



**NORTHERN ARIZONA
UNIVERSITY**
College of Business Administration

Artificial Project Time Horizons in the Absence of Discounting: The Case of Canyon Forest Village

Working Paper Series—06-11 | August 2006

Dennis Foster, Ph.D.

Senior Lecturer

and

Craig Bain, Ph.D., CPA

Professor of Accounting

Both of:

**Northern Arizona University
College of Business Administration**

Box 15066

Flagstaff, AZ 86011-5066

(928) 523-7383

Fax: (928) 523-7331

Artificial Project Time Horizons in the Absence of Discounting: The Case of Canyon Forest Village

Dennis Foster, Ph.D. and Craig Bain, Ph.D., CPA

Introduction

In the summer of 1997, the Kaibab National Forest released the *Draft Environmental Impact Statement for Tusayan Growth* (US Department of Agriculture, 1997). This report analyzed various scenarios involving the transfer of National Forest land at the boundary of the Grand Canyon National Park to a private developer, in exchange for private inholdings scattered throughout the Kaibab National Forest in northern Arizona. The resulting private development was to be called Canyon Forest Village, and would include hotels, visitor facilities, private housing, community facilities and a transportation center for tourists accessing the Grand Canyon.

Canyon Forest Village (CFV) was to be located between the park boundary and the small gateway community of Tusayan, approximately seven miles from the rim of the Grand Canyon. At the time that this Environmental Impact Statement (EIS) was released, there were approximately 1,000 hotel rooms inside the park and 1,000 hotel rooms in Tusayan. The closest communities with substantial visitor facilities are Williams, Arizona, with almost 1,400 hotel rooms, and Flagstaff, Arizona, where there are some 4,500 hotel rooms. Williams is about fifty miles from the Grand Canyon, while Flagstaff is about seventy-five miles from the park. The CFV project that was being most heavily promoted by the developer was one that included slightly more than 3,600 hotel rooms.

The proposed build out of CFV was to take place from 1999 to 2010. Consequently, the Forest Service analysis used that time frame as the basis for calculating the economic impacts CFV would be expected to have on local economies in the northern Arizona region. The EIS concluded that overall growth in demand for lodging in northern Arizona would be robust over those years, that the displacement of demand to CFV, from elsewhere in northern Arizona, would be relatively low, and that, by 2010, there would be no net negative impacts. That is, the rest of northern Arizona would continue to grow, but at a somewhat slower rate in the presence of CFV.

The results of the Draft EIS were sharply contested during the public comment phase following the release of this report. The differences between the Forest Service study and its critics have been analyzed by Foster and Bain (Forthcoming, 2005).

In the summer of 1998, the Kaibab National Forest released a *Supplement to the Draft Environmental Impact Statement for Tusayan Growth* (U.S Department of Agriculture, 1998). This document used a different modeling procedure and changed its primary focus to two, smaller, CFV proposals, involving only 900 and 1,270 hotel rooms. The Supplement did conclude that there would be some negative impacts to the communities surrounding Grand Canyon. The results of the Supplemental Draft EIS were also contested during the public comment phase following its release. The shortcomings in the new modeling approach, and the resulting conclusions drawn by the Forest Service have been analyzed by Foster and Bain (Working Paper, 2005).

In the summer of 1999, the Forest Service issued a Final EIS and adopted the CFV proposal for 1,270 rooms. However, the issue was not yet settled. The land exchange was contingent upon the rezoning of this land for commercial use. While the Coconino County Board of Supervisors did approve the rezoning request, a referendum drive was launched and the matter placed on the ballot in November of 2000. Voters rejected the rezoning and the land exchange did not take place.

One peculiarity of the Forest Service reports, throughout this process, was the failure to identify an explicit discount rate of interest in order to identify costs and benefits in terms of their present value. While EIS documentation has been required for many years, the obvious focus is on purely environmental concerns and the analyses tend to be based on scientific findings. The inclusion of a socioeconomic analysis necessitates a careful accounting of benefits and costs.

