Session A: Keynote Address

ROLE OF THE ECOLOGIST IN ENVIRONMENTAL ASSESSMENT

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Introduction

The title for this session is the Role of the Ecologist in Environmental Assessment. The introduction provided in the seminar papers indicates that here we should be concerned with the setting of objectives at the outset of a study and with the execution of such a study.

In leading into this discussion segment the first obvious duty is to suggest that the topic is one of some confusion in the past, largely due to the absence of definition. We need to define or generally appreciate what is meant when we use the word ecologist and what we refer to as environmental assessment.

Ecology

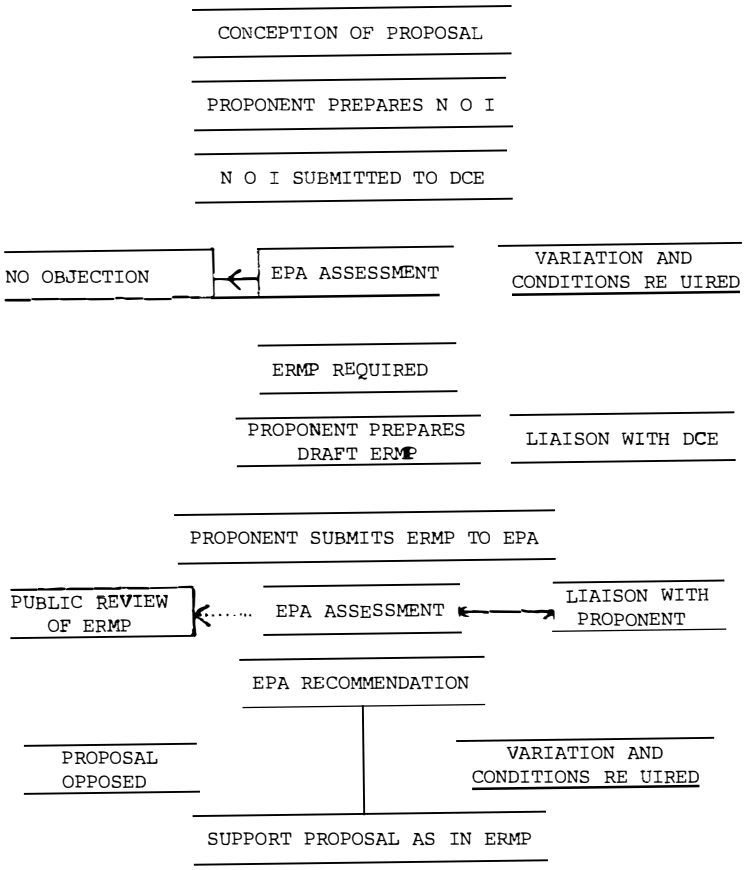
A simple definition of ecology is the study of plants and animals in relation to the place where they live or their environment. Environment comprises the surroundings of an organism - all the physical and biological factors with which a plant or animal interacts and on which it depends for its survival. LeProvost, in his paper, notes that there are many different kinds of ecologists and that ecology is a new and inexact science without the strong theoretical framework found in physics and chemistry.

O'Brien suggests that in many cases the word ecology has taken on a biological connotation and so deals more with "birds and wee beasties". In his opinion it should deal with both the biological and physical characteristics of the systems concerned and tentatively suggests a human aspect, social factors should perhaps be considered. We hence have a definition.

ECOLOGY — BIOLOGICAL / PHYSICAL / SOCIAL? — CHARACTERISTICS OF SYSTEMS

This is the definition I prefer and one may then question the validity of using the word ecologist in a general sense. We need to know what part of science does the ecologist tag refer to. I do not believe the term ecologist can be any more specific than the word scientist, other than to indicate that we are concerned with natural systems.

Figure 1. FLOW CHART SUMMARY OF ENVIRONMENTAL ASSESSMENT PROCEDURE (W.A. Dept. of Cons. & Env. Bulletin 38.)



