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Planners Guide for Estimating cost Per User-Day of Proposed Recreational Facilities

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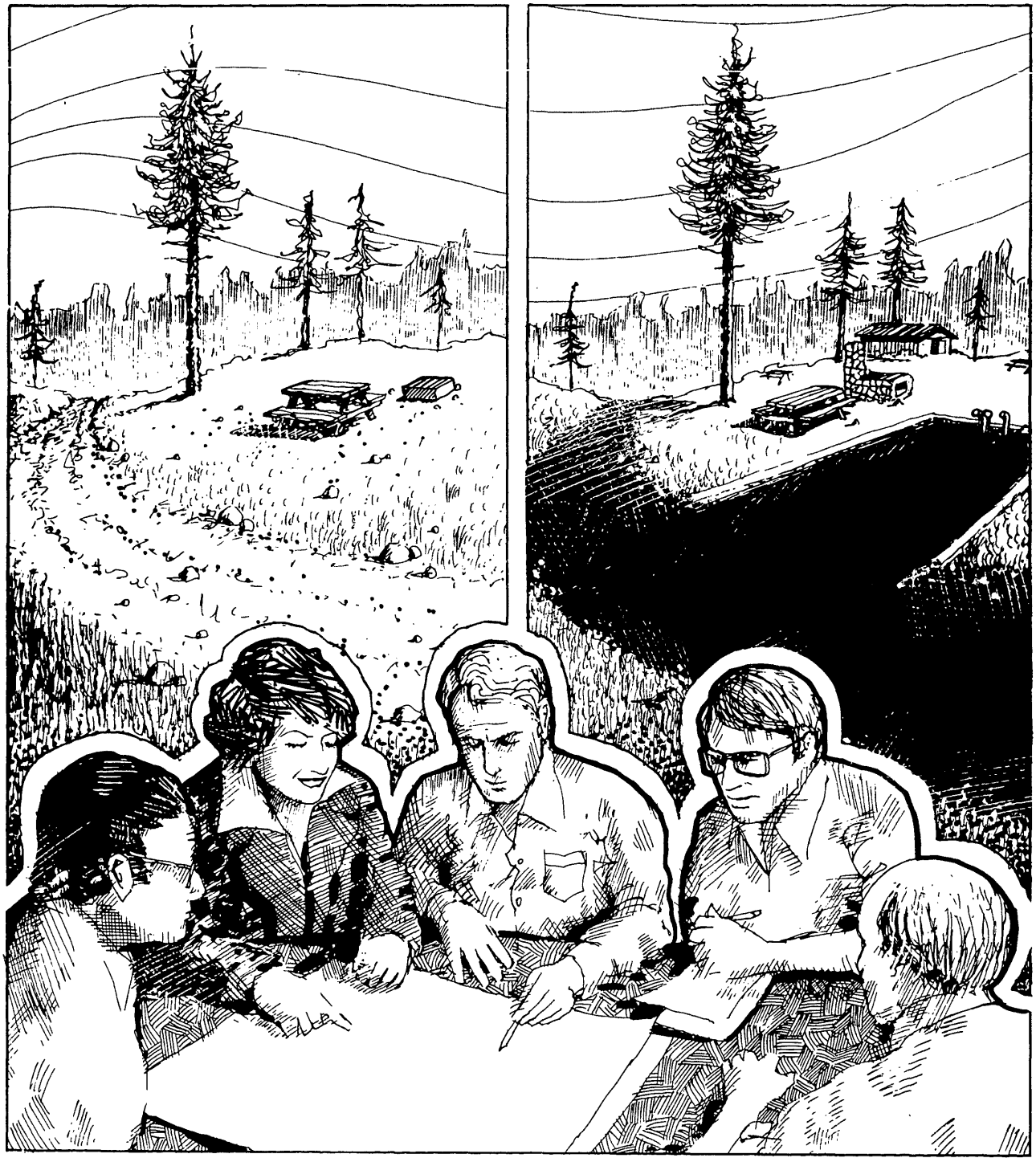

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Abstract

In the absence of prices for nonmarketed outdoor recreational services provided by public agencies, it is not possible to do a complete benefit–cost analysis for proposed facilities for recreation. Good information on the cost of providing recreational services to the public is nonetheless important. This paper provides a step–by–step procedure that recreation planners can use to estimate the cost per user–day for proposed recreational facilities.

