



**Valuing Regional Assets:
A Strategic Framework for Economic Development**

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Executive Summary

Economic development is always a two-edged sword. New development always impacts existing activities, businesses, and regional quality of life or amenities.¹ Some development may generate added value for an area, for example raising property values, attracting more business, and creating more local jobs; other development may detract value, generating traffic congestion, noise pollution, and lowering property values. And in many cases development will generate both benefits and harms.

Understanding those impacts and how they intersect with the value that current regional assets deliver is thus of singular importance in framing development policy and initiatives; those policies and initiatives ought not diminish current values and, if possible, should enhance them. That is the topic to which this report is addressed.

The Lower Connecticut River Valley Council of Governments² asked UConn's Connecticut Center for Economic Analysis ("CCEA") to develop an analysis to help frame the discussion of strategic planning and development initiatives by capturing the value of natural, cultural, and recreational assets in the region. It is important to understand the benefits (value) these amenities generate within the region and within the state, and determine how they impact quality of life. This assessment puts a monetary value on those assets that enhance the experience of those residing in and visiting the Lower Connecticut River Valley Region. Doing so then helps frame future policies and initiatives within each of the seventeen municipalities that comprise the region, as well as collaboration and coordination of such policies, and helps influence State policies. The body of this report lays out in detail those values and explains the diverse methodologies used to capture them. This EXECUTIVE SUMMARY summarizes CCEA's findings and their implications.

The most evident source of permanent amenity values in the region is an abundance of natural vistas and access of cultural venues. The results of intercept surveys broadly confirm this, with more than half of respondents, whether residents or visitors, ranking beaches, parks and forests, the Connecticut River, and Long Island Sound as the most valuable asset. CCEA captures the value of these amenity assets through a detailed evaluation of differential property values; that is, by identifying how much more people are prepared to pay for a property enjoying this locational advantage compared to nearby properties without that advantage. That approach estimates the value that Lower Connecticut River Valley Region residents put on those benefits at \$1.1 billion out of a total housing stock value of \$18.8 billion; amenities thus add 6.4% to the value of the housing stock. The CCEA analysis breaks out those benefits capitalized into property values as follows: salt and freshwater vistas: \$589 million; direct access to forest and open space: \$442 million; street-sheds:³ \$93 million; proximity to colleges: \$15 million. Given the magnitude of these benefits, it is clear that future development efforts should be

¹ Terms such as "quality of life" and "amenity value" are now widely used but are often difficult to pin down. They are inherently subjective concepts; their significant is bound up in how individuals look at their environment and what elements of it they value. Those elements may be anything from the quality of access to activities a location provides to its views. This analysis uses the terms interchangeably to denote those regional assets data show people value through their behavior, specifically their willingness to spend time and money, whether, for example, on homes or cultural activities. For a useful discussion, see "Quality of Life: Everyone Wants It, But What Is It?: at URL: <http://www.ieseinsight.com/doc.aspx?id=1478&ar=17&idi=2>

² For additional information about RiverCOG, visit their website at <http://www.rivercog.org/>.

³ Street-sheds refers to those properties along specific routes which emerged in the analysis as having differentially higher values than similar property without direct access to those streets or routes.

careful to protect the current value of these amenities; ideally they will look for ways to provide more access to such vistas.

In addition to the value that the analysis of housing prices captures, all residents of the Lower Connecticut River Valley Region benefit from access to and use of local amenities—e.g. cultural institutions, tourism attractions, access to rivers and Long Island Sound—that enrich their lives.⁴

This report finds the most important annual amenity benefit for the Lower Connecticut River Valley Region flows from fall foliage, at \$336 million, available daily during the autumn to residents so that the majority of this amenity benefit occurs within the region. The popularity of fall foliage trains offers confirmation of the value to the state as a whole.⁵ [Note: this is an annual benefit, in contrast to those embedded in residential real estate values discussed above.] Moreover, this valuation re-enforces the significance of the residential values that vistas et al produce. The second most valuable annual benefit for the Lower Connecticut River Valley Region flows from marinas, at \$19.7 million. Because the marinas are of significant value to those outside the region, at the state level their annual amenity value jumps to \$102.3 million (the section on marinas discusses distribution of these benefits between the Lower Connecticut River Valley Region and the state).

Other venues add another \$5.8 to \$6.5 million to annual amenity value accruing to residents of the Lower Connecticut River Valley Region, while at the state level the value doubles, estimated at \$11.4 to \$13.7 million. These venues include live theatres (\$2.4 to \$2.9 million), Gillette Castle and the Chester Ferry (\$1.2 to \$1.6 million), the Essex Steam Train (\$0.5 million) *et al.* In aggregate, residents of the Lower Connecticut River Valley Region capture, over and above those of vistas capitalized in residential values, \$361 million to \$362 million; state residents capture \$459 to \$461 million from these amenities annually.

Present values⁶ of these benefit streams amount to \$5.6 to \$5.7 billion within the Lower Connecticut River Valley Region and nearly \$6.9 billion for the state, as Table E-1 shows. Within the Lower Connecticut River Valley Region, those amenity assets amount to a striking \$32,000 for every man woman and child!⁷ See also Table E-2 to appreciate the values that regional amenities generate.

In addition to the venues assessed for yielding amenity benefits, patrons surveyed at various venues expressed strong appreciation for the Lower CT River Valley Region's museums, restaurants, and stores, revealing that these too generate amenity value. Their appreciation of these regional assets argues that this analysis likely underestimates total amenity values in the Lower Connecticut River Valley Region.

To underline the importance of the value of amenities, CCEA's analysis projected the likely consequences of their loss by projecting a sudden 61% cut in amenities. This exercise argues that such a cut would cause an immediate exodus of 4,052 people from the region, job losses of 635, and a corresponding decline in personal disposable income of \$128 million. This perspective confirms the

⁴ In contrast to looking at capitalized values asset values for housing, CCEA looks at these amenities (venues) as producing a stream of annual amenity benefits to those residing in the Lower Connecticut River Valley Region and the state.

⁵ Valuing access to fall foliage may strike some as odd, given that it is an asset for New England as a whole. But regional fall foliage generates significant tourism, which reveals its value. Having it literally at your doorstep thus also has value for area residents. That fall foliage emerges as such an important regional asset underlines the importance of preserving forested areas and enhanced access to them, both for residents and for tourist looking to enjoy the fall colors.

⁶ Discounted at 5% over 20 years.

⁷ Based on current population/demographic estimates.

importance of incorporating into regional strategic planning and policy initiatives a full understanding of the value that amenities generate and to protect and where possible to enhance them.

The capitalized value of these assets, discounted at 5% over 20 years, converts the above stream of annual benefits to capitalized values that Table E-2 summarizes. For those expecting to reside in the region for longer than 20 years, the values are conservative. For those with shorter time horizons, the benefits may be overstated.

**Table E-1:
Summary of Amenities Realized Annually by Residents of the Lower CT River Region
and State (\$-1,000s)**

Origin	Lower CT River Valley Region		State	
	Linear Demand	Log Linear Demand	Linear Demand	Log Linear Demand
Valley Railroad				
Circus train	\$13.7	\$13.1	\$17.7	\$13.8
Summer train	\$481.4	\$481.4	\$2,508.3	\$2,508.3
Fall Foliage train	\$10.0	\$10.0	\$1,332.3	\$1,332.3
Fall splendor for all residents	\$336,225.0	\$336,225.0	\$336,225.0	\$336,225.0
Brownstone	\$369.1	\$505.0	\$444.6	\$648.9
Chester Ferry	\$740.0	\$977.0	\$985.0	\$1,315.0
Gillette Castle	\$429.5	\$571.9	\$611.5	\$818.5
Midsummer Festival	\$33.8	\$33.8	\$57.2	\$57.2
Deep River Muster	\$43.5	\$43.5	\$60.3	\$60.3
Harvey's Beach	\$784.5	\$899.0	\$812.8	\$958.3
Marinas	\$19,662.8	\$19,662.8	\$102,320.0	\$102,320.0
The Kate	\$641.6	\$681.2	\$1,002.5	\$1,093.3
The Goodspeed Opera House	\$1,274.2	\$1,699.4	\$2,704.4	\$3,754.7
All live theatres	\$2,371.5	\$2,946.9	\$4,613.5	\$6,001.2
Residential vistas*	\$91,418.0	\$91,418.0	\$91,418.0	\$91,418.0
Totals	\$454,498.6	\$456,168.0	\$545,113.1	\$548,524.8

* Note: All the other row elements are initially measured as streams of annual benefits, but the initial assessment of residential vistas is an asset. For consistency, the elements of this row are the constant annual values of vista assets realized each year over 20 years discounted at 5% annually.

