

BACKGROUND

A PEM standards workshop was held in Victoria July 6 and 7, 1999. Three issues that were identified centre around the mapping entities that are to be predicted in the PEM process. These issues are (adapted from "Specifications for a Predictive Ecosystem Mapping Standard" - Dave Moon, 1999)

- 1) **Product Definition** The need to provide documentation on the nature of the PEM being produced including: Definition of the TEM or PEM classes used; Definition of the attributes used to define or characterize them; Rationale underlying the choice of mapping and map entities; and Relation to TEM classes.
- 2) **Non-forested Unit Nomenclature** The need to establish and name standard classes (mapping entities). Classes not currently handled within the TEM system may be drawn from other classifications where possible. This includes non-vegetated and anthropogenic classes.
- 3) **Site series generalization** The opportunity to create new classes that represent groupings or associations of existing classes to accommodate situations where more detailed predictions are not possible or practical.

In addition, the workshop identified principles that the standard will attempt to follow including: "Wherever possible, the PEM standard will conform to and utilize existing RIC Standards by reference or attachment to existing standards rather than by creating new standards requiring correlation or reconciliation." ... The standards will include "A digital data capture standard specifying entities, attributes, data structures and formats for the submission of digital data to the government repository." ("Specifications for a Predictive Ecosystem Mapping Standard" - Dave Moon, 1999)

One of the elements of the PEM standard framework is "Mapping Concepts". The standard will identify and specify standards for the identification, documentation, and rationalization of mapping entities and map entities. The standard will also make recommendations or set standards for documenting the relationship between TEM and PEM mapping and map entities. ("Specifications for a Predictive Ecosystem Mapping Standard" - Dave Moon, 1999)

THE MAPPING ENTITIES WORKSHOP

In light of the discussion at the PEM standards workshop, a small group: Dave Clark, Del Meidinger, Darren McKellar, Evert Kenk and Dave Moon (by phone) met on July 20th to establish standards for the definition, rationale and documentation of PEM mapping entities and map entities.

The workshop participants discussed the TEM mapping entities, reviewed the hierarchical model being developed for Ontario, and the classification currently under development for BC wetlands. This led to discussions of what the ecosystem mapping entity should be comprised of for PEM and the ability of the present TEM data base to accommodate changes. What can be reliably predicted in PEM? Site series only? Groupings of site series? Site series associations? ...

The main issues raised at the mapping entities workshop are discussed in the following sections.

PRODUCT DEFINITIONS

mapping unit (entity): is the basic ecosystem element being mapped e.g., Ecoregion, Biogeoclimatic Zone, subzone/variant/phase, or site series/structural stage/modifier/seral community type.

map unit (entity): is the labeled polygon on the map and may represent different compositions of mapping entities

mapping group: a complex mapping unit entity consisting of two or more mapping units for which the proportion or the pattern of all member components cannot be predicted or derived.

mapping association: a compound mapping unit entity whose definition includes a predictable or derivable pattern of its member mapping unit entities.

(Note: use of the term “association” on its own may be confusing, given the prior use of the terms “site association”, “plant association” and “ecosystem association” (not to mention “soil association”) in BC

For now, PEM projects should work within existing TEM data standards and guidelines. This does not rule out site series groupings, but the present database structure may not reflect the true nature of the map entities. PEM should work towards a gradual change of data structure to accommodate new approaches.

NON-FORESTED UNIT NOMENCLATURE

Currently, the TEM standards accommodate many non-forested ecosystem units, unclassified site units, and non-vegetated, sparsely vegetated and anthropogenic site units. Other classification systems (e.g., Broad Ecosystem Units, Land cover classes, wetland or alpine classes) may be used for units not adequately handled by the TEM standards.

GROUP SITE SERIES - RATIONALE

If site series can be mapped, do so. Otherwise, group site series within a given BGC unit. There are three points in the PEM process where grouping could be initiated:

- In the preliminary Client Requirement Assessment stage, if allocation of scarce project resources, considering stakeholder information requirements, dictates that some strata can be generalized to achieve an acceptable level of overall reliability for the project, without impacting the value of subsequent interpretations.
- In the Input Data Quality Assessment stage, if the data quality is deemed insufficient to reliably distinguish between related classes.
- In the output stage, where classes may be grouped to increase thematic accuracy and overall reliability for specific interpretations.

DOCUMENTATION

The *group* attribute in the TEM database can be used to link site series within a BGC unit. Additional documentation to justify the reasons for creating the group, and evaluating the impact of the grouping on subsequent interpretations should be submitted and referenced in the project metadata. Wherever practical, grouping should occur in the output stage only, so that the component site series can be disaggregated as required for subsequent interpretations. The project metadata must explicitly note if grouping occurs in the preliminary stage, so that subsequent users understand potential interpretive limitations. The decision to proceed with any of these options should be based on the ability of the procedure to add significant value to the interpretations of the PEM.

