CULTURAL ECOSYSTEM SERVICES AS PART OF SCENIC RESOURCE MANAGEMENT?

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Abstract.—Smardon (1983) and Gobster et al. (2007) proposed development of a theory of ecological aesthetics whereby individuals could learn to value landscapes such as wooded wetlands for their intrinsic ecological value versus more surface artistic and culturally ingrained aesthetic values (Smardon 1983). The Millennium Ecosystem Assessment Project (2005) proposed the valuation of ecosystem services, defined as regulatory, provisional, ecosystem support and cultural services provided for us by nature, free of charge. The challenge here is: How can we use cultural ecosystem services derived from scenic landscapes and seascapes for scenic resource management and assessment? This paper reviews the work done to date on assessing ecosystem cultural services related to water-based scenic landscape resources and then applies it to an Upstate New York lake landscape.

INTRODUCTION

As part of the Millennium Ecosystem Assessment Project (2005), cultural ecosystem services have received international recognition along with the more established regulatory, provisional, and supporting services. For this paper, the author is particularly concerned with those cultural services most closely related to scenic resource management, which include aesthetics and recreation as well as science/education and spiritual/historic services (Daniel et al. 2012).

Along with these services identified in the Millennium report, de Groot et al. (2002) and Farber et al. (2006) describe a progression of cultural ecosystem services summarized in Table 1 below. Note that within all three descriptions of cultural ecosystem services there are four categories but also great potential for overall assessment and difficulty with quantification. Smardon (1975, 1978, 1983, 1988a) first addressed visual-cultural values with a rating system for freshwater wetlands in the northeastern United States that included the use and value of wetlands for aesthetic, recreational, and educational purposes and also noted the interconnection and overlap of these ecosystem services.

Recently there have been efforts to develop standardized indicators or measurement units for ecosystem service accounting purposes (Boyd and Banzhaf 2007, Ringold et al. 2013). Scientists at the U.S. Environmental Protection Agency (U.S. EPA) have been working on a classification system for landscape ecosystem services for beneficiaries of such services (Landers and Nahlik 2013, Ringold et al. 2013). The U.S. EPA has been particularly focused on water-based ecosystems, including oceans, estuaries, fresh water wetlands, rivers/streams, and lakes (U.S. EPA 2009).

Measurement of ecosystem services by traditional economic means is sometimes problematic, especially for cultural ecosystem services. Particular challenges from the ecological economics literature include:

- Unquantifiable values (Boyd and Banzhaf 2007, Kumar and Kumar 2008, Reimold et al. 1980, Turner et al. 2008)
- Double counting and overlap of services (Bennett et al. 2009, Chan et al. 2012)
- Addressing tradeoffs between ecosystem services for land management decision making (Farber et al. 2006, de Groot et al. 2010, Martín-López 2013, Smardon 2009)
- Lack of stakeholder engagement (Haase et al. 2014, Smardon 2009)
- Lack of consideration of ethical issues (Jax et al. 2013, Smardon and Moran 2016)
- The need to address spatial scale relationship to ecosystem service beneficiaries (Hein et al. 2006, Smardon 2009)

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Table 1.—Cultural Ecosystem Service Classification & Description

Services[a]	**Comments and examples**	
Aesthetic	Finding beauty or aesthetic value	
Recreation	Opportunities for recreation activities	
Educational	Opportunities for formal & informal education & training	
Spiritual & inspirational	Source of inspiration, religious attachment	
Information functions[b]	**Ecosystem processes**	**Example goods & services**
Aesthetic information	Attractive landscape features	Enjoyment of scenery
Recreation	landscape variety for recreational uses	Travel for ecotourism and outdoor sports
Cultural/artistic Information	Natural feature variety with Cultural/ artistic value	Use of nature in books, film, painting, folklore, symbols, +
Spiritual & historic information	Natural feature variety with spiritual & historic values	Use of nature for religious & historic purposes plus heritage value
Science & education	Natural variety with scientific & education value	Use of natural systems for school exercises and scientific research
Functions and services[c]	**Description**	**Examples**
Aesthetic	Sensory enjoyment of functioning ecological system	Proximity to scenery, open space
Recreation	Opportunities for rest, refreshment & recreation	Ecotourism, bird watching, outdoor sports
Science & education	Use of natural areas for scientific & educational activities	Natural field lab and reference areas
Spiritual & historic	Spiritual or historical Information	Use of nature as symbol or natural landscape with significant religious value

[a]Millennium Ecosystem Assessment Wetlands Report (2005, p. 2)
[b] De Groot et al. (2002, p. 397). Information functions—providing opportunities for cognitive development.
[c] Farber et al. (2006, p.123). Cultural functions and services—enhancing emotional, psychological and cognitive well-being.

