FOREST PRACTICES AUTHORITY

A Manual for Forest Landscape Management

Chapter 4

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The area of forest in this view has a high visual capability to absorb alterations. Aspects that contribute to this potential area the characteristic pattern and shape of the native buttongrass areas contrasting with the nearby forests; the bare, bleached-white tree crowns scattered in bands throughout the landscape; the dark brown soil in the cleared logging coupe on the slope in the centre left of the view; and the screening potential of the tall, dense forest along the lower edge of the coupe.

VISUAL ABSORPTION CAPABILITY

4

Consumer demands for wood products from the forest place great pressure on the conservation of scenic values. The need to use resources and the need to retain scenic values are often in apparent conflict. Where this occurs, management treatments must be sensitively planned so that any developments are in harmony with the visual resource. The concept of Visual Absorption Capability (VAC) is a basic tool to help managers achieve this goal.

VAC supplements the Landscape Priority Zones (LPZs) (see Chapter 2), which give the level of viewing importance of each area of the landscape. VAC provides an additional perspective on the landscape and its capacity to visually withstand or absorb management activities. The two evaluations can be combined to give a more complete measure of opportunities to apply visual opportunities for management activities and the level of visual impact that might be expected.

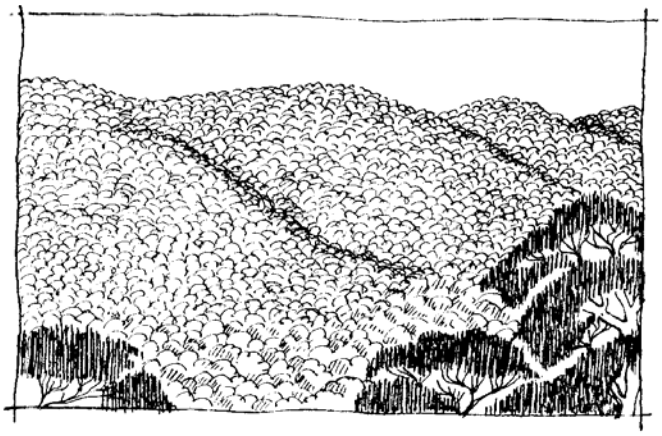
The cleared area seen on the left of the distant hillside from an important tourist road has a high VAC because of its side-on aspect to this viewpoint.

The general principle of VAC has been applied for some centuries.
When planning development in mainly open-space or natural areas, good designers have always tried to harmonise introduced changes with natural values. VAC is a formalisation of the method:
it takes account, in a systematic way, of the many attributes that have a bearing on the visual prominence of alterations in the landscape. VAC may be defined as an estimate or "measure of the ability of the landscape to visually absorb alterations" (1 P 1)~ Not only the site factors, but also the public's view of the site and the planned management activities are included in the measure. Introduced changes in landscape with a high VAC will have little visual impact; and of course the reverse is true for areas with a low VAC.

High VAC is usually associated with varied, undulating landforms; varied vegetation canopy; tall, dense forest with screening potential; and dark-coloured, stable soils. At the opposite end of the scale, low VAC is usually indicated by a uniform landscape with an even tree canopy, steep slopes, and light-coloured, unstable soils. These are called site or biophysical factors.

Some areas offer great opportunities for blending forest activities into the landscape, as illustrated here. Wrong sketch

Major forest activities can fit into this landscape without altering its character. Three major clearfells have been added to the scene on the left.



This scene has far fewer opportunities for blending forest activities into the landscape. Detailed design work would be required to fit operations into this landscape.

Two additional aspects of VAC are associated with the type and form of the proposed management activity (activity factors) and the visibility and prominence of the operational area (perceptual factors). Where a proposed harvest is small and naturally shaped and will be seen from a distance, the VAC will be high; a large, square coupe closer to and facing a viewpoint will have low VAC (i.e., the former will be absorbed into the landscape, while the latter will stand out prominently).

The form of the VAC assessment can vary widely. It may be a simple description taking account of one or two of the most critical aspects affecting the view of a planning area (e.g., areas of steep slope or skylines), or it can be more analytical, using map overlays or computer map analysis to interrelate several factors, each subdivided into a range of values. Examples of such analyses are presented later to illustrate some of the ways the VAC process has been applied in practice to give mapped inventories. The forest landscape planner is available to assist in selection of the most appropriate VAC method.

VAC Factors

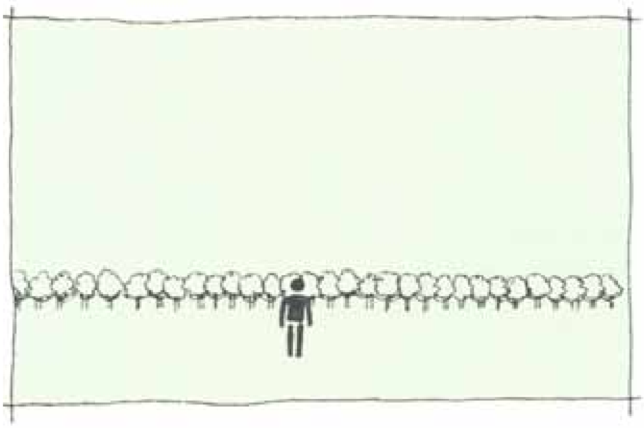
The factors described in VAC studies conducted in Australia and the United States can be grouped into three broad categories:

- .biophysical factors (biological and geophysical variables of the site or an area)
- perceptual factors (observer-related or viewing variables)
- proposed activities factors (physical variables of management activities)

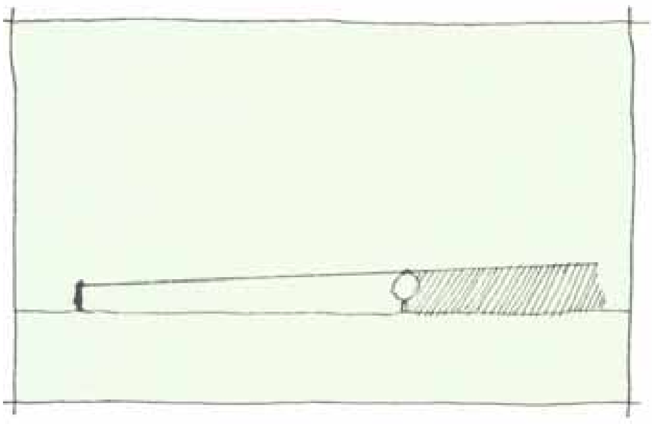
Biophysical factors

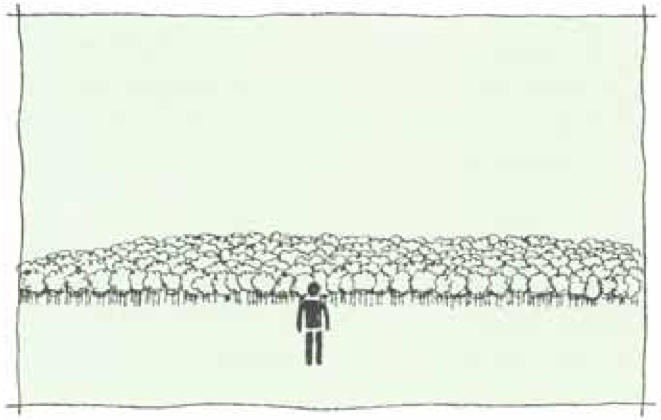
Natural attributes and processes responsible for the visual character of an area affect the way in which introduced changes will appear. These biophysical factors include: the slope of the land, vegetative screening and pattern, the ability of the vegetation to recover, and colour contrast.

