hamid Ahmed (speaker), Mr GM Khan, Mr K Jaganmohan Rao, Mr Mohd Mohiuddin. (Missing: Mr Unia Maheswara Rao).

## 2. The Kolleru Lake: Summary of recommendations

The following set of recommendations for the management and development of the Kolleru Lake represents the collective output of seminar members. These recommendations were produced using the Rotational Group Systems (RGS) method which is outlined section 3.

### A. Physical environment

#### Introduction

1. The Kolleru Lake is a shallow fresh-water lake covering an expanse of 954 square kilometres when at its maximum depth of 10.7 feet above sea-level. At times, the lake is as shallow as 3 feet above sea-level, when its expanse is approximately 135 square kilometres.
2. The lake has a catchment area of 4,700 square kilometres, which provides an inflow into the lake which enters by two main rivers, fifteen channels and a further fifteen drainage ditches. Outflow from the lake is through one main channel - the Upputeru river (see Figures 2.1 and 3.6).
3. The water-level within the lake varies according to the seasonal rainfall and consequent run-off from the catchment area. This pattern is complicated by the effects of the settlements within the lake (comprising 216,000 inhabitants in all), lines of communication (road and river) and human activities in general which combine to expose different parts of the bed area at different times of the year. In addition, the growth of the water hyacinth and other weeds has further hampered the throughflow of water.

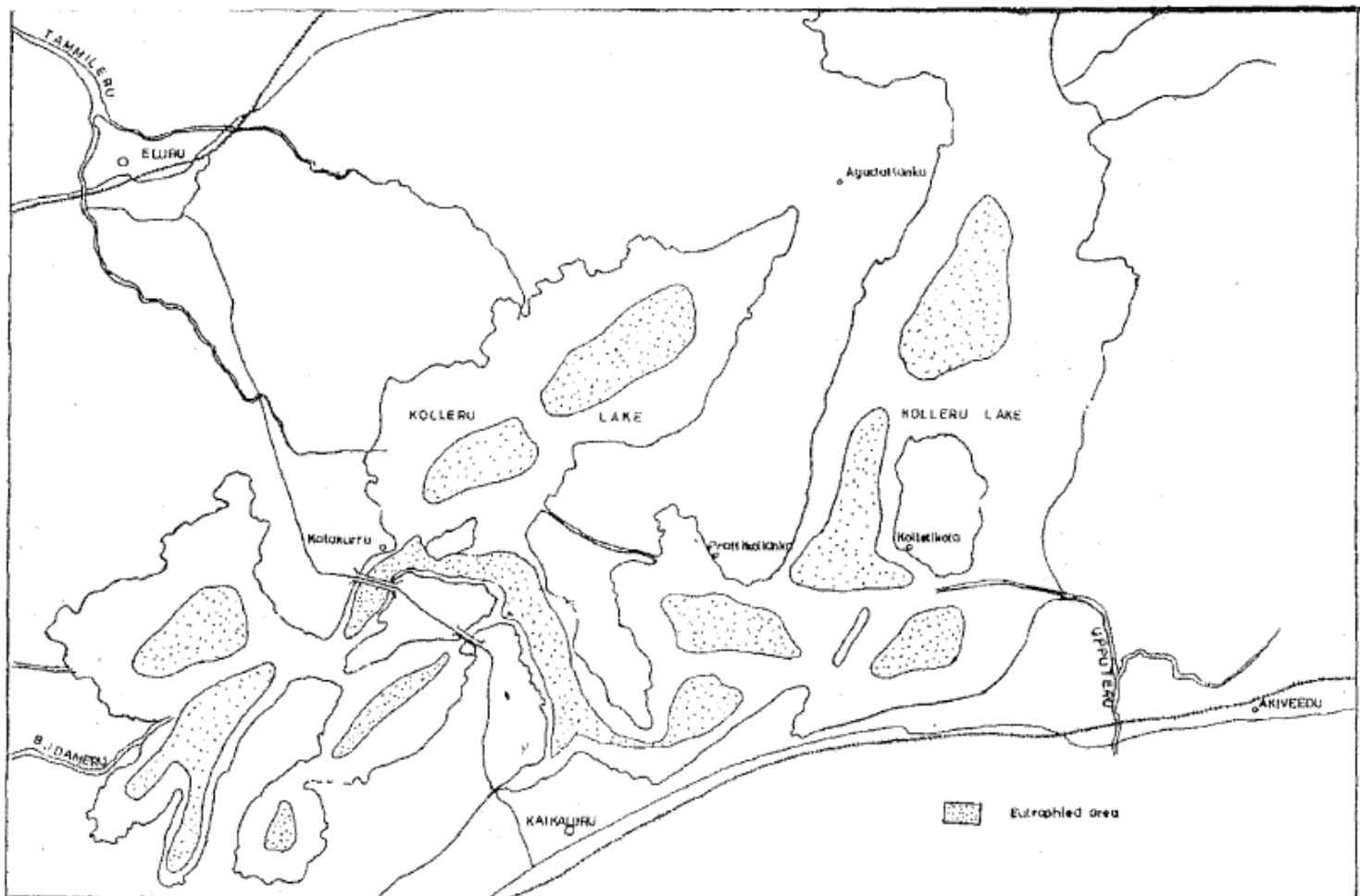


Figure 2.1. Eutrophied Areas in the Kolleru Lake

4. The lake is polluted by industrial effluent, human waste, fertilisers and pesticides emanating from both within the lake itself and from its catchment area upstream.
5. Land use within the lake area includes 127,000 acres given over to agriculture, 14,000 acres given over to fish-farming (pisciculture), and 65,000 acres used for capture fishery.