Despite these challenges, there has been interesting work by ecological economists and social scientists to assess cultural ecosystem values. Traditional econometric methods such as hedonic analysis, travel cost, and contingent valuation have been used for valuing ecosystem services for coastal recreation (Johnston et al. 2002, Wilson et al. 2005) and wetlands (Boyer and Polasky 2004, Brouwer et al. 1999, Ghermandi et al. 2010, Turner et al. 2008).

WATER VALUE STREAM LITERATURE REVIEW

There are a number of studies that address water-related "benefit streams." Meta-analysis studies that pull together economic and ecosystem service literature can be divided into water recreation studies, waterfront property valuation, aesthetic view valuation, water quality valuation, and water ecosystem valuation.

Water Recreation Value Stream

Wilson and Carpenter (1999) reviewed the use of the travel cost, hedonic, and contingent valuation methods as applied to water-related freshwater services. For water-related recreational activity measured by the travel cost method, Bouwes and Schneider (1979) reported that recreational trips to Pike Lake, Wisconsin, were valued at $7,300. Young and Shortle (1989) reported recreational benefits associated with water quality improvements in St. Albans Bay, Vermont, as $5,990 per season. Other water recreation studies include those by Cordell and Bergstrom (1993) regarding water level management and recreation benefits and Johnston et al. (2006), which assessed willingness to pay for recreational fishing resources.

Waterfront Property Values

There are many economic studies using hedonic analysis for assessing the value of waterfront or near waterfront property. Lansford and Jones (1995a, 1995b) looked at property values near the Highland Lakes chain near Austin, TX. They calculated that the market value of residential recreational benefits equaled $690,000. Young and Shortle (1989) valued the increase in property values for the St. Albans bay area due to water quality improvement at $1.8 million. The European MARS (Meta-Analysis Reporting Standards) study found that for studies using a hedonic price approach, the mean value of lake benefits was equal to $769 per property per year (Reynaud and Lanzanova 2017). From other studies they found the lake benefit equaled $348 per resident per year. The United States was on the top end with mean annual value of lake benefits per property valued at $816 (2010 U.S. dollars).

There are a few papers that address waterfront property characteristics, including Colwell and Dehring (2005), Conner et al. (1973), and David (1968). David (1968) regressed land improvement against site attributes and found that swampy or steeply sloped banks were negatively correlated with value whereas water quality, proximity to population centers, and presence of other lakes in the area were positively related to value. Conner et al. (1973) attempted to analyze the relationship of water frontage values to other factors in the Kissimmee River basin. They looked at the year of sale, size of lot, and presence or absence of houses and found that lake frontage contributed 65 percent of the total value of a vacant residential lot and 48 percent of the total value of a lot with a house.

Water Aesthetic View Values

There have also been specific studies of lakefront residential property values related to aesthetic views. Bourassa et al. (2004) reviewed a database of 5,000 residential property sales in New Zealand and found that wide views of water added 59 percent to the value of waterfront property, but this percentage diminished rapidly with distance away from the waterfront. Corrigan et al. (2009) used willingness to pay (WTP) to sample local residents and visitors about improved aesthetic water quality of a eutrophic natural lake in Clear Lake, Iowa. The hypothetical options included a ballot initiative for higher taxes for water quality improvement; the study found that the ballot initiative, if actually offered, would have passed.

Hansen and Benson (2013) analyzed 25 years of data for 20,000 home sales in Bellingham, WA, for the effect that premium water views had on sale prices over different phases of the housing cycle. Real dollar premiums associated with water views actually moved with the housing cycle, rising when housing demand and overall market prices increased and falling when the price of housing declined. In addition, the relative value of the view fluctuated as well, possibly due to the scope and quality of the view plus distance from the water.

