The Use of VIEWIT and Perspective Plot to Assist in Determining the Landscape's Visual Absorption Capability[1]

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Abstract: The concept of Visual Absorption Capability (VAC) is widely used by Forest Service Landscape Architects. The use of computer generated graphics can aid in combining times an area is seen, distance from observer and land aspect relative viewer; to determine visual magnitude. Perspective Plot allows both fast and inexpensive graphic analysis of VAC allocations, for project use.

HISTORY

The concept of using visual absorption criteria to assess the relative ability of landscapes to absorb development, by type and level, was first documented in 1968 (Jacobs et al. 1968). The Visual Absorption Capability (VAC) concept was developed in 1971 by the Forest Service in the Alaska Region (Knode). The Forest Service Manual defines VAC as, the relative ability of a landscape to accept management manipulations, without significantly affecting its visual character.

Initial VAC studies were conducted primarily in the western regions of the Forest Service. The Mineral King Visual Analysis (Johnson et al. 1974), used the concept of ability to absorb visual modification to predict the effects of four transportation system alternatives on existing visual quality. A significant development during the Mineral King study, allowed the concept of visual magnitude to be incorporated into the computer program of VIEWIT (Elsner et al. 1975). When both viewed distance, land aspect relative to observer, and times an area is seen are combined by computer programming, they produce a numeric, or gray shade map, of visual magnitude.

A study on visual vulnerability (Litton 1974) addressed the characteristics of landscape compositional types, sensitive parts and locations, and outside influences and effects which are helpful in predicting visual impacts. A 1976 study (Anderson et al.1976), documented the concepts of bringing visual quality objectives and VAC mapping together. A pilot study in the development of a VAC assessment procedure for the State of Massachusetts (Williamson 1977) states that over sixty variables are being used to explain the relative differences in the landscape's ability to absorb visual impacts.

The Forest Service manual presently addresses the weighting of factors, i.e., slope, landscape complexity, soil color, vegetative screening. The factors are combined to establish maps of high, intermediate and low absorptive capacities. This current VAC process generally involves a matrix display of the more significant local variables which are generally intuitively weighted and then mapped. These maps are used to predict how difficult it will be to meet a visual objective, determine relative costs, determine where best to place developments and establish priorities for landscape architect involvement.

CASE STUDY

A VAC study (Hilliard et al. 1977) conducted on the Kootenai National Forest used a process somewhat similar to the current Forest Service Manual format. The study area was about 5,000 acres and located in northwestern Montana. The majority of the area had a visual quality objective of partial retention. The area was viewed from a major reservoir, state highway and a forest development road. Six of the most

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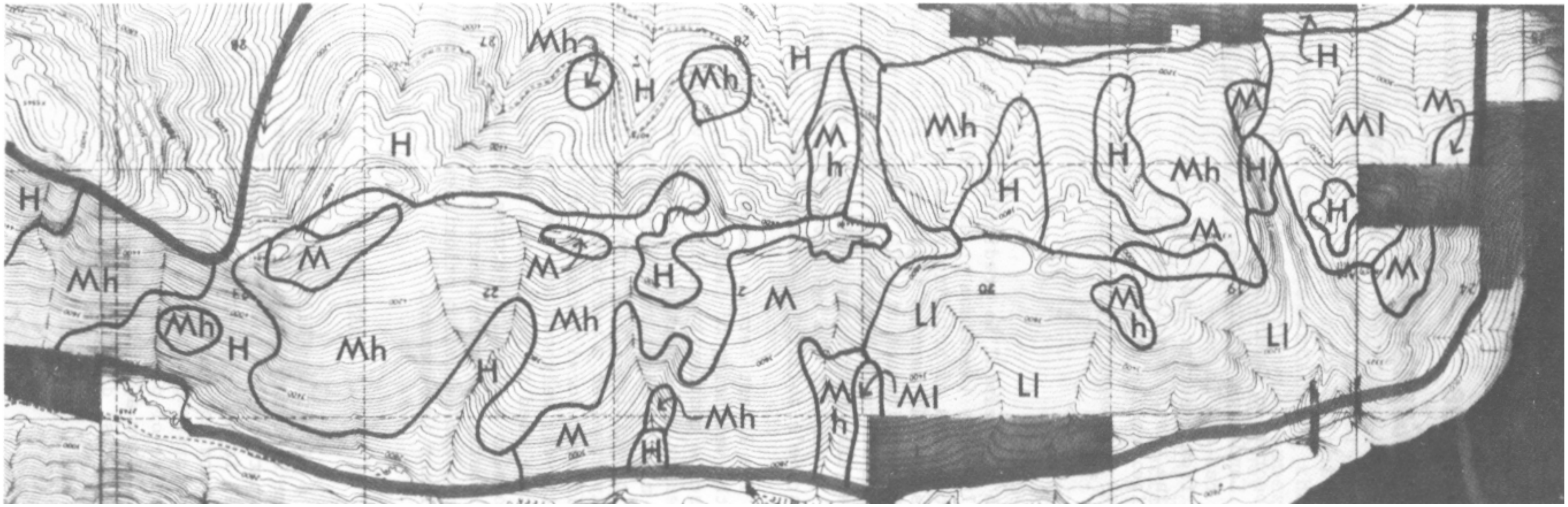

