U.S. Army Corps of Engineers Visual Resources Assessment Procedure

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The Visual Resources Assessment Procedure (VRAP) was developed to provide U.S. Army Corps of Engineers' personnel with a systematic procedure for incorporating aesthetic considerations into corps activities. To promote consistency in addressing aesthetics, VRAP was developed to provide credible procedures and guidance that can be implemented with field office capabilities. The procedure consists of two parts: the Management Classification System for classifying existing visual quality and establishing visual criteria and constraints for proposed water resource developments, and the Visual Impact Assessment procedures for measuring the visual impact of proposed projects. The VRAP was field tested in four corps planning studies, and revisions were made based on the field tests.

It has been demonstrated that when aesthetic considerations become an integral part of planning, design, construction, and operation of a project, aesthetic values are retained and improved (*1*). To this end, VRAP was developed so that corps planners could document or classify the existing visual quality in a project area, and thereby have a basis for measuring visual impact caused by a corp project. The classification of existing visual quality and measurement of impact is an important feature of the procedure. After different alternatives are evaluated, it is possible to compare the visual impacts of alternatives and to readily determine if visual impacts can be changed to an acceptable level through modification of project design. The classification of existing visual quality provides a baseline that can be used throughout construction and operation of a water resource project.

AESTHETICS AND THE CORPS

Historically within the corps, the use of principles of design or landscape architecture has been most evident in the development of park master plans for reservoirs. These master planners were responsible for bringing a level of environmental or resource conservation consciousness to the corps. After the passage of the National Environmental Policy Act (NEPA) (*2*), the establishment of environmental planning branches within district planning offices brought many landscape architects from the master planning sections, and from other state and federal agencies, particularly the U.S. Forest Service and Bureau of Land Management (BLM).

Since the establishment of the environmental planning offices, the contribution that the landscape architects have made to protection of aesthetic values varies significantly between corps field offices. This is the result of several factors. The corps is a highly decentralized organization, organized by river basins. This decentralization results in sometimes seemingly totally different approaches to planning. Different regions of the country have varying sensitivities to environmental values, resulting in different requirements and preferences by the local public sponsors, who cost-share for the projects. An historic institutional factor is that the corps is an engineering organization, motivated by values of economy and efficiency. The clean, smooth constructed lines of a well-designed levee, dam, or clear-cut floodplain may disguise the fact that a highly diverse wetland ecosystem was replaced. The marriage of environmental considerations, mandated by NEPA and other legislation, to the engineering values of the organization was successful to varying degrees because of the decentralized nature of the organization.

Before development of VRAP, a survey of district practice was conducted to identify needs and capabilities for a corps procedure. One respondent summarized the state of the practice by saying "In some cases, limited descriptions may be all that is necessary to justify the inclusion of minor measures to mitigate visual change. Some cases, however, involve more dramatic landscape changes and visual improvement costs and have received more in-depth analysis." This survey showed that in planning studies, most districts use descriptive analyses or narratives to describe the typical landscapes in the project area or explain how landscapes will change with a proposed project (*3*). Significantly fewer districts used mapping, graphic presentations, or visual simulations. In examining visual analysis capabilities, the districts showed extensive capabilities for visual analysis work. The graphic, engineering, and field survey capabilities required for the production of government reports enables the districts to perform a variety of photographic and manual visual simulations. Although most districts used descriptive analysis, the survey indicated that there was the potential for doing more in-depth visual analyses.

A primary requirement in any procedure for the Corps of Engineers is flexibility. The diverse landscape resources that result from regional differences, in addition to the variation in project types and scales, required that the procedure be readily adaptable to these differences. From the standpoint of using a systematic aesthetic procedure where more qualitative or no procedures where previously used, flexibility was required to be able to "fit" the process into a planning effort

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that may be 50 to 75 percent complete, so as to provide the rest of the planning effort with results that are usable (*3*).

The federal land management agencies share expertise and experience in the management of environmental resources. The visual resources management procedures developed by the Forest Service and the BLM influenced the development of the VRAP. The Visual Management System developed by the Forest Service for landscape management of the national forests provided a classification of lands based on aesthetic quality (*4*). This provided a basis for evaluating existing visual quality. The Visual Contrast Rating System (VCRS) developed for BLM provided a way to measure the visual impact caused by agency actions, based on changes in the design elements of form, line, color, texture, and spatial dominance (*5*). The VCRS was adapted by the Omaha District Corps of Engineers for use at several projects and served as the basis for development of the Visual Resource Evaluation Methodology for permitting activities by the St. Paul District (*6*).