In a hedonic property value study of a central Texas lake, Lansford and Jones (1995a, 1995b) found that waterfront property commanded premium prices but that the marginal assessment price fell rapidly with increased distance from the water. Kauko et al. (2003) looked at the effects of water proximity and water use factors on residential property prices in the Netherlands. The price premium for lakeside property was +25 percent but was partially offset by flood risk. Schultz and Schmitz (2008) utilized hedonic and GIS analysis to document the value of water views for homes in Omaha, NE, and determined that lake views increased home values by 7.5 percent to 8.3 percent.

Water Quality Values

Many studies have shown that water quality and transparency are major determinants of shoreline property values (Leggett and Bockstael 2000). Steinnes (1992) found that a 1-meter increase in Secchi disk transparency raised lakeshore lot prices by an average of U.S. $235 in northern Minnesota. Michael et al. (1996) studied the selling prices of over 900 properties on 34 lakes in Maine and found that a 1-meter decrease in Secchi disk transparency over 10 years correlated with a decline in property value ranging from $3,000 to $9,000 per lot.

Campbell et al. (undated) linked a phosphorous loading model, a lake trophic state index model, and a property value model to estimate how changes in lake water quality would affect property values in Michigan and Minnesota. Their research showed that an increase in the trophic state of the lake decreased the value of properties near the lake. Carpenter et al. (1999) also looked at eutrophication

of lakes and lake management. They recommended managing phosphorous levels in lakes in order to maximize property values. Parsons and Kealy (1992) used a random utility model to look at lake recreation in Wisconsin and estimated how water quality improvements would influence the recreation behaviors of boaters, anglers, swimmers, and viewers.

Walsh et al. (2011) looked at the effects of enhanced water quality on both waterfront and non-waterfront property values in Florida using hedonic models. They found that the value of increased water quality depended upon the property's location and proximity to the waterfront, plus the surface area of the water body. They also found that in urban places with high housing density, water quality improvements could cause higher aggregate property value increases for non-waterfront homeowners than for the relatively small number of waterfront homeowners.

There has been a number of studies on WTP for cleaner water for recreational uses such as boating, fishing, and swimming (Carson and Mitchell 1993, d'Arge and Shogren 1989). They conclude that there are many factors affecting WTP for cleaner water and that bringing water up to swimmable standards may not have a net economic benefit.

Cultural Ecosystem Valuation Methods

Some newer approaches have been used specifically for assessing cultural ecosystem services. Milcu et al. (2013) reviewed 107 publications to extract 20 key attributes describing the types, context, methods, scales, drivers, and tradeoffs between cultural ecosystem services. The authors stressed that cultural services can link gaps between researchers and disciplines. Chan et al. (2012) warned about conflation of services values and benefits as well as failure to address diverse value. They also demonstrated the interconnected nature of benefits and services and the ubiquity of intangible values.

Given these challenges, Brown et al. (2012) and Raymond et al. (2009) used participatory community mapping to identify community values for ecosystems services. Brown et al. (2012) used Internet-based public participation GIS (PPGIS) to identify ecosystem services in Grand County, Colorado. They found that cultural ecosystem service opportunities were the easiest to identify while supporting and regulatory services were most challenging. Most participants were highly educated about nature and science and the research found that some geographic locations were strongly spatially associated with specific ecosystem services. Finally, the PPGIS method proved to have high potential for identifying ecosystem services in general. Raymond et al. (2009) utilized in-depth interviews and mapping to quantify and map values and threats to natural capital assets and ecosystem services in the Murray Darling Basin region of southern Australia. The most highly valued ecosystem services were recreation and tourism, bequest, intrinsic and existence, freshwater provision, water regulation, and forest provision services, in that order.

Palmer and Smardon (1989a, 1989b, 1989c) used group meetings and fieldwork followed by a mail questionnaire to assess aesthetic (visual) and recreational uses and values of wetlands in Juneau, Alaska. This work was part of a regional Wetland Management Plan for the City/Borough of Juneau (LaRoche and Associates 2008). They found that the value assessments for the cultural ecosystem service component were more consistent than for the biological and hydrological components.

There have also been assessments of wetlands as heritage, historical, and/or archaeological sites. Reimold et al. (1980) cited traditional use of wetlands on the Atlantic coast for grazing. Smardon (2006) looked at the historic use of wetlands by Mayans in Mexico, and Baptiste and Smardon (2012) studied traditional subsistence use of the Nariva Swamp in Trinidad-Tobago.