Figure 1.--VAC mapping of the study area with a scale of L1 (low ability to absorb clearcuts), Ml (moderately low), M (moderate), Mh (moderately high), and H (high) which displays the relative ability to absorb impacts as viewed from significant viewpoints.

Figure 2.--Photo of the study area taken from one of the more significant viewpoints.

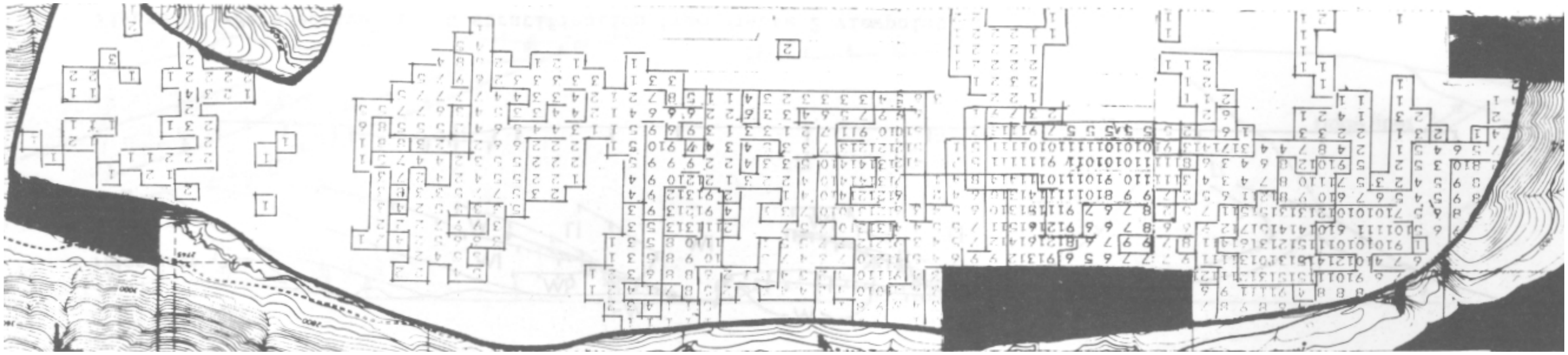

Figure 3.--VIEWIT numeric map using the program; aspect relative to the observer. VAC stratification of L1 (low) = 13-17, Ml (moderately low) = 8-12, M (moderate) = 4-7, Mh (moderately high) = 1-3 and H (high) = 0.