Environmental Assessment

To speak generally of environmental assessment can also cause problems. Being used to assessment procedures in forestry practice, my reaction to the words environmental assessment is to ask assessment for what? The assessment and inventory process has little meaning unless it is carried out to meet objectives such as forest assessment for timber volumes, wildlife habitats or recreation sites. It also can have little success unless it is designed to meet the decision process which requires its being undertaken. I believe here we are talking about environmental assessment for significant human or developmental impacts.

Bulletin 38 of the Department of Conservation and Environment titled 'Procedures for Environmental Assessment of Proposals in Western Australia' contains the following flow chart summary of environmental assessment procedures (Figure 1).

Proceedings Ecology and Environmental Assessment in Western Australia.
Perth, 15th October, 1980 (W.A.I.T. : Bentley).

We wish to discuss the role of the ecologist in his or her application within this framework.

Just to keep you on your toes and indicate the nature of the verbal and conceptual monster we can unleash in this duscussion field, I also refer you to the legal definition of "environmental assessment" acknowledged in the United States of America. (Figure 2.)

Figure 2. ENVIRONMENTAL ASSESSMENT (EA)

FEDERAL -- CEQ

(A) MEANS A PUBLIC DOCUMENT FOR WHICH A FEDERAL AGENCY IS RESPONSIBLE THAT SERVES TO:

I. BRIEFLY PROVIDE SUFFICIENT EVIDENCE AND ANALYSIS FOR DETERMINING WHETHER TO PREPARE AN ENVIRONMENTAL IMPACT STATEMENT OR FINDING OF NO SIGNIFICANT IMPACT.

II. AID AN AGENCY'S COMPLIANCE WITH THE ACT WHEN NO ENVIRONMENTAL IMPACT STATEMENT IS NECESSARY.

III. FACILITATE PREPARATION OF SUCH A STATEMENT WHEN ONE IS NECESSARY.

(B) SHALL INCLUDE BRIEF DISCUSSIONS OF THE NEED FOR THE PROPOSAL, OF ALTERNATIVES AS REQUIRED BY SEC. 102(2)(E), OF THE ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION AND ALTERNATIVES, AND A LISTING OF AGENCIES AND PERSONS CONSULTED. MOST ENVIRONMENTAL ASSESSMENTS DO NOT EXCEED SEVERAL PAGES IN LENGTH. LEGAL JARGON 30: P. 25244

Both definitions refer to a proposed action or impact and in this session we are hence referring to the role of the ecologist to understanding systems in which perturbations and human impact are paramount.

Here I wish to refer you to the paper by O'Brien in which the association between the definitions of ecology and that of economics is put. In environmental assessment the management of systems and economics is just as relevant of the description as is knowledge of natural systems. Hence if we do not put the human or social factor into the definition of ecology, it must arise as a major part of our discussion under the definition of environmental assessment.

Contributions of Ecologist

Just where do or where should ecologists contribute to environmental assessment? McArthur states that the ecologist has a role here in that he provides an objective basis for decisions involving management of biological systems. This is accepted but we must realise that the ecologist does not necessarily provide all the information required for such decisions. I would stress the point of objectivity here, and suggest that the final decision will probably be subjective and I don't think the ecologist should consider his specific role is to make such decisions.

McArthur also states that most people have become aware of the need to preserve natural biological systems and it is the role of the Government to arbitrate between development and conservation. He is a basic ecologist and I suggest that managers would take exception to this use of terms. Preservation and conservation are not synonomous to the manager who defines conservation as the wise use of natural resources. Preservation is only one option open in conservation practices. I strongly support McArthur in suggesting that the basic natural system information should come from the ecologists, but if he is suggesting the preservation option is synonomous with the ecological assessment, I cannot agree.

Multidisciplinary Approach

LeProvost in his paper is quite specific in saying that the preparation of the Environmental Impact Statement cannot be accomplished by the ecologist alone but requires a multidisciplinary, team approach. His three tiered approach of a study team framework of describers, primary synthesizers and coordinators, is most useful. We can see here that the highest tier is not necessarily occupied by the ecologist (Figure 3).

