

Appendix: The Generic Visual-Impact Checklist

BRIAN DICK and RICHARD C. SMARDON

Introduction and Explanation

The Generic Visual-Impact Checklist was prepared to facilitate complete and accurate assessment of visual impact in the field by VRM practitioners. The general assumption made in preparation of the Checklist is that activities introduced in the landscape have many different subcomponents, each generating different potential impacts, regardless of site characteristics. The VRM practitioner may not be familiar with the technology or characteristics of the varied activities that are now introduced into the landscape, especially the newer energy-extraction and generation technologies. Therefore, the Checklist serves as an aid to the VRM practitioner to ensure that all general visual impacts would be considered in the evaluation of the given project. Of course the Checklist is general or generic, so unique site conditions may aggravate potential visual impacts or ameliorate them as the case may be.

All generic visual impacts listed are culled from the most complete and up-to-date sources. Documentation of visual impacts in general is extremely poor, and substantiation is even harder to find.

Activities are grouped by family: land management, resource extraction, power generation, power transmission, transportation, water-resource development, and waste treatment and industrial processing. Any specific activity impacts could be found within a project family, such as coal power plant within power generation, or could be a combination of activities and families, such as oil and natural gas activities (resource extraction) linked by an oil pipeline (transportation) to a gas and oil power plant (power generation), which in turn is linked to overhead transmission (power transmission).

As one can see from the initial listing of families and activities, there is little or no documentation of specific visual impacts. This is especially true for certain locatable mineral-mining practices, new forms of energy generation, and certain forms of material transportation.

In the left-hand column of the Checklist are abbreviations of the landscape components affected by the visual impact: vegetation (VEG), land form (LF), and structure (STR). This should help to indicate the nature of the impact as well as suggest mitigation.

On the right-hand side of the Checklist, individual sources and page numbers are noted for reference. This is an imperfect science; therefore, more rigorous or authoritative sources of documentation would be appreciated from users of this Checklist.

General Outline

- I. Land Management
 - Agricultural
- II. Resource Extraction
 - Oil and Natural Gas Activities
- III. Power Generation
 - A. Nuclear/Thermal Power Plants
 - B. Coal Power Plants
 - C. Gas and Oil Power Plants
- IV. Power Transmission
 - A. Overhead Transmission
 - B. Oil/Slurry Pipelines
- V. Transportation
 - A. Water Pipelines
 - B. Highways/Roads
- VI. Water-Resource Development
 - Impoundments/Diversions
- VII. Waste Treatment and Industrial Processing
 - A. Wastewater Treatment Systems
 - B. Solid-Waste-Disposal Activities
 - C. Manufacturing/Industrial Operations

The Generic Visual-Impact Checklist: Actions and Impacts

I. LAND MANAGEMENT

Agricultural Land Usage

- 1. Use of herbicides
 - Dead vegetation (4:330)
 - VEG → Short-term adverse effect on visual quality until vegetation breaks down or is replaced
- 2. Channelization projects
 - LF → Results in a straight ditch instead of a meandering stream bed (4:330)
- 3. Drainage and irrigation projects
 - VEG → Change the landscape by changing the vegetative cover
- 4. Water developments .

- WATER → Add the element of open water to the landscape (4:329)
- WATER → Change the water element from meandering stream to open
expanse of water (4:329)
- 5. Prescribed fire
 - Returns landscape to previous condition (4:329)
- 6. Brush control, mechanical disruption of soil and vegetation
 - Temporary adverse effect on visual quality as a result of
uprooted vegetation (4:329)
- VEG → Long-term improvement of visual quality of the landscape
because of the introduction of grass (4:329)
- VEG → Breaks up monotonous landscapes and creates pleasing pat-
terns of change (4:329)
- 7. Grazing
 - Presence of grazing animals (4:329)
 - Enhances interest for travelers
 - Reduces monotony
- 8. Uncontrolled grazing
 - Causes accelerated erosion or destruction of vegetation
(4:329)
 - Sheet and gully erosion (4:329)
 - Increased turbidity
 - Change in odor and clarity of water
- VEG, LF →
- 9. Structural range improvements; fences
 - Introduction of structural elements in landscape (4:329)
 - Visual fragmentation of view (4:329)
 - Blocked or impaired view (4:329)
- STR →

II. RESOURCE EXTRACTION

Oil and Natural Gas Activities

- STR → 1. Towers, platforms, sea island piers (marine environments)
 - Overboard disposal of refuse (4:390)
- WATER → Floatable material
 - Accumulation on shoreline
 - Debris accumulation on bottom
 - Aesthetic displeasure to underwater exploration
- STR → 2. Refineries, tank farms, towers, platforms, sea island piers,
fencing
 - Increased desirability of unspoiled scenic areas (4:390)
 - Overuse of areas and deterioration of scenic appeal
 - Congestion and overcrowding
- STR → Highly visible projections (4:390)
 - Visual impact of truck and tank rail car traffic (4:390)

III. POWER GENERATION

A. Nuclear and Thermal Power Plants

- 1. Plant operation
 - Scale dominance to existing landscape (4:381)
- STR → Introduction of stack plume (4:381)
 - Visibility degradation
- 2. Building sites cuts and fills, fences, and bulk-fuel loading

- Blocked or impaired views
- Concentrate demand on public views areas
- Cleared swaths across landscape
- LF, VEG → Marred natural landform and vegetation pattern (4:381)
- Highly visible slopes of disturbed cover
- LF, VEG → Marred natural landform and vegetation pattern
- 3. Cooling tower
- STR → High-profile cooling tower
- SKY → Plume characteristics are dependent on meteorologic conditions

