

Setting Technical Standards for Visual Assessment Procedures¹

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Abstract: Under the impetus of recent legislative and administrative mandates concerning analysis and management of the landscape, governmental agencies are being called upon to adopt or develop visual resource and impact assessment (VRIA) systems. A variety of techniques that combine methods of psychological assessment and landscape analysis to serve these purposes is being explored, especially in this country and Great Britain. A rapidly expanding body of research dealing more generally with conceptual and methodological issues in the use of observer-based descriptions and evaluations of landscape can also be identified. Given these trends, the time has arrived to address the matter of establishing technical standards for VRIA systems as a means of fostering and documenting increased levels of reliability, validity, generality and utility and moving towards procedures that are maximally useful and defensible. This developmental process is viewed in an institutional context from the perspective of socio-cultural evolution.

In the decade since the National Environmental Policy Act of 1969 called for methods and procedures "which will insure that presently unquantified environmental amenities and values may be given appropriate consideration in decision-making along with economic and technical considerations," the visual impact of land uses upon the landscape has received attention in subsequent legislation, including the Coastal Zone Management Act of 1972, the

National Forest Management Act of 1976, the Surface Mining Control and Reclamation Act of 1977 and the Clean Air Act Amendments of 1977, plus the various state-level versions of NEPA. In addition, administrative recognition of the importance of visual impacts can be found at the federal level, e.g., in the Department of Agriculture's Forest Service (USDA, Forest Service 1974, 1975, 1976), in the Department of the Interior's Bureau of Land Management (USDI, Bureau of Land Management 1975), in the Department of Transportation's Federal Highway Administration (Redding 1971; USDOT, Federal Highway Administration 1977), and in the Water Resources Council (U. S. Water Resources Council 1973).

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During the same decade, the emergence of environmental psychology and related fields (Craik 1977, Stokols 1978) has contributed to our understanding of the factors involved in environmental perception and evaluation, particularly in the context of observer-based appraisals of scenic quality (Arthur, Daniel and Boster 1977; Craik and Zube 1976; Lowenthal 1978; Zube, Brush and Fabos 1975).

Especially in this country and in Great Britain, a vigorous and pertinent literature

is being generated on the performance characteristics of techniques devised to describe landscape attributes and to appraise landscape quality. In this country, the work has been more or less directly influenced by the legislative and administrative mandates we have already noted. In Great Britain, these endeavors seem responsive to the evolution of the Town and Country Planning Acts and to the 'Country-side in 1970' conferences (Cherry 1974, Turner 1975). Similar undertakings are in evidence in other countries as well, such as Spain and Australia (e.g., Rodenas, Sancho-Royo and Gonzalez-Bernaldez 1972; Wright 1974) and at the international level in the UN Man and the Biosphere's Project 13: Perception of Environmental Quality (UNESCO 1973).

Landscape description and evaluation emerge from an interaction between the human observer, on the one hand, and land form and land use, on the other. Thus, it is not surprising that this literature constitutes a joining of methods drawn from the fields of psychological assessment and landscape analysis. Within a relatively brief period, various techniques of visual resource and impact assessment have been introduced, applied and subjected to initial empirical and critical examination. In this country, one can note the techniques of Daniel (Daniel and Boster 1976; Daniel *et al.* 1975; Schroeder and Daniel in press); Jones (Jones *et al.* 1975); Leopold (Leopold 1969a, 1969b; Leopold and Marchand 1968; Hamill 1975); Litton (Litton 1968, 1972, 1974; Craik 1972); Peterson (Peterson and Neumann 1969; Kreimer 1977); Shafer (Shafer 1969; Shafer and Brush 1977; Shafer and Tooby 1973; Shafer, Hamilton and Schmidt 1969; Carlson 1977; Weinstein 1976; West 1969), and Zube (Zube 1974, 1976; Zube and Mills 1976; Zube, Pitt, and Anderson 1975). In Great Britain, the techniques of Fines (Fines 1968, 1969; Brancher, 1969), Linton (Linton 1968; Gilg 1975) and the University of Manchester Landscape Research Evaluation Project (Robinson *et al.* 1976; Tandy 1977) are noteworthy.

Any use of observer-based assessments of landscape in planning and management at the agency level raises a host of conceptual and methodological issues (Craik 1968, 1972; Craik and Zube 1976). First, the construct of landscape quality must be appropriately formulated and then validly captured by standard indices and methods of assessment. Second, decisions about monitoring operations for the purposes of resource inventory and impact assessment must inevitably address such issues as: 1) the selection of observers, 2) the instructional sets given to observers, 3) the levels of interjudge reliability to be required of landscape descriptions and evaluations, 4) the choice of

on-site versus simulated presentations, and 5) the degree of generality of the results across populations of potential observers that is to be expected of the procedure. Third, organizational factors must be considered, such as 1) the training requirements for staff who make landscape descriptions and evaluations, 2) conducting and communicating the landscape assessments in a fashion that maximizes their utility and influence within the decision-making process, and 3) designing and managing an overall program of visual resource and impact assessment that fully responds to and adequately implements the pertinent legislative and administrative mandates.