AESTHETIC VALUE ASSESSMENT THEORY

There are economic methods for quantifying some cultural ecosystem services as itemized above, but these methods may not capture all of the value streams. The next section of this paper will focus on aesthetic value assessment theory, again focusing on water shoreline and wetland landscapes. Wetlands are intriguing landscapes that are historically perceived as evil and dangerous places (Fritzell 1978, Neiring 1978, Smardon 1978, Vileisis 1997). So the question is, do people's understanding of landscape ecology modify their aesthetic perceptions of landscapes (Gobster et al. 2007)?

Zube et al. (1982, p. 8) provided four principal approaches to assessing the aesthetics of landscape:

1) The expert paradigm. This involves evaluation of landscape quality by skilled and trained observers. Skills evolve from training in art and design, ecology or in resource management fields where wise resource movement techniques may be assumed to have intrinsic aesthetic effects.
2) The psychophysical paradigm. This involves assessment through testing general public or selected populations' evaluations of landscape aesthetic qualities or of specific landscape properties. The external landscape properties are assumed to bear a correlational or stimulus-response relationship to observer evaluations and behavior.
3) The cognitive paradigm. This involves a search for human meaning associated with landscapes or landscape properties. Information is received by the human observer and, in conjunction with past experience, future expectation, and socio-cultural conditioning, lends meaning to landscape.
4) The experiential paradigm. This considers landscape values to be based on the experience of the human-landscape interaction, whereby both are shaping and being shaped in the interactive process.

The Expert Paradigm

The expert paradigm is illustrated by Smardon (1975) and Smardon and Fabos (1983) in the visual-cultural model. Here, aesthetic, recreational, and educational values of freshwater wetlands can be assessed using the factors of landform contrast, surrounding landform diversity, associated water body size, associated water body diversity, wetland edge complexity, surrounding land use contrast, land use diversity, internal wetland diversity, internal wetland contrast, and wetland size. These variables are augmented by educational proximity, physical accessibility, and ambient (water, air, and solid waste) quality.

The recreation-related activities plus use of settings and benefits from the landscape can be assessed with the U.S. Department of the Interior (USDI) Bureau of Reclamation's Water and Land Recreation Opportunity Spectrum (WALROS) system (USDI Bureau of Reclamation 2011). This expert system can assess the kinds of activities that benefit from either direct water presence or visual proximity to water bodies.

The Psychophysical Paradigm

There have been several studies using psychophysical methods and three will be reviewed here. Cottet et al. (2013) administered a photo questionnaire with a sample of riverine wetland photos along the Ain River (France) to 403 lay people and self-identified experts in order to: 1) identify the different parameters (visual or ecological) influencing perceptions of value of the ecosystems; and 2) compare the experts' and lay people's perceptions of value. The criteria that most strongly influenced people's perceptions of ecological and aesthetic values included water transparency and color, the presence and appearance of aquatic vegetation, and the presence of sediments and trophic status (oligotrophic to eutrophic).

Dobbie (2013) did a psychometric study involving Likert scale preference ratings made by 241 participants for 70 photos of wetlands in Victoria, Australia. Her statistical analysis related preference to socio-demographic variables and familiarity with wetlands. The major preferences, categorized from least to most, were: brown grasslands, wetlands with emergent vegetation, wetlands with open water, and wetlands with trees. Wetland preference attributes included presence of trees, amount of water, and perceived wetland health. Wetland health was related to water quality, vegetation lushness, and proportion of land to water. Overall predictors of preference were perceived wetland health, complexity, orderliness, and perceived naturalness.

Lee's (2017) research proposed some 13 factors influencing the ecological assessment of wetlands within three categories:

- Ecological health and aesthetic value of wetlands were related to nutrients, transparency, aquatic plants, sediment, water color, water shoreline, terrestrial vegetation, and surrounding vegetation.
- Factors affecting disassociation between ecological health and aesthetic value included overall landscape context and the visible area of open water. Openness was seen as better and corresponded to preference for open, savanna-like landscapes (Appleton 1984).

- Open marshes were perceived as more simple and legible compared with scrub and shrub wetlands, which were seen as more complex and less legible.