B. Coal Power Plants

- 1. Construction of facilities for extraction, clearing conversion transportation, and central station combustion
- LF → Change of surface land features and configurations (4:410)
- 2. Plant site emission stacks
- STR → Strobe lights on stack (3:116)
- STR → Strong vertical line
- STR → Flashing lights attract attention (3:116)
- 3. Cooling tower and evaporation ponds
- SKY → Steam plume, especially during cold weather (3:116)

C. Gas and Oil

- 1. Local power and telephone service
- STR → Introduction of support pole structures (1:82-95)
- 2. Access-road construction
- LF → Maintenance road construction
- LF → Introduction of linear bands in landscape (1:82-95)
- 3. Pipeline construction
- STR → Introduction of linear structures of swaths in landscape (1:82-95)
- 4. Cut and fill
- LF, VEG → Slopes are accentuated by the total lack of vegetation
- 5. Crude-oil storage tanks
- STR → Introduction of high and massive elements (7:4)
- 6. Flare
- SKY → Height and burning flame makes flare visible day and night (7:4)
- 7. Exploratory drilling
- STR → Introduction of temporary drilling-rig structures to landscape (1:82-95)

IV. POWER TRANSMISSION

A. Overhead Transmission

- 1. Transmission route selection
- STR → Visible poles and lines over streams, rivers, lakes, coastal areas (4:381)
- Increased visual access into previously inaccessible wetland areas (4:381)
- STR → Unsightly intrusions within landscape (4:381)
- Increased desirability of unspoiled scenic areas

		Overuse of areas and deterioration of scenic appeal
		Congestion and overcrowding
STR	→	Highly visible vertical projections (4:381)
VEG	→	Cleared swaths across landscape (4:381)
LF, VEG	→	Marred natural landform and vegetation patterns
		2. Site-preparation field office and storage yard
		General construction (5)
		Clearing structural demolition and vegetation (5)
LF	→	Earth work (5)
		Backfill and restoration (5:145)
		3. Removal of vegetation
VEG	→	Recognition that vegetation (except ground covers) has or will be removed for transmission line installation (2:29)
		4. Installation of overhead transmission
STR	→	Dominance because of extreme closeness
		A structure located less than twice its height from observer (2:29)
STR	→	Excessive variety of structures
		More than one type of structure (i.e., H-frame or pole) in view and/or non-synchronization of structure location (2:29)
STR, SKY	→	Silhouette (2:29)
		Exposure of structures with the sky as partial or full background
STR	→	Focal interruption (2:29)
		The interruption of lines-of-sight to a focal point by a transmission line
STR	→	Concentration
		A high density (real or apparent) of transmission structures in a localized area (2:29)
STR	→	Spatial interruption (2:29)
		The apparent division of distinct landscape spaces or patterns by a transmission line. Space division is perceived from inferior viewing positions and pattern from normal or superior viewing positions and is usually related to middle ground (2:29)
STR	→	Continual feature of extended view (2:29)
		Views along a right-of-way that extended from one distance zone to another, particularly through middle ground into background (2:29)
STR/LD	→	Incompatible topographic alignment
		Unsympathetic alignments that do not respect natural contours of existing landforms (2:29)
STR	→	Scale dominance
		Disparity in relative size of transmission structures and landscape elements (houses, barns) accentuated by proximity
LF	→	Soil contrast as a result of grading (2:29)
		Observable cut or fill necessitated by transmission-line installation
STR	→	Special-feature compatibility (2:29)
		The violation of landscape and/or cultural elements that are

- both singular and significant in a context of the project area as a whole (i.e., waterfalls, lakes, cultural centers)
- LF → Edge violation
The visible crossing of a regional linear feature or line of transition from one landscape to another (i.e., valleys, ridge lines, or between different landscape types, such as forest-field or mountain-plain).
5. Transmission towers
Rigid, unnatural appearance, medium contrast to the form and lines expressed in natural landscape

B. Oil pipelines

1. Pipeline (9:3-312)
- LD, VEG → Alter small-scale landforms and remove vegetation cover
Change in established scenic and open-space values
- LF → Permanent primitive road is likely to remain
- STR → Above-ground valves and pipeline bridge across rivers are visible
- STR/VEG, WATER → Pipeline at river crossing; oil spill would create an oil-covered area along the river until vegetation could reestablish itself (9:3-317)
2. Pump stations (9:3-313)
- STR → Introduction of pump-station structure to landscape
Above-ground power-line transmission towers

V. TRANSPORTATION

A. Highways/roads

1. Road alignments, cuts, fills, retaining walls, cribs, revetted embankments (4:267)
- LF, STR → Drainage-way terraces
Contrast between natural landforms and engineering features of highway significant if visible from public recreation area, residential areas, or scenic highways
- STR → Urban or existing development patterns and engineering features of highway
Significant if visible from residential areas or from commercial operations that benefit from view
- LF → Increased prominence of land or landscape features visible from highway
Control or prevent development that would visually degrade lands or landscape features prominently seen from highways
- LF/STR → 2. Embankments (highway above grade) berms, elevated highway (on structures, fences, and barriers landscaping) (4:267)
Blocked viewlines along visual corridors (valleys, stream courses, streets)
Sever visual continuity of open-space network
Fragmentation of open-space expanse
Isolate open-space areas from connection with larger open-space systems