These matters are receiving active scrutiny both within this country (Brush 1976; Craik 1969, 1971, 1972b, 1975; Daniel 1976; Fabos 1971; Hart and Graham 1967; Kaplan 1975; Peterson 1976; Wohlwill 1976, 1978) and in Great Britain (Appleton 1976; Clamp 1976; Crofts 1975; Laurie 1975; Lowenthal 1978; Price 1976; Unwin 1975). In the United States, the participation of research psychologists in this enterprise is more evident; in Great Britain, a practical concern with effective incorporation of landscape evaluation techniques within the planning context is apparent in case studies of their application and commentary upon them (Blacksell and Gilg 1975; Brancher 1972; Dunn 1974; Murray 1962; Penning-Rowse 1974, 1975; Penning-Rowse and Hardy 1973; Turner 1975; Weddle 1969).

In 1975, a series of research workshops supported by the National Science Foundation was held at the University of Massachusetts in Amherst to examine issues in the use of observer-based assessments of environmental quality. A subsequent volume offers a systematic research agenda dealing with 1) the development of scientifically adequate observer appraisal systems for environmental quality; 2) a conceptual model of the observer appraisal process, and 3) a conceptual model for application of observer appraisals of environmental quality within planning and management contexts; plus an array of thirty-one major recommendations (Craik and Zube 1976).

We might note that the notion of observer-based indices, or perceived environmental quality indices (PEQI's), is not limited to visual attributes. The construct of perceived environmental quality held by individuals can be thoroughly examined for specific domains of settings (e.g., residential environments, coastal zones) and then serves as a basis for devising indicators of the components of perceived environmental quality. Nevertheless, many currently used techniques entail the assumption

that visual attributes are certainly an important facet of perceived environmental quality. In any case, appraising the technical adequacy of observer-based indices and the judgments they require proceeds in a similar fashion from the point of view of psychological assessment principles.

The Amherst workshops dealt with priorities for research; this Tahoe conference focuses upon matters of application. What kinds of observer-based assessments of landscape quality are required by the recent legislative and administrative mandates? What procedures have been and are being adopted by agencies whose responsibilities entail the analysis and management of visual resources? How can we gauge the scientific adequacy of current techniques and procedures and how can we nurture the evolution of procedures that are maximally useful and defensible?

At the outset, psychologists and other researchers contributing to these developments must acknowledge some genuine sympathy for the agencies involved and their staffs. The recent legislation is requiring significant innovation and alterations from customary practice. A wide variety of procedures can be anticipated as the various agencies seek to experiment with ways of incorporating visual resource and impact assessment within their operations. They must do so in the face of a lively interdisciplinary literature that is indeed pertinent but is both scattered and rapidly growing. It would not be difficult to list over 75 reference citations since 1970 that are essential reading for anyone having professional responsibility for devising, managing or operating a visual resource and impact assessment system. And, finally, although full evaluation of the on-going technical performance and adequacy of these systems entails the application of principles and methods of psychological assessment, staff expertise in these agencies has tended to fall primarily within the natural sciences and design disciplines.

Given these trends in the analysis and management of the landscape, the time has come to address the question of establishing technical standards for Visual Resource and Impact Assessment (VRIA) systems. In making an informed decision to adopt a VRIA system or to put into operational use a VRIA system developed in-house, agency staff must know what information it is appropriate to seek and require regarding performance characteristics and psychometric properties and must apply suitable criteria of psychological measurement in appraising VRIA systems.

In the field of psychological testing of individuals, explicit standards regarding the kinds of information that should be available about psychological assessment procedures when they are to be used in decision-making have evolved over the last twenty-five years (American Psychological Association 1974). In general, current standards establish the expectation that the manuals for aptitude and ability tests, interest measures, personality inventories and related procedures will provide information to potential users on administration and scoring, reliability, scales and norms, validity, and qualifications required of users. The detailed specification of types of information is graded in importance from essential to very desirable to desirable, with the essential recommendations reflecting professional and scientific consensus about what information is normally required for operational use of the assessment procedures. Specific forms of applied research are usually required to generate this information for each procedure. These standards for the technical manuals have been supplemented since 1933 by the Mental Measurements Yearbooks (e.g., Buros 1978), which provide critical reviews of psychological tests and procedures.

These APA standards have emerged gradually from extensive consultation with professionals and research scientists in the fields of psychological and educational testing, and the consensus about these technical requirements has evolved over the years. A similar developmental process can be expected regarding technical standards for visual resource and impact assessment systems. Clearly the next step is to expect that agency-level manuals will move beyond mere description of procedures and forms to include psychometric findings on reliability, validity, generalizability and utility.