The VCRS received considerable attention from corps visual resource personnel for a number of reasons. The measurement of visual change that resulted from BLM management actions coincides with the need to evaluate the "with" and "without" conditions of corps projects (*7*). The quantitative nature of the process proved highly desirable for communicating with engineering or design personnel. Referring to a visual simulation of a project, if the "with" project condition was not acceptable as determined by the landscape classification, the sources of the unacceptable impacts can be identified by determining the design elements that contributed to the change in going from the "without" to the "with" project conditions. The use of visual simulation techniques for determining with and without conditions was observed and has proved to be an effective communication tool for improving public understanding of projects. Identifying the design elements that contribute to unacceptable visual impacts is important because many times the designs can be modified to incorporate more aesthetically desirable design elements.

Developed for BLM lands in the west and BLM land management activities (e.g., grazing), the VCRS needed substantial revision for use in corps projects. For instance, by using the BLM classification criteria, all corps project areas ended up having high visual quality, resulting from the presence of water, a scarce and highly rated resource in BLM western environments.

OVERVIEW OF THE CORPS VRAP

A contract was initiated with Richard Smardon and James Palmer at the State University of New York, Syracuse (SUNY) in 1983 for development of VRAP. Using corps guidance in the form of the survey results (*3*), SUNY developed the VRAP drawing on previous work of the Forest Service and BLM. The survey criteria identified for a corps procedure are summarized in Table 1.

The rankings of the criteria reflect the corps planner's desire to have a procedure that produces consistent evaluation results, minimizes subjectivity of different evaluators, and is flexible enough to be used in the range of corps projects.

A major consideration was whether to use a parametric approach or a visual resource component approach. Stated another way, should visual quality be measured by the total

TABLE 1 CRITERIA FOR A VISUAL RESOURCE EVALUATION PROCEDURE

Responding as Important or Highly Important (%)	Criteria
91	Reliability
85	Acceptability
85	Water orientation
81	Flexibility
79	Costs
61	Quantifiable
57	Simplicity
56	Public preference accounting
44	Computer adaptability

or holistic aesthetic value or will visual quality be determined by the visual components of the landscape? Accepted methods of determining visual quality have been based on descriptive attributes such as unity, harmony, visual compatibility or vividness (*8*). Using this approach, visual impacts would be evaluated by changes in these concepts. The Soil Conservation Service (SCS) applied this nonparametric approach in "An Assessment Procedure for Countryside Landscapes" (*9*). This is a method for classifying countryside landscapes based on combinations of land use and agricultural activities and multiple evaluation indicators, rather than "identifying a single set of essential parameters for countryside classification." Such approaches provide a descriptive method to determine the visual changes that will take place, but in the corps application, these approaches do not provide a way to readily identify sources of adverse visual impact so that design personnel could mitigate the impact through redesign. This is because the evaluation refers to the whole frame of reference, that is, the entire scene and the parts controlled by the designer; for example, vegetation or structural components may not be specifically referenced in the harmony, vividness, or other evaluation.

Within VRAP, the holistic approach was incorporated by the use of an inventory form to document the characteristics of the study area in a holistic manner. Two inventory forms are used in VRAP, one for the holistic descriptive inventory and another for the visual resources inventory. On the descriptive form, the evaluator records the total visual impression and unified perceptions of the landscape. The purpose of this is to attempt to have the user think in terms of what visual components of the area are dominant and how the components form a unified visual impression. This holistic inventory is used for the Management Classification System (MCS) and in the Visual Impact Assessment (VIA) portions. In the VIA portion, the visual simulations of future project conditions are evaluated for visual compatibility, scale contrast, spatial dominance, and landscape composition.

The other approach to visual quality involves evaluation of the natural resources that are responsible for visual quality and determination of how the resources will change with a potential project. Resources evaluated by agency procedures are compared in Table 2 (*7*).

The classification of visual resources that best corresponded to the range of project environments, especially more developed areas, are water resources, landform, vegetation, land use, and user activity. More and more corps projects are in areas that are developed, urban or otherwise, in use by public or private concerns; rarely are new corps projects in pristine

TABLE 2 COMPARISON OF VISUAL RESOURCES BY AGENCY PROCEDURE

Bureau of Land Management	Forest Service	Soil Conservation Service
Landform	Landform	Landform
Vegetation	Vegetative patterns	Vegetation
Water	Water forms	Water
Cultural modifications	Rock formations	Structures
Adjacent scenery		
Scarcity		

or uninhabited areas. This is the reason for including the user activity classification in the list of visual resources. The expectations of different types of users affect their perceptions of visual quality; so the types of users should be considered. The visual resources inventory form mentioned earlier contains the visual resources and other information used to inventory existing conditions or to forecast future conditions.

The foregoing is a brief summary of the important criteria and decisions that were part of the VRAP development. The VRAP are made up of two parts the Management Classification System and the Visual Impact Assessment Procedures. The flow of the VRAP is shown in Figure 1.