- Fragment image of community or neighborhood as a discrete cohesive unit
- Disorientation or confusion of visitor or resident
- Block or reduce view from residential areas or commercial operations that benefit from view
- Decreased residential and commercial property values and rents
- Decreased patronage to commercial operations
- Reduce affiliations to community by residents blocked off by highway
- Blocked viewlines to landmarks in community from residential and recreational areas and commercial operations that benefit from view
- Decrease patronage to commercial operations
- STR → Elevated or above-grade highway out of scale with adjacent urban development
- Highway is dominant element in view of community or neighborhood
- Scale of highway overpowers scale of community or neighborhood
- Decreased property values
- Contrast between scales
- 3. Fill slopes, grading cut slopes and faces vegetation clearing (4:266)
- LF → Highly visible erosion and/or bare earth or rock scars
- Significant if visible from public recreation area, residential areas, or scenic highway
- 4. Landscaping of cut slopes, fill slopes, graded areas, landscaping of median strips and highway shoulders, revegetation of cut slopes, fill slopes, graded areas revegetation of highway shoulders
- VEG → Contrast between existing vegetation and revegetated or landscape area
- Significant if visible from public recreation area, residential areas, or scenic highways
- STR → 5. Night lighting, vehicle reflections, vehicle lights, vehicle movement (4:266)
- Glare visible in recreational or residential areas
- Visual distraction from pursuit of recreational, residential, or commercial activities

VI. WATER RESOURCE DEVELOPMENT

A. Impoundment

- WATER,
STR → 1. Impoundment (4:346)
- Block viewlines along visual corridors (valleys, stream courses)
- Sever visual continuity of open-space network
- Fragmentation of open-space expanse
- Isolate open-space areas from connection with larger open-space systems

- LF → 2. Grading, flooding, draining, filling, clearing (4:346)
 Creation of permanent, highly visible landscape (drawdown rim, shoreline clearing, cut and fill faces) that vividly contrast with surrounding landscape
- VEG → Creation of areas of highly visible dead, dying, decaying, or unhealthy vegetation
 Degrade visual attraction of area to residents and visitors
 Degradation of recreational potential
- LF → Creation of mudflats (drawdown rim), erosion scars
 Loss of visual appeal to residents, recreational users, or visitors
 Degradation of recreational potential
- VEG → Exposure of stumps and vegetation debris
 Degrade visual attraction of area to residents and visitors
- STR → Engineering feature of the project out of scale with landscape
 Significant if visible from public recreation areas, residential areas, or scenic highways
- WATER → Water body out of scale and character with surrounding landscape
 Significant if visible from public recreation areas, residential areas, or scenic highways

VII. WASTE TREATMENT AND INDUSTRIAL PROCESSING

A. Wastewater Treatment Systems

- STR → 1. Night lighting, vehicle reflections, vehicle lights
 Glare visible in recreational or residential areas (4:425)
- STR → 2. Pipelines
 Storage of unattractive materials, equipment, and unsightly excavation piles
 Temporary decrease in visual access to surrounding areas (e.g., residential and commercial views) (4:425)
- STR → 3. Landscaping, project structural facilities (tanks, ponds, operations building, incineration facilities) (4:425)
 Alter and/or block viewlines to scenic attractions from public viewing areas (scenic highways, public recreation areas)
 Alter and/or block viewlines to scenic attractions from commercial operations that benefit from affected view
 Decrease profits to operation
 Decrease commercial property values
 Alter and/or block viewlines to scenic attractions from existing or potential residential development
 Decrease in property values
 Alter and/or block viewlines along visual corridors (valleys, stream courses, streets)
 Sever visual continuity of open-space network
 Fragmentation of open-space expanse
 Isolate open-space areas from connection with larger open-space systems
 Siting of project in open-space area that forms vivid edge of community and distinguishes community from adjacent communities

- Blurring of community definition as a distinguishable unit

4. Fences, project structural facilities (4:424)

STR, LF → Contrast between natural landforms and engineering features of project
 Significant if visible from public recreation area, residential areas, scenic highways, or commercial operations that benefit from affected view

STR → Contrast between urban or commercial development pattern and engineering features of project
 Significant if visible from residential areas or from commercial operations that benefit from affected view

5. Berms, fills, grading, cut slopes and faces, vegetation-clearing-treatment lagoons (4:424)

LD → Highly visible erosion and/or bare earth or rock scars
 Significant if visible from public recreation area, residential areas, scenic highways, or commercial operations that benefit from affected view

6. Landscaping of cut slopes, fill slopes, graded areas revegetation of cut slopes, fill slopes, graded areas (4:425)

VEG → Contrast between existing vegetation and revegetated or landscaped areas
 Significant if visible from public recreation area, residential areas, scenic highways, or commercial operations that benefit from affected view

B. Solid-waste-disposal activities

- LF → 1. Landfills of trash and garbage
 Blown to adjacent property or into water
 Litter left on beach
 Attraction of insects, gulls, and rodents
 Physical annoyance, disease vectors
 Broken glass, sharp objects, rusty debris
 Bodily injury
 Increased public disregard for area
 Increased litter, vandalism, misuse
 Olfactory discomfort

2. Automobile junkyards (4:434)

LF, STR → Low compatibility with surrounding landscape (can be ameliorated to some extent by fencing)
 Intrusion within visual scene
 Increased desirability of unspoiled scenic areas
 Overuse and deterioration of scenic appeal
 Congestion and overcrowding

3. Offshore disposal of solid wastes (4:434)
 Accumulated organic sludge on bottom
 Introduction of sewage and industry liquors

WATER → Unappealing water color and noxious odor
 Intrusion within coastal scene
 Increased desirability of unspoiled scenic areas
 Overuse and deterioration of scenic appeal
 Congestion and overcrowding

4. Landfill operation and completion (4:434)

- LF → Visual impact of new landform in creation and completion
Possible blocking of views
- LF → Shape, height, and form incompatible with immediate surroundings
New land use stimulated by completion of the landfill may be compatible with immediate surroundings
- LF, VEG → Final landscaping may add or detract from final landform