The Cognitive Paradigm

There have also been a number of cognitive studies of wetland aesthetic cultural attributes. Manuel (2003) surveyed residents in three urban communities in the Halifax Regional Municipality in Nova Scotia, Canada. He found that the residents were generally aware of the urban wetlands and identified them as assets because they were natural features in the landscape and habitat for urban wildlife. Nassauer (2004) compared restored and more natural reference wetlands using several measures including land use context, cultural perceptions, and management practices for six metropolitan wetlands in Minnesota. Cultural measures were drawn from surveys of visitors, neighbors, planners, and managers of these areas. Sites that were perceived as well-cared-for and good places to enjoy nature were perceived as more attractive. Cultural cues, natural landscape context, and bird species richness were also related to perceived attractiveness.

Two early studies of the cognitive attributes of riverine wetlands assessed the roles of coherence, complexity mystery, and legibility in landscape preferences. Ellsworth (1982, summarized in Kaplan and Kaplan 1989, p. 220-222) examined the landscape units, setting units, and waterscape units of the Cutler Reservoir and tributaries in Cache County, Utah. He asked people to use color slides and a five-point rating scale to assess the coherence, complexity, mystery, and legibility of rivers and marshes. Research participants found high coherence when there was similar vegetation with strong horizontal edges in marsh scenes and edge definition in rivers. They also found mystery in riverbeds and river bends, complexity in rivers and marshes when there was diversity in vegetation and visual depth, and legibility in straight river corridors and simple spaces as well as with fine textured marsh vegetation and spatial definition. Similarly, Lee (1983, 1979) did a study of Louisiana river landscapes and found that preference values for river scenes often included one or two characteristics (legibility, complexity, spatial definition, mystery, distinction, or disturbance) but no factor was found to be more significant than the others.

Also under the cognitive paradigm, Lee (2017) has proposed that there is cognitive appreciation of a landscape's ecological functions, which naturally arouses emotions. Others have supported this thesis (Callicot 2003, Cottet et al. 2013, Dobbie 2013, Rolston 2000, Sheppard 2001) while studying landscape preferences (Korpela et al. 2002, Ulrich 1983).

The Experiential Paradigm

Experiential assessments relate to the actual landscape as people perceive and experience it in situ (Zube et al. 1982). Such assessments also relate to engaging in specific recreational and other activities in the landscape. While no experiential studies were identified for this review, this type of assessment could be done with onsite interviews, questionnaires, or observation as well as user photography and video to capture the experiential qualities of the recreational, aesthetic, and educational experience.

Whether we are using an expert, psychophysical, cognitive, or experiential approach, a key question is how stable or accurate such assessments are over time. Palmer (2004) investigated perception of scenic quality of the Cape Cod community of Dennis Massachusetts from the 1970s to the 1990s. The original views in his 1975 study (Palmer 1983) were re-photographed and another sample of Dennis residents was surveyed. Results showed that most of the variation in scenic perceptions was explained by spatial landscape metrics indicating blocked views or changes in land use area rather than a temporal shift in resident preferences. This led Palmer to conclude that his model retained predictive efficacy after 20 years (Palmer 1983, 2004).

CASE STUDY APPLICATION: CAZENOVIA LAKE, NEW YORK

The research reviewed above laid the foundation for a recent value stream application undertaken by the author for Cazenovia Lake in New York. This town and village of the same name lie on the eastern edge of the Finger Lakes Region in central New York (Fig. 1). Cazenovia Lake itself is a dominant natural and cultural feature affecting the history, culture, economics, and land use of the surrounding community for both residents and visitors.

