CHAPTER 17

LAND COVER AND INDICATORS OF ENVIRONMENTAL QUALITY BREAKOUT SESSION REPORT

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In exploring the connection between land cover and indicators of environmental quality, the first and most obvious point is that land cover data is, in itself, an indicator of environmental condition. The status and changes in the areal extent of *any* land cover class is an important measure of some underlying environmental activity or ecological condition. However, beyond this basic connection between land cover data and environmental indicators, the charge to the environmental indicators workgroup was to explore the common ground of environmental indicators in North America and to facilitate collaboration across institutions, governments, information technology systems, and borders.

The discussion was initiated with the following questions posed to the breakout group:

1. What are the environmental indicators related to land cover data that we currently utilize in North America?
2. What are the ecological indicators related to land cover data that we would use if comprehensive land cover information were available for North America?
3. What environmental border issues are, or could be, addressed with land cover data and derivative environmental indicators?

4. In what areas are we likely to develop new or improved environmental indicators based on emerging remote sensing, GIS, statistical or other analytical methods?
5. What would be the value of developing historical land cover data and indicators in a consistent spatial and thematic framework?

Although the initial exchanges centered on the above questions, the discussion rapidly moved into specific technical areas. There was general consensus on the value of regularly-produced land cover data and on the value of a continental program. Many participants also expressed the belief that processing of historical imagery to complete a temporal series would have great benefit.

ENVIRONMENTAL ENDPOINTS

Much of the initial discussion revolved around the importance of utilizing land cover data not just to provide an index of some environmental condition, but rather as a vehicle to assess, correlate, and articulate one or more critical environmental endpoints - explicit, actual, measurable, or observable effects in the environment that are relevant and meaningful to significant environmental issues. Much emphasis was placed on the need to ensure that indicators utilize quantitative measures and are statistically validated.

Similarly, an almost unanimous opinion among the workgroup members was that land cover data serves a critical information need in helping to assess and explain many environmental issues that naturally transcend national boundaries. Further, the development of a consistent continental scale land cover program would serve the science and regulatory communities of all North American countries. Examples include bird habitat, endangered species, sedimentation, runoff, and numerous air quality issues.

METADATA, TRAINING, AND OUTREACH

A common theme noted among the participants was the need for better documentation, training and outreach for land cover data, the processes utilized in its development, and the technical issues relevant to technical interpretations of indicator values. Several members felt that many indicators

did not have a sufficient level of background or explanatory detail and that standard metadata and were often inadequate. What results is often misinterpretation or ambiguity of a key indicator because of this lack of documentation and outreach.

DATA SCALE AND RESOLUTION

Another common discussion area was the "scale" of indicator metrics and the appropriate interpretation of indicator values, especially as related to the spatial resolution, and the limitations of the source remote sensing data. Similarly, many breakout group members expressed the desire to have land cover data available at finer scales of spatial resolution, with a tiered classification schema and strong quantitative ties to biological indicators and data derived from *in situ* sampling of biological resources.

LAND USE AND LAND COVER

A unanimous theme voiced by the group was the strong desire to have a Land Use component developed coincident with Land Cover. The anthropogenic utilization of a landscape is often just as important as the biological cover and often the two are inseparable. Although certainly an additional expense, the value-added and integrative nature of land use and land cover data together would be tremendously important for understanding and reporting on environmental quality.

LANDSAT, SENSOR FUSION, AND DATA CONTINUITY

Remote sensing data themes were a major component. There was much discussion about the future of the Landsat program, the status of the existing Landsat systems, and the need for strategic planning for data continuity in the interim period. Several members of the discussion group stated that it was also desirable and appropriate that data fusion with other sensors, such as lidar and radar, be considered as part of a new land cover program. The availability of these sensor technologies and the value that the data would bring to some of the classic land cover classification issues would be worth the investment in some preliminary remote sensing research.

TIES WITH INTERNATIONAL PROGRAMS

On a more programmatic note, group members articulated the belief that any proposed North American Land Cover program should build synergistic relationships with existing cross-border programs such as the Great Lakes Program, the Gulf of Mexico Program, the Border 2010 Air Quality Monitoring Program and many others. Connections with these programs would serve to foster immediate alliances, give the program a firm legal foundation, and build an immediate clientele for land cover data products.

OTHER TECHNICAL ISSUES

Validation of indicators, trends, and forecasting models is critically important and should be treated as an inherent part of a land cover mapping program.

Backwards development of a spatially and thematically consistent land cover data for the 1970s, 1980s and even earlier, is now feasible and would present an very valuable dataset for trends analysis and forecasting models.

Improvement in the accurate classification of agricultural land uses was identified as a critical information requirement. Especially important is the difference between cropland and pasture land because they both are important to landscape models of nutrient and sediment dynamics.

Finally, many participants applauded the land cover derivative products, such as the impervious surface and canopy closure data layers that are currently being produced by the NLCD program and expressed the hope that more of these types of specialized land cover data products, developed on a continuous rather than categorical basis, would be incorporated into any new land cover mapping approaches.