

SESSION V: IDENTIFICATION OF GAPS IN KNOWLEDGE
AND ESTABLISHMENT OF PRIORITY
PROGRAMMES FOR RESEARCH

DISCUSSION SESSION V - IDENTIFICATION OF GAPS IN KNOWLEDGE
AND ESTABLISHMENT OF PRIORITY PROGRAMMES FOR RESEARCH

CHAIRMAN: PROFESSOR K.J.C. BACK

Chairman: I invite Dr Mather to present the report of her group.

P. Mather: Our group found that primarily we needed a definition of "optimal" and we decided that this depends on man's perception of the system. It therefore relates to our beneficial use of the system. It was also agreed that the research we recommended as having a priority need, has to be based on clearly stated hypotheses that are related to the management objectives. We therefore thought that one of the prime necessities was a survey of the current use and expectations of use of the area and an assessment of its impact, and a projection of the likely impact of potential users.

We then moved on to what we regarded as the priority scientific work that would be needed for management:

- 1) We were all agreed that hydrographic studies supplemented by near surface infra-red photography are essential to provide data on which to plan programmes relevant to management and investigation.
- 2) Hydrological investigations are a necessary preliminary to understanding the biology and geology of the area, including the sedimentation and lithification processes. Such hydrological studies would assist in the management of the area in relation to coastal or terrestrial uses on the mainland, and in relation to uses in the area itself. It would also help to provide an understanding of the inter-relationships between reefs. We would suggest in order to give priorities that it be directed in the first instance to key areas of the coast likely to suffer change, but we recognise that it would be impossible to restrict the study to those key areas. We are concerned that hydrological studies should be related to the composition of and the major current flows and the transport of sediments and chemicals.
- 3) In the geological field, we believe that the first research effort should be in relation to sedimentation and lithification processes. We think these are the basic necessities for understanding a healthy coral reef.
- 4) We were not able to explore fully what we thought were the priorities in biological research because of the complexity of the problem and the short time that we had defeated us. Thank you.

Chairman: Thank you Dr. Mather. Professor Michael Pitman will now present the report for his group.

M. Pitman: Baseline data: We recognised the need to collect basic information involving reef hydrodynamics and for a survey to identify reefs, so that all objects of rarity and importance like shipwrecks, archaeological sites, bird breeding areas etc. could be stored on a data bank system and be retrievable.

Monitoring human impact: Perhaps we can provide for the general public, log books for the collection of recreational fishing data. Projected land use and the relationship of reef use to land use should be studied.

Biological resources: Concerning both reef and non-reef biological resources, we felt that survey and distribution studies seem to us to be a priority at the moment in terms of variability and population dynamics. We also felt the need for physiological and biochemical studies of individual organisms. A number of particular topics were suggested, such as studying the biology of what we call fragile major species, e.g. marlin, turtle, crocodile, dugong and oceanic nesting birds. Surveys too can relate to effects of human activity, the effects of fishing on the Reef etc. We felt that the information (models) gathered from studies in the southern part of the Reef should be extended to the northern section to see if we are talking about the same system. Population dynamics especially of microfauna and plankton seemed to be an area requiring some research.

Geomorphology: A comparison of geomorphological models involving nutrient cycling, sedimentology and the origins of reefs was suggested, again to make sure that ideas developed for the Capricorn Group applied to reef development in the north.

Monitoring systems: It was suggested that an essential development was the encouragement of new observation systems, the involvement of physicists to examine the possibilities of using infra-red photography, ultra violet light, underwater technology, ultrasonics and radar, and the extent to which these techniques could be used in surveying.

Areas of special concern: Some general topics came out of the discussion. One was a concern about Raine Island; I need not say anymore about that. Concern was expressed about research logistics; do we need a research station in Torres Strait, or is all this going to be done by expeditions? How is it going to be funded? We cannot provide answers, but I think the Authority needs to consider the questions. We thought it important that there should be encouragement of research activity. Much of the work we heard yesterday has

been from people who have been following their line of interests and who are producing a lot of valuable data. An important point was the delineation of scientific and reservation areas. This should obviously be done very soon, and we felt it is a matter of high priority.

