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RAINFOREST SEMINAR PAPERS

RAINFORESTS: DEFINITION AND ECOLOGICAL CONTEXT

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AUSTRALIAN RAINFORESTS: WHAT IS THEIR VALUE?

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This is one of a special series of CRES Working Papers which examine ecological, legal, political and economic aspects of rainforest issues.

The papers are a product of a series of seminars held at CRES in September-October 1985 with the purpose of exchanging and disseminating information about rainforests.

The seminar series was organised because of the current debate over rainforest conservation. In October the Commonwealth government released a report by the Rainforest Working Group for public comment; and conservation groups are pressing for nomination of the Daintree rainforests for World Heritage listing by the end of 1985.

In order to contribute to the debate on these matters, it seems appropriate to make the papers from the rainforest seminar series available as soon as possible. These working papers are based on the notes or transcript of the material presented at the seminar.

This format falls within the purpose of the CRES Working Paper series, which are intended to present material at an early stage for comment and review.

RAINFORESTS: DEFINITION AND ECOLOGICAL CONTEXT

Andy Gillison

There is very little that is finite about the term 'Rainforest'. While there are relatively simple definitions that are usefully applied within a global of even continental context, no simple definition exists that adequately accounts for the full range of rainforest types.

For this reason, in discussing rainforest terminology and definitions, one is forced to consider a hierarchy of available terms and definitions in order to decide which best fits the particular purpose at hand. Definitions of rainforest at global level are, of necessity, somewhat oversimplified. As one progresses from global to continental to regional scale, definitions become increasingly specific and in most cases more complex. While there are a number of very broad definitions that are presently applied to Australian rainforests, at regional level, more specific classifications of rainforest types are applied, such as 'complex mesophyll vine forest' or 'simple semi-evergreen notophyll rainforest'. The criteria for classification are based mostly on structural/physiognomic features such as the presence of particular growth forms, lianes, palms and so forth, and on classes of leaf size. Whereas these features are useful for classifying so-called 'climax' or 'mature' rainforest, they are difficult to apply to vegetation mosaics with successional stages.

Global definition: Fosberg/IUCN/UNESCO..oversimplified and generally inapplicable at regional scale.

Continental definition: Ecological Society of Australia.
NSW Forestry Commission
CSIRO (Soil Survey Handbook)

Regional/Local definition: Rainforest typology of Webb etc.

Problems inherent in the definition of rainforest, arise first, in defining some of the elements that are 'characteristic' of rainforest,

and second, from the fact that many of them extend well beyond what is generally accepted as the rainforest 'boundary'.

The term 'sclerophyll' is a case in point as it has been central to the definition of what is not 'rainforest'. In global usage, the term refers to woody vegetation that possesses hard evergreen leaves such as one might find in seasonal Mediterranean flora, versus 'orthophyllous' (ie non-sclerophyll) leaves that are relatively speaking, soft, membranous, and not necessarily evergreen and which are used to typify Australian rainforest. In Australia the term 'sclerophyll' has been applied variously to heathland vegetation and to almost any community that contains Acacia or Eucalyptus, or to somewhat eucalypt-related genera such as Tristania or Syncarpia.

In the past 'sclerophyll' has been used to define, by default, non-rainforest vegetation, and its presence or absence in closed canopy forests has been a bone of contention between rainforest conservationists and State Forestry departments. The problem lies in the actual definition of 'sclerophyll'. There are many well-accepted rainforest tree genera such as Syzygium (water gum) and Nothofagus (beech or myrtle) that have upper canopy leaves that are hard and evergreen by almost any standard. The awkward fact is, that apart from a rather arbitrary but otherwise specific definition that is contingent upon laboratory analysis, there is no definition available for practical purposes, and continued use of the term 'sclerophyll' in vegetation typology will remain highly problematical under present circumstances.

What are the rainforest elements?

In the most simple form these fall into living (plant/animal) and non-living (substrate/climate) classes. This talk considers mostly the former with reference to the deterministic effects of changing climate and soils.

...Slides illustrate different rainforest types from hot/wet to cool/wet and hot/wet to hot/seasonal; including some specific examples of large, membranous-leaved forms, aroids, treeferns, lianes, strangling figs etc.

How are the rainforest elements distributed?