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Introduction

In evaluating proposed recreational facilities, the recreation planner must try to determine which facilities will produce the most public benefit from the available budget. This is not achieved by simply selecting facilities that provide services at least cost. The "public" is a diverse group and creates a demand for a mix of facilities that provide a spectrum of recreational opportunities. Public benefits are maximized by a mix of facilities for which costs are commensurate with benefits. A complete benefit–cost analysis requires a measure of benefits, as well as costs, in dollars. Until proxy prices (estimates of willingness to pay, generally based on surveys of consumers) for nonmarketed recreation are more readily available, a limited benefit–cost analysis will have to suffice. Decisionmakers can use cost information along with,subjective evaluations of the relative values of the benefits to consider the cost–effectiveness of alternative proposed facilities. The cost of construction per campground or site is not a good basis for comparison because it does not show the important effect of the level of use on the cost per unit of recreational service. It also does not include costs for operation and maintenance.

The estimated cost per unit of recreational service is a meaningful basis for comparing costs because it relates the cost of a recreational service to the amount of service provided. Costs can be estimated in any units that measure recreational use.

The primary purpose of this paper is to show how to estimate costs per unit of recreational service. The unit used here is the recreational–visitor–day (RVD)--use of a recreational area for 12 person–hours; it may be 1 person for 12 hours, 12 people for 1 hour, or any equivalent combination. This approach is applicable to many kinds of recreational facilities, but the discussion relates specificaiiy to developed campgrounds.

The secondary purpose of this paper is to present, for comparison purposes, costs per RVD for some existing USDA Forest Service campgrounds in Oregon and Washington. With this information, the planner can compare the cost of camping services to be provided by a proposed campground with the cost of camping services provided by comparable campgrounds in the region or with the cost for other types of campgrounds. These costs can be the basis for more elaborate benefit-cost analyses that may be required when public agencies plan their budgets.

Estimating Costs

The costs of a proposed campground will be figured in two parts: capital investment, and operation and maintenance. Figure 1 is a worksheet for estimating costs of capital investment. Capital costs must be separated by year so that they can be adjusted to a common year by adding interest charges. The common year is the year prior to the first full season of public use of the facility. Costs to be included are those that are incurred only if the project is undertaken. Costs that would be incurred whether or **not** the project is undertaken should not be included. Costs of vehicles, vehicle accidents, travel time, training, supervision, and other incidental costs of the project should be included. The one major item that should not be included is assessments against the project for general administration or overhead. Although these costs are commonly charged against projects, costs of general administration would not be eliminated by omitting the project and are, therefore, not attributable to the project. Other costs that should be omitted are planning costs that occur before the decision to undertake the project. These costs, like overhead, are incurred whether or not the project is completed. For this analysis, inflation can be recognized by using cost rates that are anticipated for the year in which the major construction occurs. Contributed materials should be valued at their fair market value because they could be put to an alternate use in which they would provide full value to society. Contributed labor is probably best valued at the minimum wage rate. The rationale is that the alternate use of much of that labor would be in jobs that pay fairly low wages.

Figure 2 is a worksheet for estimating the costs of operation and maintenance. These costs should be average annual estimates over the life of the project. Cost rates should be for the same year as the cost rates used in estimating the capital costs. Contributed materials and labor should be valued in the same way as for capital investment items.

The next step is to estimate the recreational use that the facility will generate. There is no "formula" for making this estimate. The planner can only look at the available information and make a judgment about future use. The level of use of similar facilities in the same general area may be most useful. The attributes of the proposed facility, however, may have an important effect. A destination campground will typically receive more weekday use and will have a higher total use than a campground used primarily on weekends. Other sources of data that may be useful are State comprehensive outdoor recreation plans and River Basin Commission reports. These sources often have estimates of projected levels of recreational use and potential needs by counties or planning areas. Figure 3 provides a systematic way to develop estimates.