Prior to the issuing of the Draft EIS, officials with the Kaibab National Forest conducted public scoping sessions to help determine what topics needed to be addressed in their report. Among the topics identified was this:

“Large-scale development in the Tusayan area could negatively impact the economic base for a number of northern Arizona communities through the loss of Grand Canyon tourist revenue.” [Executive Summary of the Draft Environmental Impact Statement for Tusayan Growth, Kaibab National Forest, 1997, p. 5.]

While this EIS is not the first to include an explicit accounting of economic benefits and costs, it may serve as a harbinger of more reporting of this type. Unless those with an appreciation of the discounting process, especially economists and accountants, are included in these analyses, present values may be employed only on an erratic basis, making the results of such reports difficult, if not impossible, to adequately interpret.

The Time Value of Money

It is clear that a stream of dollars over time, whether they represent costs or benefits, are not of equivalent value. One reason for this is the presence of inflation. However, in this EIS all of the diverted spending impacts are calculated from base year values and, consequently, they are already in current dollar terms.

What has not been accounted for in the EIS is the time value of money. A dollar today is worth more than one dollar next year because you don't have to defer the potential use of that dollar for a year. Where the EIS calculates diverted spending in 2010, this value is not stated in present value terms. Aggregating a stream of spending impacts requires that this stream be discounted. However, simply adding up values over time does not truly ignore discounting. Rather, it implies a discount rate of zero, which is very difficult to justify.

Failure to use discounting is not unusual. As reported by Zerbe, et. al (Working paper), there is no consistency in governmental use of discount rates and, if used, no consistency in what values are used. Still, some economic analyses can be quite thorough in evaluating what discount rate to use, as was done in the case of the Elwha River Restoration Project (U.S. Bureau of Reclamation, 1995). In that analysis, a review of the literature suggested an appropriate range of discount rates between 1% and 4%.

To properly evaluate the impacts of the Canyon Forest Village proposal, we must establish two key parameters:

1. The length of life of the project.
2. The appropriate discount rate to apply to the stream of impacts over this life.

Neither of these parameters was identified in the EIS reports.

Project Timing in the Tusayan EIS

In the Draft EIS, the proposed CFV project would begin construction in 1998, with the first rooms available the following year, in 1999. The final block of rooms would be finished in 2010 and available to the public in that year. The build-out rate is shown in Table 1.

Table 1. Build out for 3,600 room Canyon Forest Village												
year:	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
rooms:	670	320	680	180	530	180	250	180	180	180	150	150

The Draft EIS only calculated impacts for this time period, meaning that rooms built in 1999 would have measurable impacts over 12 years, while rooms built in 2010 would have a measurable impact over only one year. The only justification for ending such an analysis at 2010 was that it represented the end of the construction phase of the project.

From the standpoint of economic theory, and accounting practice, this is untenable. The impacts of the CFV project are measured, primarily, as the diversion of spending from elsewhere in northern Arizona to Canyon Forest Village. That is, some visitors staying overnight at CFV would have stayed in Tusayan, Williams or Flagstaff. This diverted spending represents lost income in these communities as well as lost tax revenue that would have been generated from this spending. This diverted spending would certainly last beyond 2010.

If the CFV project has been planned for land privately held, then the impact questions would, by and large, have been moot. That is the way the marketplace functions, and rational economic agents must factor such possibilities into their decision-making. However, in this case, the government is facilitating the creation of private property for a specific developer, with a locational advantage over other, existing, property owners. Hence, there are policy implications that arise from a full accounting of these impacts.

In the Supplemental Draft EIS, smaller versions of CFV were the focus of attention. Ultimately, a version with 1,270 rooms was approved by the Forest Service. Its build-out rate is shown in Table 2:

year:	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
rooms:	0	0	900	370	0	0	0	0	0	0	0	0

Interestingly, the time frame for analysis has remained 1998-2010 even though this version has all rooms built, and available, by 2002. However, this did not reflect a new-found appreciation for the extended impacts of this project. Rather, this time frame was used merely because it represented the longest build-out for the largest version (3,600 rooms) of Canyon Forest Village. That all versions of CFV were analyzed over the same time frame gives a misleading impression of consistency. Clearly, despite this common element, making direct comparisons between the impacts of different versions of CFV would be problematic.