## Key Issues

6. The Kolleru Lake, as a physical and environmental resource, requires unitary and effective management. Management and control of the inflow and outflow regimes (about which exact and reliable data are hard to come by), is one critical area in need of attention.
7. Eutrophication results in the spread of water hyacinth and other weeds, which impede the flow of water and decrease the productivity of the lake as a whole.
8. Pollution from industrial and human sources threaten fish stocks and render water unfit for human consumption. Despite this, many lake people do drink the water and the incidence of water-borne disease is high.

## Recommendations

General: The overall objective of all recommendations for action in the Kolleru Lake must be the promotion of an integrated approach to socio-economic development of the Kolleru Lake through the optimum utilisation of its land and water resources.

9. The wetland character of the lake should be maintained by keeping the water level at 5 feet above sea level (+5 msl). This should be done through the construction of lake-bed water-flow regulators.
10. Weed control measures (both biological and mechanical) are required to arrest and reverse the spread of the water hyacinth and other weeds.
11. The Kolleru Lake is a declared bird sanctuary. This recognition needs to be reinforced in practice by more effective anti-poaching controls.
12. Stringent anti-pollution measures should be adopted to control point source pollution from industry and from non-point source pollutants such as those contained in run-off from agricultural areas.

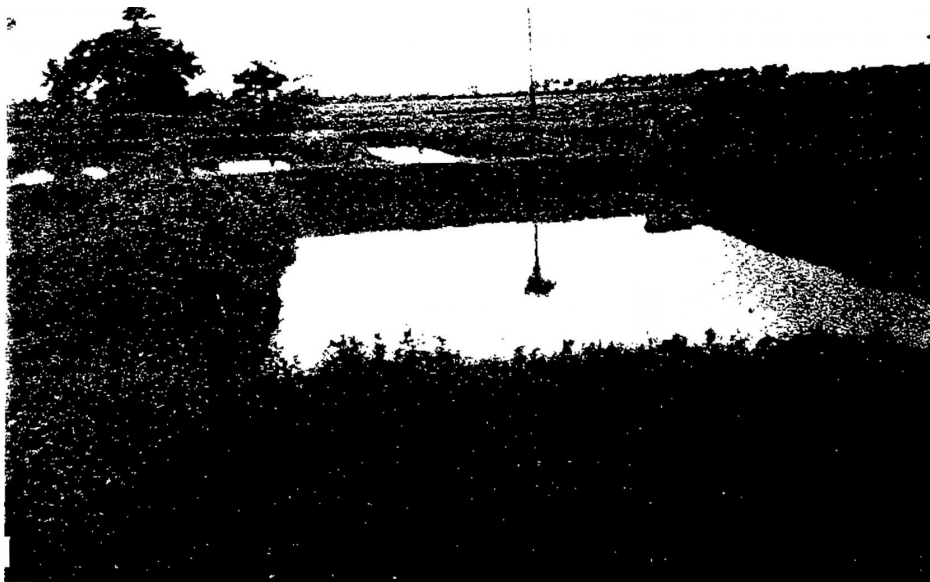


Figure 2.2 'Bunds' (low walls) in the Kolleru Lake

13. Bunds (low walls - see Figure 2.2) are constructed to facilitate the trapping of fish for both controlled pisciculture and the more ad hoc 'doddi' fishing, and for some agricultural practices (eg rice growing). These must be removed where necessary to facilitate better drainage. Existing and future roads within the lake area must be (re)constructed to facilitate cross-drainage.
14. The potential contribution of afforestation in the catchment area to limiting run-off needs to be researched.