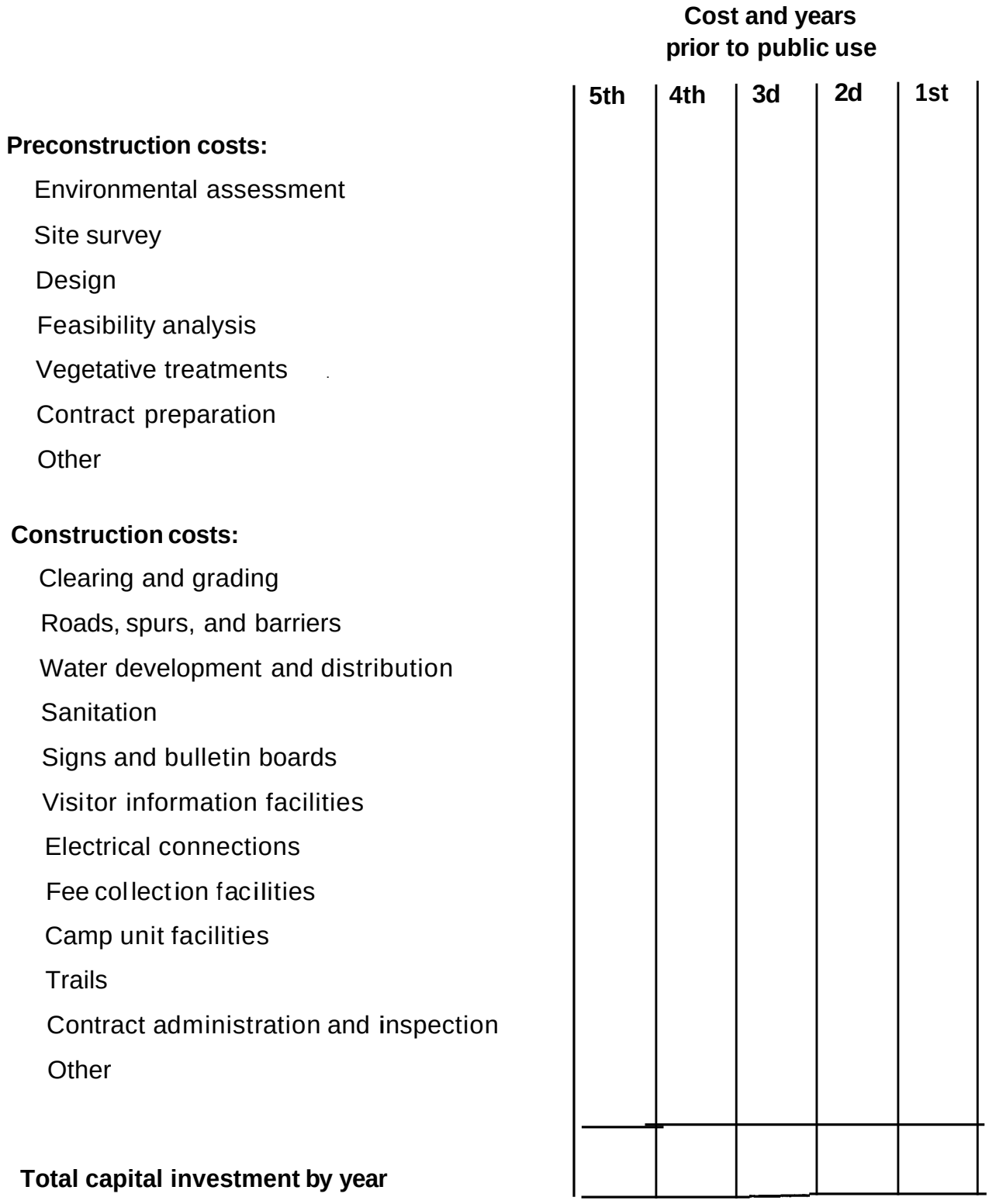

Figure 1.--Worksheet for estimating costs of capital investment.