**Table E-2:
Summary of Amenity Assets Accruing to Residents of the Lower CT River Region and
State (\$-millions)**

Origin	Lower CT River Valley Region		State	
	Linear Demand	Log Linear Demand	Linear Demand	Log Linear Demand
Valley Railroad				
Circus train	\$0.17	\$0.16	\$0.22	\$0.17
Summer train	\$6.00	\$6.00	\$31.26	\$31.26
Fall Foliage train	\$0.12	\$0.12	\$16.60	\$16.60
Fall splendor for all residents	\$4,190.12	\$4,190.12	\$4,190.12	\$4,190.12
Brownstone	\$4.97	\$6.29	\$5.54	\$8.09
Chester Ferry	\$9.22	\$12.18	\$12.28	\$16.39
Gillette Castle	\$5.35	\$7.13	\$7.62	\$10.20
Midsummer Festival	\$0.42	\$0.42	\$0.71	\$0.71
Deep River Muster	\$0.54	\$0.54	\$0.75	\$0.75
Harvey's Beach	\$9.78	\$11.20	\$10.13	\$11.94
Marinas	\$245.04	\$245.04	\$1,387.29	\$1,387.29
The Kate	\$8.00	\$8.49	\$12.74	\$13.62
The Goodspeed Opera House	\$15.88	\$21.18	\$33.70	\$46.79
All live theatres	\$29.55	\$36.73	\$57.49	\$74.79
Residential vistas	1,139.27	1,139.27	1,139.27	1,139.27
Totals	\$5,640.56	\$5,655.20	\$6,859.29	\$6,887.58

Growing the \$5.6 to \$5.7 billion in amenity assets enjoyed by the Lower Connecticut River Region and \$6.9 billion realized in the state is both a serious challenge and a significant opportunity. Good management and planning will clearly generate benefits in which all will share for generations to come.

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FORWARD-LOOKING STATEMENTS

This report contains forward-looking statements regarding economic and financial metrics. Herein, we do not use the term “forward-looking statements” as it is specifically understood within the Private Securities Litigation Reform Act of 1995. However, we use the term in a similar manner, in so far as forward-looking statements involve uncertainties because they relate to events, and depend on circumstances, that have yet to occur, but will or may happen in the future. Forward-looking statements are subject to risks and uncertainties, which could cause actual results to differ, possibly materially, from those anticipated and presented herein. Forward-looking statements are based on the authors’ beliefs, established economic principles, and data from RiverCOG representatives and survey respondents, and other accessible, reliable sources, as well as assumptions made by the authors and the base-case scenario contained in the REMI model.

When used herein, the words “forecast,” “estimate,” “anticipate,” “should,” variations of such words, and similar expressions, are intended to identify forward-looking statements. However, throughout this report, all economic impacts that have not yet been realized – that is, numbers that are not purely historical – as well as conclusions, recommendations, and the like that are based on such results, should be understood to be or involve forward-looking statements. Factors that could cause forward-looking statements to differ from actual results include but are not limited to: revisions to extant data series; alterations to federal, state, and municipal fiscal policies; timing of specific investments and/or expenditures; demographic growth; legal and regulatory developments; availability of new technologies; natural disasters, adverse weather conditions, and any other force majeure event.

All forward-looking statements made in this report are qualified by the cautionary statements in this section. The authors cannot guarantee that the results we anticipate (and present herein) will be realized, or even if realized, will have the expected consequences to, or effects on, the State of Connecticut’s or local municipalities’ economic situation. Forward-looking statements made in this report apply only as of the date of this report. While the authors may elect to update forward-looking statements, we specifically disclaim any obligation to do so after the date of this report.

Introduction

The Lower Connecticut River Valley Council of Governmentsⁱ engaged the Connecticut Center for Economic Analysis (“CCEA”) to develop amenity values for the Lower CT River Region’s natural, cultural, and recreational attractions (assets) to frame planning and analysis of development initiatives. Knowledge of the value amenity assets create for the region ensures future development takes them into account, looking to preserve and even enlarge them, to the benefit of all residents. Such knowledge also facilitates balancing assessments of what various development alternatives offer relative to what they may either alienate or expand.

This report presents CCEA’s methodology and findings in two main sections. *Part I – Amenities* estimates the value amenities generate annually within the Lower CT River Region for its residents, Connecticut residents, and out-of-state visitors.ⁱⁱ The analysis then develops the amenity asset values tied to each venue and aggregates them to demonstrate part of the *raison d’etre* for residing in or visiting the Lower CT River Region.

Part II – Economic Impact of Amenities considers the costs of alienating amenities, and the role such considerations could have when evaluating economic development proposals, such as the extensive development plans for the Preserve. Our intent in analyzing the Preserve is not to resurrect long-running contentious issue—now resolved—but to demonstrate how and why a comprehensive and dynamic approach to evaluating economic benefits is needed when evaluating development initiatives in the Lower CT River Region. This section also illustrates the importance of amenity values by considering the impact of a catastrophic event that sharply reduced the resource foundations of amenity benefits.

To perform the analysis, CCEA used the Regional Economic Modeling Inc.’s (“REMI”) county-level model (“the REMI model”),ⁱⁱⁱ together with other established methodologies, to project the impact amenity values have narrowly on Middlesex County and broadly on Connecticut’s economy.

CCEA is indebted to local businesses and their clients for providing data at various venues via interviews of diverse management teams and databases from both The Katharine Hepburn Cultural Arts Center (“The Kate”) and the Goodspeed Opera House. CCEA extracted driving distances of patrons based on zip codes of origins and destinations. In addition, CCEA utilized OPM’s transaction data on market-based sales of single family residences and housing characteristics⁸ of single family dwellings. CCEA supplemented these materials with additional information on vistas and street-sheds in their immediate surround available from maps and various geographic information system (“GIS”)^{iv} sources. GIS data and industry cooperation were essential for sizing the marina and yachting industries.

The Lower CT River Region captures considerable economic value from its natural resources, including, but not limited to, natural beauty. CCEA’s findings demonstrate annual benefits to the individuals,

⁸ The authors wish to recognize and thank everyone who participated in, and helped collect, survey information, as well as the proprietors and managers who provided data regarding their businesses/operations. While numerous individuals were involved in the process of gather data, Erin A. Bogan, Associate Planner at RiverCOG, deserves special thanks for her assistance in gathering, aggregating, and helping to analyze data.



businesses, and governments in the area are at least \$5.9 billion, with an asset value larger than \$73.8 billion - so large that integrating them into any regional planning is paramount. Failure to take them fully into account risks destroying economic value for all Lower CT River Region stakeholders.

Background

Communities in the Lower CT River Region are well endowed with historic and cultural sites; Table 1 enumerates 124 by town. In addition, as intercept surveys confirmed, the remarkable array of restaurants is a significant draw. Beyond the official count of 303, as shown in Table 1, available public information adds another 80: Old Saybrook (20), Westbrook (11), Lyme (4), Ivoryton (5), Essex (7), Clinton (18) and Centerbrook (15).⁹ Marinas in the region offer at least 10,000 slots and moorings, and there are at least 15 identified fishing lakes, ponds, and holes.

These resources and facilities put the Lower CT River Region at the forefront of Connecticut's tourism industry. At the state level Connecticut Tourism Partners estimated 2013 tourism spending at \$14 billion which generated 118,500 jobs and greeted \$1.6 billion in tax revenues of which \$523 million accrued to the state and \$345 million to local Connecticut governments¹⁰.

⁹ https://www.google.ca/?gfe_rd=cr&ei=MufVeDhM8mC8QeT0bXwCQ&gws_rd=ssl#tbn=lcl&q=westbrook+ct+restaurants&tbs=lf_ui:1,lf:1&oll=41.28105903067748,-72.44993145000001&ospn=0.06024322468103804,0.10591506958007812&oz=13&fll=41.28105903067748,-72.44993145000001&fspn=0.12048644554536025,0.21183013916015625&fz=12 and thereabouts.

¹⁰ Connecticut Tourism Partners, Tourism Tracker April 2015.

Table 1: Historic Sites and Restaurants by Community

Number of historic sites	Historic Sites	Restaurants
Centerbrook	1	N/A
Chester	5	12
Clinton	2	N/A
Cromwell	3	43
Deep River	4	11
Deep River/Westbrook	1	N/A
Durham	2	15
East Haddam	12	7
East Hampton	3	17
Essex	7	N/A
Haddam	6	7
Ivoryton	1	N/A
Killingworth	4	9
Lyme	6	N/A
Middlefield	2	5
Middletown	31	134
Old Lyme	11	19
Old Saybrook	18	N/A
Portland	3	24
Westbrook	2	N/A
Total	124	303

Source: Lower Connecticut River Region

As part of this project, RiverCog staff conducted intercept surveys, asking residents and visitors to identify the region’s top three community assets as well as its perceived top three draws. Table 2 shows the highest percentage of residents ranked the Connecticut River as the first and foremost regional asset with state parks and forests second followed by the region’s 383 restaurants ranking third and beaches fourth. Visitors chose the beaches as the most valuable regional asset followed by State parks and forests, the Connecticut River with restaurants ranking fourth. Thus, including Long Island Sound, the top five got 60 to 65% of the vote, whether by residents or visitors.

Table 3 looks at perceived top draws for the region. Residents, familiar with the variety and quality of local fare, think the 383 restaurants should be more significant draw for the region than visitors. Similarly, residents think cultural events are a stronger draw than visitors do, while visitors are dramatically more drawn to historical sites and to fishing than residents appreciate. The data provide valuable insights that point to potentially powerful marketing initiatives to strengthen the draw of the region (and perhaps to alert local resident to some assets they do not fully appreciate).