Finally a general point, the need to encourage specific research projects rather than a general idea of concern, on the basis that if you encourage a specific research project you are likely to get answers from it, whereas if you have a general area of concern, you just spend money on it. Thank you.

Chairman: Thank you Professor Pitman. Dr. John Farrands will report on the findings of his group.

J. Farrands: The highest priority on which we found consensus was mapping the area and naming or numbering the reefs. The mapping should be complete and there should be underwater mapping as far as possible using satellite techniques.

The next issue in this class was the measurement of water flow, which is clearly important. It is enormously complex because of the currents which are turbulent and wind driven, and although the tidal diary seems to be sufficient for the fishermen present in our team, it is clearly inadequate for the biologists. We thought that it would be impossible to produce a complete study of water flow but efforts could be directed initially towards areas where it is relevant to the particular biological research.

We felt that the biological data would never be complete, but at least it should begin to comprehend aspects like plankton movements and seabird population impacts which we have not considered here.

We felt that there should be a survey of the reef users, including scientists, and an assessment of the damage they are doing to the reef. We suggest that there should be more inter-disciplinary studies, particularly on the energy flow in the reef.

In view of the magnitude of the problem considering the geographical extent of the reef, the group felt that there should be a nomination or areas of points of outstanding scientific, aesthetic and social features and interest should be concentrated on these areas.

We discussed the estimation of the size of reservation areas referred to by the last group, but we did not reach a useful consensus because of uncertainty about the interaction of the reservation area with the rest of the ecosystem.

But I think a significant number of us did agree with the previous group in this matter. We stopped at that point because to begin to delineate more details of research topics would involve us in questions of priority which we could not resolve.

Chairman: Thank you Dr. Farrands. Dr. Connell is substituting for Dr. Saunders and will report on his behalf.

D.W. Connell: Our discussion group makes no claim to having developed a co-ordinated and cohesive report on research needs. It is clear however that the northern sector of the Reef has been little studied and that there is a great lack of information of all kinds. In our rather hurried discussion we had little time to fully develop our ideas and establish a firm rationale for research priorities. Nevertheless our ideas represent an immediate expression of opinion on research needs which can serve as a basis for further development with the reports from other groups.

Initially our group discussed whether research needs should be related to the overall development of scientific knowledge or the specific needs required by the Authority to effectively manage this northern sector of the Reef. We decided the major focus for identifying research needs should be related to management problems and the activities of man, in other words the latter alternative. We discussed the various impacts that man had on this sector of the reef and divided them basically into the following groups:

1. Tourism: The development of tourist resorts, the visitation of tourists to reef areas for diving, boating and reef walking activities were considered to be in the early stages of development.
2. Fishing: In this category we included commercial and recreational fishing and also the illegal poaching activities of foreign fishing vessels. In addition professional shell collecting could be included in this category.
3. Shipping: This includes development of shipping channels, harbours and associated works.
4. Pollution: Under this heading we considered such things as a possible spillage of noxious cargoes being carried by vessels through the Reef, pollution from resorts, and pollution from mainland sources.
5. Coastal Development: Here we were concerned with the development on the mainland coasts as well as development of the coasts on the islands.

6. Mining: Although mining is prohibited by the Great Barrier Reef Marine Park Act in areas declared part of the marine park, mining could occur in other areas.

Within all these various individual activities on the Reef we can identify three basic impacts.

- (1)^s Introduction of pollutants.
- (2) Physical damage.
- (3) Extraction of species.

After this initial discussion of impacts on the area, we now turned our discussion towards identification of research needs. Overall we can see two areas of major interest. The first is the lack of basic data which would be needed by a research programme so that it could function effectively. The second was an assessment of the specific management areas which were believed to require early investigation. These areas are outlined separately below:

BASIC DATA:

1. Charting and Mapping: The need for an accurate set of charts together with satellite and aerial photograph material was felt to be basic to all research. Somewhat related to this it was felt there was a need for a standard referencing system for all of the reefs and islands in the whole area of the Great Barrier Reef. The group was not entirely agreed but the Standard Metric Grid might be useful in the regard.
2. Data Bank: Some members of the group suggested the need for a computer based data bank system to allow easy access to all data available on the Reef. However one member expressed concern that such systems could become an end in themselves and a great deal of wasted effort could be made in developing the system rather than providing for reef information needs.
3. Social and Economic Data: The group generally felt there was a need for data on current visitor usage and projected usage in the future. In addition there was seen a need for basic information on the fishing industry; such facts as catch size, return to fisherman, species types and other aspects were considered important.
4. Baseline Studies and Gross Survey: The group felt this was one of the most important immediate basic data requirements for the northern sector. It was agreed that monumental studies of the northern reef ecosystem would be an inappropriate use of scarce resources at this stage but what was needed was a survey in which major factors were identified. Techniques such

as the use of aerial photography and satellite information could help identify such major features as sea bird and turtle rookeries and other major features.

In order to manage the reef, the opinion was expressed that there was a need to measure the "health" of the reef, to assess in fact, the success or otherwise of the various management options being exercised. In order to do this there is a need for baseline studies to be carried out. Once again the group felt that such baseline studies should not develop into major undertakings in theoretical research but should be concerned with the development of an understanding of reef ecosystems as related to the major usage factors identified.

SPECIFIC AREAS FOR RESEARCH

The group now turned its attention to more specific aspects of reef management which were in need of early investigation. Within this category we were generally agreed there were three aspects which needed to be considered. We recognised that given more time other areas could have been identified which possibly may have been of equal or greater interest.

1. Fishing: The group saw the management of fishing in the area as being an important management problem. In addition to commercial and recreational fishing there was a need to investigate the impact of illegal foreign fishing in the area.
2. Pollution from Shipping: We were aware that a substantial volume of shipping is using the various reef shipping channels at this time. Some ships are believed to carry cargoes of noxious chemicals while large cargo vessels are claimed to carry quantities of fuel oil up to 10,000 tonnes. The group felt there was a need to quantify the volume of various products passing through reef waters and investigate the impact of any materials accidentally or purposely discharged into those waters on the Reef ecosystem.
3. Effect of Tourism: We discussed the effect of tourism on the northern sector of the Reef and agreed that at this stage this is comparatively low. However the opinion was expressed that a study of the effect of the tourist industry at Lizard Island was important for two reasons: firstly, it would provide information which would be of value for the management of the tourist industry at Lizard Island; and secondly, it would provide information which could be used for the management of the rest of the reef as it may give indications of the effect of tourism on a pristine reef area.

It is interesting to note that the group felt that at this stage pollution from mainland sources was not a research area that required early investigation. Thank you Mr. Chairman.

Chairman: Thank you Dr. Connell. The final group was led by Dr. John Bunt.

J. Bunt: Our group was primarily concerned to identify areas of interest rather than become too specific. A number of specifics have emerged in any case in the course of the discussion just now, and what I am saying is not necessarily a priority listing.

We felt that there should be an attempt by a suitable group to decide on the limits of the study area, and how it might be zoned for study, because there are a number of factors that are involved in that consideration.

As our discussions proceeded, we zeroed in on the fact that we are looking at a system which is vulnerable to human use, human impact and that in terms of immediacy, this deserved the highest priority. There are two types of events involved - a catastrophic type of event, and a set of events very diffuse in time and space. Thus we felt there might be some merit in setting up task groups to consider likely impacts in the areas talked about already. These task groups might be in a position to call into operation the logistics and the expertise to investigate either as a matter of urgency or over extended periods.

It was suggested that a great deal could be gained from examining inputs and outputs of reefs (symptomology) to give some indication of what the system is doing, e.g. examining productivity, levels of nitrogen fixation, amounts of dissolved organics. One of the group indicated that there are quite specific techniques that enable one to reconstruct the character of a reef perhaps for the preceding 50 or 100 years.

Another area requiring close examination is the biological connection between reefs.

The final area that we considered is a long term project, which I have called resource monitoring, involving mapping and bathymetry. It would extend to cover biological resources to provide some indication of the biological character of the reef areas and the adjacent coast.

The climate and the character of the water masses, their physical and chemical properties should be examined and of course the geology of the entire system should be examined.

We discussed looking at specific things like the population dynamics of individual species, but the options are extensive and we really feel that the Authority should invite groups to investigate those types of details..

Chairman: Thank you Dr. Bunt. I will now close this session and thank on your behalf the Chairmen of the various sessions.