

## Article

## Visual Preferences for Simulated Restorations of Disturbed Coastal Landscapes

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**Abstract :** This study intends to find out what manmade elements in typical moderately disturbed coastal landscape are most adversely affecting its aesthetic quality. Simulation photos including a combination of five most common manmade structures (houses, roads, power lines, embankments, and aquaculture facilities) found on coastal areas were made, and thirty eight subjects in the field of landscape architecture and forty eight average subjects were asked to evaluate their visual preferences of the 32 simulation photos using seven levels of Likert scale. Overall, average and professional subjects did not show significant differences in their evaluations. Visual preferences were greatly influenced by the presence of the manmade structures. A natural coastal landscape without any manmade structures was most preferable, and a disturbed coastal landscape by all five manmade structures was least preferable. Power lines had the most serious negative impact on the landscape, and followed by the embankment. In coastal landscape restoration works and management, priority needs to be given to these manmade structures which have bigger negative landscape impacts.

**Key words :** coastal landscape, landscape simulation, visual preference, landscape restoration.

### 1. Introduction

#### Research objectives

Much of Korean coastal area has been developed and disturbed. There are increasing efforts to preserve remaining undisturbed coastal landscapes, and also there are efforts to restore disturbed coastal landscapes. However, we would not intend to restore a harbor or a coastal urban area as they are so heavily developed and intensively used for varying purposes and the restoration cost could be prohibitively high. One of the objectives of restoration works may be to restore a less disturbed coastal landscape "look" as close as possible to a natural one in addition to restoring it to a more natural state of ecological processes with minimum human interferences. In our such restoration efforts, we may want to know what kinds of developments, or disturbances, are most visually impinging, and we want

to remove first. This paper intends to test the visual preferences for a set of different coastal area restoration simulations in order to find which manmade landscape elements have greater adverse impacts on coastal landscapes and thus should be given higher priority in restoration works.

#### An overview of related researches

Since 1970s, there have been increasing worldwide concerns and research interests in conservation and improvement of coastal landscapes. Wallace (1974) investigated characteristics of Essex coastal landscape and processes to evaluate them. Ahn (1997) highlighted threats to the natural coastal landscape of Jeju Islands of Korea, and emphasized conservation and control of developments.

Morgan (1999) and Yang (1987) found, in harbor landscapes, areas of green space and sea have positive impacts, and views of factories, harbor structures or other

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artifacts have negative impacts on visual preferences. Lee(1998) proposed typology of coastal landscape and semantics for coastal landscape evaluation. These studies indicate the necessity for further research on how to conserve and/or restore coastal landscapes.

Kim (1991), Joo (1998) and Park (2001) reviewed advantages and disadvantages of various simulation techniques and suggested some improvements. Lee (2001) applied photo simulation techniques to demonstrate the need to protect views from roads to the sea in Jeju Island, and proposed a “visual screen index” as a control measure. We adopted and improved the simulation techniques used in these studies for our research.

## 2. Research scope and method

### Research scope

We intended to find out what manmade elements in typical moderately disturbed coastal landscape were most

adversely affecting its aesthetic quality. Intensively developed urban or harbor coasts were out of our research scope.

First, a typical natural coastal landscape without any manmade structures was taken to be used as a base photo. Then, a series of simulation photos were made by adding combinations of common manmade structures into the base photo. The simulation photos were then presented to subjects and evaluated for their aesthetic values.

The base photo, a typical natural coastal landscape without any manmade structures was taken at a place which showed, as mid-ground, ocean view, a sweep of beach, some nearby land, and a forested hill (Fig. 1). Then, five most common manmade structures that disturbed coastal natural landscape were chosen. They were houses, roads, power lines and poles, embankments, and aquaculture facilities. Though more kinds of manmade structures might be found in any disturbed coastal area, we limited them to above five major elements mainly because any more addition would increase the number of



Fig. 1. The base photo for simulations. A typical natural coastal landscape without any manmade structures.



Fig. 2. One of the thirty two simulation photos. This photo has all the five manmade structures; houses, roads, power lines, and poles, embankments, and aquaculture facilities.

simulation photos exponentially.

Thirty two simulation photos were made by adding a series of combinations of the five manmade structures to the base photo (Fig. 2).

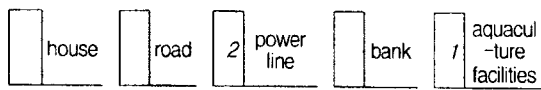
**Research method**

Eighty six subjects were asked to evaluate the simulation photos for their visual preferences. Among the subjects thirty eight were in the professional field of landscape architecture. They were undergraduate or graduate students of Seoul National University, and landscape architects in private companies. Others who were non-professionals were randomly selected.

They were asked to tick evaluations of their visual preferences of the 32 simulation photos in seven levels of Likert scale from “very poor” to “very good” as shown below.



Finally, they were asked to indicate two manmade structures that they thought to give the most negative impacts on the scenic beauty in the simulation photos, and they were also asked to give their priorities as illustrated below.