ASSOCIATIONS OF SITE SERIES - RATIONALE

The next step in implementation would be to identify project-specific predictable site series occurrence patterns - what could be called “landscape associations” [using terminology from Wetland classification structure (MacKenzie and Banner 1999)]. Implementation of the concept of associations of ecosystems would add complexity to the system and there would be a significant infrastructure cost associated with their definition, with quality assurance and with storage and retrieval. Prior to considering the acceptance of “associations” in the standards, testing and an impact analysis would have to be undertaken. “Landscape association” does not currently exist in the TEM database, and would have to be added to the PEM database.

PEM infrastructure would have to gear up to deal with “associations”. There are issues around organizational control; implementation, training and buy-in; and data base considerations i.e., how do you describe the association pattern - systematically or in free-form text?

CDT Inc. has a model being tested with the developing Ontario hierarchy that includes correlation, and control of proliferation through business rules that determine allowable variation before a new unit is created. Once these rules are in place, redundancy and correlation are systematically controlled - free-form listing of the occurrence pattern initiates a system-generated list of similar, pre-defined units that can be adopted or rejected in favour of justification for a new unit. New associations would be subject to an approval process and exported to the data capture routine.

Criteria for creating new associations

What is the rationale behind the new category or class?

Why is the new association required - what is the interpretive value of the new class?

What are the decision criteria to determine the class limits?

What is the underlying process to be characterized?

Rationale for accommodating "associations"

The Ontario ELC (ecological land classification) architecture project, is discussing the spatial distribution of ecosites (site series). Although treatments are often prescribed at the ecosite (site series level), they are often implemented at a landscape level consistent with the "association. Recommendations may change given the context of surrounding map units; the interpretive value of the association may be greater than the sum of its parts. There is also an expectation that landscape associations can be predicted more accurately than site series by terrain and DEM data. Associations within a given hydrosequence or toposequence give a range of expected conditions without having to delineate site series. This could result in a more accurate map that still identifies processes and components, one that may be better suited for some interpretations.

DOCUMENTATION

New associations would require definition, justification, and impact analysis reported for consideration by the custodian agency.

COMPLEX POLYGONS

How are site series structural stage and/or modifier to be assigned within complex polygons?

In cases where the PEM output consists of aggregated resultant polygons, or where output is constrained to describe a given polygon coverage (e.g., bioterrain units or VRI polygons) there are difficulties with assigning structural stage and/or modifier to the 2 or 3 site series that may exist within a polygon.

The appropriate approach will depend on the stated purposes of the mapping project. Consistent map units are more easily interpreted. The standards may set limits of shape and size for removal and for aggregation of resultant polygons. These limits will partially address the issue. It may be feasible to deliver site series and modifier, or site series and structural stage, but in some cases, not for all three permutations.

The modifiers for ridge, active floodplain and shallow soil should be considered guidelines, not standards, because they cannot be easily modeled from the TRIM Digital Elevation Model. Other core modifiers that describe slope and aspect can be included as standards.

An option that is not currently supported by the TEM standards is to deliver modifiers and/or structural stages as (a) separate layer(s), thus avoiding ambiguous couplings with site series in the map product. Subsequent interpretations will still be forced in some manner to deal with the ambiguity between the datasets. For example, interpretations of wildlife suitability are directly linked to the combination of mapping unit and structural stage.

Structural stage can be derived as required for specific interpretations from the most recent Forest Cover/Vegetation Resource Inventory, but not all potential users have access to the required technology. For some interpretations and reports it would be useful to have an attribute of polygon area in the TEM/PEM database, particularly where GIS tools are not available to the user.

DOCUMENTATION

We will propose documentation standards requiring the project proponent to identify what was done with regards to site series modifiers and structural stage, and how it was done.

SUMMARY

The decision to proceed with any of the following options should be based on the ability of the procedure to add significant value to the interpretations of the PEM.

- i) use of higher level (than site series) classes if and when appropriate – for non-forest areas where site series are not defined or where site series are too detailed a level of discrimination

- ii) use of complex entities – two or more site series grouped where there is no predictable pattern – generally to handle minimum polygon size restrictions and increase mapping accuracy
- iii) use of associations – two or more site series associated where they occur in a definable pattern in the landscape – generally to handle minimum polygon size restrictions and to enhance interpretability and accuracy
- iv) modeling modifiers
- v) handling of structural stage

NEXT STEPS

Given the discussion above, Dave Clark will revisit the “White Paper” to identify needed revisions.

The structure of the chapter should:

- define “mapping unit” and “map unit”;
- articulate the issues, and
- our present thinking - what is feasible given time and other constraints; what will be explored; what we anticipate including at a later date;

We need direct feedback from TEM and PEM practitioners concerning their experience in modeling modifiers and structural stage.

To determine the utility of the Broad Ecosystem Unit classification as a basis for grouping site series, an exercise that compares the idealized toposequence of site series within a number of BGC units with the corresponding BEU toposequences should be undertaken. Another validation would be to compare interpretations of site index, for example, for BEU with those for their component site series.