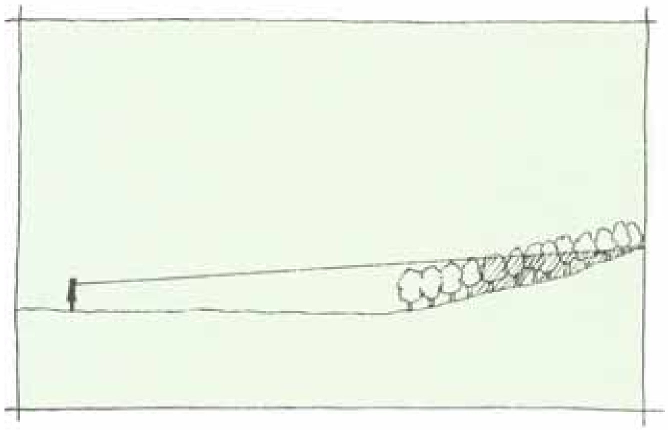
- **Slope** As the upward slope increases, the VAC decreases; a greater area of land becomes directly visible, erosion becomes more likely, and any intervening vegetation loses the potential to screen the activity[1].



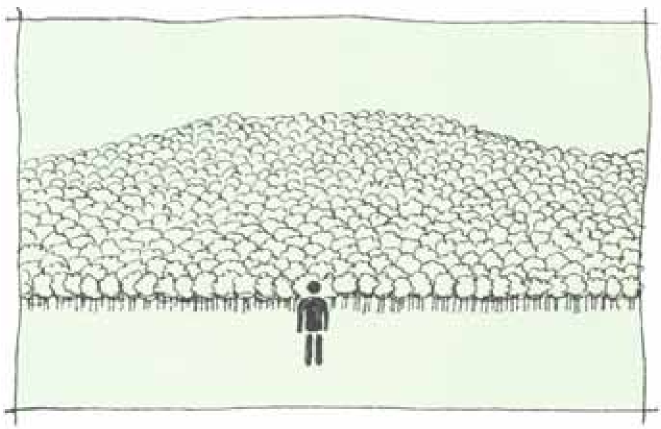
Flat to undulating slopes have the least visual magnitude and the greatest vegetation screening.

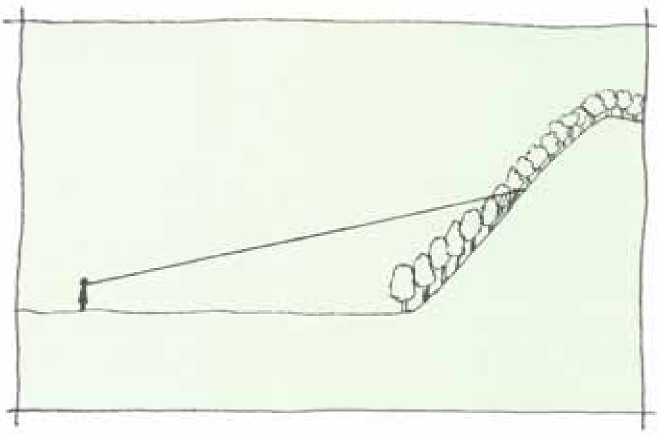






Moderate to moderately steep slopes have moderate visual magnitude and moderate vegetation screening.





Steep slopes have the greatest visual magnitude and the least vegetative screening

• **Vegetative pattern and screening** Land with high vegetative variety (due to a mix of forests and openings) will absorb changes more readily than land with uniform vegetation, and will therefore have higher VAC. In addition, tall dense forest will help screen management activities from view and give a high VAC.

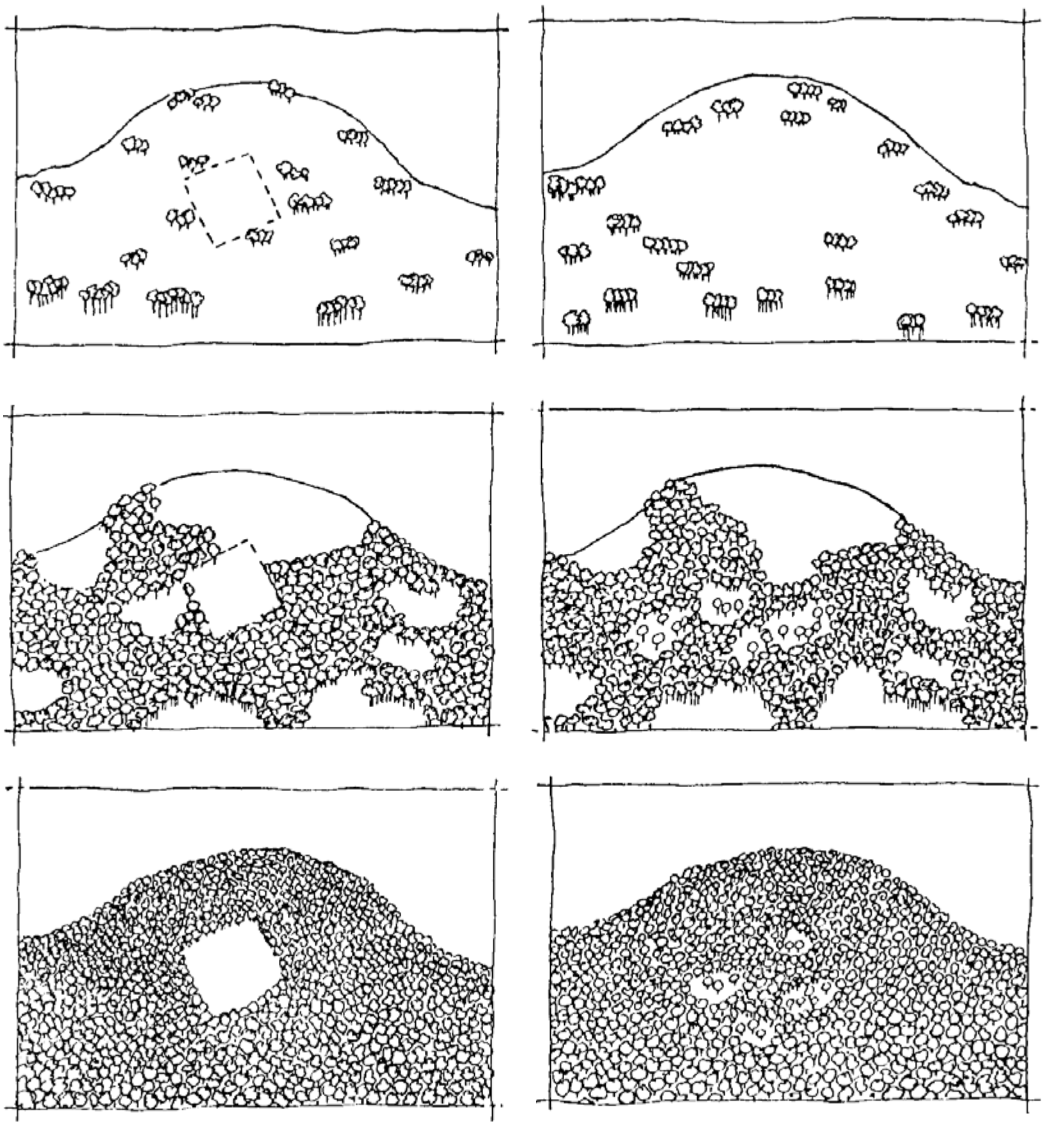
The effectiveness of vegetative pattern and screening in absorbing alterations will, however, depend on the type of management activity. This is largely due to the visual interaction of the line, form, colour and texture of the vegetation and the alteration[1]

CLEAR-FELL HARVESTS *PARTIAL HARVESTS*

Open Vegetative Pattern

Varied vegetative pattern

Uniformly dense vegetative pattern



Open forest absorbs clearfell harvesting more readily (i.e., it has a high VAC) than a uniformly dense forest. This is because the texture and line elements do not offer a strong visual contrast in open forests.