Average annual fixed costs:

Annual opening and closing	_____
Scheduled maintenance	_____
Other	_____

Average annual variable costs:

Cleaning	_____
Maintenance dependent on occupancy	_____
Collection of fees	_____
Vandalism	_____
Law enforcement	_____
Contacts with visitors	_____
Utilities	_____
Other'	_____

Total average annual costs of operation and maintenance _____

'If road maintenance or fire patrols in the vicinity of the facility will be increased because of the project, these increased costs should be included in costs of operation and maintenance.

Figure 2.--Worksheet for estimating costs of operation and maintenance.

1. Number of units of facilities; e.g., number of campsites or picnic units _____

2. Number of user-units of recreational use per unit of facilities per day with full occupancy _____

3. Number of days in season of use _____

4. Theoretical seasonal capacity (item 1 x item 2 x item 3) _____

5. Proportion of full occupancy' _____

6. Estimated average annual user-days (item **4** x item 5) _____

'If the proportion of full occupancy can be estimated more readily by separating days of peak use from the remainder of the season, do steps 3-6 separately for days of peak use and other days and add the results for estimated average annual user-days.

Figure 3.--Worksheet for estimating amount of recreational use.

The final step is to use figure **4** to compute the estimated cost per user-day. First, transfer the total costs of capital investment by year to the worksheet. These costs are multiplied by the cost adjustment factors from table **1** to include interest charges to adjust them to the year prior to the first full season of public use. The total is entered on line **1** and is then converted to an equivalent annual cost over the life of the facility by multiplying the cost by the appropriate capital recovery multiplier from table 2. This equivalent annual cost is the amount that would have to be paid annually over the life of the facility to recover the initial investment and interest on the investment. To this annual cost must be added the average annual costs of operation and maintenance to get the total average annual cost for the campground. The cost per **RVD** is obtained by dividing the total average annual cost for the campground by the average annual **RVD's** estimated for the campground.

Year prior to public use	Total capital investment	Cost adjustment factor2	Equivalent cost3
(1)	(2)	(3)	(4)
5th			
4th			
3d			
2d			
1st		1.00	
		Total	

1. Equivalent total construction cost for the year prior to first full season of public use _____
2. Capital recovery multiplier _____
3. Equivalent annual cost (item 1 x item 2) _____
4. Average annual operation and maintenance cost _____
5. Total average annual cost (item 3 + item 4) _____
6. Estimated average annual user-days[4] _____
7. Cost per user-day (item 5 ÷ item 6)[5] _____

[1] From capital investment worksheet.
[2] Factor to carry cost at compound interest to 1st year prior to use.
[3] Column 2 x column 3.
[4] May be in recreation-visitor-days or other user-units.
[5] The annual cost per unit of facilities or per unit of theoretical capacity could be determined by dividing the total average annual cost (item 5) by the units of facilities or units of theoretical capacity.

Figure 4.--Worksheet for estimating costs per user-day.

Table 1--Cost adjustment factors

Year prior to public use	Interest rate (percent)					
	5	6	7	8	9	10
5th	1.216	1.262	1.311	1.360	1.412	1.464
4th	1.158	1.191	1.225	1.260	1.295	1.331
3d	1.102	1.124	1.145	1.166	1.188	1.210
2d	1.050	1.060	1.070	1.080	1.090	1.100
1st	1.000	1.000	1.000	1.000	1.000	1.000

Table 2--Capital recovery multipliers[1]

Years	Interest rate (percent)					
	5	6	7	8	9	10
15	0.096	0.103	0.110	0.117	0.124	0.131
20	.080	.087	.094	.102	.110	.117
25	.071	.078	.086	.094	.102	.110
30	.065	.073	.081	.089	.097	.106
35	.061	.069	.077	.086	.095	.104

[1]The formula for this table is:

$$CRM = \frac{i(1+i)^n}{(1+i)^{n-1}}$$

where CRM = capital recovery multiplier;
i = interest rate as a decimal--i.e., 7 percent = 0.07; and
n = number of years facilities will be used.