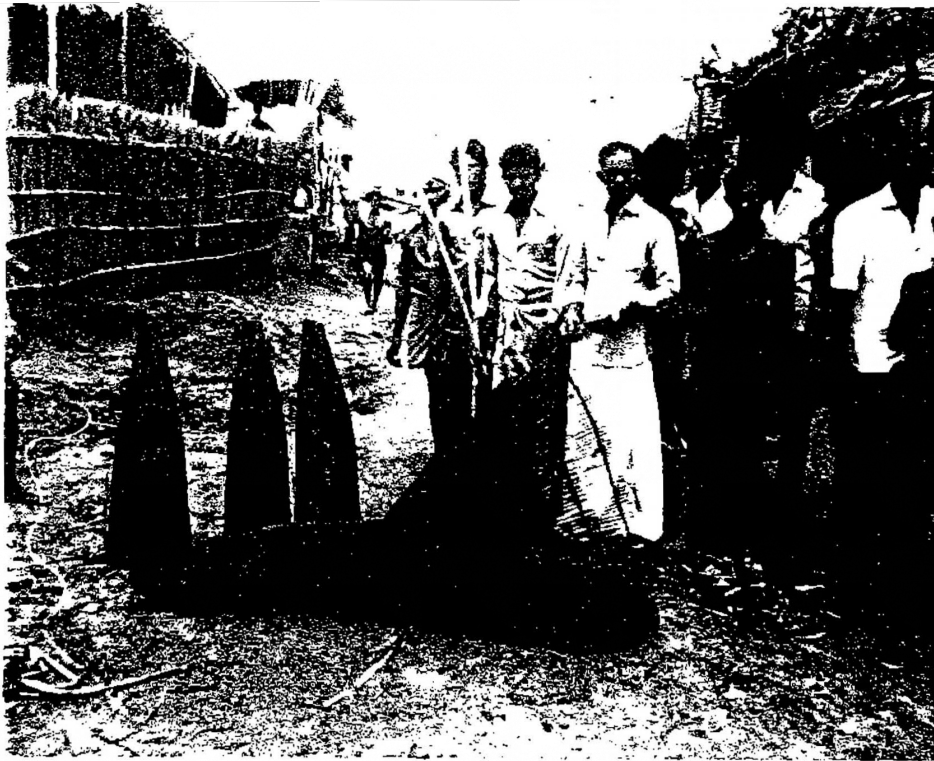
## B. Human activities

### Introduction

15. There are 148 scattered settlements within the lake area. The total population of these settlements is 216,000 inhabitants.
16. A livelihood is gained in the main through fishing, crop growing (mainly rice) and/or duck and pig-raising. There are several types of fishing. 44, 000 fishermen gain their livelihood from capture fishery using a variety of basket traps, nets and fishing craft (figures 2.3 and 2.4). Culture fishery (pisciculture) was introduced in the lake area in 1979 and has since grown to be the mainstay of 133 fishing co-operatives farming 14,000 acres in the lake-bed

area lying below 5 feet above sea level. 'Doddi' fishing, referred to above, is a traditional form of fishing pursued by elders having control over the lake bed area in their village.

An area of 50 to 200 acres (a doddy) is sold off to the highest bidder, who can then wall off the area, and as the water recedes, can capture basketfuls of fish. This has generally resulted in overfishing, especially in the breeding season from May to June.



**Figure 2.3** Local Villagers with Fishing Nets, Pandiripalligudem



**Figure 2.4** The 'Palmyra' Dug-out, used for fishing and transport

17. There is a chronic lack of drinking water in the lake area. Due to pollution by industrial effluent and sewerage, the lake water is very rich in nutrients and heavily loaded with dissolved and suspended organic matter (eutrophication - see figure 2.1). The very high concentration of nutrients makes the water congenial for heavy growth of weeds. The drinking water problem is exacerbated by the brackish ground water, which again is not drinkable.

18. Communication between the bed villages is by road and water. The native palmyra canoes (see figure 2.4) are the main form of water transport available. Only 10 bed villages have outside links via fair weather roads.
19. Housing is built from dried reeds (phragmites), bamboo, casuarina poles and mud (figure 2.5). Although these have proved hardy constructions in the face of gales and floods, the general standard of living conditions suffer from the non-availability of cement, bricks and steel which are scarcely available in the lake area for economic/transport reasons.
20. There are practically no sewerage treatment plants within the lake area, and as a consequence, sanitary conditions in the bed villages are extremely poor. Untreated sewerage is released directly into the lake, and the lake is also polluted by sewerage from the surrounding Vijayawada, Eluru and Gudivada municipalities.

### Recommendations

21. A 'protected' water supply is to be provided in all the bed habitations. Effective sewerage and sanitation facilities must be provided for all villages.
22. Waterways and jetties are to be constructed to facilitate mechanised water transport between all lake villages.
23. 'Doddi fishing' and the construction of fishtanks and bunds below 5 feet above sea-level are to be prohibited. Only local 'vaddi' (fishing communities) shall have the right to fish the Lake.



**Figure 2.5** Typical Housing in the Kolleru Lake Villages

24. The necessary infrastructure to facilitate the marketing of fish outside of the region shall be provided by the government. This includes cold storage, ice plant, loading and repacking facilities. Sale depots for timber and bamboo should also be provided.
25. The large areas of weed should be harvested and used for the production of compost and biogas. Slurry and compost should be used instead of inorganic fertilisers; blue-green algae may be cultured and used in agriculture.
26. The potential of the lake area for tourist exploitation should be carefully examined.
27. In general, modern technology should be introduced where appropriate in transportation, fisheries, agriculture, water supply and sanitation.

### C. Administration and management

#### Introduction

28. The lake area is split between several administrative units. Of the 148 settlements, 105 rank as villages. These fall into 9 mandals, three divisions and two districts (moving upwards in the administrative hierarchy). Informal self-government is practised in most of the villages.