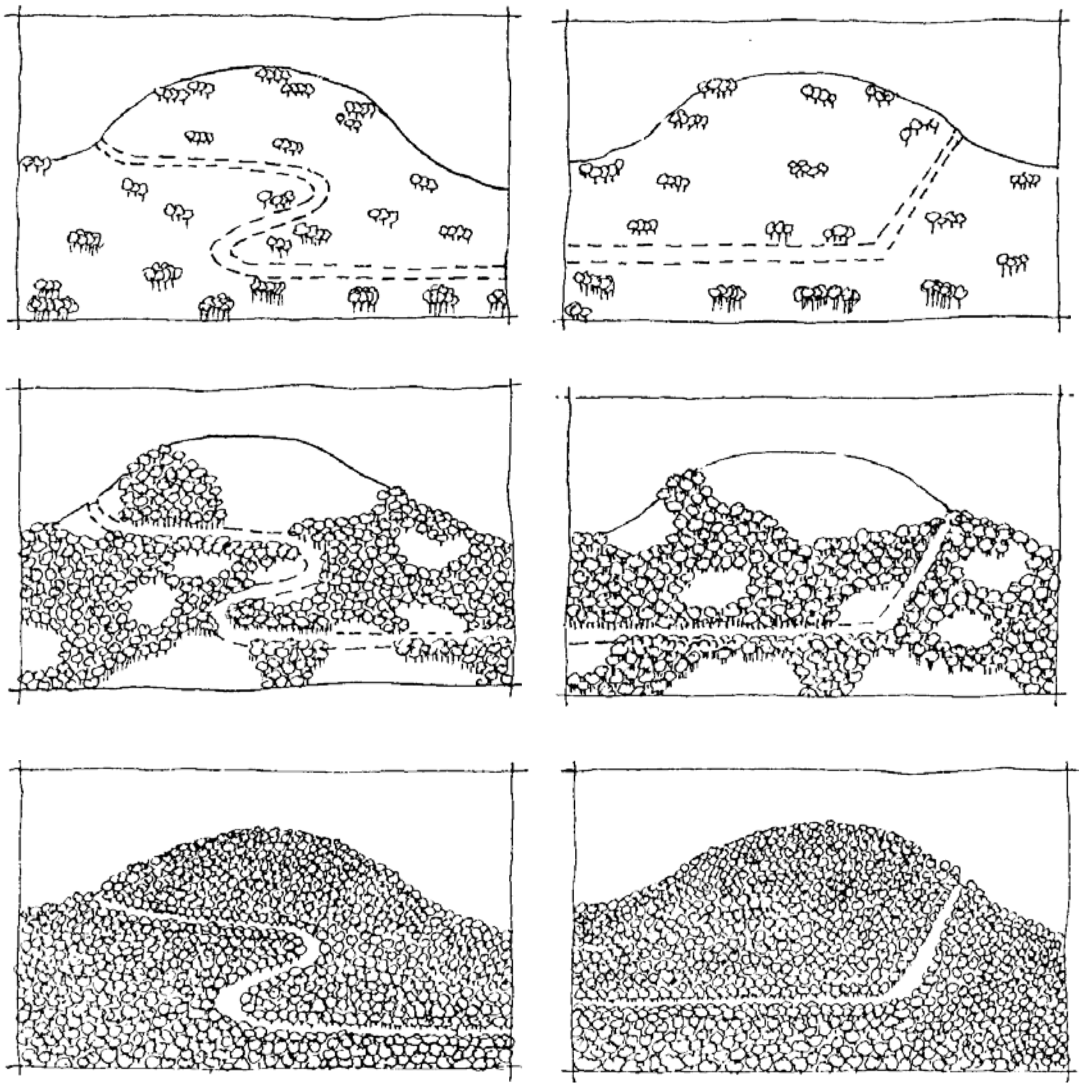
Partial harvests generally create less visual contrast than do clearfell harvests. Both open and varied forests have a high VAC; uniformly dense forests have a moderate VAC.

ROADS *TRANSMISSION CORRIDORS*

Open Vegetative pattern

Varied vegetative pattern

Uniformly dense vegetative pattern



Open forest, although possessing few screening opportunities, visually accepts road corridors because there is no line contrast (moderate VAC). Varied forest provides some road screening and, in open areas, the line contrast disappears (moderate to low VA C). VAC varies from high to low for dense vegetation, depending on the height of the canopy and width of the road clearing.

Transmission corridors with straight lines and angular alignments create high visual contrasts in a uniformly dense forest (i.e., they have a low VAC), while in varied and open landscapes, they create only moderate contrasts (i.e., moderate to high VAC).

- **Site recovery** Sites with slow recovery rates due to poor growing conditions (low fertility and poor climate) have a low capacity to absorb visual change.

- **Soil colour contrast** Areas with soils that contrast strongly in colour or tone with the surrounding vegetation have a low capacity to absorb visual changes.

Perceptual factors

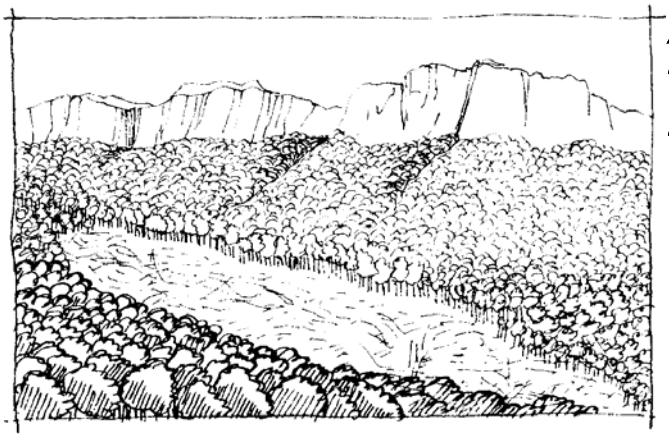
Perceptual factors determine how the viewer's attention is drawn to view the different parts of the landscape. The relationship between the viewpoints and viewed areas of the landscape is dependent on: the viewing distance; the number of points from which the land can be seen; the number of viewers and the duration of viewing; view targetting due to axis, framing and sometimes line sequence.

Other factors, especially relating to the land itself, give an indication of relative visual prominence. These include: the visual quality and distinctiveness of landform or pattern; the land's aspect relative to the viewer; the aspect relative to the sun and lighting direction, and the configuration, patterns and scale of land cover in the scenery.

