Science Roundup

by I. Jack Stout

The theme of biodiversity seems to permeate just about every issue concerned with the environment today. The relatively new area of applied science known as conservation biology is very much focused on biodiversity — mostly on how to preserve it. In fact, it is safe to say the whole field of conservation biology (its evolving science, the practitioners, and the academic programs) is a response to the perceived crisis associated with the loss of species and ecosystems. Clearly many approaches are being taken to maintain biodiversity at all levels of biological organization. From a local view of our neighborhood or county, each biodiversity problem, regardless of how it is framed, seems to require a unique solution. However, the public agencies responsible for the maintenance of our natural resources must step back and take a broader view.

A promising methodology receiving much attention today is called "gap analysis". Gap analysis is defined by Machlis et al. (1994) as ..."the generalized technique of creating GIS datasets of various biological and socioeconomic factors, and using them to identify critical components and areas of unprotected diversity". (GIS makes reference to a computer "tool" or application known as geographical information system.) A starting point with GIS would be to create a data base of the area of Florida from some form of aerial imagery, e.g., Landsat satellite imagery. The imagery would be interpreted to yield a map of the vegetation or plant communities of the state. These data may now be used as a "layer" of information that could be printed as a map.

This is only the beginning of the work. Additional layers might show the distribution of species of plants within the state. Finally, layers that show the distribution of conservation lands (county, state, federal, or private) must be created.

At this point "gap analysis" can begin to take on practical meaning. Persons skilled in GIS are able to mix and match the various layers to determine if particular plant or animal species of interest are, in fact, being conserved by existing public lands, or if "gaps" in protection do indeed occur. This very elementary explanation of gap analysis does reveal the incredible potential of this technique to quickly assess how well existing public lands offer protection of biodiversity.

For an in depth discussion of gap analysis by the founding workers, I recommend Scott et al. (1993). We in Florida may be very proud of Jim Cox, and others in the Office of Environmental Services, Florida Game and Fresh Water Fish Commission. A very impressive first cut at gap analysis for Florida's declining wildlife species and rare plant and animal communities has been completed by Cox et al. (1994). The National Biological Survey, U.S. Department of Interior, is currently engaged in an extensive gap analysis of the state.

Gap analysis offers a course filter approach to mapping so-called biodiversity hot spots when large numbers of biological species co-occur. Our response to this knowledge may be to move to fill the gaps by land acquisition; however, this may not be practical in periods of declining resources for land purchase. Issues other than biodiversity may be of great concern in specific cases. A recent (February 1994) workshop, entitled "Socioeconomic Factors and Biodiversity: An Advanced Research Workshop", was conducted in Semiahmoo, Washington (Machlis et al., 1994) to review the medley of views, opportunities, and potential conflicts associated with gap analysis. This workshop identified the lack of economic and cultural components in current gap models as a major shortcoming.

Gap analysis is almost certainly here to stay, but we must recognize that the approach is undergoing rapid changes both in the technical aspects as well as in the components of the models.

Cox, J., R. Kautz, M. MacLaughlin, and T. Gilbert. 1994. Closing the gaps in Florida's wildlife habitat conservation system. Office of Environmental Services, Florida Game and Fresh Water Fish Commission, Tallahassee. 239 pp. [Available from that office, 620 South Meridian Street, Tallahassee, FL 32399–1600.]

Machlis, G. E., D. J. Forester, and J. E. McKendry. 1994. Biodiversity gap analysis: critical challenges & solutions. Idaho Forest and Range Experiment Station. University of Idaho, Moscow. 61 pp. [Available from Dr. Gary E. Machlis, Department of Forest Resources, University of Idaho, Moscow, ID 83844–1133, at $5.00 per copy.]

Scott, J. M., F. Davis, B. Csuti, R. Noss, B. Butterfield, C. Groves, H. Anderson, S. Caicco, F. D'Erchia, T. C. Edwards, Jr., J. Ulliman, and R. G. Wright. 1993. gap analysis: a geographic approach to protection of biological diversity. *Wildlife Monographs* 123:1–41. [Available from Executive Director of The Wildlife Society, 5410 Grosvenor Lane, Bethesda, MD 20814, at $4.40 per copy.]

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