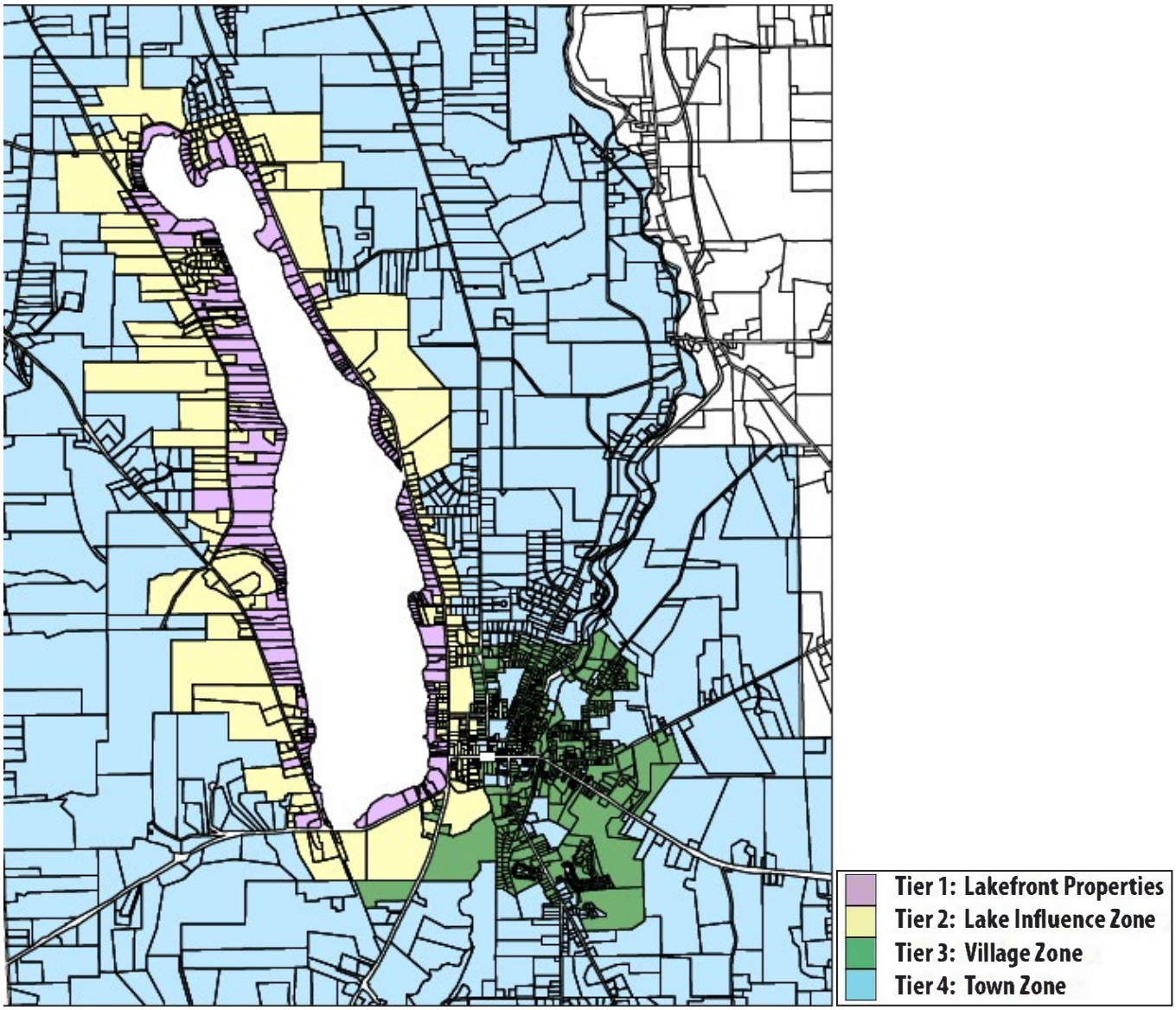

Figure 1.—Area map of Cazenovia Lake showing major land use zones.

For this case study, the author created a lake-related benefit matrix shown in Table 2. The matrix incorporates information from the U.S. EPA's Final Ecosystem Goods and Services Classification System (Landers and Nahlik 2013) to classify activities. Information on settings and benefits was incorporated from the U.S. Department of the Interior Bureau of Reclamation's WALROS system (USDI Bureau of Reclamation 2011) to represent the kinds of activities that benefit from direct lake presence, visual proximity to the lake, or proximity within the lake watershed. The matrix is a work in progress and will be further refined.

Overview of Cazenovia Lake Benefit Streams

The matrix summarizes the benefit flows to the Greater Cazenovia township/watershed area from Cazenovia Lake. Some of these benefit flows, like resource-dependent businesses and recreational activities, have quantifiable economic benefits. Others, such as inspiration, learning activities, and ecosystem services, are more difficult to quantify or translate into economic benefits. Let us start with the more direct economic benefit streams and move to the more indirect or less quantifiable.