While the time frame chosen ignores diverted consumer spending extending beyond 2010, it does introduce a small, but perceptible, bias into the calculations of impacts. The EIS models calculate Grand Canyon visitation through 2010, based on a robust range of growth rates. However, in applying these results, annual Grand Canyon visitation changes are averaged over this time period. For example, at an annual growth rate of 2.5% from 1998 to 2010, on average, an additional 141,556 visitors, per year, will be visiting the park.

The import of this result is that more visitors are front-loaded into the model, which reduces the excess supply of rooms in the early years, thus mitigating the amount of demand, and spending, diverted to CFV. For example, in the case of 2.5% annual visitation growth, the additional visitation would have been barely 120,000 in 2001, more than 20,000 fewer than used in the “averaging” procedure. Clearly, the longer the time frame used for this purpose, the more pronounced is this bias.

Accumulating Economic Impacts

The Draft EIS does not show cumulative impacts, although it does report values for 2010, without any attempt to discount them into present value terms. The Supplemental Draft EIS does show annual impacts and does aggregate them, without any explicit discounting. Essentially, what the EIS reports show is a zero discount rate over the study’s time horizon (1998-2010) and an infinite discount rate thereafter. The implied average rate can be calculated from their results if a true time horizon can be specified. For the purposes of this study, we will contrast the impact results when 2010, 2030 and 2050 are used as the end points for the CFV project. These time frames provide some valid comparison points. First, 2010 the date used in the EIS. Next, 2030 is approximately 20 years after the start of the project, with 2050 40 years after the end of the project. These dates allow us to compare the EIS timeframe (2010) with the tax system depreciation timeframe (2030) and a timeframe allowing for the maximum useful life of the project (2050).

For the purposes of this study, the actual dollar values are unimportant. We are concerned with how a proper accounting of present values will magnify these amounts, quite possibly from “is acceptable” to “is not acceptable.” Although any dollar amounts will provide a basis for comparison, we have used the dollar values shown in the EIS reports.

In the Draft EIS, the annual impacts can be calculated, and the cumulative result ascertained, from the results shown in the report. The impacts represent spending diverted from elsewhere in northern Arizona and to Canyon Forest Village when it comprises 3,600 rooms at the end of the project. These values are shown in Table 3.¹

Table 3. Draft EIS Spending Impacts	
<u>Year</u>	<u>Annual Impact</u>
1998	\$286,160
1999	\$12,519,500
2000	\$19,494,650
2001	\$32,622,240
2002	\$36,163,470
2003	\$43,281,700
2004	\$44,998,660
2005	\$47,144,860
2006	\$48,253,730
2007	\$49,362,600
2008	\$50,471,470
2009	\$51,115,330
<u>2010</u>	<u>\$51,759,190</u>
Total	\$487,473,560

The figure for 2010, nearly \$52 million, is the impact that will persist for the life of the Canyon Forest Village project. So, while the aggregate impact over the time frame of 1998 to 2010, with no discounting, results in a displacement of about \$487 million dollars, this displacement would continue at \$52 million in each year thereafter.

In the Supplemental Draft EIS, a different model was used. However, these impacts were shown on an annual basis, and, then, aggregated to the end of the study period, 2010. The results are as shown in Table 5.

Table 5. Supplemental Draft EIS Spending Impacts	
<u>Year</u>	<u>Annual Impact</u>
2001	\$659,932
2002	\$1,319,864
2003	\$1,979,796
2004	\$2,639,728
2005	\$3,299,660
2006	\$3,959,592
2007	\$4,619,524
2008	\$5,279,456
2009	\$5,939,388
<u>2010</u>	<u>\$6,599,320</u>
Total	\$36,296,260

As noted, the modeling of impacts was changed in the Supplemental Draft EIS. Casual inspection of Table 5 will show that their reported impacts rise by a constant amount, \$659,932, every year. This result is due to an increased use of averaging effects over the time frame studied. Consequently, while the results are stated in annual terms, they do not reflect any actual expectation of what these annual impacts are likely to be.