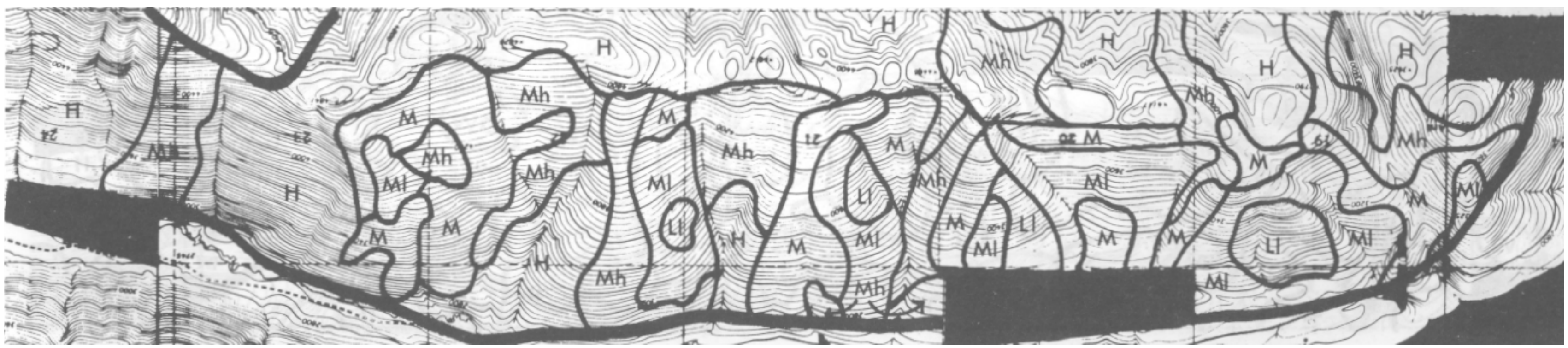

Figure 4.--Numeric map information converted to topographic map.

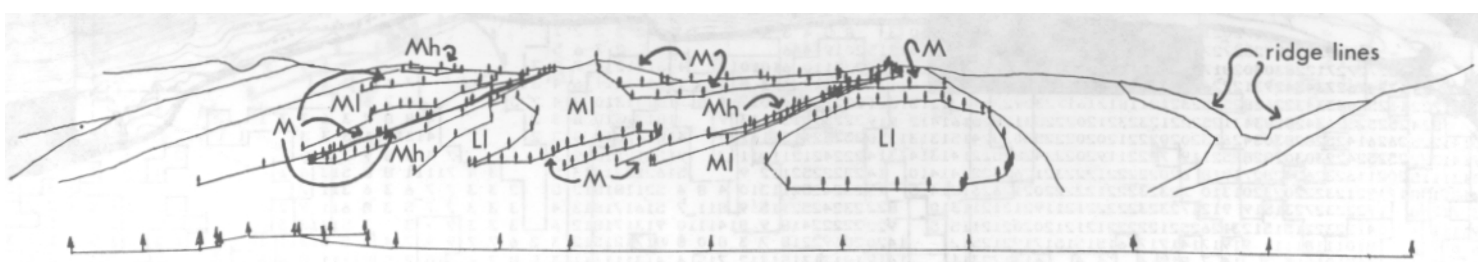

Figure 5.--Perspective of VAC stratification from Figure 2 viewpoint.

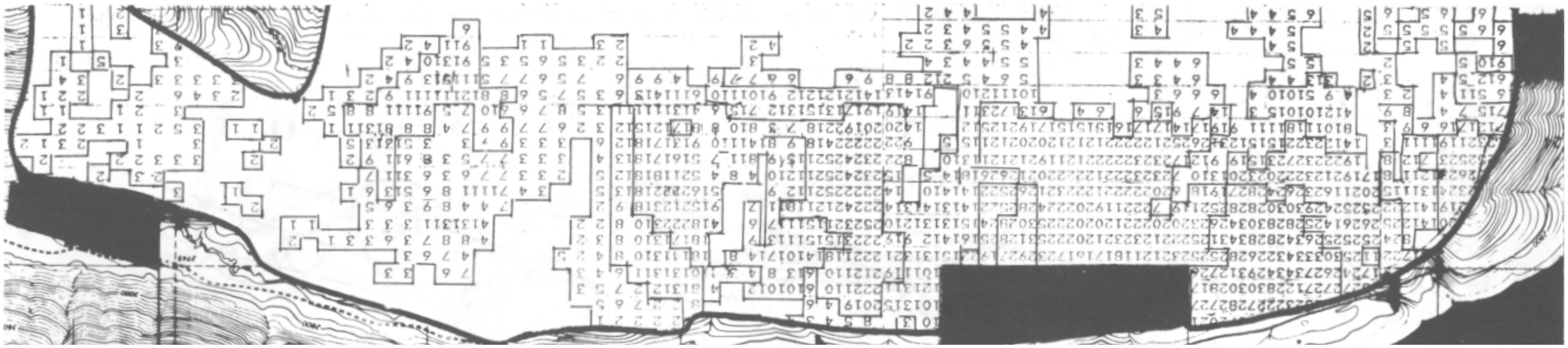

Figure 6.--VIEWIT numeric map using the program, visual magnitude - distance, aspect relative to the observer and times seen. The VAC stratification is L1 = 26-34, Ml = 17-25, M = 8-16, Mh = 1-7, and H = 0.