Using the Results

The cost per RVD developed here is based on average annual costs of operation and maintenance and average annual levels of use. If the annual level of either of these is skewed heavily toward the early part or the late part of the life of the facility, the estimated cost will be biased. This approach can still be used by using the annual figures, but that goes beyond the scope of this paper.

The cost per RVD omits the opportunity costs of using the land for a campground. The opportunity cost is the value of other benefits that are forgone when the land is used for a campground. For example, if the campground is on productive timberland, some timber harvest may be forgone both on the campground area and on a buffer area. A careful treatment of opportunity costs would make the analysis too cumbersome for general application by recreation planners. The opportunity cost of forgone timber harvest was, however, only a small part of the total cost of USDA Forest Service campground costs according to one study.[1]

[1]Kenneth C. Gibbs and Willen W. S. van Hees. 1978. U.S. Forest Service campground management in Region 6: A cost analysis. Report on file at Pacific Northwest Forest and Range Experiment Station, Portland, Oregon.

Table 3 is provided so that costs you estimate can be compared with the estimated cost per RVD from a sample of 111 USDA Forest Service campgrounds in Oregon and Washington. These costs are not the actual historical costs. They are estimates of what the cost would have been if the campgrounds had been constructed in 1977 and the average annual use was the 1977 level of use. These figures could be updated to estimate costs based on construction in the current year by multiplying the cost by the proportionate change in an appropriate cost index.[2] This would provide the most meaningful comparison of proposed campgrounds and existing campgrounds. Differences in costs could then be traced to their sources. Possible sources of significant differences in costs include: (1) standards of design; (2) site development costs because of terrain, soil, etc.; (3) access; and (4) the level of use.

[2]Cost indexes for "buildings" and "construction" are published quarterly for major U.S. cities in the "Engineering News-Record" (issued weekly by McGraw-Hill, Inc.). The multiplier is the index for the current year divided by the index for 1977.

Table 3--Estimated cost per recreation-visitor-day (RVD) for a sample of USDA Forest Service campgrounds in Oregon and Washington[1]

Experience level[2]	Capital cost	Operation and maintenance costs	Total cost
		Dollars	
1	0.13	0.14	0.27
2	.71	.45	1.16
3	1.05	.52	1.57
4	.81	.45	1.26
5	2.03	.79	2.82
Average	.92	.48	1.40

[1]Data are from Gibbs and van Hees (unpublished report on file at Pac. Northwest For. and Range Exp. Stn., Portland, Oreg.). Costs for construction are based on the estimated cost of constructing an identical facility on an identical undeveloped site in 1977. Recreation-visitor-days are based on 1977 data from the RIM (Recreation Information Management) file. Capital costs are amortized over an assumed 20-year life for the campground at a real rate of interest of 6 percent. If the assumed life for the campground were 30 years, the capital costs/RVD would be approximately 16 percent lower and the total cost/RVD would be reduced by the same dollar amount as the capital costs.

[2]USDA Forest Service campgrounds are classified by "experience level"; level 1 provides the most primitive camping experience.

The interest rate used in the cost figures is 6 percent, and your costs should be estimated at 6 percent for comparison. If the real rate of interest specified for planning purposes for your agency is different, you will want to also make cost estimates at the specified rate.

The approach presented here uses the economics profession's approach of measuring costs in terms of costs to society. This is the most defensible basis for comparisons for a public agency even though the costs included do not correspond exactly to the dollars that must be budgeted. Dollars requested in the budget should exclude the value of contributed materials and labor and should include general administration charges that will be taken out of budgeted funds. Budgets can be based on the cost level for a particular year or on estimated inflated costs, depending on agency policy.

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