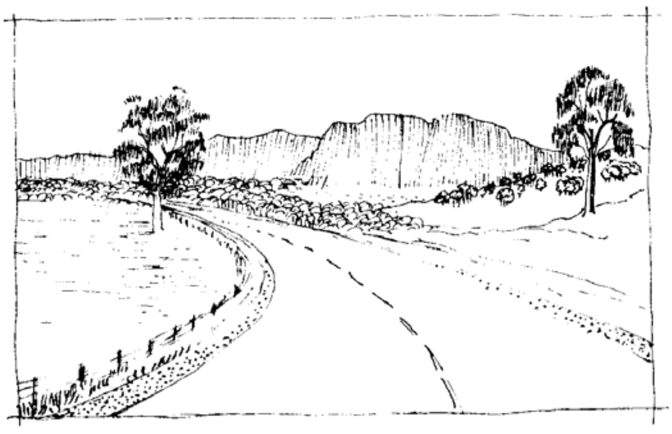
(Also see the end of this chapter for *distance from viewpoints*).

The seen-area viewing distance will have already been considered in the LPZ rating. If the VAC and LPZ are considered together or combined at a later stage, the use of "distance" as a perceptual factor may lead to double weighting; this should be taken into account when selecting perceptual factors.

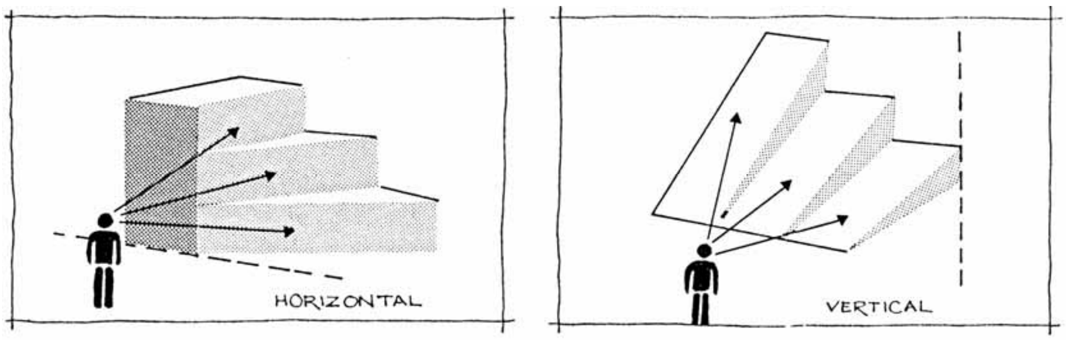
- **Distance** As distance from the observer increases, the VAC of the scene increases. A management activity in the foreground is visually more prominent than if seen in the middleground or further in the background. The alterations appear smaller and less distinct, and the visual contrasts in the landscape are less marked.



A clearfelling area in the middleground is clearly visible. The same area in the background (below) is barely visible.

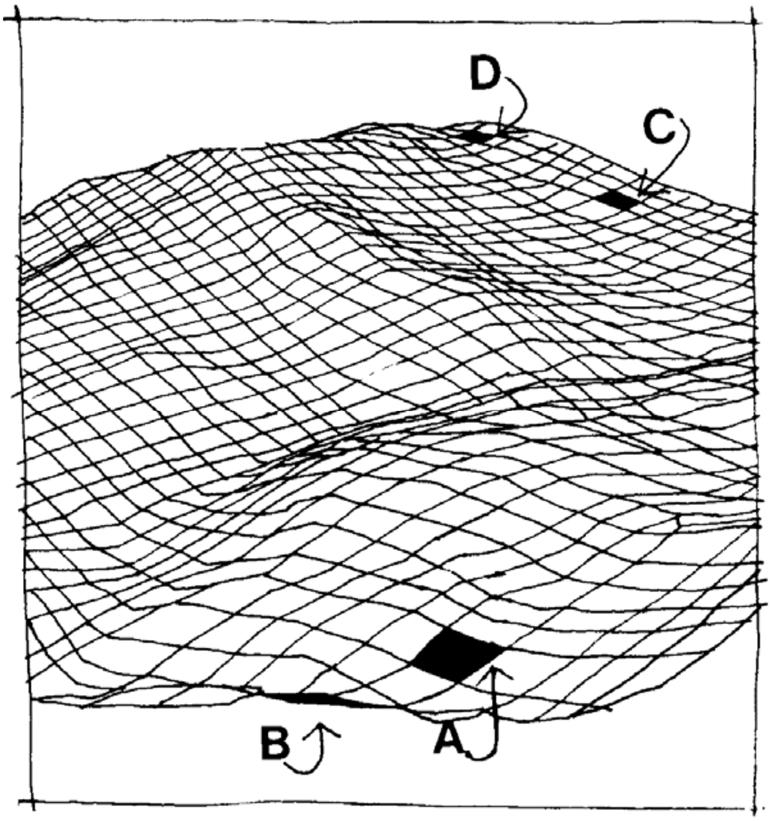


- **Aspect relative to the viewer** Aspect refers to the tilt of the land toward a viewpoint – it has both horizontal and vertical components, as shown below. The greater the tilt towards an observer, the lower the VAC will be[2]. Vertical "aspect" is similar to "slope", described earlier under biophysical factors. There is, however, a major difference: slope is independent of how the area is viewed, while aspect refers to the angle of viewing relative to the surface, and depends on the position of the viewer as well as the slope or direction of the land surface.



(Above) The two components of aspect

(Below) From an elevated viewpoint, this land surface, shown as a computer graphic, illustrates how changes in aspect relative to the viewer affect the visibility of equal-sized squares.



Cell A has a very low VAC because it is close to, and tilted towards, the observer.

Cell B, although closer, has a higher VAC than Cell A because it is tilted away from the observer.

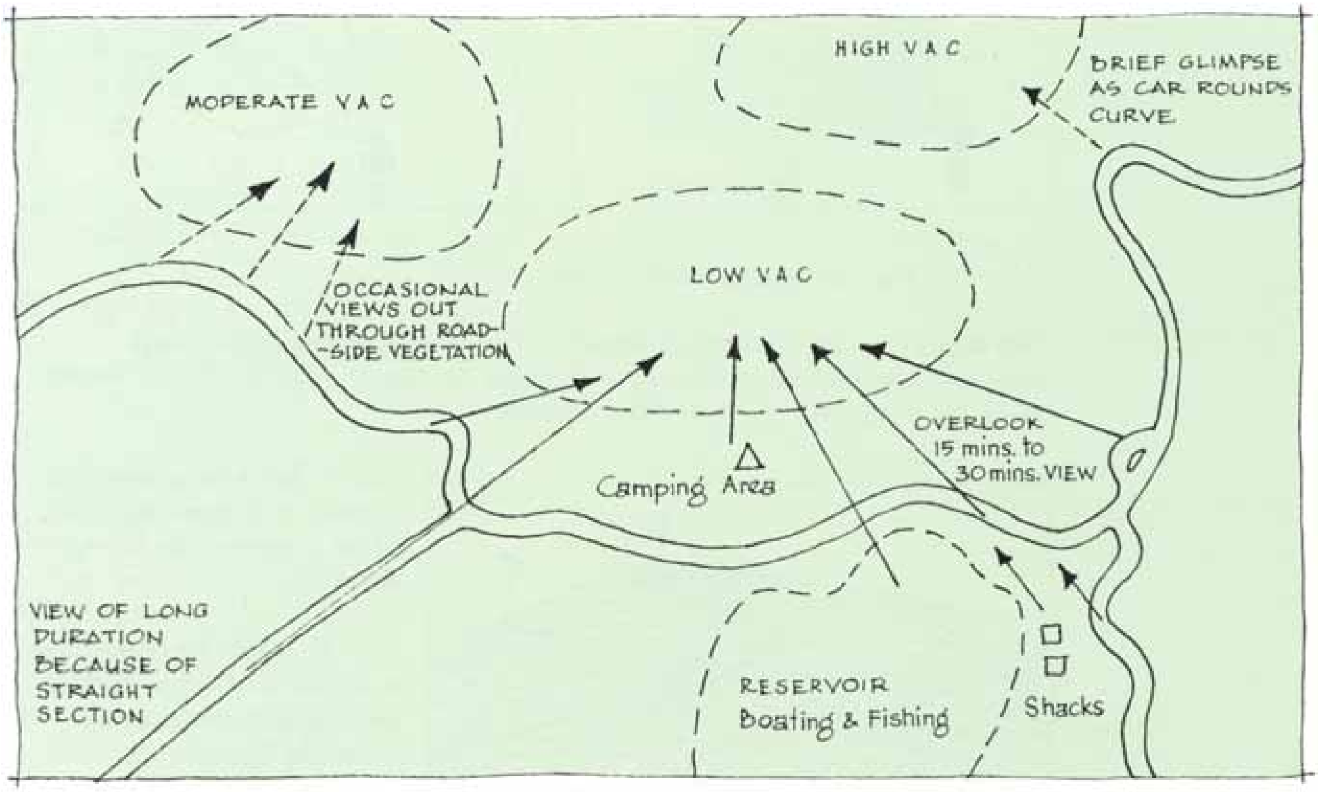
Cell C has a lower VAC than Cell B, despite its greater distance, because Cell C is tilted towards the observer and Cell B is seen side-on.