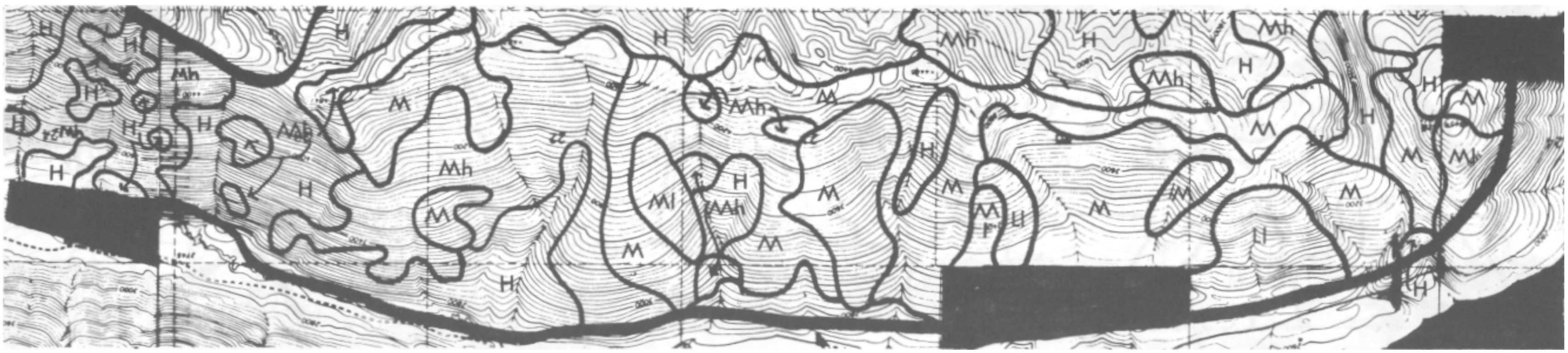

Figure 7.--Numeric map information converted to topographic map.

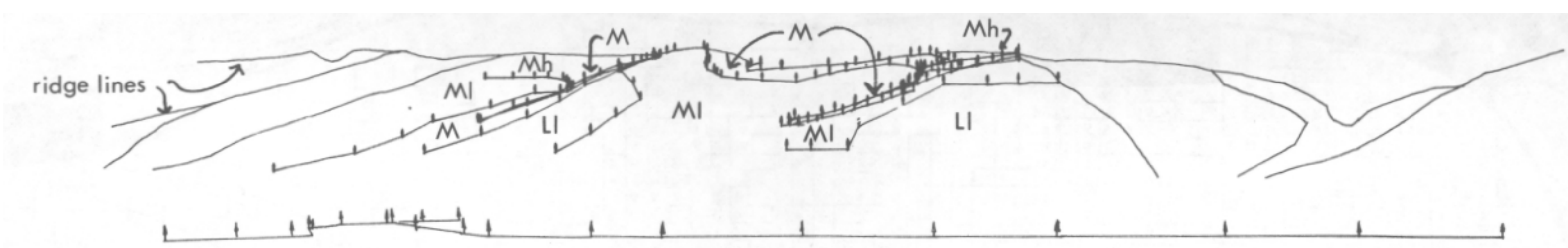

Figure 8.--Perspective of VAC stratification from Figure 2 viewpoint.