Table 2: Top Three Most Valuable Regional Assets

	Most Valuable Regional Assets	
	Residents	Visitors
	% (n=221)	% (n=118)
Restaurants	14.2	10.9
Proximity to major cities	3.9	4.1
Shopping	3.2	5.6
School systems	7.0	6.2
Museums	4.3	6.5
Local history	6.0	7.1
Cultural events	3.0	5.9
Theaters	6.5	5.6
Long Island Sound	8.2	8.3
State parks & forests	15.2	13.0
Connecticut River	18.3	11.8
Beaches	10.3	14.8

Table 3: Top Three Draws

	Perceived Biggest Draws	
	Residents	Visitors
	% (n=212)	% (n=108)
Restaurants	16.6	9.2
Shopping	4.6	5.9
Museums	3.5	3.8
Historical Sites	5.5	11.9
Cultural events	8.3	5.9
Theaters	5.8	4.3
Local attractions	9.2	10.3
Boating	9.9	9.7
State parks & forests	16.2	16.2
Beaches	18.0	18.4
Fishing	2.3	4.3

With the state parks and forests as well as the beaches ranking so well, a further question drilled down to identify specific locations. The responses tended to be more favorable to sites in close proximity to where respondents were surveyed, so there was sampling bias in favor of proximate venues. For example, respondents at the Chester Ferry crossing under the looming shadow of Gillette Castle tended to recognize it – fog aside, hard to miss at that distance!

While respondents generally gave three answers to each question, fewer listed their top three venues, suggesting that some only had one or two favorites. Indicative of the lack of knowledge and/or experience, 1.7% of residents had no favorites, as did 6.1% of visitors. The three venues chosen most frequently among both residents and visitors were Gillette Castle, Hammonasset, Devils Hopyard, and

Rocky Neck, as noted in Table 4. (Hammonasset and Rocky Point are both just outside the RiverCog region, but because of their immediate proximity). The Airline Trail also received double-digit support from visitors.

Table 4: Top Three Venues

	Perceived Biggest Draws	
	Residents	Visitors
	% (n=150)	% (n=85)
Airline Trail	6.7	10.2
Chatfield Hollow	5.7	2.9
Cockaponset	6.3	2.9
Devils Hopyard	13.1	11.0
Gillette Castle	17.1	11.4
Haddam Meadows	5.9	4.9
Hammonasset	16.7	12.2
Meshomasic	1.7	2.4
Nehantic	2.9	2.0
Rocky Neck	7.8	12.2
Salmon River	7.4	5.7
Wadsworth Falls	4.0	4.5
Other	3.0	11.4
None	1.7	6.1

The results of the intercept surveys are especially valuable for highlighting perceptions of what creates value for local residents and what draws visitors to the region. In so doing, the surveys provide critical insights into how the region might better promote itself—both to visitors and to residents.

Part I – Amenities

While it was not been possible to assess the amenity values on each and every venue, CCEA established amenity values for venues falling into categories that 71.7% of residents and 73.1% of visitors put into their top three choices; 78.8% of residents and 84.9% of visitors listed these categories as the major draws for the region. (An important follow up on this analysis is teasing out the significant divergence between what respondents viewed as the most important and what they thought others valued, i.e. what they believed draws visitors to the region.)

This section summarizes detailed calculations assessing the value of amenities, first describing various methodologies used to develop these values, then summarizing the detailed results.¹¹ The application of the first methodology determines econometrically shadow prices for various natural attributes enjoyed by homeowners in order to estimate the value of amenities capitalized in residential values. To put that differently, CCEA sought to identify how property values reflected the benefit of having a

¹¹ CCEA has assembled the detailed analysis in a separate document, available upon request.

location providing immediate access to valuable amenities, including vistas over oceans, freshwater, and forests, as well as proximity to university campus and street-sheds. A second approach captures the annual stream of numerous amenities available from undertaking activities at local venues. Those values are based on estimating total expenditures by those participating in (enjoying) those venues in the Lower Connecticut Valley River Region.

2011 Real Estate Sales and Amenity Values

Within the Lower CT River Region there were 2,250 real estate transactions in 2011, including commercial and residential sales.^v While 2,004 of these were for residential dwellings, the total includes sales of lots as well as non-market transactions within families (such as those resulting from inheritances) and other factors e.g. foreclosure, where prices may not be wholly subject to competitive pricing. The property types were also heterogeneous, including single and multi-family units. The analysis relies only on sales of single-family¹² homes.

From OPM's database, CCEA isolated sales of single-family houses sold at market prices; the total was over half the sales – 1,193 houses. Single-family sales exclude condo sales because of their packaged nature, including variable condo fees OPM does not document. Other data gaps reduced the sample of single-family transactions to 1,116 or 1.56% of total occupied housing stock^{vi} in the Lower CT River Region. The 2011 sales value of these homes was \$288.7 million (M), suggesting a total value in regional housing stock of about \$18.8 billion in occupied single-family units alone.

This analysis relies on OPM's database on house sales in the Lower CT River Region to establish specific amenity values attached to housing location, including:

1. Coastal or fresh water views;
2. Forest vistas;
3. "Street-sheds"; and
4. Proximity to college campuses (in Middletown).

To determine the portion of the total value of each house attributable to one of the above amenities, CCEA mapped each house sale to establish whether or not it benefited from any of the above amenities. While the first amenity was relatively straight forward, views and derived values could differ between ocean and fresh-water views. For that reason, CCEA developed separate estimates among coastal towns – Clinton, Old Saybrook, Westbrook, and Old Lyme, and non-coastal ones as well as Middletown.

The existence of a forest vista is subject to interpretation of maps and may be repeated once more effective GIS data are available. In the interim, there is sufficient evidence for proceeding with this promising approach. Street-sheds were important but of less statistical relevance, but may be somewhat recast in greater granularity as more robust GIS data become available. They are primarily concerned with streetscapes which capture the character of the market and residential street views going down to water's edge or to particular attractions. For Middletown, CCEA included a special

¹² Families consist of one or more members.

variable for housing within a mile of college campuses. Due to its size and more urban orientation than elsewhere within the Lower CT River Region, CCEA developed separate estimates for Middletown.

Approach

The approach utilized in this analysis considers the sales price of each single-family home as a function of the assessed value, which is based on normal housing attributes of lots size, size of the house, number of baths and bedrooms and proximity to various services including schools and other factors, and the presence or lack of the above mentioned amenities. Previous studies¹³ have shown that residential properties that sit adjacent to green-spaces enjoy a premium compared to similar homes that do not, when controlling for socio-economic factors and real estate characteristics.^{vii} In this analysis, we employ a hedonic pricing model.^{viii} Using such a model, the house’s selling price is understood to represent both the house’s characteristics (those that are reflected in its assessed value), as well as the monetary value of the environmental, or external, attributes. The estimating equation is:

$$1) \text{ SP} = f(\text{AV}, \text{Amenities})$$

Where:

- SP is the selling price;
- AV is the assessed value; and
- “Amenities” are as discussed above.

In other words, the selling price – that is, the market value at any given point in time – of a house is a function of both its assessed value (sometimes referred to as “intrinsic” or “fundamental” value) and the amenities it possesses or to which it provides access.

Estimates

For this analysis, CCEA used the ordinary least squares approach to estimate variable coefficients. The estimated parameters have special meaning as the coefficients on the amenities are their “shadow prices” within the locale covered by each equation. In layman’s terms, the estimated numbers indicate the derived market value of the amenities, values Table 5 shows. CCEA estimates were made on the latest annual data, for 2011, publically available from the OPM at the time the estimates were made.

Table 5: Estimates, 2011 Data

Locale	Constant	Assessed Values	Water View	Woods Vista	Street-Shed	College	Low East	Adjusted R ²
Coastal	7395.12 (0.78))	1.148 (57.24)	66161.0 (4.75)	45103.3 (2.16)	12225 (0.907)			0.912
Middletown	-9940.0 (1.780)	1.253 (44.67)	15798.6 (2.441)	32268.6 (9.52)		19904.0 (2.80)		0.911
Other in the Lower CT River Region	-6196.8 (0.776)	1.302 (56.24)	33413.7 (4.17)	22825.7 (3.17)	27222.7 (1.54)		-43287.0 (4.89)	0.864

¹³ See, for instance: Bolitzer & Netusil’s (2000) and Tyrväinen & Miettinen’s (1998).

For cross sectional data, these estimates are quite good with explanatory powers expressed by the adjusted R^2 where 1.0 would indicate an identity (a complete, or perfect, explanation). For example, an adjusted R^2 of 0.912 means that the equation explains 91.2% of the variation in the average selling price of the single family residence within the specified jurisdiction.

The bracketed “t-scores” indicate the statistical significance of the estimates; a score above 1.66 indicates that the variable would be significant at the 95% level (that is, 95% of the time) when the expected sign is known. Only for Middletown are all the variables significant at that level. All the variables in the coastal equation, excepting the street-shed, are significant. The negative values for the “LowEast” variable mean that the analysis identified fewer amenities in Lyme and East Haddam than in the other municipalities, leading to lower prices for single-family residences.

Differing values for equation parameters on assessed values may reflect either lags in reassessing areas other than Middletown and the coastal communities or relative severe price declines during the recession on more luxurious coastal properties.^{ix} The higher parameter value for water view in the coastal communities than in each of the other two types of locales indicates premiums for ocean views relative to fresh water ones, while recognizing that fresh water views are still a positive amenity.

The above shadow prices, in 2011-dollars, are more useful when converted to percentage premiums on single-family house sales, as Table 6 shows. As housing prices vary through time, percentages are likely to be better guides to the impact of amenity on residential property values than 2011 values *per se*.