29. The Kolleru Lake Development Committee, created in 1982 and now disbanded, had no executive powers.

### **Key Issues**

30. The multiplicity of departments, divisions and districts involved in administering the Lake renders control and coordination almost impossible.
31. There is a lack of clear objectives in the management of the Lake, despite the number of reports and studies that have been commissioned.
31. Inadequate attention is given to health, the protection of birds, animal husbandry, fishery conservation, point pollution and land-use in general. This is in part because of the general lack of resources for any government intervention in the region.

### **Recommendations**

32. The lake area shall be brought under a single administrative entity and shall become a single parliamentary constituency.
33. The single administrative entity shall be an autonomous authority, responsible for the overall development of the region. Central and State government agencies working in the region shall function under the overall control of this authority, which shall be endowed with the powers necessary to regulate pollution and overall ecology in the region.
34. A data bank on all environmental and ecological aspects of the Lake is to be set up and maintained.
35. The Kolleru Lake is an internationally recognised Wetland. Efforts should be made to obtain funds from national and international agencies.
36. A plan of action for the integrated development of the region is to be drawn-up, and future management of the lake should adhere to the plan.

## **3. Seminar structure, content and organisation**

### **A. Course overview**

The course timetable (Figure 3.1) was put together in India by Dr Thaha (appointed course director by the N.I.R.D) and Mr Mangapathi Rao (Administrative Officer of the Kolleru Lake Development Committee), based on a framework put forward by the UNESCO representative (Dr M Wynn) working from England.

This worked out quite well in practice. Dr Thaha arranged for a number of experts in the human settlements field to give lectures to the group, to be followed by question and answer sessions, whilst leaving a number of caveats in the timetable for the UNESCO representative to conduct the Rotational Group Systems sessions. At the same time, Mr Mangapathi Rao organised a two-day field trip to the lake area, so that participants (some of whom had not visited the Lake before) could see problems first hand.

The range of themes covered in the lectures were suitably; relevant to be informative and stimulate discussion and new thinking in the intensive group sessions (Figure 3.2). Nevertheless, the general feeling of course participants at the close of the seminar was that not enough time had been given over to the Rotational Group Systems sessions and that too much time had been spent on the lecture sessions. Because of this, some simple guidelines are provided at the end of this section for those wishing to plan similar seminars in future.

### **B. Lecture sessions**

The following notes summarise the major points discussed in the lecture/question and answer sessions. These encompassed a wide range of themes and disciplines and invariably produced many questions and much discussion. These modules were not only entities in themselves, but many were also of direct relevance to participants' own experience and to the Kolleru case study. They thus helped in providing a range of disciplinary and thematic perspectives from which the Kolleru Lake case study could be viewed.

In *Environmental Aspects of Human Settlements*, Mr KV Natarajan outlined [missing text] basic statistics on land-use in India, and drew attention to the fact that forest areas now covered only 11% of the country - a dangerously low figure. He discussed the 1986 Environment Protection Act and the difficulties of implementing it effectively. The general picture he portrayed was one of developmental chaos, administrative ambiguities and source shortages that made attempts at planning and control difficult in the extreme. Nevertheless, Mr Katrajan concluded that one had no alternative but to keep on trying to improve the situation, step by step.

*Settlements - Problems and Planning Techniques* saw Professor B Mishra set out some key demographic facts. Between 1971 and 1981, the population of India increased by 47 millions, and in the next two decades, the population of India's major cities will double. Yet over half the settlements of India have less than 1000 people.



Should we, then, scatter our limited national resources over the small settlements of less than 1000 inhabitants? Or should we concentrate resources in the major urban conurbations? And what role should the intermediate-sized towns play?

At present, less than 10% of national investment goes to the small settlements, where basic services are often not available; a recent survey has shown that 75% of these small settlements are experiencing a deterioration in the quality of life. Investment in middle-sized settlements has failed to establish them as *poles de croissance*; meanwhile, there is a massive investment in Delhi, where the annual budget alone is greater than 11 individual State budgets.

Professor Mishra then suggested that the most hopeful strategy was to find ways of harnessing human endeavour more productively. State-level action must come more to the fore, and attempts must be made to 'humanise' development

August	3rd	4th	5th	6th	7th
9.00 am	Registration Introduction to N.I.R.D. Welcome Address (Dr Tripathy)	Kolleru Lake Case Study (Mr Manga- pathi Rao)	Human Settlements Planning Principles (Prof. Vagle)	K O L L E R U  L A K E	
1.00 pm	Key-Note Address (Dr Wynn)	Environmental Aspects of Human Settlements (Mr K.V. Natarajan)	Low Cost Sanitation (Mr Hamid Ahmed)		
2.30 pm	Participant & Experience Sharing Introduction to Rotational Group Systems & the Kolleru Lake Study (Dr M Wynn)	Human Settlements Problems and Planning Techniques (Professor B. Mishra)	Planning and Management of a Settlement Environment - A Case Study (Dr M Thaha)	F I E L D  V I S I T  (see details)	
5.30 pm					
August	8th	9th	10th	11th	12th
9.00 am	Kolleru Lake - Rotational Group Systems Phase A: Taking Issues Apart (Dr M Wynn)	Site Visits in Hyderabad	Rural Housing in Kerala (Mr Thomas Pouluse)	Drinking Water in Andhra Prad. (Mr I Haque)	Kolleru Lake Rotational Group Systems Phase C: Synthesis Panel Presentations (Dr M Wynn)
1.00 pm			Kolleru Lake - Rotational Group Systems Phase A (contd.) (Dr M Wynn)	Participation in Planning (M. Windey) Psychological Dimensions (Dr Mathayya)	-close-
2.30 pm	Management of Human Settlements: Implement- ation and Evaluation (Professor M Salim)	Site Visits in Hyderabad	Planning for Rural Growth Centres (Dr M Thaha)	Kolleru Lake Rotational Group Systems Phase B (continued)	Panel Presentat- ions (Dr M Wynn)
5.30 pm			Kolleru Lake - Rotational Group Systems Phase B: Rec- ommendations (Dr M Wynn)		