C. Manufacturing/Industrial Operation

- STR → 1. New plant construction/operation (4:457)
Low compatibility of manufacturing activity located within sight of a recreational facility, historical area, or unique ecological setting
- STR → Vertical structures of the plant visible from great distances
Building colors and design conflict with natural coloration and surroundings
- SKY → Plant gaseous emissions visible great distances
- STR → 2. Power pylons and wires; bulk refining and processing utilities (4:458)
High visible projections
Intrusions within the view
- STR → 3. Power pylons and wires; utilities, fences, railroads, tanks, elevators and warehouses, building-site cuts and fills, structures solid-waste disposal, bulk refining and processing
Visual intrusions
Increased desirability of unspoiled scenic areas
Overuse and deterioration of scenic appeal
Congestion and overcrowding
Blocked or impaired views
Concentrated demand on public-view areas
Increased demand on public-view areas
Congestion and overcrowding of area
Overuse and deterioration of area and facilities
Insufficient space to accommodate parking
- LF, VEG → 4. Building-site cuts and fills (4:458)
Cleared swaths across landscape
Marred natural landform and vegetation pattern
Highly visible slopes of disturbed cover
Marred natural landform and vegetation pattern

Sources

1. Oil and Gas Environmental Assessment of BLM Leasing Program, Miles City District, U.S.D.I., Bureau of Land Management. February 1980.
2. An Assessment Methodology for Transmission Line Visual Impact, prepared by Kane and Carruth, P. C. Landscape Architects, 1977; David B. Carruth, Randall Arthur, Douglas R. Snider.
3. Draft, West-Central North Dakota, Regional Environmental Impact Study on Energy Development, USDI, Bureau of Land Management, State of North Dakota. 1978.
4. Environmental Assessment Resource Handbook (1st ed.), Environmental Impact Assessment Project, Oregon State University Extension Service, Corvallis. 1976.

5. Study of Environmental Impact of Underground Electric Transmission Systems by EDAW, Inc., Environmental Planning, San Francisco. May 1975.

6. Final Environmental Statement by the U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, for Montague Nuclear Power Station, Units 1 and 2, February 1977. Proposed by Northeast Nuclear Energy Company, Docket Nos. 50-496, 50-497.

7. Trans-Alaska Pipeline System, Visual Impact Engineering Program/APSC Prepared by R & M Consultants, Inc., the Collins Dutot Partnership Hok Associates. September 1975.

8. Choosing Transmission Tower, Office of Environmental Planning, State of New York Department of Public Service. 1975.

9. Final Environmental Impact Statement, Crude-Oil Transportation System: Valdez, Alaska, to Midland, Texas (as proposed by Sohio Transportation Company).

10. National Forest Landscape Management, Vol. 2, Chap. 5, Timber, U.S., Forest Service, Agriculture Handbook No. 559. 1978.

11. Landscape Architecture Technical Information Series, published by American Society of Landscape Architects in cooperation with Surface Environment and Mining Program of U.S. Forest Service, Vol. 1, No. 3, "Creating Land for Tomorrow." 1978.

Index

Bold-face numbers indicate figures and tables

- Access: physical, of inland wetlands, 161, **165, 166**;
physical, in wetlands evaluation, 6, 7; visual, and vegetation, 56-57; visual, in Visual Impact Assessment, 194-97; visual, in wetlands evaluation, 6, 7
- Aesthetic (visual) values of wetlands, 3; in Amberley Wild Brooks (U.K.) assessment, 33-34; in bog environment assessment, 79-93; classification of, for Cape Cod, 65-73; EPA dredging regulations and, 16-17, 18; of inland wetlands, assessment of, 149-68; landform contrast in evaluation of, 7-9, **8, 9**; land use and, 97-98, **99, 102-4, 103, 114**; literature on evaluation of, 5-13; in Louisiana river landscapes, 41-60; model for evaluation of, 44-60; perception in, 41-42, 80, 85-93; in St. Lawrence-Eastern Ontario region, 97-114; U.K. attitudes to, 23, 24-28, 31, 35-36; in U.K. land drainage programs, 24-28, 31, 33-34; variety and contrast in evaluation of, 7-9, **8, 9**; vegetation in evaluation of, 6-12, **10, 11, 12, 46-59, 85, 92, 97-98, 99, 107, 108, 110**; visual access in evaluation of, 6, 7; water bodies in, 46-59, 97-98, **99, 107-10, 109**; in wetlands evolution, 142 (see also Visual Impact Assessment)
- Agriculture: drainage and, in Amberley Wild Brooks (U.K.), 33-35; drainage and, in Yare Basin (U.K.), **26-27, 28-33, 30, 32, 34, 36**; wetlands drainage in the U.K., 24-28 (see also Vegetation)
- Amberley Wild Brooks (U.K.), assessment of, 33-35
- Barnstable Marsh, Massachusetts, evolution of, 119-22, **121**
- Bayou, defined, 44
- Beach and water landscapes, in visual classification system, **67, 68**
- Black River Bay, New York, aesthetic values assessment in, 102-14
- Boardwalks, in aesthetic valuation of bogs, 80-81, **83, 84, 84, 85, 92**
- Bogs: aesthetic values in assessment of, 79-93; defined, **158**
- Bolinas Lagoon, California, evolution of, 125-29, **126-28, 130-32, 131, 132, 134, 137, 138, 138, 139, 140, 141**
- California: Bolinas Lagoon, evolution of, 125-29, **126-28, 130-32, 131, 132, 134, 137, 138, 138, 139, 140, 141**; Coastal Commission, 182-83; tidelands loss in, 139; Tomales Bay, evolution of, **138, 139**; Visual Impact Assessment for LNG terminal, 181-83, **185-87**
- Cape Cod, Massachusetts, landscape classification for, 63-77
- Cape Hatteras, North Carolina, Visual Impact Assessment of, 184-94, **191-93**
- Channels: in estuarine evolution, 123, 137, **138**; maintenance by U.S. Army Corps of Engineers, 184
- Character areas of St. Lawrence-Eastern Ontario, 110-14, **113**
- Chesapeake Bay, Maryland, Visual Impact Assessment of, 183-84, **188-90**
- Classification: complexity in inland wetlands, 159; of land use, 102-4, **103, 152-53**; system of, commercial development in, 68, **70, 71**; system of, for inland wetlands, 149-53, **150-51, 153-58**; system of, for residential landscapes, 68-73, **72**; visual, of coastal lands, 63-77 (see also Landscape assessment)
- Coastal shelf, emergence of, 137-38
- Coastal wetlands: Coastal Zone Management Act of 1972, 15-16, 19; Massachusetts, assessment of, 63-77; New York, landscape units classification of, 102-5, **106**; New York, wetlands units classification, 105-10, **111**; shoreline complexity in, 52; Visual Impact Assessment of, 181-99 (see also Estuaries)
- Coastal Zone Management Act of 1972, 15-16, 19
- Coastal Zone Management Journal, 195
- Commercial development: in visual classification system, 68, **70, 71**; Visual Impact Assessment for LNG terminal, 181-83, **185-87**
- Complexity: of edges, 159-60, **162, 164**; in inland wetlands classification, 159; legibility and, in aesthetic valuation, 57-59, **59**; shoreline, defined, 52; skyline, defined, 52; in visual preference, 45, 45, **46, 49-52, 51, 52**
- Contrast (see Visual contrast)
- Corps of Engineers (see U.S. Army Corps of Engineers)
- Countryside Act of 1968 (U.K.), 25
- Cranberry Glades Botanical Area, Monongahela National Forest, West Virginia, aesthetic values in, 80-93
- Cultural ("extrinsic") values of wetlands: described, 4; U.K. attitudes to, 23-24 (see also Human artifacts; Visual-cultural values)
- Deposition (see Sedimentation)
- Developed open land, in visual classification systems, 68, **70**
- Dick, Brian, 207-16
- Disturbance factors in visual preferences, 53-55, **54, 55**
- Drainage: agriculture and, in the U.K., 24-28; Amberley Wild Brooks (U.K.), 33-35; Yare Basin (U.K.), **26-27, 28-33, 30, 32, 34, 36**
- Dredging: of estuaries, 139-40; permit procedures for, 16-18, 19, 21, 166