Table 6: Premiums Attributable to Amenities on Houses with Them (%)

Locale	Water View	Woods Vista	Street-Sheds	College	Low East
Coastal	10.67	10.62	3.16	N/A	
Middletown	6.97	11.72	N/A	10.35	
Other	9.30	6.64	7.46	-14.16	-14.16
Lower River Valley Region	10.03	8.69	3.77	10.35	

Extrapolated Values

Extrapolating the above values to the housing stock in the Lower CT River Region assumes that sales in 2011 are typical of regional housing stocks. There is an upward bias because new homes are by definition atypical (in comparison with those of the average age of the housing stock). Yet a few new home sales were eliminated because locales were not yet mapped and therefore impossible to determine whether their location included amenities. There is also an offsetting downward bias because in 2011 homes were selling below long-term market prices and were therefore capturing proportionately lower values from their amenities than would likely be the case if prices were closer to long-term market values. (Hence the suggestion above to look at the impact in percentages rather than dollar values.)

Extrapolations for the entire value of region’s residential stock of \$18.8 billion then approximate amenity values realized from vistas from the existing housing. In short, preliminary estimates suggest that households in the Lower CT River Region currently derive \$1,139 million in amenity benefits based on annual house sales data. Amenity values can be broken down as follows:

1. Coastal or freshwater views \$ 589 million
2. Forest vistas \$ 442 million
3. Street-sheds \$ 93 million
4. Proximity to colleges \$ 15 million

Additional work on street-sheds might improve these estimates. Because the value of these amenities is based on purchases of residences in which owners have expectations of realizing amenities over the duration of their occupancy, these values for amenities are for the asset value of the amenity, not the benefits derived annually. Consistent with a discount rate of 5%, realizing 5% of these capitalized amenity benefits would mean that the annual stream of amenity benefits is \$57.0 million.

Venue Amenities: Attributes and Values

Introduction

Before embarking on these estimates it is important to spend some time on methodology to understand that the estimates are likely to be biased downward. Start with a basic question: “Are some clients willingly paying more to experience a recreational venue than are others?” The answer is clearly yes, in that some are traveling further than others to participate in what each recreational venue offers. By establishing the distance driven, the number of days required to reach destination and return from it, and the number of people in each party or vehicle, CCEA can estimate additional travel costs per capita.^x

For each venue, there will be a separate demand curve based on users’ willingness to pay, which reflects their valuation of the venue. Because there are competing alternatives for how any of us spend our scarce income, that demand curve tends to slope downward as individuals consume more and more of any good or service.¹⁴ To determine citizens’ and other visitors’ perceptions of these other amenities and the costs they experience in reaching those venues, the Lower CT River Region completed surveys at each venue to determine the origins and destination of parties traveling to and from those venues; CCEA then estimated the additional costs more distant travelers bore.

Methodology

What is important here is to understand the higher costs to visitors residing outside of the Lower CT River Region relative to the average costs of travelling for residents of the Lower CT River Region and those residing within the same zip code as the venue. By obtaining zip codes of respondents, CCEA determined the distance driven to each venue.^{xi} When responding to the survey, generally respondents with summer homes in and around the Lower CT River Region gave their zip codes within the Lower CT River Region, implying that their incremental costs of day travel are properly indicated in their

¹⁴ Criminals aside who often will end up in jail because they resort to illegal activities to supplement incomes.

responses,¹⁵ not the total costs of travel incurred from their primary residence to their summer home. CCEA of course excludes the latter cost because it is spread among the plethora of activities undertaken over the entire stay; CCEA thus assumed it approaches zero for each venue visited over the duration of their entire stay.

Driving costs from current residence to each venue were then set for each party as the distance times \$0.55 per mile, as recognized by the Internal Revenue Service, times 2, to include the cost of the return trip. Where known, parties coming by bus were set at rental rates of \$1,200 per day. The costs of meals and overnight accommodations were excluded because they were assumed to be separate pleasurable activities. Those exclusions make estimates basically conservative. Costs were then attributed per capita by dividing by the number of days in the trip and the number of people in each party reported in the survey.

A second methodological issue centers on the shape of the estimated demand curve. While introductory economics classes utilize linear demand curves, reality is frequently less simple. Empirically what we find for the venues surveyed is that demand is log-linear as estimates using log prices fit better than estimates with linear prices. While there is no estimating bias in using the center point for a number of visitors at the same venue if demand is linear, approximating a concave log linear function that way generates downward biased estimates. Where sample sizes were sufficient, CCEA computed both results.¹⁶ The assumption of the linear demand curve generates further downward bias.

The above process measures the annual daily amenity enjoyed by participants who take advantage of the assets. Where those amenities can reasonably be expected to continue annually at the same level CCEA expands the analyses to estimate asset values. In all cases of annually recurring amenity values, NPVs may be derived by discounting that stream of benefits over time. Here CCEA used a discount rate of 5% over 20 years. Out to an infinite time, the amenity asset value would be a multiple of 20-times current benefits. At the 5% rate, 62.3% of the benefit stream is enjoyed during the first 20 years and 85.8% over the first 40 years. The higher the discount rate, the lower are total benefits, but a higher percentage is realized sooner.^{xii} In addition many amenities such as fall foliage are enjoyed by residents throughout the autumn, so amenity values for fall colors extend beyond estimates based on daily amenity values enjoyed by tourists.

Sample sizes are small for individual sites, but sufficient in totality to give confidence in the results, with similar, but understandably, differences among assets in the Lower CT River Region.

Lower CT River Region offers remarkable beauty, from its northern Powder Ridge and zip lines over the Brownstone Quarry to fishing ponds and navigable waters to its marina-dotted shores on the Sound and along tributary rivers. Ancient stone fences guide drivers by verdant pastures over long-established roadways to rivers accessible by kayaks; steam trains pass migrating spring and fall flocks, as birches

¹⁵ The occasional party with both a summer home and primary residence within the Lower CT River Region may have given the Zip Code for their primary residence but which one they actually gave is unknown.

¹⁶ A full discussion of these technical issues is in a separate report the also provides detailed analysis by venue; available upon request.

turn yellow-green in spring soon followed by the onslaught of crimson maples. And still the tides ebb and flow, crashing beneath the bold lighthouses bleating into the fog, mans' cry for mariners' safety.



Patrons fresh from days of re-enacted pageantry or history-preserving museums keep theatre lights burning bright as they flock from far and wide to witness live presentations of the old favorites and the novel at the Goodspeed Opera House, Ivoryton Playhouse, The Kate, and Odd Fellows Playhouse.

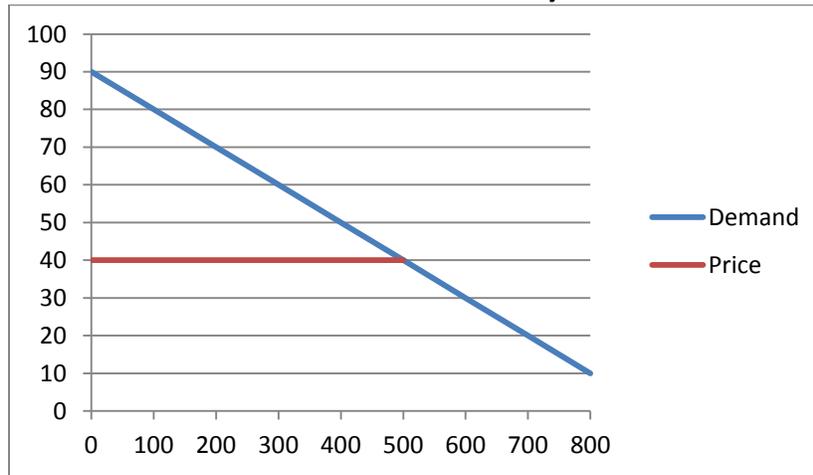
Many ride for a short while on the Essex Steam Train to take the Chester Ferry across to Gillette Castle and beyond. Others visit parks and beaches. Residents share the region's vistas and cultural riches that may too often be taken for granted in the general hub-bub of our time. This paper steps back for a moment and puts a value on those assets that give joy to residing in Lower CT River Region. Given the Lower CT River Region's natural beauty, it is not surprising that, in 2013, employment in industries whose primary function is to serve tourists was 9,161¹⁷ out of 80,000 in statewide tourism direct employment,^{xiii} proportionately larger than Lower CT River Region's population share. Tourism in the Lower CT River Region is then a large driver of its economy.

The objective of this part of this study is to translate the natural, cultural, and other amenities of the Lower CT River Region into monetary equivalents. Only in doing so is it possible to create the framework for evaluating the value that differing regional planning initiatives might deliver—or may destroy.

¹⁷ REMI base-case for Middlesex County for industries including scenic and sightseeing transportation, theater arts and sport, food and beverage, accommodations, museums, historic sites, zoos and parks, and amusement gambling and recreation. Significant by its absence is recreational boating, an activity that is notorious badly handled in tourism statistics if not ignored! In the above comparison it is ignored in both sets of data, but not in the remainder of this report.