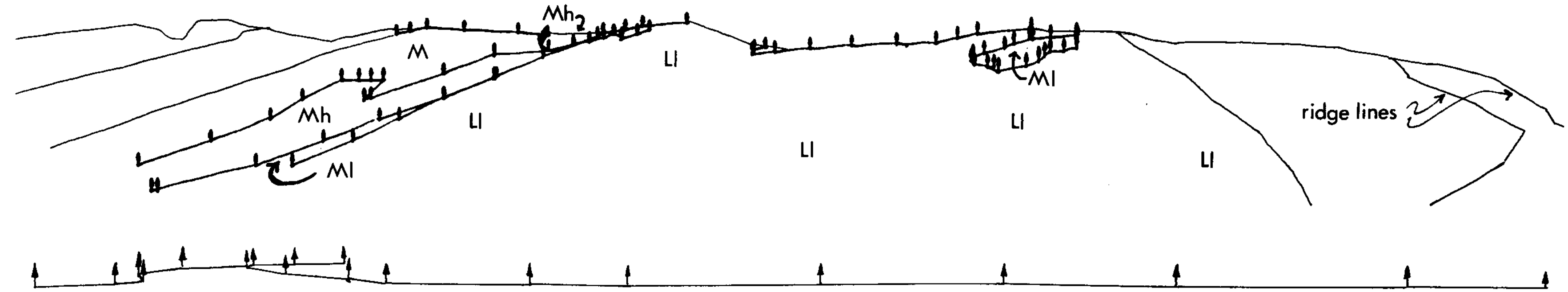

Figure 9.--Perspective of initial study area VAC map (figure 1).

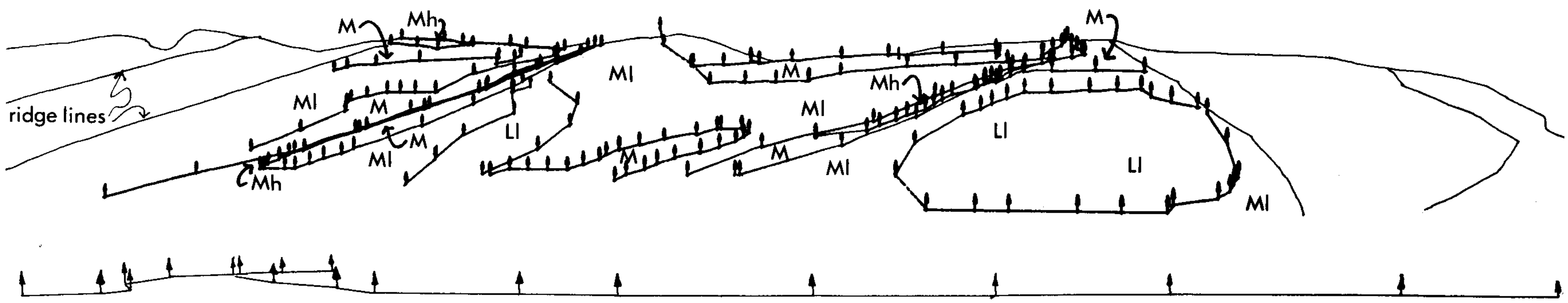

Figure 10.--Perspective of aspect relative observer program.

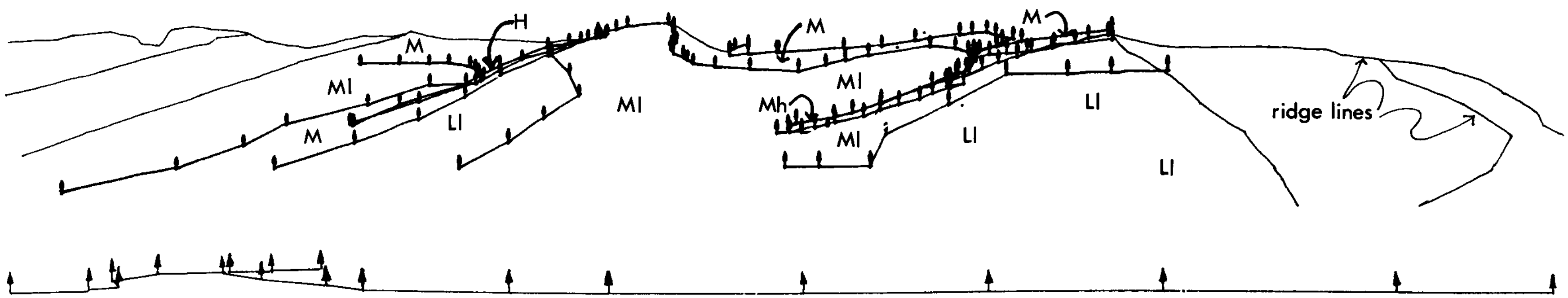

Figure 11.--Perspective of visual magnitude program.