- Earthquakes, estuarine evolution and, 138
- Ecological-aesthetics values of wetlands, 3-4, 141
- Economic values of wetlands (see Wetlands valuation, economic)
- Edges: in aesthetic valuations of bogs, **83, 84, 85, 85**; complexity of, 159-60, **162, 164**; vegetative, in aesthetic valuation of shorelines, 110, 111
- Educational values of wetlands, 3; in Amberley Wild Brooks (U.K.) assessment, 34; described, 4; of inland wetlands, 153, 159, 161, **165, 166**; literature on evaluation of, 5-13; St. Lawrence-Eastern Ontario, 112-14
- Emergence of coastal shelf, 137-38
- Enclosure: in aesthetic valuation, **45, 45, 46, 52, 53, 110, 111, 112**; in bog aesthetic valuation, 82, 92
- Environment impact: aesthetic valuations in analysis of, 112; of drainage programs (U.K.), 24-36; U.S. Army Corps of Engineers assessment of, 183, 184-88
- Environmental Protection Agency (EPA), dredging regulation of, 16-18, 19, 21, 166
- Estuaries: cultural and political factors in evolution of, 139-41; description of evolution of, 119-23, **120, 121, 133**; documentation of evolution of, 123-32, **124-28, 142**; geologic events in evolution of, 135-39; tides in evolution of, 132-35, **134, 139** (see also Marshes/swamps)
- Evaluation (see Wetlands evaluation)
- Evolution (see Estuaries)
- Fabos, Julius Gy., 147-68
- Familiarity in aesthetic valuation of bogs, 85-93
- Features in aesthetic valuation of bogs, **83, 84-85, 84, 85**
- Floods and flooding: National Flood Insurance Act of 1968, 15, 19; Yare Basin (U.K.), **26-27, 28-33, 30, 32, 34, 36** (see also Tides)
- Fresh meadow, defined, 156
- Generalizability in Visual Impact Assessment, 174
- Generic Visual-Impact Checklist, 198, 207-16
- Geologic events in estuarine evolution, 137-38
- Goose Bay, New York, aesthetic values assessment in, 102-14
- Great Lakes, Coastal Zone Management Act of 1972, 15-16, 19
- "Guide for Recording Aesthetic and Biological Changes with Photographs, A" (Magill and Twiss), 198
- "Guidelines for Specification of Disposal Sites for Dredged or Fill Material" (EPA), 16-18
- Gulf Coastal Plain, Louisiana rivers in, 43-60
- Guttman-Lingoes Smallest Space Analysis (SSA-III), 83
- Hammit, William E., 79-93
- Hatch Act, Massachusetts, 147
- High-density residential landscapes in visual classification systems, 68-73, 72
- Human artifacts: in aesthetic valuation of Cape Cod, 68-72; boardwalks in aesthetic valuation of bogs, 80-81, **83, 84, 84, 85, 92**; in inland wetlands assessment, 160-61; in landscape evolution of estuaries, 118-19, 129-30, **130, 139**; residential landscape visual classification, 68-73, 72; Visual Impact Assessment of, 172, 181-99; in Yare Basin (U.K.) study, 31, **32** (see also Commercial development)
- Hunter, Michael, 169-99
- ICLUST (clustering technique), 83
- Imageability in aesthetic values, 41
- Image of the City, The* (Lynch), 41
- Inland Wetlands Protection Act, Massachusetts, 147
- Internal Wetland contrast, 107
- Just v. Marinette County*, 20-21
- Land Drainage Act of 1930 (U.K.), 24
- Land Drainage Act of 1976 (U.K.), 24, 33
- Landform: aesthetic classification of, 104, **105**; in aesthetic valuation of wetlands, 97-98, **99, 104, 105**; classification of Massachusetts, **152, 153, 159**; in Louisiana river landscapes, 43-44; rating of, in aesthetic valuation, 46-59, in Yare Basin (U.K.) study, **26-27, 29, 32**
- Landform contrast, 104, 160, **162, 164**; in evaluation of aesthetic values, 7-9, **8, 9**; landscape dimensions in, 148
- Landform diversity, 104, 159-60, **162, 164**
- Landscape: change in, 117-19; manmade structures in, Visual Impact Assessment of, 173-94
- Landscape assessment: Amberley Wild Brooks (U.K.), 33-35; visual classification of coastal lands, 63-77; Yare Basin (U.K.), **26-27, 28-33, 30, 32, 34, 36** (see also Classification)
- Landscape control points (LCPs) in Visual Impact Assessment, 172
- "Landscape Control Points: A Procedure for Predicting and Monitoring Visual Impacts" (Litton), 198
- Landscape units, 98, **99, 102-5, 106, 108-10**
- Land use: aesthetic values in determination of, 114; classification of, 102-4, **103, 152-53**; surrounding, in aesthetic valuation of wetlands, 97-98, **99, 102-4, 103**; Visual Impact Assessment in, 169-99
- Land Use and Natural Resource Inventory of New York State (LUNR), 102-4
- Land Use Consultants and Yare Basin Study, **26-27, 28-33, 30, 32, 34, 36**
- Land-use contrast, 102, 160, **163, 164**
- Land-use diversity, 102, 159-60, **163, 164**
- Lee, Michael S., 41-60
- Legibility: complexity and, in aesthetic valuation, 57-59, **59**; of vegetation, in aesthetic valuation, 56-57, **59**; in visual preference, **45, 45, 46, 49, 50**
- Legislation, federal: Coastal Zone Management Act of 1972, 15-16, 19; local regulatory impact of, 19-20; National Environmental Policy Act (NEPA), 169-70; National Flood Insurance Act of 1968, 15, 19; Rivers and Harbors Act of 1899, 15, 16; Water Pollution Control Act Amendments of 1972, 16-18, 19, 21, 166, 205; court cases in wetlands regulation, 20-21; Massachusetts Hatch Act, 147; Massachusetts Inland Wetlands Protection Act, 147; Massachusetts Wetlands Protection Act, 147; New York State Tidal Wetlands Act, 19
- Legislation, United Kingdom: Countryside Act of 1968, 25;