To derive these estimates, CCEA utilizes a standard exercise in economics: deriving demand relationships to estimate how much consumers value an activity, over and above what they pay for it. One of the features that all Lower CT River Region amenity-yielding venues share in common is that tourists travel from far and wide to enjoy them. From an economic perspective, this implies that many more distant tourists incur costs to visit venues that, in comparison, are readily available to Lower CT River Region residents for little cost beyond the price of admission. Yet, it is highly likely that if they had been living further away, some current local residents would also be willing to pay more to attend favorite venues. A demand curve slopes downward for those kinds of reasons.¹⁸ The methodology used here to estimate amenity benefits assumes that patrons from afar as well as local patrons have similar tastes and capacity to pay. Because attendance and patrons vary among venues, amenities are measured separately for each venue. Where patrons are likely to have similar means and home residence, such as theatergoers, some extrapolations have been made from data on attendees at The Kate and the Goodspeed Opera House to other live theatres.

Chart 1: Demand and Amenity Estimates



By way of example, in Chart 1 ticket prices are \$40 and 500 people purchase tickets at that price. The most anyone paid to get to the performance was \$90 (the top point of intersection with the “Y” axis), implying that those willing to pay that total price incurred transportation costs of \$50. The triangle formed above the price line and below the demand line has an area that represents “consumer surplus” or amenities that are largely free to local attendees, worth $\$50 \times 500 / 2 = \$12,500$, so the average amenity value is \$25. In making the estimates of amenity values, projecting values is not quite that easy because everyone within the Lower CT River Region cannot get to all events without incurring minor travel costs. Based on zip codes to estimate distances, consumer surplus accruing to Lower CT River Region residents is reduced by their minor incursion of such costs.

Similarly, benefits accruing to other Connecticut residents are reduced by their generally higher travel costs to and from Lower CT River Region venues, so their amenity benefits per capita are below those

¹⁸ The demand curve derived above is simply the total amount paid per patron to attend a venue inclusive of the price of admission and transportation costs to and from the venue. Transportation costs include mileage charges, accommodations and food and beverages.

Lower CT River Region residents enjoy. Nevertheless, there may be many more attendees from the rest of the state than residents from Lower CT River Region so that total amenity benefits accruing to Lower CT River Region residents may be larger or smaller than those in the rest of the state.

Constraints on total feasible amenity values go beyond the average amenity values enjoyed to cover the numbers of residents with access to the amenity. While attendees to live indoor theatre performances are limited by the number of seats, the number of performances, and the duration of presentations, residents with access to the glories of fall foliage are not. In other words, both the average amenity values generated for each user of a venue and the numbers taking part in each amenity affect total amenity values. Under those conditions, the analysis estimates annual amenity values for various Lower CT River Region venues that enhance residents' lifestyles.

Venues

This discussion of amenities is limited to assessed venues. This process is not exhaustive. There are other venues that with enough time and money could be added to the list. Annual results are presented first followed by estimates of the assessed value of the amenity benefits. Annual amenities by venue appear in Table 3 in all but the penultimate and final lines. The penultimate line contains annually realized estimates from residential properties and the final line the grand total of all amenities. Total annual amenities within the Lower CT River Region are \$418 million and within the state \$419 million.

These annual amenity estimates and assessments do not in any way comment on the assessed value of the properties involved but only on the value of the benefits from annual amenities derived at current usage rates by residents. Amenities would also rise with increased awareness and use by residents discovering and partaking of them.

This report finds the most important annual amenity benefit for the Lower Connecticut River Region to emanate from fall foliage at \$336 million, available daily during the autumn to residents so that the vast majority of this amenity benefit occurs within the region. Statewide additional annual amenities are identified in the use of fall foliage trains.

The second most valued annual amenity in the Lower Connecticut River Region was marinas at \$19.7 million. At the state level, the annual amenity value from the region's marinas \$111.3 million. In establishing the distribution of these benefits between the Lower Connecticut River Region and state, the CCEA assumed that recreational boaters were distributed in line with fishing licenses issued by Connecticut and that all non-residents of the Lower Connecticut River Region used marina facilities in proportion to the number of marinas in the region and the state whereas residents of the Lower Connecticut River Region deployed local regional marinas.

Various other venues add another \$5.8 to \$6.5 million to annual amenities accruing to residents of the Lower Connecticut River Region and even more at the state level: \$11.4 to \$13.7 million. Among those within the Lower Connecticut River Region were live theatres (\$2.4 to \$2.9 million), Gillette Castle and the Chester Ferry (\$1.2 to \$1.6 million), the Essex Steam Train (\$0.5 million) et al. In aggregate, these annual amenity benefits over and above the ones from residential vistas, capitalized residential values, add \$361 million to \$362 million to annual amenities in the Lower Connecticut River Region and \$459 to

\$461 million to amenities realized annually by state residents. The derived data were insufficient to estimate other amenity benefits from other venues such as Powder Ridge.

Table 7: Summary of Annual Amenities by Origin within the Lower Connecticut River Region Connecticut (\$)

Origin	Lower CT River Region		Connecticut	
	Linear	Log Linear	Linear	Log Linear
Valley railroad				
Circus train	13,684	13,074	17,746	13,840
Summer train	481,423	481,423	2,508,310	2,508,310
Fall Foliage train	9,955	9,955	1,332,317	1,332,317
Fall splendor for all Lower CT River Region residents	336,225,750	336,225,750	336,225,750	336,225,750
Brownstone	399,136	504,991	444,626	648,878
Chester Ferry	740,000	977,000	985,000	1,315,000
Gillette Castle	429,360	571,772	611,549	818,463
Midsummer Festival	33,769	33,769	57,201	57,201
Deep River Muster	43,462	43,462	60,285	60,285
Harvey's Beach	784,503	899,015	812,819	958,324
Marinas	19,662,795	19,662,795	111,319,978	111,319,978
The Kate	641,590	681,235	1,022,483	1,093,298
The Goodspeed Opera House	1,274,177	1,699,397	2,704,434	3,754,652
All live theatres	2,371,484	2,946,934	4,613,471	6,001,174
Residential vistas	56,963,375	56,963,375	56,963,375	56,963,375
Total	418,158,696	419,333,315	515,952,427	518,222,896

The resulting array of amenity assets available within Lower CT River Region is impressive as indicated by their asset values evaluated over 20 years discounted at 5% shown in Table 8.

Table 8: Summary of Amenity Assets by Origin within River COG and Connecticut (\$M)

Origin	Lower CT River Region		State	
	Linear Demand	Log Linear Demand	Linear Demand	Log Linear Demand
Valley Railroad				
Circus train	\$0.17	\$0.16	\$0.22	\$0.17
Summer train	\$6.00	\$6.00	\$31.26	\$31.26
Fall Foliage train	\$0.12	\$0.12	\$16.60	\$16.60
Fall splendor for all residents	\$4,190.12	\$4,190.12	\$4,190.12	\$4,190.12
Brownstone	\$4.97	\$6.29	\$5.54	\$8.09
Chester Ferry	\$9.22	\$12.18	\$12.28	\$16.39
Gillette Castle	\$5.35	\$7.13	\$7.62	\$10.20
Midsummer Festival	\$0.42	\$0.42	\$0.71	\$0.71

Deep River Muster	\$0.54	\$0.54	\$0.75	\$0.75
Harvey's Beach	\$9.78	\$11.20	\$10.13	\$11.94
Marinas	\$245.04	\$245.04	\$1,387.29	\$1,387.29
The Kate	\$8.00	\$8.49	\$12.74	\$13.62
The Goodspeed Opera House	\$15.88	\$21.18	\$33.70	\$46.79
All live theatres	\$29.55	\$36.73	\$57.49	\$74.79
Residential vistas	1,139.27	1,139.27	1,139.27	1,139.27
Totals	\$5,640.56	\$5,655.20	\$6,859.29	\$6,887.58

Even leaving aside the asset value of the marinas, the fall colors and vistas from residences, Lower CT River Region's amenities approach \$66 million to \$81 million dollars and the state's amenity assets reach \$143 to \$171 million. Extrapolating the results from Harvey's Beach to other local and state parks would further boost this result. The asset value of the marinas, fall colors and residential vistas to Lower CT River Region residents suggests the need to husband those resources carefully or expand operations.

Other Attractions

In addition to the venues assessed for yielding amenity benefits, patrons at various venues expressed strong appreciation for Lower CT River Region's museums, restaurants and stores, reflecting additional amenities of value to them. Their appreciation of this other regional assets suggests that this paper is likely to be underestimating total amenity assets in the Lower Connecticut River Region.

Surveys administered by Lower CT River Region staff as part of this process of assessing the specific venues lend color to diverse tourism activities involving venues beyond those specifically assessed. Based largely on interviewee availability at other venues in close proximity, activities highlighted were the following mixes of preferences:

- Among parties, the most popular activities at the circus train were the show alone (34%), ride alone (24%) and the combined ride and show (3%). Train and related events were also popular (12.7%) of respondents.
- With the Gillette Castle towering above them, visitors to the historic Chester Ferry focused their interests on other scenic and recreational venues (44%), shopping (21%), historic and educational (18%) as well as theatres (17%);
- Reflective of a greater percentage of the patrons being local, those at the Chester Market placed less emphasis on recreation and scenic attractions and more on the theatres with recreational venues (29%), shopping (22%), historic and educational (24%) as well as theatres (25%)¹⁹;
- Attendees at the midsummer festival emphasized scenic and recreational activities (40%), shopping (20%), historic and educational (26%) and theaters (14%);
- Patrons of the Deep river Muster put an even greater emphasis on scenic and recreational venues at (49%), shopping (15%) education and historic at (16%) and theatre (20%); and

¹⁹ Specifically the excellent of the school systems was appreciated by many.