MANAGEMENT CLASSIFICATION SYSTEM

The Management Classification System provides an assessment framework that defines criteria for judging visual quality. The MCS requires the planner to determine exactly what is considered high visual quality and what is minimal quality for the visual resources. Water resources considered to have high visual quality on the main stem of the Mississippi River (e.g., slow-moving, backwater areas) may be of average or minimal quality in marshes of south Louisiana where these conditions are more common. An assessment framework is developed to identify the visual resources that are considered to be distinct, average, or minimal in visual quality. The assessment framework represents the judgments of visual quality that are used to evaluate the existing visual quality of a project area. More important, the framework is used to evaluate

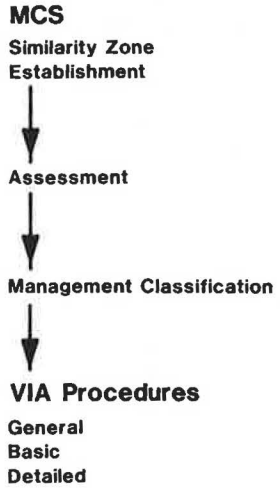

FIGURE 1 Corps visual resource assessment procedure.

visual impacts caused by a project. Separate frameworks are developed for different regional landscapes to accommodate the unique characteristics of each landscape type.

Ideally, the development of an assessment framework should occur before consideration of any project so that the determinants of visual quality will be agreed on objectively before any engineering measures are considered that could alter or obliterate any of the resources. MCS development was likely the most difficult part of field tests of the VRAP. This is because perceptions and judgments about visual quality are often not articulated or explicitly detailed. Development of the assessment framework forced planners to give thought to what they considered good and bad visual quality. Sometimes this proved difficult and required consensus among planning team members.

Public evaluation of visual resources is sometimes different from professional or planners' evaluations. Because of this and the need for public input into all aspects of planning, the corps has an established public involvement program for planning studies whereby public input on visual resources can be incorporated. It is better to get public input from separate meetings or other gatherings where the participants do not have an expressed interest in or other bias for a project. The Huntington, West Virginia District of the Corps of Engineers set up public meetings and used civic organizations to elicit input on the importance of visual resources. Using a series of slides that provided an overview of the project area, the participants were able to rate the visual quality or desirability of the visual resources.

The question is raised about the frame of reference or the size of the area under consideration for the assessment framework. Should an assessment framework be made for an entire river basin or for only a small part of a subasin? The question is answered based on the homogeneity of the landscape. In some regions, the diverse vegetation, land forms, and land uses produce a wide variety of different landscapes. In other areas there is relative consistency over a large portion of or an entire river basin so that a single assessment framework could likely be used throughout. The concept originally developed for VRAP was that of the similarity zone. A similarity zone is defined as "a physiographic area of land that has common characteristics of ecoregions or vegetation, land use, land use intensity, and water resources." In working with the concept and drawing on work by others characterizing regional landscape characteristics, it became apparent that the regional landscape contains certain homogeneous characteristics and is likely composed of a number of similarity zones.

The vegetation, land use, and water resources of an area are overlayed on a single map to delineate the similarity zones. The zones are characterized by location names or by descriptive titles of their characteristics (e.g., commercial/urban). When a specific project is under consideration, and an assessment framework is already developed for the area, it is used. If not, one is developed. The visual resources in the project area are inventoried. Using the assessment framework, distinct, average, or minimal classifications of the resources are transformed into numerical values (district = 3, average = 2, minimal = 1). The numerical values from the visual resource classification are summed to produce a total assessment value. The assessment values correspond to the management classes. The management classes contain visual quality objectives and criteria that describe the degree and nature of visual change

acceptable for a zone in that class. The MCS classes are preservation, retention, partial retention, modification, and rehabilitation. An example of the MCS class description follows for the partial retention class:

> These areas are locally valued for above average visual quality, but are rarely protected by institutional policies. Project activity may be evident and begin to attract attention; structures, operations, and use activities should remain subordinate to the existing visual resources. Form, line, color, texture, scale, and composition may differ from but should be compatible with the visual characteristics of the existing resource. Similarity, zones having a Total Assessment Value of 11 to 13 should be included in this class. Projects in these zones should have VIA Values no lower than −5.

The MCS classification is completed before the VIA procedures so that decisions made in the VIA process will have a solid basis. The MCS borrows from the experience of the Forest Service Visual Management System (*4*), the BLM Visual Resource Management System (*5, 10*), and the SCS Landscape Management System (*11*). These borrowed aspects include mapping of landscape physical features, patterns, and uses. There are two major differences, however. One difference is that the corps VRAP provides a professional and public assessment of existing and projected landscape quality. The second aspect in which MCS differs from other agency systems is that future landscape conditions are projected (i.e., the "without" project condition) for a certain time period. Because of such things as vegetative succession and land use changes that would occur in the absence of corps actions, and their effect on visual quality, it is important to determine the level of visual quality in the future so that the future "with" project condition can be compared. This future "without" difference is the definition of impact as defined in federal planning and environmental policies.

