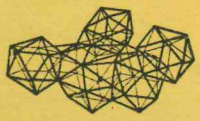

Western Australian Institute of Technology

THE PEEL INLET REGIONAL SURVEY

Conducted by the Environmental Studies Group W.A.I.T.
in association with WAIT-AID LTD.

Peel Inlet Regional Survey

The proximity and recreational potential of the Peel Inlet Area to metropolitan Perth and the regional centres of Bunbury and Pinjarra have long warranted a detailed study and an ordered development policy. Whether development throughout the Region is to follow haphazard urbanization, or areas maintained for recreational use or a combination of recreational usage and tracts totally preserved as nature reserves, must form a basis for discussion of the Region's future.

The Environmental Science (now Environmental Studies) Group at W.A.I.T. commenced in 1971, an interdisciplinary investigation by staff and undergraduate students of Geography, Biology, Microbiology, Chemistry and Physics to assess land use and water movement in the Region. It is an ongoing study expanded to include staff from the Marine Studies Group, with certain aspects later financed by Government agencies through WAIT-AID LTD., a Company set up by the Western Australian Institute of Technology to facilitate co-operation between the Institute, its staff and the community it serves.

Land Use

Initially attention was directed to commercial central places with special reference to growth patterns, morphology and function. An hierarchy of central places was postulated and an attempt made to evaluate this in terms of the Christaller model. Apart from the educational aspect, a major aim in the Study was the preparation of base-line information to enable a subsequent study of central-place development as related to possible development of the South-West and South-East corridors, the growth of recreational activity in the Peel Region and industrialisation at Pinjarra.

In addition a rural land-use classification was developed along a number of East-West transects. The information generated was subsequently applied to a one-inch air photo mosaic of

the region to enable broad patterns of rural land use to be extrapolated for the whole area. Sampling points for chemical and microbiological analyses of waters were selected and channel cross-sections and water depths plotted.

Later work was concentrated on the geography of recreation. A study was made of the morphology, function and growth dynamics of recreational places along the lower Murray, around the Inlet and Estuary, and along the coast from Peelhurst to Binningup. Two types of classification were applied:–

i) with reference to functions of site and situations;

ii) hierarchical with reference to the number and magnitude of the various recreational services offered.

Again, apart from the educational function, the principal value of the exercise was the generation and ordering of base-line data. In the process certain problems in the development of recreational land-use were identified and some predictions may be made.

In addition to the study of recreational use, a detailed pilot survey of rural land-use was begun in the interfluve of the North and South Dandalup rivers. This was related to water sampling and analyses by other members of the Group.

The most recent field work was on rural land use in an area bounded by the Darling Scarp to the East, the Peel Inlet Drainage Basin to the North, and the Harvey Diversion Dam to the South. Information obtained enabled detailed mapping of ground cover, including pasture and crop types, and its relationship to such factors as soils, drainage, distance, live-stock distribution and the patterns of distribution of farm houses and agricultural plant. In addition dispersed central-place and recreational-place functions have been located. In order to assess present and possible future data sources, a survey of Government Departments, research institutions and private organisations linked with the Peel-Preston Lakelands was carried out in 1974.

Water-Ways

The recreational appeal of the Region stems partly from its water bodies, and human activity influences the condition of these stretches of water.

In general one may say that biological communities of the Peel-Harvey Waterways can be distinguished approximately as:—

i) open water communities including plankton but excluding fish;

ii) benthic communities including large algae, worms, molluscs, shrimps, prawns, crabs and fish;

iii) shore line communities of rushes and paperbark trees;

iv) microbiological communities.

An understanding of the biology of a waterway and the factors that affect it, is essential to any management programme. In any waterbody a complex interaction of factors influences the pattern of growth and the type of species that occur. Not the least of these factors are nutrient availability, flow rate of water, turbidity of water and competition between species. The present study includes collecting biological information on the area and relating it to conditions of weather and water movement, water chemistry and surrounding land-use.

What is apparent so far is that there are two important aspects of the total biological system. These are the open water, planktonic component and the bottom dwelling or benthic component. Their relative importance differs in different times of the year. As a result of these studies hypotheses have been developed which purport to explain the connection between the parts of the biological system, with a focus on the factors that produce the unsightly accumulation of **Cladophora** on the beaches.

Mathematical Modelling

Work has been proceeding on an extensive literature review to evaluate the state of the art of mathematical modelling in estuarine systems, with a view to determining the feasibility of applying such a model to the Peel Inlet – Harvey Estuary. The fundamental premise is that a computer model is sought to predict the distribution and concentration resulting from the presence of "pollutants" in the estuary. Additionally, it is hoped to be able to predict what will happen to such things as salinity intrusion and pollution concentration if the fresh water inflow is subjected to permanent change.

Two basic types of model are available, and have been used with success in other similar shallow, vertically mixed systems. They are:–

i) **The hydrodynamic model** which attempts to predict tidal stage and current directions and velocities

ii) **The pollutant transport model** which simulates water quality constituents including temperature, ammonia, dissolved oxygen, nitrate, B.O.D., phosphate, fecal coliforms, total dissolved salts, etc., etc. This type of model is not nearly so well advanced or successful as the former.

A study is under way to determine and recommend data collection programmes necessary to provide suitable inputs to such models, were it ultimately decided to set them up. One such significant input may be the groundwater inflow, and the Geological Survey of W.A. is co-operating to produce estimates of groundwater volume, quality and flow direction in the vicinity of the Inlet. This is just one input to any computer model; there are many others, and measurement programs will need to be instituted at any early date.

The importance of water movement and water-borne wastes is immediate. The growth of industry on the periphery emitting to the atmosphere while possibly of more significance in the future, requires measurements of air pollution now to obtain base-line data.

The display shows some aspects of the programme with an emphasis on how particular specialities relate to the broad pattern of solutions to environmental problems. The complexity of the Peel System for instance emphasises the necessity for co-operative activity among specialists, each with a broad appreciation of the scope of an environmental issue; and this reflects the approach to graduate studies at W.A.I.T.

The importance of the Region to Western Australia and the nature of the problem highlights the need to marshal all the available information and in a carefully organised public forum, to stand above the promotion of sectional, institutional and political interests.

THE TOTAL ENVIRONMENT

ENVIRONMENTAL STUDIES GROUP W.A.I.T.