- The emphasis among those attending the North End Farmers Market was definitely on shopping (40%) followed by scenic and recreation (32%), in theatres at (20%) with scant interest in educational and cultural sites (8%).

The diversity of these interests at specific sites challenges the development of marketing initiatives while simultaneously providing data for channeling future complementary marketing activities.

CCEA also asked patrons about regional assets which they considered most valuable. Generally the beaches and other recreation assets received a stronger share of support than the share of attractions being utilized. This result suggests patrons assigned additional amenity values to recreational and scenic venues simply because it is worth knowing that they are in place to be utilized at will, albeit not always or frequently visited by respondents themselves.

Patrons spread their favorites broadly among venues, not only partly determined by close proximity but also among more commonly known and, frequently more distant favorites, such as Hammonasset, Lower CT River Region Castle, Rocky Neck and Devil's Hopyard.

Tourists generally designated Lower CT River Region's biggest tourism draws as the beaches, the Connecticut River and the quality of the region's restaurants. The lack of references in this section to marinas may reflect the shortage of interviews with recreational boaters and anglers rather than any diminution of the amenities generated by recreational boating.

Part II – Economic Impacts of Amenities

The impacts of amenities in Lower CT River Region are tested by two applications of REMI's dynamic equilibrium model for Middlesex County as an approximation of the Lower CT River Region. The first and most straight forward test is to comprehend the importance of amenities is to cut amenities within Lower CT River Region by 61% or \$315 million annually for the foreseeable future. The second is to test how amenities would affect the earlier analysis that went into the housing segment of the proposal to develop the Preserve.

61% Cut in Amenities

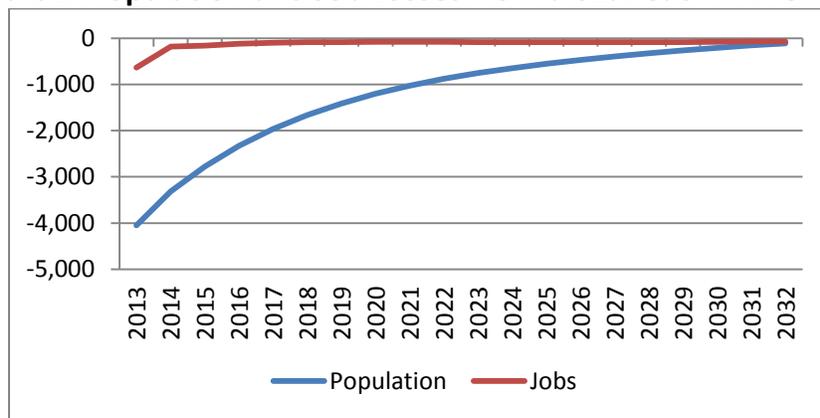
Cuts in amenities can occur for a number of reasons. For instance, natural disasters such as a blight destroying deciduous trees on the same as scale the mountain pine beetle has ravaged conifers in the West and/or poisoning of fish in the Sound would undercut amenity benefits. More seriously, a tsunami could wipeout marinas and beaches along the Sound, albeit unlikely. Additionally, man-made developments and changes can have a negative impact – although, it should be noted, that new projects can also increase amenity benefits if executed to do so.

To investigate the impacts that amenity benefits have on the Lower CT River Region's economy, CCEA simulated what would happen should amenities in Middlesex County be suddenly curtailed by \$315M. At a minimum, slashing amenities reduces the attractiveness of residing in Lower CT River Region resulting in a population exodus which in turn leads to a shrinking of the economy. It could also lead to a further reduction in tourism which would further damage the economy. That second round of cuts is

not included in the following because there is little evidence that even severe blight by the Mountain Pine Beetle has adversely impacted tourism to stricken areas.

Economic impacts of a severe cutback in amenities are immediate and severe. A sudden 61% cut in amenities would cause an immediate exodus (2013) of 4,052 people from Lower CT River Region, a commensurate job loss of 635 and corresponding decline of personal income of \$156 million and personal disposable income of \$128 million. Of the job losses 89 occur in tourism type industries and the rest elsewhere suggesting that the main impacts stem from alienation of amenities previously accruing to Lower CT River Region residents. As the economy adjusts, these annual negative impacts shrink but not by enough to disappear even out to 2032 as shown in Charts 2 and 3.

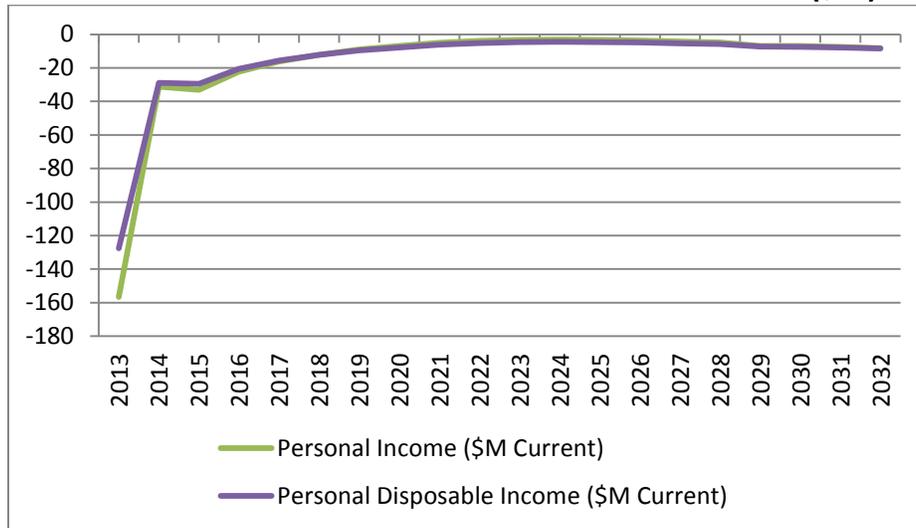
Chart 2: Population and Job Losses from a 61% Cut in Amenities



Population recovers only slowly from the initial shock, but jobs more rapidly recover as shown in the above Chart.

Chart 3 illustrates that the quality jobs, indicated by their income generating capability, recover faster than those of lower quality. The net present value of the loss of income from reductions in amenity values rises at a decreasing rates over time. Out to 2032 discounted at 5%, the NPV of lost personal income is \$301 million and \$272 million. Lost personal disposable income is indicative of lost freedoms to purchase goods and services and/or to save by Lower CT River Region residents. Differences between personal income and personal disposable income are largely personal taxes representing losses in government's fiscal capacity to act at current tax rates without adjusting tax rates.

Chart 3: Income Losses from a 61% Cut in Amenities (\$M)



Both the initially relative large adverse impacts and their prolonged negative impacts underline the need to avoid such alienation of amenity benefits.

Revisiting the Preserve

The Preserve is a single land mass of nearly 1,000 acres where lumber has not been harvested since 1997. It is located principally in Old Saybrook but extends into Essex and Westbrook. In 1999 development plans called for the construction of 308 houses on large treed lots and the building of a golf course. Due to the currently depressed market for golf courses and uncertainties about water quality from the restructuring of the land for a golf course and once water is used for irrigation mixing with the chemicals utilized to maintain the course, the project was abandoned. This analysis is concerned with only the impacts of the housing aspects of the proposed development inclusive of the infrastructure – roads, sewer, water and energy providing utilities servicing the houses, but exclusive of the golf course.

CCEA's approach differs from the earlier assessments in that REMI-based escalators are applied to compensate for intervening inflation and the rollout of the phased housing is taken into account so the assessment is dynamic albeit the values are in 2014-dollars. As initially planned, phasing extends over 10 years when the expected timing of sales is taken into account. In CCEA's analysis the development commences in 2013 rather 1999. Taking phasing into account is important because it facilitates infrastructure construction in line with the phases of the development for releasing unit sales onto the market. In this way the infrastructure related to each phase is constructed over the summer prior to each phase released for sales in the fall and houses are built over the subsequent years covered by each phase with only half being completed in the year they are released and the rest the subsequent year. In keeping with the proposed plans, revenues accruing to local governments from the new houses are not expected to cover incremental costs of servicing the new households, including education of children, this process leads to only a gradual rise in local government shortfalls. The net shortfalls are

modelled as being met by cutbacks to other local government expenditures. In maintaining the principles of balanced budgets tax rates could also have been adjusted.

CCEA modeled the impacts on Middlesex County so that area results may exceed those of Old Saybrook, Essex, and Westbrook combined so that net benefits accruing outside of those jurisdictions are captured. Furthermore, CCEA modelled the development with and without taking losses in amenity benefits into account.

Even given the foregoing considerations of amenity benefits arriving at a precise estimate of such losses that the development could impose on the Preserve are far from obvious. There will be considerable loss of deciduous forests and up to 28 vernal pools could be in jeopardy as will wildlife in the largest remaining preserve of its kind in Connecticut. Based primarily on the alienation of deciduous trees, CCEA has modelled the amenity loss as \$4 million. The Preserve constitutes about 1.5 square miles of Middlesex's forest cover of roughly 300 square miles or 0.5% of the county's forest cover, albeit an important piece in environmental characteristics. For this reason the \$4 million loss in amenities, well above its share of forest land because it is also part to the vista of adjoining properties, should be treated as a starting point for the analysis rather than an unshakeable concrete estimate.