He also associates impact statements with three basic stages

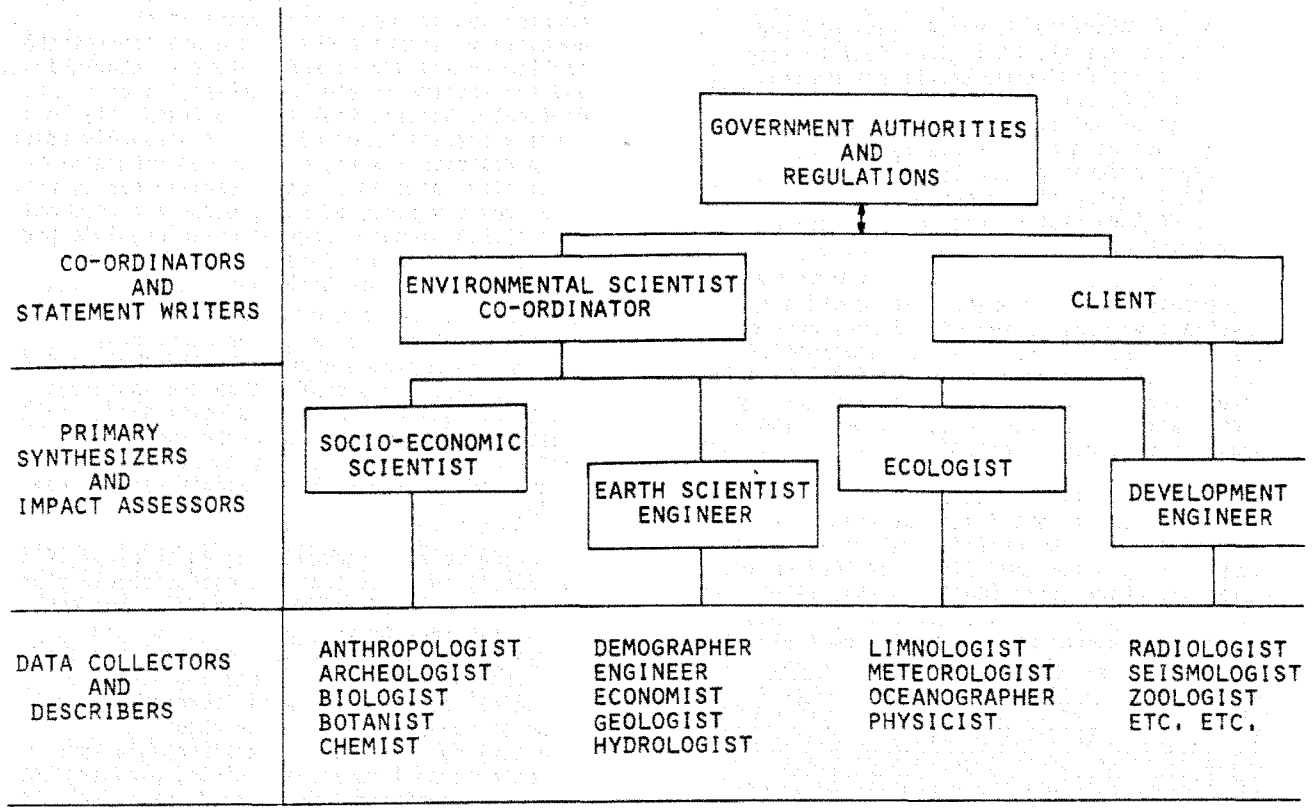
i) Design - objectives are established and the study team is gathered and briefed.

ii) Implementation - collection of data considered necessary and adequate to allow assessment.

iii) Reporting - synthesis of results, impact assessment and presentation in the required EIS format.

The key aspect in the design stage should be to ensure that all environmental factors that need to be considered are included, while at the same time excluding those items which have little relevance to the environmental effect of the desired project. This is a definite management emphasis and perhaps highlights the need for a multidisciplinary approach.

Figure 3. FRAMEWORK FOR E.I.S. PREPARATION



I would like to personally suggest here that an environmental assessment should concern the minimum effort required to define:

(a) the nature of the impact;

(b) management options which minimise the impact;

in a form suitable to the decision process. The accent should be to minimise work, not make work, but to ensure the decision can be based on a true range of options.