- Land Drainage Act of 1930, 24;
Land Drainage Act of 1976, 24,
33; Water Act of 1973, 25, 35
- Likert scales, 5, 13, 81
- Liquid Natural Gas (LNG), siting
of terminals for, 181-83,
185-87
- Littoral zone, estuarine,
sedimentation in, 129, 139
- Louisiana, rivers in, aesthetic
values and, 41-60
- MacGibbon v. Board of Appeals
of Duxbury*, 20
- Maine: property rights case in,
20; tidal ranges in, 135
- Maps: for aesthetic valuation of
New York shoreline, 100-114,
101, 103, 105, 106, 108, 109,
110, 113; for tracing estuarine
evolution, 125-29, **126-28,**
130-31, 131
- Marshes/swamps: aesthetic values
of, literature on, 5-13; drainage
of Amberley Wild Brooks (U.K.),
33-35; drainage of Yare Basin
(U.K.), **26-27, 28-33, 30, 32,**
34, 36; evolution of Barnstable
Marsh, Massachusetts, 119-22,
121; intertidal, in estuarine
evolution, 122-23, 137, **138**;
recreational values of, literature
on, 7-13; shrub swamp,
defined, **157**; vegetation in
evaluation of, 5-12, **12**; in
visual classification system,
65-68, **66**; wooded swamp,
defined, **158** (see also Estuaries)
- Maryland, Chesapeake Bay Visual
Impact Assessment, 183-84,
188-90
- Massachusetts: Barnstable
Marsh, evolution of, 119-22,
121; coastal wetlands, visual
assessment in, 63-77; economic
valuation of wetlands, model
for, 161-64, **166, 167**; Hatch
Act, 147; inland wetlands
classification in, 152-53, **152,**
159; Inland Wetlands Protection
Act, 147; Natural Resources
Planning Program, 63; visual-
cultural assessment of wetlands,
model for, 147-61; Wetlands
Protection Act, 147
- Mean higher of high water line
(MHHW), 122-23, 129
- Mean high water line (MHW),
122-23, 129
- Mean lower of low water line
(MLLW), 123, 129
- Mean low water line (MLW), 123,
129
- Ministry of Agriculture, Fisheries,
and Food (U.K.), 24-28, 35
- Monongahela National Forest,
West Virginia, bog visual
assessment in, 80-93
- Mooney, Molly B., 97-114
- Mudflats in estuarine evolution,
123, 131-32, 135, 137, **138**
- Muench v. Public Service Commis-
sion*, 20-21
- Municipal landscapes in visual
classification system, 68, **71**
- Mystery: in aesthetic valuation
of bogs, 84, 92; in visual
preference, **45, 45, 46, 53**
- National Environmental Policy Act
(NEPA), 169-70
- National Flood Insurance Act of
1968, 15, 19
- National Municipal League of
Cities and Towns, 76
- Natural areas in inland wetlands
assessment, 155-56
- Nature Conservancy Council
(U.K.), 25-28, 35-36
- NEPA (National Environmental
Policy Act), 169-70
- New York: aesthetic values
measurement in St. Lawrence-
Eastern Ontario region, 97-114;
Land Use and Natural Resource
Inventory (LUNR), 102-4; Tidal
Wetlands Act, 19; tidelands loss
in, 139
- North Carolina, Cape Hatteras
National Seashore Visual Impact
Assessment, 184-94, **191-93**
- Oceans, Coastal Zone Manage-
ment Act of 1972, 15-16, 19
- Palmer, James F., 63-77
- Parks, National Nature Reserves
(U.K.), 25-28
- Penning-Rowsell, Edmund C.,
23-36
- Perception: in aesthetic valuation,
41-42, 80; familiarity and, in
aesthetic valuation of bogs,
85-93
- Photographs: aerial, for document-
ing estuarine evolution, 123-25;
in aesthetic evaluation methods,
5-7, 13, 44, 64, 80-81; for
documentation of site condi-
tions, 18; for documentation of
tidal ranges, 135; in Visual
Impact Assessment, 172, 184,
194, **195, 195-97, 198-99**;
visual-simulation techniques
with, 189-90, 194
- Property rights, cases in:
*MacGibbon v. Board of Appeals
of Duxbury*, 20; *State of Maine
v. R. B. Johnson*, 20; *Turnpike
Realty Co. v. Town of Dedham*,
20
- Public trust doctrine, cases in:
Just v. Marinette County, 20-21;
*Muench v. Public Service
Commission*, 20-21; *State v.
Ashmore*, 20
- Recreational values of wetlands,
3; adjoining areas, 4, 8; in
aesthetic valuation of bogs, 90;
of Cape Cod beaches, 68;
described, 4; EPA dredging
regulation and, 16-17, 18; food
gathering, 4; of inland wetlands,
153, 159; landform contrasts in
evaluation of, 7-9, **8, 9**;
literature on evaluation of, 7-13;
physical access in evaluation of,
6, 7; in Visual Impact Assess-
ment, 188, 195
- Regulation (see Legislation,
federal; Legislation, state;
Legislature, United Kingdom)
- Reliability in Visual Impact
Assessment, 174, 175-76,
180-81, **182**
- Residential landscapes, visual
classification of, 68-73, **72**
- Rivers: aesthetic valuation of
Louisiana, 41-60; literature on
recreation, 5
- Rivers and Harbors Act of 1899,
15, 16
- Rowntree, Rowan A., 117-42
- St. Lawrence Eastern Ontario
Commission, 97, 112, 114
- St. Lawrence-Eastern Ontario
region, aesthetic values assess-
ment in, 97-114
- Sandy Creek, New York, aesthetic
values assessment in, 102-14,
103, 105, 106, 108, 109, 110,
113
- Scenic values (see Aesthetic
values)
- Section 404 (see Water Pollution
Control Act, Section 404)
- Sedimentation: dredging and,
139-40; in estuarine evolution,
119, **120, 129-30, 137, 138, 139**
- Shoreline: aesthetic values in Lake
Ontario, 100-114; complexity
of, 52; disturbance of, in
aesthetic valuation, 53-55, **54,**
55, 58; river and, in aesthetic
values, 56, **58**
- Shrub swamp, defined, **157**
- Simulation: computer methods of,
197, 198; photographs and,
189-90, 194
- Skyline, complexity of, 52