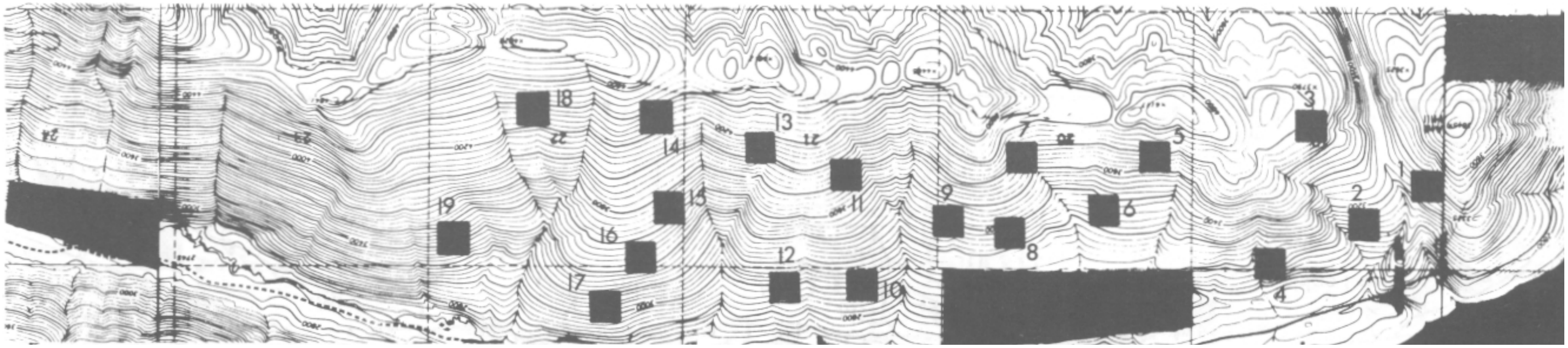

Figure 12.--Study area with ten acre conceptual test units.

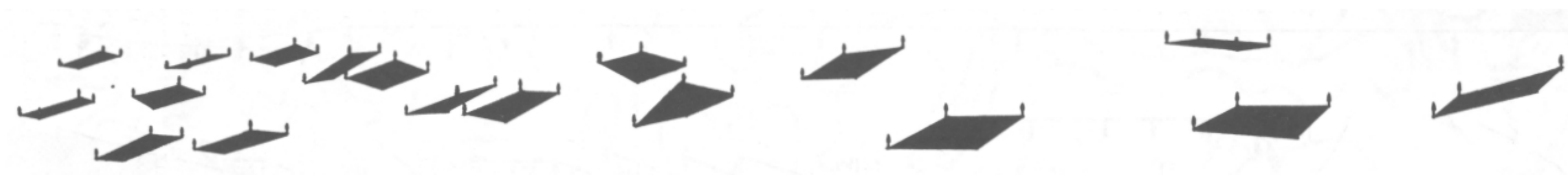

Figure 13.--Ten acre test units, displayed in actual size; in perspective from Figure 2 viewpoint.

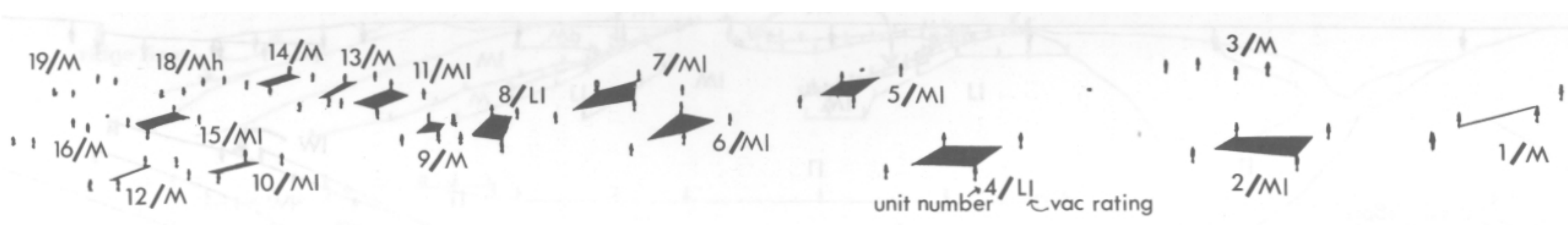

Figure 14.--Ten acre test units, displayed in apparent size; in perspective from Figure 2 viewpoint.

significant viewpoints were selected to determine the relative frequency of viewing for areas. of the landscape.