Figure 3.1 Timetable for the Kolleru Lake Seminar

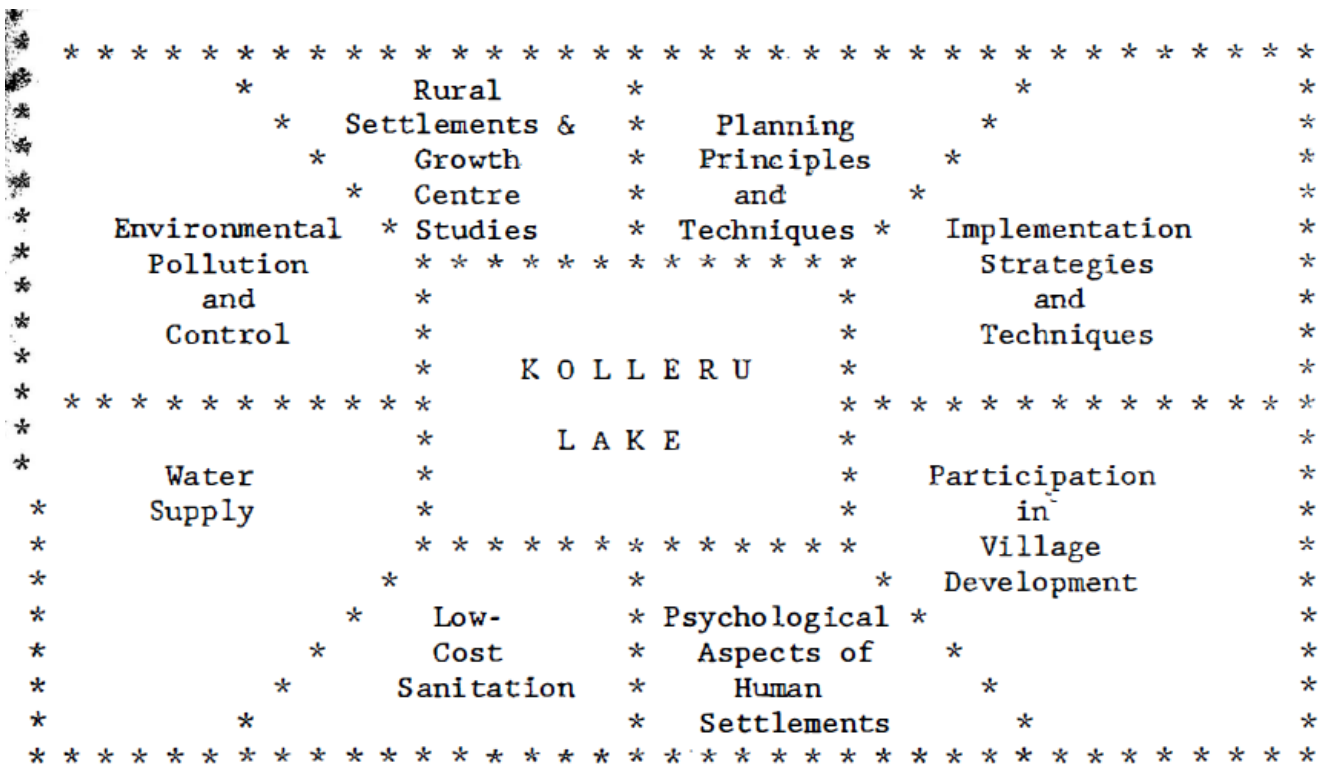


Figure 3.2 Lecture Topics Having Bearing on the Kolleru Case Study

In *Human Settlements - Planning Principles*, Professor L Vagle maintained that rural planning had generally been much neglected, and that assisted self-help is the key to resolving the situation in India today. He then drew on his experience as UNCHS consultant in many countries, and singled out Sri Lanka as having achieved significant success in settlement planning.

Sri Lanka have achieved low birth and death rates, whilst the per capita income is double that of India's. Country migration is low (0.3% in 1982), and Columbo, the capital, has grown at only 2.1% per annum for two decades.

Professor Vagle asserted that the key to their success has been a concerted programmes of rural housing construction, accompanied by self-help service provision schemes.