Historically there have also been hot debates concerning whether or not the development would warrant the construction of a fire station and other municipal infrastructure above and beyond that planned for the property *per se*. Financing and operating such infrastructure would increase economic construction impacts while swelling operating and carrying costs which would erode the proposed project's viability. Under these considerations the model yields results from which educated approximations may be drawn. Model results should never be treated as Gospel truths, albeit they may be utilized as useful guides in considering crucial issues.

What has been modelled is development of the Preserve based on previous assumptions about the rollout of its housing construction with no price adjustments of housing due to the lack of a high-end golf course contained within the preserve, generating both amenity values associated with overlooking golfing green spaces nor any of the negative amenities associated with wayward golf balls or water contamination. Construction and related local government revenue phasing is as shown in Table 9

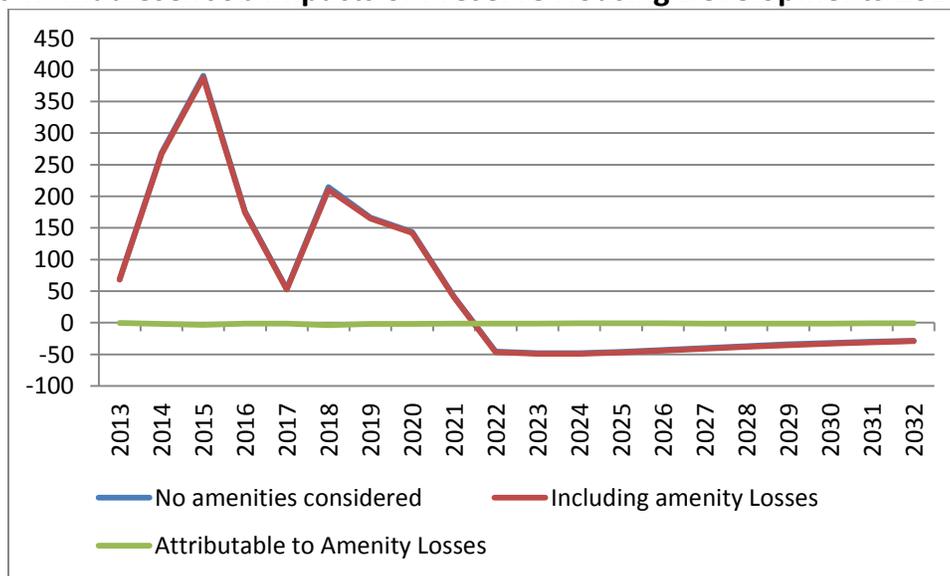
Table 9: Development Phases for the Preserve 2014-2023: Annual Building Costs and Impacts on Local Government Budgets (\$-thousands) 2013-2022

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Roads	775	2,499	3,759	0	0	4,367	0	0	0	
Utilities	581	1,874	2,820	0	0	3,275	0	0	0	
All in house sales	7,749	32,739	48,534	28,860	10,633	23,164	32,278	29,240	14,810	
House construction costs	7,362	31,102	46,107	27,417	10,101	22,006	30,664	27,778	14,069	
Total increase in municipal revenues	43	282	512	990	1,234	1,443	1,786	2,166	2,438	2,530
Local government expenditures	224	876	1,453	1,584	1,714	2,152	2,506	2,869	3,560	3,560
Net impact on local gov't budgets	-181	-594	-941	-593	-480	-709	-720	-703	-1,122	-1,030

Mounting annual amenity losses are timed to occur with the loss of forest cover primarily tied to infrastructure construction so that they begin in 2013 at \$272 thousand, rising to \$1.149 million in 2014, \$2.468 million in 2015 and \$4.0 million in 2017. These data complete the direct impacts modelled with REMI to establish the economic impacts of developing housing on the Preserve. Direct impacts extend into 2022 because half the housing lots released in 2021 are not expected to be completed to 2022 and would therefore not be yielding tax revenues nor be occupied by residents with commensurate demands for local services.

The results indicate that such developments could be marginally positive but are sensitive to key assumptions. Chart 4 illustrates Middlesex job impacts with and without the \$4 million of amenities taken into consideration.

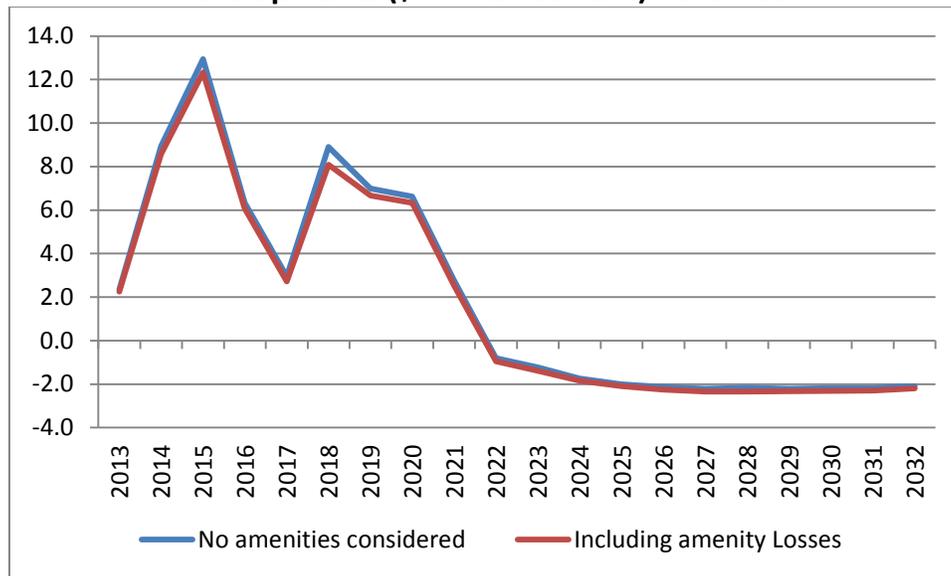
Chart 4: Middlesex Job Impacts of Preserve Housing Developments 2013-2032



The amenity benefits or lack of them have very little impact on jobs related to the project. Jobs shrink by one to four per year depending on how much infrastructure construction is proceeding. In reality even these losses could be offset by including special construction activities related to the mitigation of adverse environmental impacts. The post construction period is one of marginally negative employment impacts as the economy adjusts to the completion of the Preserve project. In short, there is little guidance in this result.

Results concerning disposable income are more informative because they impact migration and therefore future aggregate demand. Personal disposable income is adversely impacted by reduced amenities as noted in Chart 5. Income impacts follow the same general direction as the job ones but are affected considerably more by the alienation of amenities inherent in the project with annual reductions in disposable income throughout the process.

Chart 5: Middlesex Personal Disposable Income Impacts of Preserve Housing Developments (\$-million current) 2013-2032



Discounted at 5% out to 2032, the NPV of increased disposable income is \$38.8 million without consideration of amenity benefits but only \$35.4 million with consideration of them. In essence, if a case can be made for amenity benefits being higher than \$45.7M or 11.5 times that used here, the alienation of amenities would outweigh development impacts on disposable income. Given the unique nature of the Preserve, attaching that level of amenity benefits from not proceeding may be quite rational. In reality, the gap may not be that large if funding and operations of additional municipal infrastructure were to be required. It is also clear that extending the analysis beyond the normal twenty years for funding would reduce both estimates for the NPV of proceeding.

Conclusion

REMI underlines the need to include amenity benefits into account when evaluating possible developments as illustrated in *Part I* of this exploration. As noted in *Part II* it can also be used as a tool to establish benchmarks for guiding one’s judgement about trade-offs between development options

and the preservation of amenities. In the latter case, it may be possible to generate other infrastructure, such as non-intrusive trails, capable of enhancing amenities realized from the relative pristine Preserve that could offset any disposable income forgone by not developing it.

The key finding from CCEA's study of the Lower CT River Region area is not that future economic development *per se* is desirable or not. Rather, based on the data analyzed in this analysis, the authors find that what is of primary importance is that economic development initiatives consider existing (and/or potential) amenity benefits. Amenity benefits are very real, not only from a subjective or personal perspective, but in terms of economic prosperity. In fact, as we have shown herein, the magnitude of these benefits is considerable. Careful planning and analysis is therefore critical *ut prius* to any major development initiative that will alter the existing Lower CT River Region's essence.

Conclusions

Amenity assets capitalized in the value of homes are worth \$ 1,139 million to Lower Connecticut River Region residents who benefit from overlooking vistas. In essence, amenities embedded in housing prices add 6.4% to what the value of the housing stock would be without them. These benefits have been capitalized in the Lower Connecticut River Region's housing stock estimated to be worth \$18,800 million. Among the contributing vistas are salt and freshwater (\$589 million), woods (\$442 million), street-sheds (\$93 million) and close proximity to colleges (\$15 million). Future developments may facilitate more access to such vistas but in any case should either carefully avoid alienating current amenities or adequately compensate those adversely affected.

In addition, all residents of the Lower Connecticut River Region benefit from their use of and close proximity to local venues that enrich their lives. As opposed to the asset values above, these venues are valued as producing a stream of annual amenity benefits to those residing within each of the Lower Connecticut River Region and the state from which asset values are further estimated. It is useful for future developments to understand amenity benefits within the region and within the state. Doing so from each perspective can guide future policies within each jurisdiction.

This report finds the most important annual amenity benefit from venues in the Lower Connecticut River Region to emanate from fall foliage at \$336 million, available daily during the autumn to residents so that the vast majority of this amenity benefit occurs within the region. Statewide considerations are identified in the use of fall foliage trains.