VISUAL IMPACT ASSESSMENT PROCEDURES

In assessing visual impacts caused by a water resources development project, two questions are addressed: How are visual impacts measured, and how are the impacts evaluated (i.e., judged acceptable or unacceptable)? In VRAP, the visual impacts are measured by changes in the visual resources, going from the "without" to the "with" project condition.

The VIA process is outlined in Figure 2. An evaluation framework is developed for the study. The evaluation framework involves identifying evaluators and significant viewpoints in the field. Visual simulations are prepared realistically depicting the project. Rendering on a photograph and artistic rendering are the two most common simulation methods. If vegetative conditions, land use, or other changes are expected to change in the project area, it is necessary to simulate "future without" project conditions. If conditions remain basically as the present, the present photography can be used for the "without" project simulation.

Visual impact is determined by using the viewpoint simulations and having a panel of evaluators assess the change in visual resources. Using the assessment framework as a basis; if "without" project conditions for vegetation, for instance, are defined as average and "with" project conditions are minimal, converting to numerical values, there is a −1 change in the vegetation. The changes for all resources and for the special considerations are similarly determined. The visual compatibility, scale contrast, and spatial dominance ratings are evaluated for the viewpoints by determining a majority rating among the viewpoints. For each evaluator, the visual resource differences are averaged for each of the resources and special considerations. A visual impact assessment value is determined by calculating an average of the resource impacts for all evaluators and adding the average impacts for the resources and special considerations.

After the visual impact assessment value is calculated, it is compared with the MCS class criteria. If the calculated value is within the range specified by the MCS criteria, then the visual impacts caused by the project are acceptable. What happens if the value is outside the acceptable MCS range? If the visual impacts are not acceptable, then the detailed VIA procedure is undertaken. The detailed procedure is identical to the basic procedure explained earlier and shown in Figure 2, except that an additional analysis is undertaken. The addi-

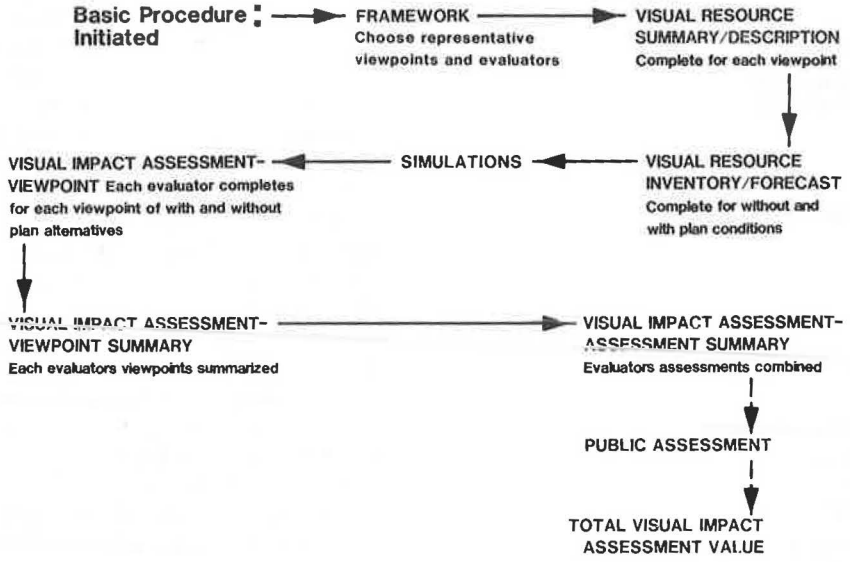

FIGURE 2 VIA procedure.

tional work involves an analysis of the design elements, that is, form, color, texture, and scale. The design element analysis is performed for the "with" and "without" project conditions. The purpose of the detailed procedure is to identify which design elements result in changes in visual quality. By identifying the design elements that cause adverse visual impacts, it is possible to further determine how the project can be modified, redesigned, or reformulated to reduce the visual impacts.

SUMMARY

The VRAP provides Corps of Engineers' planners with a method to determine existing visual quality and to measure and evaluate the visual impacts caused by a proposed project. Use of the VRAP to date has allowed the planners to address visual impacts of such projects as a dredged material transfer site, a reregulation reservoir, a levee and channelization project, and MCS classification of scenic bayous in south Louisiana. Experience with the VRAP has enabled planners to assess the visual impacts of corps projects and provide a tractable way to start redesign and reformulation of projects with unacceptable visual impacts.

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