Cell D has the highest VAC because of its distance and its tilt away from the observer. However, Cell D also appears to be on the ridge line. Care must be taken not to disrupt the silhouette against the skyline.[2]

- **Number of viewing points** If part of the landscape is seen from many viewpoints, it is considered to have a low VAC.

- **Number of viewers** Landscapes with a large number of viewers are visually more sensitive and therefore have a low VAC.

- **Duration of viewing** Forest lands viewed for long periods of time have a lower VAC. Views from campgrounds, scenic overlooks and roadside rest-stops are typical long-duration views. Long, straight sections on a highway provide views of longer duration than do curved alignments.



Proposed activity factors

The visual characteristics of such management activities as timber harvesting, roading, powerlines and pipelines provide a guide as to how well a landscape will be able visually to absorb them. In practice, the VAC analysis is often tailored to a particular activity, so the activity factors are not used directly. The scale, shape, duration, frequency and visual sequence of a particular activity are used as a guide to selecting the relevant biophysical factors. The proposed activity factors, unlike the biophysical and perceptual, have some flexibility and can be manipulated when choosing the final design of the proposed activity. The following factors relate mainly to forest harvesting operations.

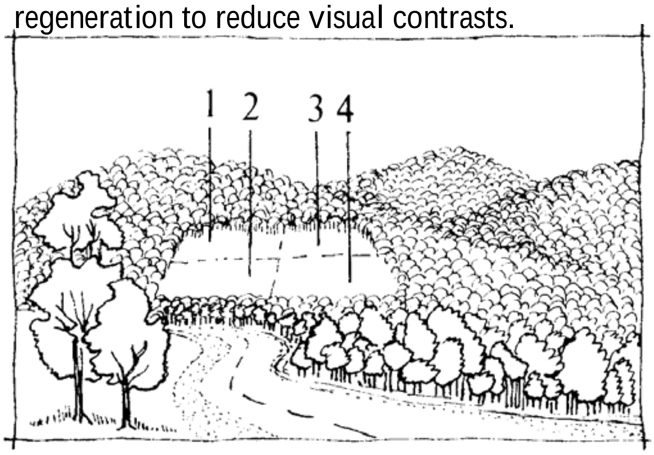
- **Scale** As the size of a project increases, its scale in the landscape increases and the VAC will decrease.

- **Shape** Introduced changes with shapes or patterns having a natural appearance similar to those already existing in the landscape will be absorbed more easily and the visual character established in an area will be retained. An exception is with operations that are adjacent to geometrical agricultural patterns, or where a more angular shape may be appropriate.

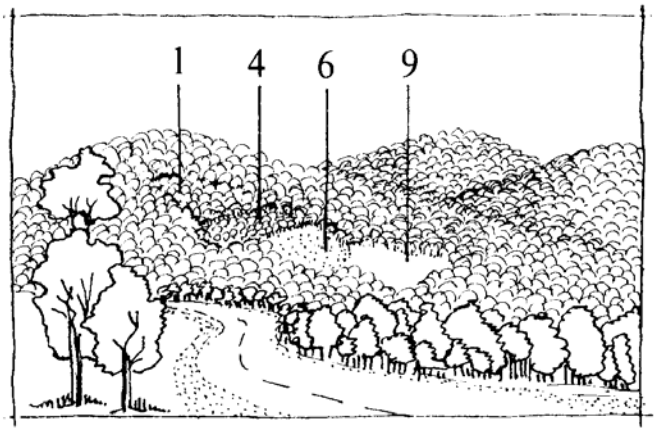
- **Duration of impact** Such activities as a permanent road or a quarry have an enduring or long-term impact, and therefore have a lower VAC than a harvest operation that regenerates quickly.

- **Frequency** The more frequent the activity on any site (e.g., the shorter the rotation period or period between harvests of the same area), the lower the VAC will be. Thus, if a single activity that occurs only once is planned, the site will have a higher VAC.

- **Sequence** How quickly one harvest follows a nearby or adjacent harvest has a direct bearing on the VAC. For higher VAC, operations seen from the same viewpoint should be spaced apart in time and location to allow for regeneration to reduce visual contrasts.



A single year between harvests gives a low VAC. With a three- or four-year interval, the VAC of the activity will be increased. By the tenth year, the initial coupe from year I has regenerated sufficiently to blend in well with the surrounding landscape.



Application of VAC Assessment

The VAC concept can be applied at all stages of planning. It can be used initially with long-term forest planning as well as at any stage through to preparation of final operational plans. Some examples of methods developed in Australia and the United States to apply VAC principles to forest management are described at the end of this chapter. They illustrate the adaptability of the concept and the need for assessors to be creative and flexible in analysing each study area, taking into account its size and the availability of useful information.

Procedures for applying VAC analysis range from a straightforward checklist of visually important factors in a proposed operational area, to formal systematic assessments, with chosen factors mapped individually for the whole of a study area and combined through mapping overlays or the use of computers. Systematic procedures have wide applicability and can be used successfully in both small-scale and broad-scale planning studies. The checklist approach is suited to operational-level planning for a small area; it is especially useful when staff time is limited.

Checklist procedure

The factors that are visually most relevant to all parts of the study area are selected and then studied to determine how they interact. From this, the ability of an area to absorb the proposed activity is judged. Checklists are helpful in determining visually desirable design alternatives for harvesting, roadworks and snigging. A comprehensive list of biophysical, perceptual and proposed activity factors from which to choose is in Table 1.