Reassessing the Canyon Forest Village Impacts

One must presume that the generation of these impact values has some value to decision-makers in the Forest Service. That is, after the Supplemental Draft EIS was published, the relevant policy choice comes down to answering the question, “Is the CFV proposal worth \$36 million of lost spending to the rest of northern Arizona?” Once again, the problem here is that this aggregation represents the sum of a truncated stream of impacts and not the present value of those impacts.

As noted, the present value of these impacts depend on the lifespan of the project and on the discount rate used. While both of these parameters are unknown, we can pick a range of reasonable outcomes to see the results that follow from applying these basic economic and accounting principles. Using discount rates of 2%, 3% and 5% and evaluating the present value of displaced spending through the years 2010, 2030 and 2050, we get the outcomes shown in Table 4 for both the Draft EIS and the Supplemental Draft EIS.

Table 4. Present value of Impacts for Different Discount Rates over Different Time Horizons			
Draft EIS – 3,600 room CFV			
	2%	3%	5%
1998-2010	\$413 million	\$381 million	\$327 million
1998-2030	\$1,067 million	\$906 million	\$669 million
1998-2050	\$1,508 million	\$1,196 million	\$798 million
Supplemental Draft EIS – 1,270 room CFV			
1998-2010	\$31 million	\$30 million	\$26 million
1998-2030	\$120 million	\$103 million	\$76 million
1998-2050	\$180 million	\$143 million	\$96 million

Where the Draft EIS shows a cumulative displacement of about \$487 million (Table 3), if the discount rates are low, 2% to 3%, and the time horizons are long, 20 to 40 years, the present value of the displacement would be double to triple this amount. Under the same circumstances, in the case of the Supplemental Draft EIS, where the cumulative impacts are given as \$36 million (Table 4), the present value of these displacements may be five times greater. If the relevant decision-maker is identifying some level of impacts that are acceptable (and this did not happen), one would presume that the difference between \$36 million and \$180 million to be unacceptably wide.

Conclusions

This article applied basic and commonly accepted time value of money principles to an EIS report. Although an economic analysis was provided as part of the report, the time value of money was ignored. In order to present a viable economic impact, these basic financial tenants must be employed. The authors used basic time value of money principles with reasonable discount rates. The result is that impacts could be as much as six times greater than the values given by the Forest Service. In the case of the Supplemental Draft EIS, this difference represents one hundred and fifty million dollars.

References

Foster, Dennis and Bain, Craig, *All Roads Lead to ...? An Analysis of the Economic Impact Modeling and the Canyon Forest Village Proposal*, The Clarion Business and Economic Review Publication (forthcoming).

Foster, Dennis and Bain, Craig, *Round Two of the Canyon Forest Village Debate – One Step Forward, Two Steps Back*, Working Paper.

The U.S. Bureau of Reclamation, The National Park Service, The Lower Elwha S'Klallam Tribe of Davis, California, “**Elwha River Restoration Project: Economic Analysis Final Technical Report**”, (April, 1995). Also found at: http://faculty.washington.edu/zerbe/docs/discount_rates/

U.S Department of Agriculture, Kaibab National Forest, *Supplement to the Draft Environmental Impact Statement for Tusayan Growth*, (1998).

U.S Department of Agriculture, Kaibab National Forest, *Draft Environmental Impact Statement for Tusayan Growth*, (1997).

Zerbe, Richard, Xi Han, David Layton, and Tom Leshine., “**A History of Discount Rates and Their Use by Government Agencies**” Unpublished Working Paper, (2002), can be found at: http://faculty.washington.edu/zerbe/docs/discount_rates/

¹ It should be noted that while the CFV rooms are not expected to be available until 1999, an artifact of the Forest Service model is that impacts are traceable to 1998. These results are not separated out from the aggregated results. As the 1998 values are relatively small, they have been left in our analysis for the sake of consistency with the Draft EIS report.