Trudinger also stresses that the assessment of impacts will normally involve interaction between disparate disciplines. Even within the general concept of ecology it is rare for a single biologist to have sufficient knowledge and experience to carry out an ecological assessment unaided.

Trudinger further suggests that a common problem with biologists is a difficulty in solving problems. Identification of problems is achieved readily enough in most cases but many ecologists are unwilling to suggest biological solutions. Unless this situation changes, ecological problems will continue to be solved by agricultural, engineering or political measures, when potentially superior ecological solutions may be ignored. In this respect biologists may have to relax their academic requirements for 10 years (or more) of data and "stick their necks out".

Here I would again stress the second need of environmental assessment, to define the range of management options which lead to least impact. Ecologists have pushed the "no go" option too much in many assessment processes. A decision to go will be made in many cases and it is essential that ecologists show the path of least damage, if the path of no damage is not acceptable to decision makers.

Basic, Applied and Consultants

Let us briefly consider the ethics for ecologists, a matter raised by Bridgewater in his contribution.

Westoby of Macquarie University has offered a draft policy for the Ecological Society with respect to the Environmental Impact Process (Bulletin ESA, June 1979, Vol. 9(2)).* The six points of policy provided by him are directed not at the environmental impact assessment process generally, but rather at the relationship of professional ecologists to it. Westoby states that the profession, as represented by the Ecological Society, should develop a united point of view on how assessments should be made. This would help individual members to resist the pressures of other interests and so do better ecological work. In this statement a professional is a professional ecologist who may be employed by or contracted to a proponent, a determining authority or a consultant.

Most of the points considered in the draft policy have merit, but I suggest that this consideration of the professional rather ignores the problems and fields of the applied ecologist. Parr-Smith (Bulletin ESA, 1979, 9(3)) in replying to the draft policy stresses that the assessment process is in the field of applied ecology. He states that efficient ecological study for environmental impact assessment must start with the engineering of the project, with liaison between engineer and ecologist at the project pre-design stage. Such liaison requires the ecologist to understand engineering, more than the reverse. He states that the impact assessment should only be performed when the project has been "ecologically optimised". He proffers a blatant plea for ecologists to get into project preplanning constructively, not to sit back and criticise later. Parr-Smith stresses that the EIS, as much as being a decision making tool, should show that effective ecological design has been undertaken. Often "environmental optimisation" is more a question of subtle and sympathetic engineering than of ecology, but to perform it in the absence of ecologists is to court disaster.

I feel we should strongly support this requirement that the ecologist should be involved at the early project design stage. Where this is accomplished effectively, the environmental assessment need not be more than one or two pages and does not require the rigours and horrors of the current run of EIS's.

* Note that the revised, second draft of the proposals by Westoby is included in these proceedings (Editorial note).

The lively discussion on ethics and policy in the Bulletin of the Ecological Society of Australia is an echo of activity in the U.S.A. in the early 1970's. For example Barbour (Ecology 1973 Vol 54(1)) commented "The preparation of impact statements which adequately summarise the literature, survey the problem, reach strong and reasonable conclusions, and are written in simple English, is a difficult, hectic, full time business. It takes a special breed of cat, an unusually adept and perceptive writer, even to contribute a specialists position. Good practitioners can come from a variety of backgrounds and need not have 'E.S.A. member, degree in ecology' stamped on their foreheads. I've seen good work by relatively untrained biologists with a B.Sc., but who knew how to dig and read and learn in the field. And I've seen some atrocious, shallow, incomplete, unreadable work by 'professionals' who couldn't do the job given the time, audience and interdisciplinary constraints". Barbour closes by suggesting that ecologists ought to let those who can - do. Do that is, whatever their talents permit them to do.

