

APPENDIX I.

LAND COVER CLASSIFICATION CONCEPTS

The following is a synthesis of the concepts of land cover classification which are of most relevance to a surface reef cover and zonation classification system of the Great Barrier Reef.

For the present purpose of reef cover classification four of Clawson's nine basic concepts of land cover classification were of concern, namely:

1. 'Location', or the relation of a specific parcel of land (reef) to the poles, the equator, and the major oceans and land pieces;
2. 'Natural' qualities of the land (reef), including its surface and subsurface characteristics and its vegetative (coral) cover;
3. 'Activity' on the land (reef), man-made structures; and
4. 'Intensity' of land (reef) cover, or the amount of land (reef) cover per unit of area.

(Clawson, 1965)

Two other basic ideas were utilized in the construction of the Classification System presented here:

1. At the basic data collection stage, land (reef) cover should be recorded in as much detail as possible. It is possible to aggregate categories but it is operationally impossible to separate detailed information from a generalized data base;
2. At the basic data collection stage, data should be recorded for individual units of land (reef) cover, that is, land (reef) covers of the smallest aerial extent.

(Clawson, 1965)

In addition to Clawson's (1965) basic concepts and ideas presented above, the characteristics of a 'good' classification of land cover were observed. 'Good' is discussed by Clawson (1965) in terms which are qualitative generalities based on the usefulness of the data. The five characteristics of a 'good' classification which were observed are:

1. The classification should deal exclusively with land (reef) cover;
2. It should be flexible in detail of aggregation and combination;
3. It should be based on what is observed. The interpretation should do only a minimum of grouping. Work should be based on the smallest unit which can be differentiated;
4. It should be amenable to machine processing; and
5. The classification may be restricted so as to be compatible with any existing systems.

(Clawson, 1965)

One constraint on this ideal classification system of Clawson's (1965) is the use of remote sensing as a data source. The basic concepts and ideas of land cover classification as presented by Clawson (1965) are suitable for the design of a classification system for use with a single data source, that is, a classification system for use with aerial data or with orbital data. However Clawson's (1965) basic concepts and ideas need to be modified to allow the design of a classification system for use with multistage data sources, that is, a classification system for use with combinations of ground, aerial and orbital data. Anderson (1971) overcomes the constraint of Clawson's system (1965) in presenting ten criteria for a land cover classification system for use with orbital imagery.

Anderson's 10 criteria were modified for application to the reef cover and zonation classification system and for use with the range of scales in the aerial and orbital imagery. However, in the classification system presented in Appendix B no distinction has been made between the different scales of the aerial and orbital imagery. Anderson's modified criteria are listed below:

1. The level of accuracy in the interpretation of this imagery should be 90 per cent or better. However, this will depend on resolution, quality, and scale of the imagery, and the skills of the interpreter;
2. The accuracy of interpretation for the several categories should be about equal. However, this will depend on the interpreter's skills and the degree to which deduction is used at each level in the Classification System;
3. Repeatable results should be obtainable from one interpreter to another and from one time of sensing to another. However, this will depend on the interpreter's background and previous experience;

4. The classification system should be usable or adaptable for use with all reefs of the Great Barrier Reef;
5. The categorisation should permit reef cover types to be used as surrogates for activity when the activity is not listed;
6. The classification system should be suitable for use with seasonal or multirate imagery and with multistage data;
7. Effective use of sub-categories should be possible. These can be obtained from ground surveys, large scale and enhanced imagery;
8. Collapse of categories is desirable. Although this is only partly true in the devised semi-hierarchical system presented here (Appendix II);
9. Comparison with present or future reef cover and zonation information should be possible;
10. Multiple aspects of reef cover units or heterogeneity should be recognized whenever possible.

(after Anderson, 1971)

Some of the remote sensing characteristics as related to reef cover may be inferred from the criteria given by Anderson (1971). These characteristics are:

1. The interpretation from one interpreter to another will vary greatly for certain types of interpretation where insufficient guidelines are poorly constructed and defined classes are used. This problem can be minimized by the interpreter referring to the definitions and illustrations of the nomenclature given in Appendix II or to the accompanying technical paper 'Geomorphological Nomenclature: Reef Cover and Zonation, Great Barrier Reef, Australia' when the definition of a reef term used in the Classification System (Appendix II) is in doubt;
2. Reef cover appearance may change seasonally, over time or with varying atmospheric and marine conditions;
3. Reef cover may not be able to be 'read' or interpreted directly from some imagery and therefore may have to be inferred;
4. Data obtained from an imagery is dependent on scale.

A fifth criterion, drawn from Ryerson and Gierman (1975) is:

Terrain appearance and the size of similar features change from place to place, and the level of available detail may therefore change for similar imagery scales.

The guidelines for classification developed by Anderson (1971) and Clawson (1965) are general and therefore in attempting to form a specific classification system for geomorphological reef cover and zonation on reefs of the Great Barrier Reef, the explicit inter-relationships in the reef cover data need to be considered.