The assemblage of rainforest elements can be shown to be distributed along wide spatial and temporal continua or gradients. Generally speaking, with increasing seasonality, leaf size decreases and deciduousness increases as does succulence in some woody plants. Leaf size and leaf hardness also tend to increase with decreasing temperature and nutrients. Conifers and palms and plant taxa from the so-called softwood scrubs or seasonal rainforests range from closed canopy environments to isolated individuals in open savanna formations. Many mammals and birds also range inside and outside closed-canopy 'rainforest' environments. How does their presence or absence influence the rainforest ecosystem and how important are they in the definition of rainforest as a habitat?

What is habitat?

Plant and animal taxa 'perceive' their environment in a way that is presumably different to the human eye. Human-related pre-conceived boundaries that are implied by mapped areas of classified types of rainforest or other vegetation types may not be the most useful for conservation purposes involving target taxa. For this reason Nix and Gillison (1985) define habitat as 'that part of the physical and biotic environment required for the continued survival of the target taxa'.

What is disturbance?

Environmental change influences the nature and distribution of vegetation. Because environment is continually changing, there are dynamic consequences for vegetation and associated terminology. The definition of 'disturbance' in this context is an important but highly complex problem. Under conditions of periodic damage from cyclonic winds, for example, rainforest may be regarded as undergoing a 'disturbance'. But it can be argued also that a rainforest whose dynamic status is geared to anticipate more-or-less regular cyclonic perturbation, may suffer 'disturbance' if that phenomenon becomes entirely absent. In a similar way, many Australian plant communities that are subject to regular fire may change dramatically in the absence of fire over a long period.

Most naturally-occurring pertubations are usually contained within the ecosystem, ie even with extensive wind-damage, gap-phase regeneration and recycling of available nutrients tends to be the norm.

This is quite different from conditions where parts of the resource suffer actual removal, such as the logging of rainforests or their conversion to other forms of land use. Changes of this kind usually brought about by man-made activities may be truly regarded as 'disturbance' or as creating a departure from normal functioning of the ecosystem. However one must be careful to define the ecosystem under analysis: for example, the rotational 'slash-and-burn' agriculture of the kind practised in parts of Papua New Guinea in the same land area over many thousands of years, may be a case where the manipulation of the ecosystem has become a desirable ecological feature in the maintenance of viable populations of rainforest taxa.

Towards operational definitions of rainforest for management/conservation purposes

It should be clear from the foregoing that any operational definition of rainforest must be influenced by the scale and purpose of the problem at hand. The general definition of rainforest at the 'biome' or continental level may not be useful at the local or even regional level. The nature and distribution of rainforest-associated taxa also suggests a great deal of movement or 'ecological traffic' between what might be termed 'rainforest' and 'non-rainforest' patches that together make up a landscape mosaic. Present-day rainforest and associated vegetation types owe their existence to long periods of environmental 'sieving' of an ancient genetic stock where the spatial 'boundaries' of component taxa have undergone considerable movement in response to climatic and edaphic change. Such traffic has consequences for the definition of 'habitat' and for the effective management of target taxa.

I would therefore argue that for conservational and management purposes, a useful definition for rainforest can be couched in a hierarchical context:

General: 'Rainforest' (continental or global definitions)
Specific: 'Simple Semi-Evergreen Notophyll Vine Forest with araucarian emergents'
Contextual: 'SSENVF biotope'

Whereas the term 'rainforest' may be useful in a general communicative sense, it is of little use in field survey for example, when it becomes necessary to discriminate between different types of rainforest. The importance of patch dynamics and the movement of taxa across perceived rainforest boundaries strongly suggests that the total 'protection' afforded a patch of rainforest by isolating it completely from its normal surroundings is not in the best interests of its inhabitants. When considering the conservation of a certain rainforest type therefore, it is highly desirable that an 'ecological buffer zone' is maintained. The extent and nature of such a zone will depend on local circumstances.

It is therefore important to consider the ecological context of an assemblage of taxa such as those contained in an area of vegetation that may be classified or defined as 'simple semi-evergreen notophyll vine forest with araucarian emergents'. The addition of the term 'biotope' allows for the inclusion of associated non-rainforest patches that go to make up the ecosystem of which the particular rainforest assemblage is likely to be an integral part.