The second most valued annual amenity in the Lower Connecticut River Region was marinas at \$19.7 million. At the state level, the amenity value from marinas in the Lower Connecticut River Region is \$111.3 million. The distribution of these benefits between the Lower Connecticut River Region and state is discussed in the section on marinas. In essence, CCEA assumed that recreational boaters were distributed in line with fishing licenses issued by Connecticut and that all non-residents of the Lower Connecticut River Region used marina facilities in proportion to the number of marinas in the region and the state whereas residents of the Lower Connecticut River Region deployed local regional marinas.

Various other venues add another \$5.8 to \$6.5 million to annual amenities accruing to residents of the Lower Connecticut River Region and even more at the state level: \$11.4 to \$13.7 million. Among those within the Lower Connecticut River Region were live theatres (\$2.4 to \$2.9 million), Gillette Castle and the Chester Ferry (\$1.2 to \$1.6 million), the Essex Steam Train (\$0.5 million) et al. In aggregate, these annual amenity benefits over and above the ones from residential vistas, capitalized residential values, add \$361 million to \$362 million to annual amenities in the Lower Connecticut River Region and \$459 to \$461 million to amenities realized annually by state residents.

The net present values of such benefit streams discounted at 5% over 20 years reach \$5.6 to \$5.7 billion within the Lower Connecticut River Region and \$6.9 billion for the region, as noted in Table E-1. Within the Lower Connecticut River Region, those amenity assets amount to \$32,000 for every man woman and child!

In addition to the venues assessed for yielding amenity benefits, patrons at various venues expressed strong appreciation for Lower CT River Region's museums, restaurants and stores, reflecting additional amenities of value to them. Their appreciation of these other regional assets suggests that this paper is likely to be underestimating total amenity assets in the Lower Connecticut River Region.

CCEA also asked patrons about regional assets which they considered most valuable. Generally the beaches and other recreation assets received a stronger share of support than the share of attractions being utilized. This result suggests patrons assigned additional amenity values to recreational and scenic venues simply because it is worth knowing that they are in place to be utilized at will, albeit not always or frequently visited by respondents themselves.

A sudden 61% cut in amenities would cause an immediate exodus of 4,052 people from Lower CT River Region, a commensurate job loss of 635 and corresponding decline of personal income of \$156 million and personal disposable income of \$128 million. Of the job losses 89 occur in tourism type industries and the rest elsewhere suggesting that the main impacts stem from alienation of amenities previously accruing to Lower CT River Region residents. As the economy adjusts, these annual negative impacts shrink but not by enough to disappear even out to 2032.

Taking account of lost forest cover, CCEA assessed development of only the proposed housing and related infrastructure on the Preserve. The results indicated positive impacts. It also established the amount of damage that would have to occur from the alienation of other environmental assets, such vernal pools, and construction and operation of additional infrastructure to more than offset any apparent benefits from those included in that section.

Appendix 1 – About CCEA

The Connecticut Center for Economic Analysis (CCEA) is a University Center located within the School of Business at the University of Connecticut (UConn).

CCEA specializes in economic impact and policy analysis studies as well as advising clients regarding business strategy, market analysis, and related topics. CCEA focuses particular attention on the economic and business dynamics of Connecticut, for which it maintains a license to the dynamic REMI model of the state's economy.

CCEA was created at the request of Governor Weicker in 1992 to serve the state's citizens by providing timely and reliable information regarding Connecticut's economy and to evaluate the potential impacts of proposed policies and strategic investments. By mobilizing and directing the expertise available at the UConn, state agencies, and the private sector, CCEA aims to equip the public and decision makers with transparent analyses to facilitate systematic, thoughtful debate of public policy issues.

CCEA has conducted hundreds of studies involving the Connecticut economy, at both the state and local levels. Copies of its studies and reports that are available to the general public, can be found at <http://ccea.uconn.edu/>. For additional information about CCEA, please contact Professor Fred Carstensen (860.305.8299, fred.carstensen@uconn.edu).

Appendix 2 – Bibliography

- Archer, W. R., D. H. Gatzlaff, and D. C. Ling. (1996). Measuring the Importance of Location in House Price Appreciation. *Journal of Urban Economics*, 40: 334-354.
- Bajari, P. and C. L. Benkard. (2005). Demand Estimation with Heterogeneous Consumers and Unobserved Product Characteristics: A Hedonic Approach. *Journal of Political Economy* 113:6, 1239-1276.
- Bayer, P., F. Ferreira, and R. McMillan. (2007). A Unified Framework for Measuring Preferences for Schools and Neighborhoods. *Journal of Political Economy* 115:4, 588-638.
- Cherry, Todd L. (Editor), Dan Rickman (Editor). (2011). *Environmental Amenities and Regional Economic Development*, Routledge Explorations in Environmental Economics (Book 21).
- Clapp, J. M. And C. Giaccotto. (1998). Price Indices Based on the Hedonic Repeat-Sales Method: Application to the Housing Market. *Journal of Real Estate Finance and Economics*, 16: 5-26.
- Ekeland, I., J. J. Heckman, and L. Nesheim. (2004). Identification and Estimation of Hedonic Models. *Journal of Political Economy* 112, S60-S109.
- Freeman, A. M. III. (2003). *The Measurement of Environmental and Resource Values, Resources for the Future*, Washington D.C.
- Gill, H. L. and D. R. Haurin. (1991). User Cost and the Demand for Housing Attributes. *Journal of the American Real Estate and Urban Economics Association*, 19: 383-395.
- Lutzenhiser, M., & Netusil, N. R. (2001). The effect of open spaces on a home's sale price. *Contemporary Economic Policy*, 19(3), 291-298.
- Middletown Kids City Museum. Odd Fellows. Stuart B. McKinney, Refuge. Autobahn, Birders, 100-400 gig network ergo IT Co.
- Pearse, P. H. (1968). A New Approach to the Evaluation of Non-Priced Recreational Resources, *Land Economics*, Vol. 44, No. 1, pp. 87-99.
- Rosen, S. (1974). Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition. *Journal of Political Economy* 82, 34-55.
- Wilkinson, R. K.. (1973). The Income Elasticity of Demand for Housing. *Oxford Economic Papers*, New Series, Vol. 25, No. 3, pp. 361-377.
- Wold, H. and Juréen, L. (1953). *Demand Analysis*, John Wiley & Sons.

Appendix 3 – Endnotes

ⁱ For additional information about RiverCOG, visit their website at <http://www.rivercog.org/>.

ⁱⁱ The literature regarding amenities in economics is extensive. For those interested in exploring this topic further, we recommend Cherry and Rickman (2011). The topic of amenity values is also addressed in greater detail in Appendix 2.

ⁱⁱⁱ The REMI model is the primary tool CCEA uses for conducting long-term economic impact analyses. The REMI model is a multi-sector, dynamic, equilibrium impact model of Connecticut so that inputs and impacts are specific at the state level. The program measures total economic changes over time by comparing a baseline forecast (one in which there is no change) to an alternative scenario or scenarios via changing direct impacts generated by the company's project such as generation of direct industry jobs and development of new capital assets. Because the variables in the REMI system are inter-related, a change in any one variable affects many others. For example, if wages rise in one sector, the relative costs of producing a certain output (or outputs) change, and could potentially cause the producer to substitute capital for labor. The change in the capital-labor ratio potentially impacts input demands, which affect jobs, wages, migration and other variables throughout the economy. Such "chain-reactions" propagate across all sectors in the model over time. For additional information regarding the model, visit: <http://www.remi.com/the-remi-model>.

County-level break-outs are based on annual data of where current and future projects have been and are to be located. Due to the Green Bank's initial marketing targeting of Middlesex, it played an inordinately large role beginning in 2012, but its share of RSIP declines to be in-line with state income shares by 2016. The 2016 shares among counties are expected to remain stable from that time onward. The numbers presented herein are aggregated statewide. Outcomes were calculated and are available on a county-by-county basis, but are not part of this overview at the state level.

^{iv} For a description of GIS, see <http://education.nationalgeographic.com/education/encyclopedia/geographic-information-system-gis/?ar a=1>.

^v Based on data from OPM.

^{vi} DEEP report.

^{vii} For additional information on the general topic of the determinants of housing prices, see, among others: Jud, Roulac, and Winkler (2005); Bourassa et al (2009); Lutzenhiser & Netusil (2001); Archer, Gatzlaff, and Ling (1996).

^{viii} For more on the topic of hedonic pricing models, see: Ekland et al (2004); Clapp and Giaccotto (1998); Freeman (1993); and Rosen (1974).

^{ix} The relationship between macroeconomic factors (e.g., expansions or recessions) and housing prices is a vast topic, to which a prodigious amount of academic literature has been dedicated. See, for instance, Wilkinson (1973). Even a cursory treatment of this subject is well beyond the scope of this report. Suffice to say, that prices for "luxury" properties exhibit different dynamics than "non-luxury" properties.

^x Wold and Juréen (1953) and Pearse (1968).

^{xi} Conversion from zip code information to distance driven set the distance within a zip code at 3 miles but otherwise utilized http://www.zip-codes.com/distance_calculator.asp for each response to the surveys.

^{xii} This statement is true as rising rates approach 100%. Hyperinflation at rates above 100% would have the opposite effect.

^{xiii} DECD Connecticut Office of Tourism, Fact Sheet 2015.