*Low-cost Sanitation*: Mr Hamid Ahmed outlined the dire situation regarding sanitation facilities in India, and his organisations' attempts to make some initiative in this field.

Sulabh International is a non-profit making organisation which focuses on action ie getting things done in the field. Mr Ahmed discussed their programme to provide over 200 villages in Andhra Pradesh with sanitary facilities, using 50% finance from the Central Government, 30% from the municipalities, with the rest to be recouped from user charges

He discussed the inadequacy, misuse and dereliction of municipal latrines, and examined the related social issues, including the rehabilitation of 'scavengers' - those who carry the 'night soil' away, on their heads, for a living.

In *Planning and Management of a Settlement Environment - A Case Study*, Dr Thaha outlined the research programme which examined rural settlements in the Kunrathur 'block', near Madras. A cluster of small villages, none with a population above 3000, was studied. The results emphasised the inadequacy of services, particularly latrines and human waste disposal. The majority of inhabitants still defecated near to their dwellings, and the consequent problems of hygiene and disease were examined. Dr Thaha discussed the need for more thoughtful and sensitive treatment of this subject by State authorities.

*Management of Human Settlements - Implementation and Evaluation* saw Professor Salim provide an analysis of management shortcomings and guidelines for improvement. He suggested that managers adhere to one of two models - either manipulative or transformative. What the country needed was the latter; what it had, in the main, was the former!

Indian managers tend to be too *dependent* on their bosses; managers must be more *assertive* and more *creative*. Managers must try to develop leadership skills to encompass entrepreneurial, administrative and political functions. 'Negatives' to avoid were *dependency*, *immaturity*, and being *impulsive*. 'Positives' to develop were social *extroversion*, *leadership* and *tolerance*.

The *organisation* must provide the Strategy, Structure and System; the *manager* must develop his skills and style in the functions of planning, organising, directing and controlling

In *Rural Housing in Kerula*, Mr Poulouse related his experience as Housing Commissioner in Kerula, focussing in particular on the provision of free housing for the poor. House design and house finance were discussed, and housing materials were illustrated with slides. Of particular interest was the use of mud blocks and coconut timber in dwelling construction.

*Planning for Rural Growth Centres* saw Dr Thaha outline a methodology currently being used in Andhra Pradesh

for locating service facilities at different hierarchical levels in rural settlement. A policentric hierarchical model was shown in its adaptation to concrete reality. 'Entry point' and 'threshold level' concepts were explained and illustrated.

Mr Inamul Haque outlined the evolution of water supply policy and practice in Drinking Water Supply in Andhra Pradesh. There is currently a financial limit of 200 rupees (16 US\$) per capita for any rural supply system implemented by the State. Mr Haque then went on to itemise the supply problems. Andhra Pradesh State has 830 villages with drinking water giving liver infections; 197 villages with fluoride-related problems; 622 villages with salinity problems; and many more with a mixture of chemical and biological contamination.

The position was gradually improving, he maintained. Andhra Pradesh now has three desalination plants.

Professor Michael Windey then gave his paper on *Peoples' Participation in Planning Settlements*. He recounted his experience in the Village Reconstruction Organisation (VRO), a voluntary organisation that recreates villages for those displaced from their habitat by natural disasters and other causes. He was very critical of the Government's housing schemes (the 'colonies'), and lamented the lost opportunity of creating something really Indian in new developments such as these.

Planning principles adhered to in VRO settlements were then discussed. The physical layout should be neither concentric nor linear, but rather should allow the free movement of people and transport. There should be double access to each dwelling, and alternation of land use within each village. Environmental and cultural aspects were also discussed.

In the last paper of the conference, *Psychological Dimensions in Human Settlements*, Dr Muthayya discussed the psychological implications of providing appropriate and inappropriate housing and services in rural settlements.

Comment: There were undoubtedly some valuable insights to be gained from this series of lectures. Many participants were surprised to learn of the gravity of sanitation and water supply problems for example, whilst Professor Salim's account of public sector management in India kept most of us spellbound, despite having driven back from the lake area through the night just a few hours before.

Nevertheless, it seems fair to comment that there were probably a few too many lectures, and that some of these were more relevant to the main issue of the Kolleru Lake study than others. This notwithstanding, the lectures collectively provided a valuable conceptual base for the field trip and rotational group systems work.

## **C. The Kolleru Lake Field Trip**

Departure for the Kolleru Lake was planned for 6.00pm on the evening of August 5th (Wednesday), but because of some problems with train reservations, departure was delayed until the morning of August 6th (Thursday). The party finally arrived in Eluru, on the edge of the lake area, on the evening of the 6th. The field excursion was thus reduced to one full day. The full itinerary was as follows:

### **August 6th (Thursday):**

11.00am Depart NIRD, Hyderabad, by coach for Secunderbad station.

12.30pm Depart Secunderbad Railway Station.

9.00pm Arrive Eluru and night halt.

### **August 7th (Friday):**

8.30am Depart Eluru by coach.