Following up the argument Bingham (Ecology 1975, Vol 56(1)) suggests that ecologists should stop worrying about ecologists who aren't, but ought to be involved, or who should be, but aren't studying the right kind of ecosystem. Instead they should worry about channeling accurate ecological data and concepts (perhaps also a sense of modesty and humility about their finality) to those applied environmentalists (foresters, soil conservationists, planners and landscape architects) who already exist and who are looking for guidance. She further suggests that "increasingly ecologists will need to redefine the position and the role of the basic ecologist and the applied ecologist. Indeed, perhaps some new term, 'environmental practitioner', must be defined".

In closing I wish to suggest that environmental assessment is indeed an applied field in which the science of ecology has a specific role along with management sciences and engineering. Apart from the use of published basic data on systems, and the ability of ecologists in the team to keep the focus onto the relevant parts of the system, I agree with Bingham and favour the role of ecologists teaching an appreciation of ecology to the many management and physical science orientated groups associated with environmental assessment.

As an applied ecologist associated with environmental assessment, I can assure you there is no lack of applied and amateur ecologists. There is however a dearth of basic ecological data and a lack of engineers, planners, etc. who are environmentally orientated.

Session A: Discussion

Carbon (Chairman) Would anyone like to comment on Dr Hopkins' remarks relating to the uncertain status of the social factor?

Quilty Social impacts should not be overlooked in environmental assessment. These are not necessarily part of the role of the ecologist but of the social scientist who should be an integral member of the team carrying out impact assessment. When so much effort is concentrated on assessing - and mitigating - impacts on flora, fauna, soils, hydrology, etc., we should be alert to ensure that we don't neglect impacts on people, where such are likely, and the implementation of appropriate measures to mitigate such impacts.

EIS is only the initial stage in project planning, so we should not be overly concerned that there is a degree of subjectivity in every EIS, and that none is 'perfect'. Management of the environment is an ongoing, dynamic process and, after approval (which may be conditional) is given to a project on the basis of an EIS, there is then an ongoing review of the project as it progresses by the Government and the developer, with interaction on the control of impacts between the two.

Carbon May I ask Dr Hodgkin whether he considers that the 'social' component should be included in environmental impact studies?

Hodgkin Sometimes they must be. Social studies are no different in this respect from any other aspects of an investigation e.g. botanical or meteorological. At some stage decisions on the social implications of the study will have to be made, but this is not necessarily part of the study itself, and we cannot make generalisations.

Carbon Regarding the question of an 'objective basis' I should like to suggest that the ecologist is not capable of being objective. Indeed neither can an economist be objective with regard to jobs.

Trudinger It is the function of environmental assessment to present both sides of the picture - both the adverse and beneficial effects of a development. Where possible quantitative evaluation (e.g. economic) should be made to enable the adverse and the beneficial impacts to be compared on an objective basis.

Carbon A separate study of the economic aspects of Wagerup was not done.

Hollick Objectivity in environmental assessment is limited. The first step in any study is to decide what factors to include and what to exclude. This involves judgements of importance which, while being based on professional knowledge and experience to some extent, are also influenced by personal values and interests. Wide discussions with other professionals and the public at the study formulation stage can reduce but not eliminate this problem. Data collection and analysis should be objective if the scientist is competent. However, E.A. involves the further step of evaluation. The ecologist is expected not only to present facts, but also to comment on their significance (e.g. 'serious' or 'slight' impact) and these comments are subjective to a large extent.

ERMP's fail to deal adequately with alternatives and the evaluation of them in objective terms. For example, the costs of alternative mining strategies for bauxite in the Darling Range were not evaluated, so that options for conserving other values could not be assessed. I have only ever seen one EIS which used multi-objective techniques to determine the non-inferior set of alternatives. This was for an urban transport link where most factors were easily quantified.

Integration of environmental factors with project design from the outset is vital. Separate environmental studies are harmful to the extent that they inhibit such integration. From this point of view it is worth noting that the EIS process did not originate from a desire for integrated project design, but as an 'action forcing mechanism'. The idea was that Federal Government agencies would be forced to take account of the environmental goals of the National Environmental Policy Act if they were made to prepare and publish a statement describing the effects of their actions and how these had been taken into effect in their decision making. The USA is still grappling with the problem of integration with project design.