- Sardon, Richard C., 15-21, 147-68, 169-99, 205-6, 207-16
 Soil Conservation Service, 63-64
 Spatial definition (see Enclosure)
State of Maine v. R. B. Johnson, 20
State v. Ashmore, 20
 Stream, defined, 43
 Subsidence of coastal shelf, 137-38
 Suburban development, in visual classification systems, 68, 69
 Succession in estuarine evolution, 119
 Swamps (see Marshes/swamps)
- Tidal curves, 134, 135
 Tidal Wetlands Act, New York, 19
 Tidelands (see Estuaries)
 Tomales Bay, California, evolution of, 138, 139
Turnpike Realty Co. v. Town of Dedham, 20
- United Kingdom: aesthetic values in, 23, 24-28, 31, 35-36; Amberley Wild Brooks assessment, 33-35; Countryside Act of 1968, 25; Land Drainage Act of 1930, 24; Land Drainage Act of 1976, 24, 33; Ministry of Agriculture, Fisheries, and Food, 24-28, 35; Nature Conservancy Council, 25-28, 35-36; Water Act of 1973, 25, 35; Water Space Amenity Commission, 35-36; wetlands policy in, 24-28; Yare Basin assessment, 26-27, 28-33, 30, 32, 34, 36
 United States: Coastal Zone Management Act of 1972, 15-16, 19; Environmental Protection Agency (EPA), 16-18, 19, 21, 166; National Environmental Policy Act (NEPA), 169-70; National Flood Insurance Act of 1968, 15, 19; Rivers and Harbors Act of 1899, 15, 16; Water Pollution Control Act Amendments of 1972, 16-18, 19, 21, 166, 205 (see also specific states)
 U.S. Army Corps of Engineers: channel maintenance by, 184; dredging permits from, 16-18, 19, 21, 166; Environmental Impact Statements (EIS), 183, 184-88; review of assessment methodology, 205; visual impact studies by, 172
 U.S. Bureau of Land Management: Visual Contrast Rating method, 175-81, 176-78, 181; Visual Impact Assessment by, 170-72
 U.S. Coast and Geodetic Survey, and Bolinas Lagoon, California, 125-29, 128
 U.S. Department of Commerce, 16
 U.S. Forest Service, Visual Absorption Capacity (VAC) analysis of, 170-72, 171
 U.S. Geological Survey, and Bolinas Lagoon, California, 125-29, 126-27
- VAC (Visual Absorption Capacity) analysis, 170-72, 171
 Validity in Visual Impact Assessment, 174, 176-77, 181
 Vegetation: in aesthetic valuation of bogs, 85, 92; in aesthetic valuation of wetlands, 6-12, 10-12, 97-98, 99, 107, 108, 110; in Cape Cod landscape classification, 65-68, 66; edges of, 110, 111; in estuarine evolution, 119, 120, 122-25, 124, 131-32, 135; in inland-wetland classification, 152-53, 153-58; in intertidal marshes, 122-23; in Louisiana river landscapes, 43-44; rating of, in aesthetic valuation, 46-59; in Visual Impact Assessment, 197; in Yare Basin (U.K.) study, 29-31, 32 (see also Agriculture)
- VIA (see Visual Impact Assessment)
 VIEWIT, 197
 Visibility in Visual Impact Assessment, 195-97
 Visual Absorption Capacity (VAC) analysis, 170-72, 171
 Visual contrast: in evaluation of aesthetic values, 7-9, 8, 9; in inland wetlands assessment, 156, 159; internal wetland, and vegetation, 107; landform contrast, 7-9, 8, 9, 104, 148, 160, 162, 164; land-use, 102, 160, 163, 164
 Visual Contrast Rating Method, 175-81, 176-78, 181
 Visual-cultural values of wetlands: defined, 1, 3, 148; evaluation of, literature on, 4-13; model for assessment of inland wetlands, 147-68; in wetland evolution, 142 (see also Aesthetic values of wetlands; Cultural values of wetlands; Educational values of wetlands; Recreational values of wetlands)
- Visual diversity in inland wetlands assessment, 159
 Visual Impact Assessment (VIA): of Cape Hatteras, North Carolina, 184-94, 191-93; checklist for generic, 198, 207-16; literature on, 170-74; methodological framework for, 194-99; methods for wetlands, 181-84; research on, 174-81
 Visual preference (see Aesthetic values of wetlands)
- Water Act of 1973 (U.K.), 25, 35
Water and the Landscape (Litton et al.), 5
 Water bodies: in aesthetic valuation of wetlands, 46-59, 97-98, 99, 107-10, 109; diversity of, 107, 159-60, 163, 164; size of, 107, 159-60, 162, 164
 Water Pollution Control Act Section 404 (Amendments of 1972), 16-18, 19, 21, 166, 205
 Watershed, estuarine, sedimentation in, 129, 139
 Water Space Amenity Commission (U.K.), 35-36
 Water supply in inland wetlands assessment, 164-66, 166, 167
 West Virginia, Monongahela National Forest, bog visual assessment, 80-93
 Wetlands Protection Act, Massachusetts, 147
 Wetlands valuation (economic): court cases in, 20-21; drainage for agriculture in the U.K., 24-36; EPA dredging regulation and, 16-18, 19, 21, 166; inland wetlands, model for, 161-66, 166, 167; literature on, 5
 Wetland-type diversity, 107, 160, 163, 164
 Wetland units, 98, 99, 105-10, 111
 Wildlife: in Amberley Wild Brooks (U.K.), 33-35; in estuarine evolution, 119, 123; in estuarine mudflats, 123, 132, 135, 136; in evaluation of wetlands, 7, 12; in inland wetlands assessment, 164-66; U.K. protection of, 25-28; in Yare Basin (U.K.) study, 31, 32
 Wooded swamp, defined, 158
- Yare Basin (U.K.), assessment of, 26-27, 28-33, 30, 32, 34, 36
 Zoning, 19-20; landscape planning and, 77