To illustrate how the selected factors interact, picture the following:
a clearfelling coupe is proposed for an area of even-aged forest situated one kilometre from a major tourist highway and at the same elevation. It is tilted gently towards the highway, but the dense vegetation along the highway completely screens the coupe. In this case the screen is obviously the critical factor, giving a high VAC to the project. Once this is realised, it becomes important to protect the screen by locating and designing the spur road from the highway so as to give it minimal exposure from the highway. Use of a dogleg in the spur will limit direct viewing. However, if there had been no roadside screening, the VAC would have been low. The impact of the coupe would then need to be reduced by careful design of its shape, size and edge treatment.

Table 1. Visual Absorption Capability checklist

Biophysical Factors (concerning the land where the operation is to take place)

• slope	0–20% / 20%–45% / 45%+
• vegetation screening	open / moderate / dense, and variety of species and structure
• vegetation pattern	open canopy / varied canopy / uniformly dense canopy
• pattern and shapes	characteristic shapes and patterns in natural landscape to use as model
• site recovery	soil fertility, altitude, exposure, rainfall and vegetation species
• soil colour contrast	colour and tone against surrounding vegetation — dark grey or brown / light grey / light yellow / white
• aspect relative to sun	backlit / sidelit / direct light *or* exposure to sunlight (north, east, south or west)

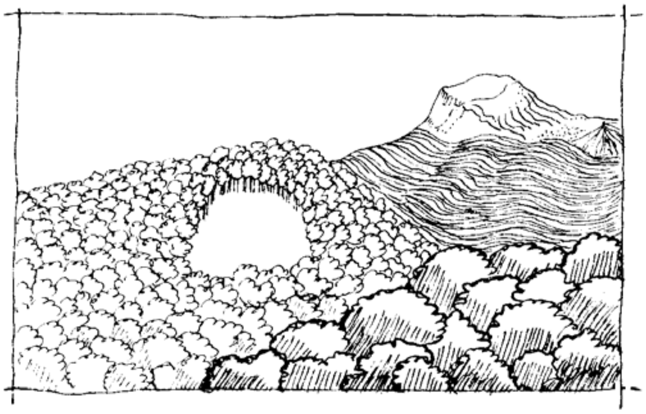
Perceptual Factors (concerning viewing towards the land)

• distance	foreground/middleground/background
• aspect relative to viewer	side-on viewing / low-aspect viewing / face-on viewing
• number of viewpoints	identify all likely viewing points
• number of viewers	refer to sensitivity-level map, use your own field knowledge
• duration of viewing	look for straight sections of road, intersections, lookout points, campgrounds, etc.

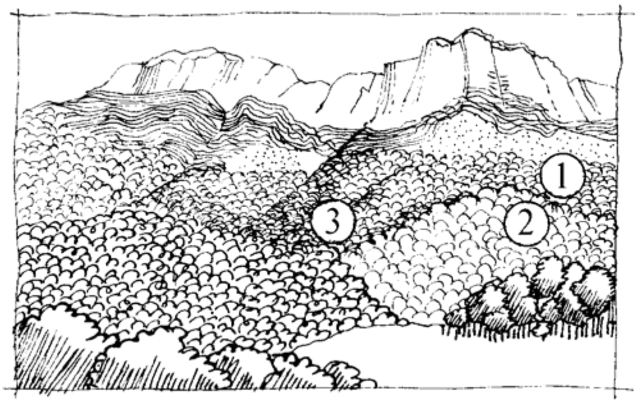
Proposed Activity Factors

• scale (size)	how big is the project in relation to the surrounding landscape?
• shape	what is the shape of the proposed operation?
• duration	how long until revegetation begins and green cover and screening are effective?
• sequence	in what order and spacing will activities occur?
• frequency	how soon will one operation be followed by the next?

Further examples to show consideration of separate factors in combination are illustrated below.



In this case, the dense vegetation does not effectively screen the visual impact of the coupe. This is because the slope is steep and the aspect of the hill is towards the viewer.



Analysis of VAC factors in this landscape can identify opportunities:
1 — the shelf provides an opportunity for this clearfelling to be screened from view.
2 *— hillside tilted toward observer has low VAC.*
3 — complex valley with many unseen areas gives high VAC and opportunities for small clearfells.

Systematic mapping procedure

When VAC rating is required for a large area and several factors are to be analysed, it is helpful to follow a systematic procedure to combine and map relevant information. The important difference between this and the checklist procedure is that the various factors are brought together by using either an analysis table or mapping overlays. The checklist procedure, on the other hand, relies on intuitive analysis to combine factors for each area in the study.

The first stage in the systematic procedure is to identify the biophysical, perceptual and activity factors pertinent to the study area. Only factors that are directly relevant to the ability of that particular piece of land to absorb changes should be chosen. As well, the factors selected should relate to the level of planning; to the amount of time, money and manpower available to carry out the analysis; to the desired product; to how the analysis will be used 2; and to the type, format and availability of information. Each factor chosen should have at least moderate variation across the study area to allow effective subdivision into a number of levels. If a study area has slopes ranging from 5% to 15%, slope as a factor would contribute only slight variations to VAC.

But if the range is between 0% and 60%, slope is a useful factor for rating VAC. Example indicators suitable for classification can be obtained from the VAC project checklist.

In practice, the breakdown of each factor should be based, where practicable, on either visually distinct changes seen in the landscape or on how factors relate to the various road building and harvesting conventions or standards.

At least three systematic mapping procedures for combining the various factors have been developed for determining VAC ratings. The simplest uses a *descriptive table* of required conditions (standards), showing for each VAC rating the required combination of biophysical, perceptual and activity conditions. A table of this kind provides a frame of reference that can be translated into map overlays either manually or with a computer-based Geographical Information System. This method is reasonably precise where the condition for each factor can be defined and measured accurately. An example for the Western Tiers area of Tasmania[3] is given in the appendix to this chapter.

Another method is the ~*numerical* procedure where values are assigned across the range of conditions for each factor. For example, if the slope is defined into three types (<2O% / 20-40% / >40%), each of these can be given a value between 0 and 5 (i.e., 0 / 2 / 5 respectively). If other factors are given valuations in a similar manner, they may then be combined by simple addition to give a VAC rating.

This method is suited to studies where a large number of factors are to be considered. It has been used successfully for both large and small areas. Two examples are illustrated in the appendix to this chapter. Note that the number of factors should be limited as far as possible to ensure the largest possible divergence of the totalled value from the average. This makes it easier to differentiate between each level of VAC rating at the final stage of the assessment[4].

A third procedure uses an *overlay matrix* or matrices to combine mapped values of the factors. A series of matrices, each able to combine the values of just two factors at a time, can be used to progressively integrate related factors to give a VAC rating. The Blue Range study[1] used this method; it is summarised in the appendix to this chapter. An advantage of this method is that particular factors can be integrated in a controlled and meaningful way at different stages in the analysis.

Use of available information

VAC factors may be derived from many sources. These normally must be re-interpreted so they will more closely model the particular factor required. Some of the sources are:

- .maps of soils, geology, topography, vegetation and rainfall
- published reports of land systems, geology/soils, climate
- aerial photographs

Data from such sources can often be used in combinations, based on an understanding of how the different recorded aspects actually interrelate in the landscape. The perceived interrelationships and the usefulness of the VAC factors selected should be verified by field checking to ensure actual visual conditions in the landscape are effectively represented.

To illustrate the adaptability of existing sources, a summary is given below of how the VAC factors of site productivity, erosion potential and soil colour might be determined from land-systems data*.

- **Productivity** Consider such factors as annual rainfall, altitude, parent rock, floristic associations and fertility of soil (e.g., alluvial river flats — especially in the south-east and central north of the State — or quartzite and peat).