Meagher Ecologists should not be unduly concerned by self examination in relation to objectivity. The "hard numbers professions" such as engineering are all subjective, e.g. there are a variety of options for bridge design or jetty design for the same project. These will largely vary due to the personal choice of client and the background experience of the design firm. Quite often choice is largely influenced by position on the critical path schedule rather than by cost/benefit considerations. Thus ecologists are no different in their variability compared with other professionals such as engineers, geologists, solicitors, or medical practitioners.

Hopkins If the role of the ecologist is not to provide objective information this may be because there is inadequate basic ecological research. The current demand for environmental knowledge could and should involve sponsorship of basic ecological research of relevant natural systems.

For instance we have had several EIS's in the Darling Range conerning the jarrah forest. And yet we do not have a useful basic ecological knowledge of the natural system of the jarrah forest. As a forester and an applied ecologist I would love to have increased basic ecological

research of the jarrah forest to improve knowledge of the key strengths and weaknesses of such a system.

Carbon The briefs for EIS/ERMP call for lists of species and not for information on system dynamics. It is easier and cheaper to produce lists than to delve into the dynamics of a system.

Humphries The distinction between "pure" and "applied" ecological research is spurious, since any good analysis of an ecological system requires clarity of the research objectives.

There are rarely useful data available (other than inventory information) for the analysis of dynamic natural systems at the proposal stage of a development. Since the general type of development in an area may generally be anticipated in advance (5 years into the future), it is a relatively simple matter to selectively fund research of relevance to potential problems, rather than tolerating the largely haphazard and post hoc approaches currently in use.

Prince Surely the comments made so far are emphasizing the problem that there is confusion regarding the role of the environmental assessment process. In part at least, the public appears to believe that environmental assessment is, or should be central to the decision making process(es). However, the two examples reported by Hodgkin suggest that in some cases, such as the Blackwood study, the assessment is part of the decision making process. There a more broadly based team is appropriate. On the other hand in cases like the Peel perhaps, where the study is of an operative system and the decisions have already been made, the assessment and study is directed towards a management need, and a different team is best suited to the job. A distinction is certainly required.

Carbon Is there, or should there be, a recipe for doing an EIS?

Browne-Cooper The philosophy of the Department of Conservation and Environment in respect of EIS is that the document is not the end but the beginning of environmental management of a project. The purpose of the EIS is not necessarily to answer all the questions but at least to ask most of them so that we know the problems which must be managed.

Meagher The acceptability of an EIS will largely rest with the criteria set by the DCE. Their process in reviewing the documents will determine whether it has been adequately prepared and thus determine the suitability of each practitioner. EIS documents are not necessarily any more perfect than any of our other social decision-making processes e.g. arbitration between employer and employee, but it does function.

Carbon Hopkins suggested the ecologist should not be involved in decision making. Who should ~~make~~ the decision? Should not the people who produce information also put forward recommendations?

Fletcher An ecologist should give the options ranging between no action and ultimate action with regard to environmental management.

Management can then put $ values on the options and compare the real cost of implementing the action as against the anticipated future cost of no action at this stage.

e.g. US Federal rehabilitation law is of great concern (in terms of present costs) to companies who opted for little or no action when their mines commenced operations. They now have to bring old areas up to standard.

One cost of a poor job could be the loss of a lease five years hence.

John Approvals of EIS/ERMP's can, in a democratic system, only be given by government: this is the very basis of participatory democracy. With respect to EIS/ERMP approval, recommendations are received from individuals, organizations, and involved government departments, before approval is contemplated. Surely this safeguards the interests of society as a whole.

Perhaps we are seeking the unattainable in searching for the "perfect ERMP". What an ERMP surely aims to do is establish the basis for a longer term appraisal of a particular environment, both in its original form and as affected by development. The emphasis, as others have pointed out, is on the dynamic and evolutionary nature of the study, of which an ERMP is but the first step.

Also, it can be argued that development has led, and will lead to more intensive examination of areas which otherwise might remain unstudied.