About the Authors

Richard C. Smardon, M.L.A., is Senior Research Associate and Coordinator for Research and Community Service at the School of Landscape Architecture, College of Environmental Science and Forestry, S.U.N.Y., Syracuse. He is the editor of a special issue on visual resources management for the *Coastal Zone Management Journal* and of the proceedings of the *Our National Landscape* conference, and he is on the editorial board for the *Northeastern Environmental Science Journal*. His interests and activities include community cultural landscape image assessment, visual impact assessment, and urban ecosystems.

William E. Hammitt, Ph.D., is Associate Professor of Forest Recreation in the Department of Forestry, Wildlife and Fisheries at the University of Tennessee, Knoxville. His major research interests are in the areas of recreation behavior, on-site visual preferences, environmental cognition, and recreation resource management. The author of more than fifty published articles and past associate editor of the *Journal of Leisure Research*, Dr. Hammitt's current research involves the management of trail landscapes and parkway vistas for the visual preferences of park visitors.

Michael S. Lee, M.L.A., is a landscape architect with the city of Arvada, Colorado, and an active member of the Colorado Chapter of the American Society of Landscape Architects. His papers cover work on landscape assessment methodology.

Molly Burgess Mooney, M.L.A., is a landscape architect with her own design practice in Sheridan, Wyoming. She is active in Wyoming's historic preservation movement, and serves as a consultant for the state office.

James F. Palmer, Ph.D., Research Associate and Curriculum Director for the Program in Environmental Studies at the College of Environmental Science and Forestry, S.U.N.Y., Syracuse, holds graduate degrees in landscape planning and forestry. His past work focused on rural and wildlands environments, while his current work is concerned with the role of nature in the lives of urbanites.

Edmund C. Penning-Rowsell, Ph.D., is Reader in Geography and Head of the School of Geography and Planning at Middlesex Polytechnic and Director of the Polytechnic's Flood Hazard Research Center. He is a consultant for national and regional agencies, and his published research covers geomorphology, landscape evaluation and planning, flood plain management, and the economics of flood alleviation and land drainage schemes.

Rowan A. Rowntree, Ph.D., a specialist in forest ecology and biogeography, conducted research on watersheds and estuaries in California under fellowships from the Conservation Foundation and Resources for the Future. His publications include articles and chapters on the ecological foundations of estuary planning.