Brief comment on these technical properties will reveal their practical significance for the use of landscape assessment procedures in decision-making contexts (Daniel 1976; Feimer, Craik, Smardon and Shepard 1979). The most basic property of any measurement instrument is its degree of reliability. Within this context, reliable visual resource and impact assessment requires substantial agreement among independent observers for the landscape constructs being monitored. Ample evidence exists in the research literature to demonstrate that landscape descriptions and evaluations can be dependably and consistently assessed and need not be arbitrary or whimsical. However, indices of interrater reliability and agreement should provide this empirical assurance for specific monitoring techniques. The validation of landscape assessment procedures takes several forms. For

example, descriptive and evaluative dimensions should differentiate sensitively among landscape conditions, and assessments of simulated impacts should accurately forecast actual post-construction or post-transformation assessments. The generality of the reliability and validity indices for landscape assessment procedures must be gauged across the strikingly wide range of land form contexts and land use conditions that constitute the domain of land management policy and decision-making. Similarly, especially in light of the increasing requirement of attention to public participation, the generality of landscape assessment results across observer populations (including agency staff, interest groups and the general public) must be estimated and form part of the available information on the operating properties of visual resource and impact assessment techniques. Finally, the practical utility of an assessment system resides in the extent to which it usefully forms a part of the land management process and advances the institutional goal of responding adequately to legislative and administrative mandates.

We must recognize that despite legislative and administrative mandates to attend to observer-based appraisal of environmental quality, effective incorporation of these amenities and values into agency-level decision-making-obstacles. We cannot allow technical standards set at premature or unrealistic levels to generate discouragement about the entire effort or to offer an excuse for dismissing these considerations out of hand. Instead, we require a perspective which shows that the specification and application of technical standards is a necessary and inevitable step in the maturation of effective visual resource and impact assessment procedures. Presumably, if there are mandates to incorporate visual resources and impacts within the land management process, then there follows just as strong an accompanying imperative that the job be done well and defensibly.

Perhaps the formulation of socio-cultural evolution recently offered by one of our psychological colleagues, Donald T. Campbell, will serve this purpose. Socio-cultural evolution is viewed by Campbell as an adaptive process, distinct from biological evolution but displaying parallel attributes, entailing variation and selective retention of societal and institutional forms, such as skills, customs, plans, designs, and procedures (Campbell 1965, 1969, 1975). When confronted with a challenge to its equilibrium, an effective society or societal entity emits a wide variety of efforts to cope with its new situation, embodying alterations, innovations and other deviations from customary practice. Consistent selection

criteria are then applied to identify those new forms that display functional adaptation. Societal mechanisms come into play to retain the selected variants, such mechanisms as legitimacy, imitation and diffusion. Subsequently, additional mechanisms for the preservation and duplication of the selected variants are mobilized, including sanctions, policies, training programs and socialization into the new practices.

The loosely organized institution of land management in this country has been challenged to take account of landscape quality in a systematic fashion in its decision-making. As we have seen, a variety of applied techniques for visual resource and impact assessment has been generated and some forms are being tried out at the agency level. Several recommendations flow from Campbell's perspective on socio-cultural evolution.

1. The variation in types of visual resource and impact assessment procedures should not be prematurely curtailed. Indeed, new variants should be fostered, for it is too soon to be convinced that the intent of the various legislative and administrative mandates has been fully captured by any of the present systems. A period of experimentation and openness to innovation and critical analysis is in order.
2. Although variation is to be fostered, consistent selection criteria should be specified and applied to sort out those variants that are reliable, valid, generalizable, practical and useful from those that are not. This point has been our central message today.
3. Those VRIA systems that meet suitable standards must be retained, transmitted and continued in operation. This phase of the process will require training programs and continuing technical management of the VRIA systems. A new corps of technical experts, trained in both psychological assessment and landscape analysis will be required to serve this function.

Perhaps this last recommendation is the most alarming of all. The prospect of having to attend to visual impacts may itself be disconcerting, but having to welcome a new breed of environmental psychologists and landscape evaluators will surely be daunting to the Department of Agriculture, the Department of Energy, the Department of the Interior, the Department of Transportation, and other loci of federal land management and land use impacts.

Possibly the model that has emerged in the assessment and selection of high level managers and executives in industry will be appropriate. In many management assessment centers, staff psychologists operate the centers, provide training in the techniques, monitor and ensure adequate levels of reliability and predictive validity, conduct applied research, but do not themselves assess and judge the candidates; that function is served by managers already functioning in the institution who meet to observe the candidates (and potential peers) and to render their descriptions and evaluations (Dunnette 1971; MacKinnon 1975). In any case, the need for technically trained managers for visual resource and impact assessment systems possessing appropriate backgrounds in both psychological assessment and landscape analysis is compelling and perhaps even urgent.

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