Brock I have two comments. Firstly on decision making in environmental assessment. Surely decisions are being made at all stages in a project. Because of the necessary subjectivity in experimental design, in data collection and interpretation and in the formulation of recommendations, the decision making process is already activated. Hence the ultimate decision, whoever makes it, should be an interpretation and blending of many previous decisions made at all levels and by all contributing parties.

My second comment deals with objectivity and subjectivity in ecological work. I agree with the comments already made about the subjectivity involved in our objectively based research. This is, of course, not confined to ecological fields, every scientist is faced with subjective decisions at all stages of objectively based research. The recognition of our own subjectivity should be the very stimulus that makes us strive for objectivity at every level: in defining objectives, in considering

all options and in outlining all alternatives in formulating recommendations.

Ullinger Standard of technical reporting - some studies have been models of clarity and brevity and the "authors" are to be congratulated. Alas, a few have been merely a collection of vaguely interconnected and at times disjointed bits of information, rather than interactive confirmed data. Practitioners should critically examine their reporting and presentation techniques, lest they reflect discredit on their professions. Some of the best reporting has come from the "Jacks of all trades" with extremely wide experience in the many facets of this new science.

Biologists may have to stick their necks out and relax their academic requirements in assembling data in order to solve ecological problems or else they will continue to be solved by agricultural, engineering or political measures (Trudinger's paper). Engineers have been making decisions based on experience for many years but recently have become more involved with problem analysis than with problem solving. Perhaps more experience in biological fields may lead to quicker experience-based decisions.

Browne-Cooper The problem of disjointed reports is often due to its being a synthesis of many technical inputs by a co-ordinator who perhaps has little expertise in many of the areas he is trying to synthesize.

Farrell Unfortunately the session has skirted an important aspect of the problem. We are able to define broadly the subject of ecology, but what is an ecologist. An engineer can be defined as someone who has completed one of a specific number of courses, and who has professional recognition by a proper Institute. There is as yet no control over who can call himself an ecologist or environmental scientist.

Loneragan An ecologist can be defined as a scientist concerned with natural systems (refer to B. O'Brien). Natural systems operate more slowly than man commonly perceives. Rather than planning for the immediate present or merely 5 years, planning for one life-time is worth considering. In the same way that feed-back mechanisms operate in nature and control limits of stress, so should indicative planning by man. At the boundary of limits a small shift in a critical limiting factor is able to create a great change (which may be irreversible) in a whole system. The system has functions more important than its parts. Survival demands that we understand this as united viewpoints, perhaps expressed as a code of ethics or guidelines, would enable co-operation and resolution of conflicting interests.

Why plan for one life-time? I quote Nicholas Jarchow LL.D.(1893) "Certainly there is a great difference between our (USA) government and that of most of the European nations, and politico-economical matters are often treated here differently from what they are there; but this does not affect the question of preserving to the succeeding generations the natural resources of a country necessary for the welfare of its inhabitants" (Forest Planting Part I Forest Culture. Orange Judd Co. New York). Are we now here, 87 years later, equally or more effective? So why not plan (indicative planning adjustments) for the individual life time?

Jenkins We may define an ecologist as 'a bearded man on T.V. Further, an ecological disaster is 2 bearded men on T.V.'

(Editorial note : Much laughter at this point. Dr Jenkins is clean-shaven, a number of bearded participants disappeared shortly afterwards.)

Hart Logical progression in environmental assessment has been hindered by monetary factors. We need to know more of the effects of changes that will occur, because we will have to live with such changes, and manage their effects. To a great extent we seem to be groping to determine what changes will occur and also to identify the policies that will be appropriate to counter their effects.

Carbon Ecologists have a role to play in education.

Majer The need for ecologists to be able to communicate and understand the problems of engineers, geologists and other experts concerned with the planning of proposals has been stressed. The converse is also of importance. I believe that engineers, geologists, town planners and the like should undertake a course in ecology as part of their basic training. Practicing members of these professions should also be encouraged to under-take similar courses. The WAIT Urban and Regional Planning course has recently introduced such a unit which is taught by the Biology Department and appears to be introducing the students to aspects of their future profession which they have hitherto not considered. Perhaps a course such as this could serve as a model for future courses aimed at non-biologists who will be involved in development.