Eluru is a provincial town of some 200,000 inhabitants, lodged between the two branches of the Tammiteru river which drains into the Kolleru Lake. The main streets are dirt roads lined by rows of small shops and workshops (Figure 3.3). These streets are a chaotic mix of lorries, cars, rickshaws, cyclists, wildboar, oxen and goats. Away from the main streets, the houses are mainly of *pucca* construction with dried reed roofs. Sanitation is poor, at best consisting of open drains which find their way into the Tarnmiteru river, at worst there being no provision for sewerage effluent at all.

8.45am Briefing by Eluru District Collector and Chief Magistrate.

The Collector and Chief Magistrate outlined the major issues as he saw them. His conclusion was that it was difficult to see any clear way of making much initiative in the area, given other demands on resources. (9.15 departure).

9.45am Arrive Kalakurru (see Figure 2.1)

Examination of weed infestation and beetle that feeds on it (Figure 3.4), a measure introduced into the area by Mr Mangapathi Rao. Paddy field (rice cultivation - figure 3.5) and fish-farming, involving the construction of bunds (mud walls - figure 2.2) were visited and discussed. (10.15 departure)

10.45am Arrive Kaikaluru

Visit to this small town, which has been the centre of the Kolleru Lake Development Committee since 1983. (11.00 departure).

11.30am Arrive Upputeru Bridge

Study of river-widening operations employing manual labour (Figure 3.6). Embarkation on motorboat, heading up river. National press and TV representatives meet organisers and participants. (11.45 departure).



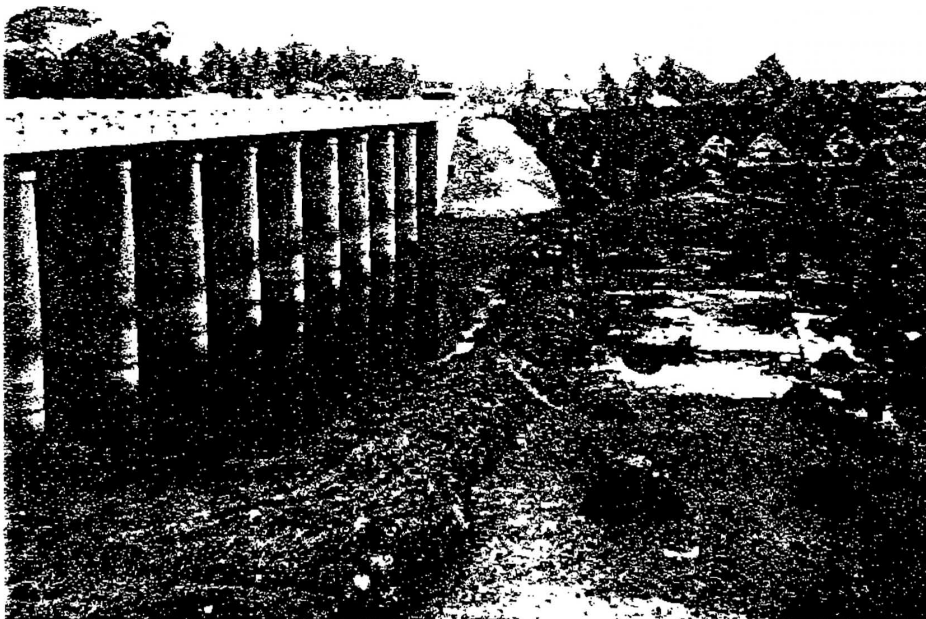
Figure 3.3 Eluru Street Scene



Figure 3.4 Examining Weed Infestation in Kolleru Lake



**Figure 3.5** Rice Cultivation in the Lake-bed



**Figure 3.6** River Widening Operations at Upputeru Bridge

12.30am Arrive Pandiripalligudem (near Kolletikota - see Figure 2.1)

Visit to village and local temple was followed by a meeting with village elders and about 60 village men. Mr Mangapathi Rao, administrative officer of the Kolleru Lake Development Committee, explained the possible future plans for the lake area. There followed a heated discussion, lasting over an hour, between members of the visiting group and the villagers. Villagers were concerned their agricultural livelihood would be threatened by the introduction of measures to keep the water level above a certain level. (Depart 4.15pm in small launch through weed infested channel back to motor boat. Belated lunch on board motor boat 4.45pm).

5.30pm Trip up Upputeru main channel, to study wildlife.

7.30pm Arrive back at Upputeru Bridge (departure in coach, 7.45pm).

9.00pm Arrive back in Eluru.

9.30pm Depart Eluru by coach.

**August 8th (Saturday):**

6.30am Arrive back NIRD, Hyderabad.

**D. Rotational Group Systems Sessions**

The three phases of Rotational Group Systems Work were structured as follows:

**Phase A: Taking issues apart**

Groupings: 4 groups of 4 people each.

Objective: To take issues apart, identify problems and key facts relating to the Kolleru Lake. A loose three-way classification was suggested as follows:

Physical/Environmental Aspects

Human Activities

Administration and management

Duration: 6 hours, including report preparation and panel presentations.

**Phase B: Putting recommendations together**

Groupings: 3 groups of 5 people.

Objective: To put together recommendations for action in the three areas listed above. All reports from Phase A were made available to all groups.