The landscape architects established visual criteria to determine the landscape's Visual Absorption Capability. Slope, observer distance, aspect relative to observer, landscape complexity, frequency viewed, and vegetative condition were inventoried. An overlay for the study area was developed, showing the prominent features of primary ridges, secondary ridges, focal points, existing clearcuts, natural openings and areas with critical soil problems. The variables were individually mapped and then a combined process was used to develop a single VAC map (figure 1). This stratified the study into five absorptive levels. The map was used in developing both silvicultural prescriptions and timber harvest concepts for a proposed sale (Tlusty 1979).

After completion of the proposed sale an informal study (Tlusty et al.) was conducted to determine the relative accuracy of the overlay VAC process. It was also suggested by team members that increased detail would be useful. The comparison was conducted using the VIEWIT program of aspect relative to the observer and times seen and the visual magnitude concept using distance, aspect relative to observer and times seen (Elsner 1975). Two numeric maps were generated (figure 3 and figure 6). An important analysis within both programs combines groundslope with relative observer elevation to determine viewslope (Iverson 1975).

Each numeric map was stratified into five levels, this allowed comparison with the initial five level VAC map which was developed primarily by overlay techniques. The five levels on the two numeric maps were replotted on topographic maps (figure 4 and figure 7). This allowed computer generated perspectives to be drawn from one of the significant viewpoints (figure 2). The VAC unit boundaries (figure 9, figure 10 and figure 11), were drawn using Perspective Plot (Twito 1978) for all three VAC maps.

The visual magnitude VAC map (figure 7), also had ten acre square conceptual harvest units delineated in each of the five absorptive levels (figure 12). Perspectives were generated from the same significant viewpoint (figure 2). Actual sizes, i.e., surfaces viewed without screening, (figure 13) and apparent sizes (figure 14) were determined by not delineating ground surfaces screened by 80-foot trees in the study area.

RESULTS

1. The visual magnitude option, of the VIEWIT program, allows many forest landscape architects quantitative visual assessment opportunities by combining viewslope, distance and aspect relative the observer.

2. Perspective Plot complements the visual magnitude option of VIEWIT and allows selected VAC unit stratifications to be drawn in perspective; and with a scale relative to on-site viewing. This process is faster, more useable and less costly than terrain analysis perspectives, generated with VIEWIT data. VIEWIT's best use is in broad scale planning and Perspective Plot is most effective at the project level.

3. By using both VIEWIT and Perspective Plot programs, users can obtain a high degree of accuracy in grouping numeric values into like visual absorption levels.

4. The visual magnitude map offered both more accurate and more detailed mapping stratification than the initial overlay generated VAC map. Increased stratification, with accuracy, is desirable as it provides more project useability and credibility in determining priority areas which require special landscape management techniques in silvicultural prescriptions and timber harvest concepts.

5. The VAC process allows broad visual resource objectives to be broken down into similar areas of absorptive ability, for specific project development. The process is most effective when specific development activities are assessed for visual absorption and accompanied by visual management guidelines.

SUMMARY

Presently there is an absence of VAC research which supports processes for local, intuitively weighted variables. Many forests presently have the ability to use both VIEWIT and Perspective Plot programs. These programs should be used to establish a quantitative rating for the visual magnitude variables of viewing distance, frequency an area is seen, viewslope and land aspect relative to the position of the observer. This information can be combined with overlays of the remaining significant VAC variables, i.e., vegetation type, vegetation height, soil color contrast, features and ridge positions which are not included in the VIEWIT program. This will allow more accurate VAC maps from which landscape management guidelines and design strategies can be developed.

The use of VIEWIT and/or Perspective Plot for VAC mapping in all project activity areas is not presently possible. But, the use of these techniques, in especially sensitive locations and on occasional test plots, will allow landscape architects to have increased accuracy and confidence, where more intuitive approaches are necessary.

ACKNOWLEDGEMENTS

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