The subjects for questionnaire survey were given explanations of the objectives and methods of the survey in advance, and then they were exposed to each simulation photos in a random order for four seconds per each photos. They were given additional four seconds per each photo to fill in the evaluation sheet. It took about five minutes for each person to complete the survey.

The results were cross tabulated, and a t-test was done to see if there were differences in their evaluations between professional and non-professional groups.

**3. Results**

**Visual preferences**

Visual preferences for each simulation photo are shown in table 1. Among the randomly ordered photos, “photo No. 2” (natural coastal scenery without any manmade

**Table 1. Average visual preferences for each simulation photo.**

Photo no.	Preference values	Manmade structures in the photo				
		House	Road	Power line	Bank	Aquaculture
2	5.16*					
17	4.26	•				
14	4.51		•			
16	3.59			•		
31	4.17				•	
11	4.49					•
12	4.15	•	•			
22	3.33	•		•		
21	3.74	•			•	
29	4.10	•				•
8	3.88		•	•		
3	4.09		•		•	
7	3.98		•			•
30	3.23			•	•	
24	3.31			•		•
20	3.60				•	•
15	3.38	•	•	•		
1	3.78	•	•		•	
9	3.56	•	•			•
10	3.07	•		•	•	
26	3.13	•		•		•
32	3.51	•			•	•
23	3.29		•	•	•	
25	3.23		•	•		•
4	3.29		•		•	•
6	2.84			•	•	•
19	3.07	•	•	•	•	
27	3.19	•	•	•		•
28	3.37	•	•		•	•
13	2.92	•		•	•	•
18	2.99		•	•	•	•
5	2.71**	•	•	•	•	•
avg.	3.59					

Note: Dot indicates the structure(s) appear(s) in the simulation photo of the number.

\* : Natural coastal scenery without any manmade structures.

\*\* : Scenery with all the five manmade structures.

structure) was most highly valued with average relative preference value of 5.16. “Photo No. 5” (scenery with all the five manmade structures) was least valued with average relative preference value of 2.71 (Table 1).

**Manmade structures with the greatest negative impacts on the scenic beauty**

Power lines and poles was the manmade structure that

**Table 2. Manmade structure that had the greatest negative impacts on the scenic beauty.**

	Priority 1		Priority 2	
	Frequency	%	Frerquency	%
House	10	11.6	18	20.9
Road	12	14.0	18	20.9
Power line	30	34.9	25	29.1
Bank	20	23.3	13	15.1
Aquaculture	14	16.3	12	14.0
Total	86	100.0	86	100.0

had the greatest negative impacts on the scenic beauty. 34.9 % of the respondents answered power line and pole was the first to have the greatest negative impacts on the scenic beauty. 23.3 % of the respondents pointed embankment to have the greatest negative impacts on the scenic beauty. Again, the greatest number of respondents pointed power line and pole to have the next greatest negative impacts on the scenic beauty, followed by embankment (Table 2).

#### Number of manmade structures in the photos and visual preferences

When only one manmade structure appeared in the photos (photo numbers 17, 14, 16, 31, 11; Table 1), photo number 14 (with road) was most preferred. Photo number 16 (with power line and poles) was least preferable.

When two manmade structures were included in the photos (photo numbers 12, 22, 21, 29, 8, 3, 7, 30, 24, 20; Table 1), photo number 12 (with houses and road) was most preferable. Next most preferred photos were numbers 3 (with road and bank) and 29 (with houses and aquaculture facilities). Photo number 30 (with power line and bank) was least preferable.

When three manmade structures were included in the photos (photo numbers 15, 1, 9, 10, 26, 32, 23, 25, 4, 6; Table 1), photo number 1 (with houses, road, and bank) was most preferable. Photo number 6 (with power line, bank, and aquaculture facilities) was least preferable.

When four manmade structures were included in the photos (photo numbers 19, 27, 29, 13, 18; Table 1), photo number 28 (with houses, road, bank, and aquaculture facilities) was most preferable. Photo number 13 (with houses, power line, bank, and aquaculture facilities) was least preferable. The remaining photos all had power line and poles in them and visual preferences were lower.

Result of t-test showed that average and professional subjects did not have significant differences in their

evaluations for coastal landscapes.

#### 4. Discussion

Visual preferences for coastal landscapes were greatly influenced by the presence of manmade structures. Randomly sampled objects and professionals did not show significant differences in their evaluations of the simulated photos.

As expected, a natural coastal landscape without any manmade structures, photo No. 2, was most preferable, and a disturbed coastal landscape by all five common manmade structures, photo No. 5, was least preferable.

Power lines and poles had the most serious negative impact on the landscape, and followed by the embankment. In order to restore coastal landscapes, we may ground the power lines, and soften or screen the bank by planting.

In restoration works and management of coastal landscapes, priority needs to be given to such manmade structures with bigger negative landscape impacts such as power lines and embankments.

Further study with photos of coastal land covered with grass or shrub rather than a forested hill, which is also frequently found along the coast, may complement this study.

The results of this study implies that photo simulation and evaluation survey can be useful aids to restoration policy formulation, and restoration planning and design. Because of the varied and diverse coastal landscapes of each potential restoration site, each needs its own simulation and evaluation study.

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