Duration.: 4 hours, including report writing and panel presentations.

**Phase C: Synthesis**

Groupings: 2 groups of 8 people.

Objective: To synthesize all reports generated to date, and produce a final report for the group as a whole.

Duration: 3 hours, including report writing and final presentation.

The final report is included in its entirety in section 2. Whilst this process was without doubt successful, it is suggested that a useful guideline for those planning such seminars is to allow about 1 hour of lecture time for every 4 hours of Rotational Group Systems work. In this seminar, the balance was in favour of lectures, which limited the depth of discussion possible in Rotational Group Systems work.

**4. Concluding remarks**

The Kolleru Lake seminar should be seen as a part of a process of change that will require many other agencies and individuals to play their part before anything concrete is achieved. The set of recommendations are but a starting point for subsequent discussion and action.

The seminar nevertheless certainly did achieve certain goals. The sixteen participants were involved in a stimulating and thought-provoking exercise in which the exchange of experience was constant and intense. As such, everyone benefitted from the experience, and there are several possibilities for follow-up work.

Many participants suggested that such seminars should be run focussing on different case study issues in their home States. There are clearly a wide range of subjects that might be considered in the settlement management field. Equally, it was suggested by N.I.R.D. staff that a training trainers course to help staff fully understand and use such participative training methods as Rotational Group Systems would also be extremely valuable. It is hoped that follow-up to some of these constructive proposals may be possible in the future.

**Appendix A Seminar Organisers and Speakers**

*Dr Martin Wynn*, UNESCO representative and joint conference organiser, has organised several courses in UNESCO's Human Settlement Managers Training Programme since 1980. He is joint editor of UNESCO's *Handbook for the Design and Organisation of Courses* (1986), and has published three books on Housing, Planning and Simulation. He is also by profession an Information Technology specialist.

*Dr M Thaha*, joint conference organiser, is deputy director of the Centre for Micro-Planning at the National Institute of Rural Development, Hyderabad.

*Mr Mangapathi Rao*, joint conference organiser, is Administrative Officer of the Kolleru Lake Development Committee, and was responsible for compiling the case study material and organising the field trip to the Lake.

*Dr RN Tripathy* is head of the Centre for Micro Planning at the N.I.R.D., Hyderabad.  
*Mr RP Kapoor* is Director-General of the N.I.R.D., Hyderabad.  
*Mr KV Natarajan* is Principle Secretary, Environment, Energy and Forests, Government of Andhra Pradesh.  
*Professor B Mishra* is head of the Centre for Rural Development, School of Planning and Architecture, New Delhi.  
*Professor LR Vagle* is a planning consultant and former UNCHS consultant.  
*Mr Hamid Khan* is on the staff of Sulabh Souchalaya, Hyderabad.  
*Professor M Salim* is Chief Engineer (Projects), State Planning Board, Trivandrum.  
*Mr Thomas Poulouse* is Housing Commissioner, Trivandrum.  
*Mr Inamul Haque* is Chief Engineer of the Government of Andhra Pradesh.  
*Professor Michael Windey* is Director of the Village Reconstruction Organisation.  
*Dr BC Muthayya* is on the staff of the Psychology Department of the N.I.R.D.  
*Mr J M Lyngdoh* is Deputy Director-General of the N.I.R.D., Hyderabad.

## **Appendix B: Seminar Participants**

Mr D Janardhana Rao, IAS Additional Director of Fisheries, Govmt of Andhra Pradesh, Hyderabad.  
Mr Anjani Kumar Singh, IAS Deputy Development Commissioner, Gopalgunj, Bihar.  
Mr H Roy, Assistant Housing Commissioner, Tripura Housing Board, Agartala Tripura.  
Mr Md. Kadir Zaman, Consultant, 16-10-49, Malakpet, Hyderabad - 36  
Mr G Prasad, Asst Director, APSADA, Finance and Planning, Planning Department, Hyderabad.  
Mr D S Gangakhedkar, Deputy Conservator of Forests, Wild Life Investigation, Hyderabad 500 004.  
Mr P V Krishnama Raju, Joint Director, Bureau of Economics and Statistics, Khairatabad, Hyderabad - 4.  
Mr C Uma Maheswara Rao, Chief Corporate Planning and Projects Officer, Hyderabad Allwyn Ltd, Sanatnagar, Hyderabad.  
Mr P Gopal Reddy, Joint Director of Fisheries, Tilak Street, Kakinada, Andhra Pradesh.  
Mr Mohd Mohiuddin, Housing Engineer, AP Housing Board, Gruhakalpa Hyderabad.  
Mr K Jaganmohan Rao, IFS Conservator of Forests, Field Director, Project Tiger, Srisailam, Kurnool District, Andhra Pradesh.  
Mr M Srinivasa Rao, Assistant Director, Town and Country Planning, Govmt of Andhra Pradesh, Hyderabad.  
Mr G M Khan, Joint Director, Town and Country Planning, Govmt of Andhra Pradesh, Hyderabad.  
Mr P K Goel, Associate Planner, Sambhagiya Niyozan Khand, Meerut, Uttar Pradesh.