- **Erosion potential** The geology of the land system can be a useful guide to whether soil erodes easily. The lowest levels of erosion can be expected for dolerite areas, even when these have a high rainfall, while mudstone/sandstone and coastal sands have greater erosion potential, with granite soils at the extreme.

- **Soil colour** To be worthwhile for VAC analysis, information on the colours of the soils must be detailed. However, the broad area land-systems data showing vegetation associations and their respective soil types can be useful. Through analysis of aerial photographs, assisted by local knowledge, vegetation associations described in each land system can be recognised and the representative soil type and colour determined from the descriptions given with each land system.

·See “Land Systems of Tasmania”[5], stored on the Forestry Commission’s Geographical Information System.

Total Visual Opportunity

The Landscape Priority Zone and Visual Absorption Capability mapping can be combined .to give a rating of the relative Total Visual Opportunity (TVO) for an area. This provides a general rating for a proposed activity of the visual potential for alterations to satisfy the recommended Landscape Management Objectives.

The TVO rating can assist in determining:
- the best location for roads, quarries, powerlines fuel breaks, etc. .the visually most vulnerable areas where detailed project-level
- landscape analysis should be undertaken
- areas with potential for greater utilisation (i.e., high TVO)
- areas where greater utilisation is undesirable (i.e., low TVO)

The TVO rating stratifies landscapes in a continuum from visually tolerant to visually vulnerable. It serves a moderating role by countering the often incorrect assumption that an area mapped as LPZ "A" with the "Inevident Alteration" objective* will in all cases strongly limit the opportunities for forest management activities. At times the opposite will be true. For example, where an area of LPZ "A" (Inevident Alteration objective) has a high V AC, there is a moderate opportunity for visual changes. Conversely, an area of low V AC suggests caution and few opportunities for change, even for LPZ "B" (Apparent Alteration objective).

The most visually tolerant landscape with the highest opportunity is LPZ "C" (Dominant Alteration objective) with high V AC, especially when seen in the background, while the lowest visual opportunity occurs in LPZ "A" (Inevident Alteration objective) with low V AC. LPZ and V AC maps are combined by overlaying. The simple matrix shown below gives the level of Total Visual Opportunity.

* "Objective" refers to the Landscape Management Objective; see Chapter 2.

Table 2. Total Visual Opportunity matrix

		Visual Absorption Capability			
		L	M	H	
Landscape Priority Zones	A	0	1	2	Total Visual Opportunity
	B	1	2	3	
	C	2	3	4	

Total Visual Opportunity	0	Very low opportunity — Activity questionable and costly
	1	Low opportunity
	2	Moderate opportunity — Activity is suitable with some constraints
	3	High opportunity
	4	Very high opportunity — Activity suitable

Appendix—VAC examples

Some studies of state forest areas in Tasmania have already incorporated VAC procedures. The approaches have varied according to the purpose and importance of the study, and range from analysis of one or two factors as indicators of visual sensitivity to more formal and systematic approaches using up to five factors. Three additional examples of VAC studies from interstate and overseas are described to show the diversity of methods used and the variety of factors that can be evaluated. These studies are summarised below.

Checklist procedure

In this broad-scale study conducted in the Wesley Vale management area of northern Tasmania, a checklist of factors was used in each of the four Forestry Commission districts to identify areas where clearfell operations would be strongly restricted by landscape concerns. Without previous knowledge of the VAC concept, staff recognised that the ratings alone did not give sufficient information.

The factors considered by the districts included: slope of the land; presence of wet forest requiring clearfelling operations; roadside areas required for screening; skyline zones; and forest patterns. Each district chose one or two of these factors for comparison with the corresponding rating. This highlighted areas where forest operations should be constrained or excluded because of visual concerns. Generally, the districts took a straightforward, non-systematic approach, based largely on local knowledge of these factors, to identify where landscape concerns were likely to cause operational restrictions. The checklist (Table 1)will be useful in the future in determining the most critical factors and ensuring that the most important are not overlooked.

Appendix Table 1. Required Conditions procedure

Visual Absorption Capability	Required conditions
Low	Slopes >40%; altitude >800 m; continuous regular forest canopy; foreground and middleground viewing; aspect face-on to viewpoint
Moderate	Slopes <40%; altitude <800 m; broken forest canopy of different age classes and types; background viewing; low aspect to viewpoint
High	Slopes <20%; altitude <500 m; forests adjacent to existing agricultural openings; background viewing; aspect side-on to viewpoint

Required conditions procedure

(a) This more systematic VAC analysis was used in a study of the Great Western Tiers, Tasmania (3). Factors were combined into required conditions, which were then used as a guide to VAC rating (see Table 2). With the aid of map overlays, the area was analysed to determine the likelihood of satisfying the Landscape Management Objectives established for the area. This indicated where the original operational proposal should be changed.

(b) A detailed visual analysis for a single planning unit was conducted for the viewing corridor along the Gordon River Road in south-west Tasmania (see sketches p 115) (6). For this analysis a map was prepared identifying areas as having high, moderate or low VAC, based primarily on aspect relative to the viewer and vegetative screening. VAC levels were assigned, using these categories:

- always seen and very prominent—very low VAC
- always seen and moderately prominent—low VAC
- seen now, but will have vegetative screening in the future—moderate VAC
- presently unseen because of vegetative screen—moderately high VAC
- unseen because of topographic screen—high VAC

Analysis of perceptional factors such as viewing duration by the motorist and which areas are directly viewed from straight sections of roads gave the final VAC rating. From this it was determined how far the landscape objectives were being, or could be, met. In some areas it was difficult to meet the required objective using planned harvests, so alternative approaches to harvest sequence, shape and size were developed to minimise impact as far as possible.

Numerical procedure

By far the most common form of VAC analysis uses numerical values to combine individual VAC factors. A study of this type was carried out for the Beaver Creek area in Colorado, by the United States Forest Service *(7).* It helped decisions on where facilities could be located to have least impact on the landscape, and to estimate relative costs and constraints for alternative locations for development proposals.

The study reviewed four categories of VAC factors (see Table 3). Values between I and 3 were allocated according to their effect on the VAC of each part of the area, and then totalled to give one of three VAC. ratings.

The second stage of this study combined the VAC and LPZ mapping, using a matrix to give a measure of the Total Visual Opportunities. This was then presented as a map, showing numerical ratings.

Combined numerical and matrix procedures

A study of the Kalamath National Forest in California, again by the United States Forest Service (2) combines four biological factors to assess VAC. These were: slope, vegetative pattern and screening, site recoverability, and soil colour contrasts with the surrounding landscape. Table 4 illustrates the methods used to stratify these factors. A matrix has been used to combine vegetation pattern and screening, while other factors are allotted numerical values directly.

Appendix Table 2. Numerical procedure

Score of 0 to 17 = low; 17 to 23 = medium; 24 to 30 = high				
Existing vegetative and landform screening ability	ASPECT RELATIVE TO VIEWER	80° — 100° 1	60° — 80° 100° — 120° 2	Less than 60° More than 120° 3
	SLOPE	60% + 1	25% — 60% 2	0 — 25% 3
	HEIGHT	0 — 2 m 1	2 m — 10 m 2	10 m + 3
	DENSITY (Summer months)	0 — 20% 1	20% — 80% 2	80% —100% 3
Landscape diversity	LANDFORM DIVERSITY	Low 1	Medium 2	High 3
Regeneration potential of vegetation	SOIL PRODUCTIVITY	Low 1	Medium 2	High 3
	ASPECT*	180° — 270° 1	90° — 180° 270° — 360° 2	0° — 90° 3
Potential magnitude of soil contrast	POTENTIAL SOIL COLOUR CONTRAST	White to yellow 3	Medium 2	Brown to black 1
	EROSION HAZARD RATINGS	High 3	Medium 2	Low 1
	SOIL STABILITY	Low 1	Medium 2	High 3

*Compass angles defined for the Northern Hemisphere

The numerical range of V AC values was assigned according to the perceived importance of the different factors in this study area. For example, slope ranged from 0 to 9 "because of the steep nature of the Kalamath-Siskiyou mountains, where slopes can vary from 0 to 150%" (2, P 168). Site recoverability, on the other hand, was less finely divided, with a range of 0 to 3. Such stratification and valuation should be based on extensive analysis and field verification.

The Kalamath study took account of only biophysical factors. The perceptual factors were considered to be adequately covered in the LPZ inventory (which was to ,f be combined with V AC at a later stage), while the biophysical factors had been .chosen to reflect the particular activity types proposed for the area (which obviated the need to consider specific activity factors). These were readily available in existing data inventories. Such reasoning was tailored to this particular area, but the appropriate V AC factors (from the biophysical, perceptual and activity categories) should be specifically selected for each new study area to ensure that the V AC of the land is effectively represented.

Appendix Table 3. Numerical plus Matrix procedure

Vegetation Pattern and Screening				
Crown Closure		0–30%	30–70%	70%+
Size Class (height)	0–1	0	0	0
	2	1	3	2
	3	2	4	3
	4-5	3	5	4

Slope	VAC Value
0–20%	9
20–40%	7
40–60%	4
60%+	0

Site Recoverability	VACValue
High	3
Moderate	2
Low	1
Non-commercial	0

Soil Colour Contrast		
		VACValue
Least:	Dark grey, blue-black or dark brown on green landscape	3
Some:	Light grey, brown or red-brown on green landscape, or red on red landscape	2
Most:	White or red on green landscape	1

Overlay matrix procedure

The major systematic V AC analysis carried out in Australia is the Blue Range study by the Forests Commission of Victoria (1). This used the multiple overlay matrix procedure for combining factors to give a V AC rating and final Total Visual Opportunity levels (or Management Constraint Levels, as called in the Blue Range study). The published report of this study gives a comprehensive explanation of the analysis used to determine each of the factors. This study is noteworthy because it deals with Australian forests and conditions.

Appendix Table 4. Overlay Matrix procedure

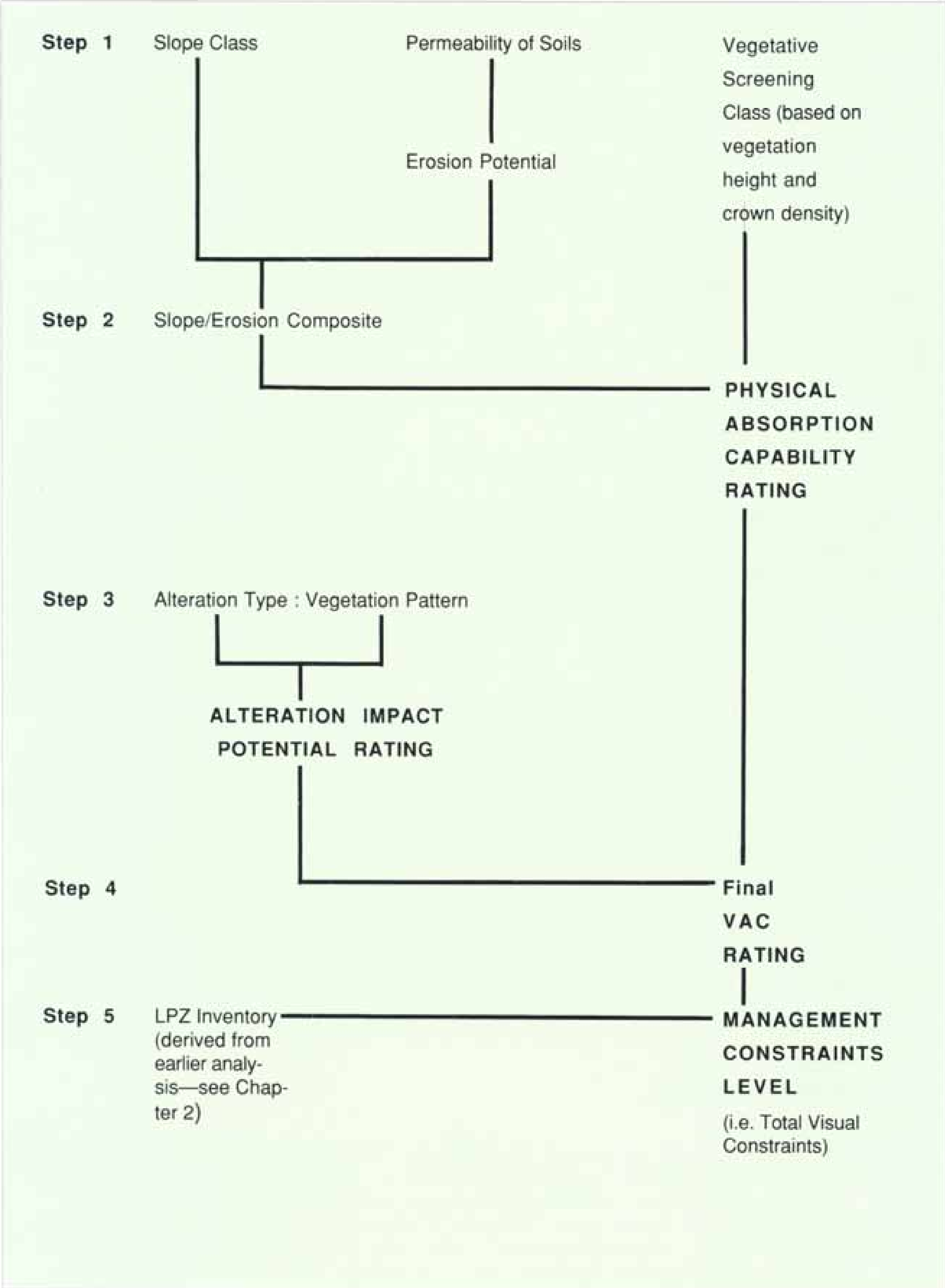


Table 4 (previous page) shows the various factors and how they were integrated. Six separate matrices were used to combine information by mapping overlay. The example Erosion Potential/Slope matrix (Table 5) was used to generate the slope/erosion composite map.

The advantage of this procedure is that specific factors can be interrelated at each stage (e.g., erosion potential can be derived from slope and soil permeability), In theory this gives a more meaningful analysis than the numerical procedures, which combine individual factors in a single step. It is, however, more complex and time- consuming, especially if done manually.. Computer manipulation of such mapped information using a Geographical Information System would speed up the aggregation process.

Appendix Table 5. Example matrix (erosion potential / slope)

Slope	Erosion Potential		
	Low	Moderate	High
Flat 0–9%			
Moderate 10–35%			
Steep 36%+			

Combination rating	
	High
	Moderate
	Low

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