Table 2.—Preliminary matrix of Cazenovia Lake cultural service benefits

Activity category	Setting	Beneficiary experience	Benefit	Economic indicator
Resource-dependent business				
Marina	Lakeside presence	Water access	Water access	Sales +
Restaurant	Lakeside presence	Water views	View access	Expenditures
Agritourism	Lakeside presence	Water views	View access	Sales +
Recreational activities				
Motor boating	Dock/launch	Water experience	Water experience	Expenditures
Personal water craft	Launch point	Water experience	Water experience	Expenditures
Sailing	Launch point	Water experience	Multi-sensory	Rental cost
Paddleboard	Lake access	Water experience	Multi-sensory	Travel cost
Kayak/canoe	Lake access	Water experience	Multi-sensory	Travel cost
Swimming	Beach access	Water experience	Multi-sensory	Travel cost
Fishing/ice fishing	Water access	Water/ice experience	Multi-sensory	Expenditures
Wildlife viewing	Lake access	Viewing wildlife	Multi-sensory	Travel cost
Lake edge cultural activities				
Picnicking	Lake edge parks	Water views	Relaxation	Travel cost
Tennis/volleyball	Lake edge location	Water edge views	Relaxation	Rental cost
Foot races	Lake edge course	Water edge views	Relaxation	Travel cost
Bicycling/touring	Lake edge roads	Water edge views	Relaxation	Travel cost
Festivals	Lake edge location	Water edge views	Relaxation	Travel cost+
Inspirational activities				
Weddings + other events	Lake edge location	Water edge views	Presence	Event cost
Art related activity	Lake edge location	Aesthetic inspiration	Inspiration	Travel cost
Learning activities				
Historic interpretation	Lorenzo State Park	Historic understanding	Historic experience	Travel cost
Educational trips	Lake location	Educational understanding	Educational experience	Travel cost
Research	Lake location	Research opportunities	Educational experience	Travel cost
Municipal operations/revenue				
Residential owners	Lakeside	Lake environment	Lake access	Property value
Ecosystem services—regulatory				
Maintain water quality		Water related activities above		Water quality treatment
Nutrient retention		Downstream water quality		Water quality treatment
Sediment retention		Downstream water quality		Water quality treatment
Carbon storage		Reduced CO_2		Climate change mitigation
Ecosystem services—production				
Water supply	Lakeside residences	Drinking water		Replacement cost
	Erie Canal (historic)	Water level		Replacement cost
Ecosystem services—support				
Aquatic habitat		Fish and wildlife		Enhancement
Food chain		Sustain fish and wildlife		Enhancement
Ecosystem services—cultural				
See recreational-cultural-inspirational-educational activities above plus				
Public views of the lake		aesthetic enjoyment		Viewer numbers
Existence value		Knowledge of existence		Option value

Resource dependent businesses are activities such as lakeside marinas, restaurants, and agritourism facilities that are located on or near the lake and draw users because of location and/or views. Economic indicators are sales and expenditures from consumers who visit the area because of the lakeside location, views, or both.

Similarly, recreational activities are a benefit stream because of physical and sensory lake access; this may have a seasonal aspect. Lake edge cultural activities do not require physical access to the lake but are a draw because of their visual proximity to the lake. Both of these activity sets can be quantified by onsite expenditures and/or travel cost.

Inspirational activities are special events such as weddings or other celebratory events that occur near the lake edge and/or rely upon visual access to the lake. Onsite expenditures and/or travel costs can be used to quantify this benefit flow.

Learning or educational activities are also place-connected to the historical heritage of Cazenovia Lake. The major draw in this regard is Lorenzo State Park, but there are other cultural, historical (Environmental Design & Research 2008) and ecological attributes connected to the lake. Travel cost of visitors can be used to calculate these benefit flows.

One of the major benefit flows for lakeside property owners includes amenities of being on the lake. The literature reviewed above suggests that increased physical proximity and water view access will increase property values near the lake. This translates to higher assessed value for these properties and higher real estate tax revenue for the Village and Town of Cazenovia.

Arrays of benefits flow from ecosystem services, which in the context of the lake ecosystem includes regulatory (improving water quality), provisional (providing drinking water), ecosystem support (habitat for fish and wildlife), and cultural (aesthetic, education and recreation benefits) services. It also includes the amenity values gained by lake edge property owners, plus lake-related recreational, cultural, inspirational, and learning activities previously covered.

Existence value could also be considered a cultural ecosystem value. Existence value is the knowledge by village, town residents and others in the region that Lake Cazenovia exists in case one wants to visit or engage in any of the cultural activities previously covered.

In addition, there are public viewsheds or significant views of the lake that are enjoyed by both residents and visitors (see Figs. 2-4). These are documented in the Village and Town of Cazenovia Comprehensive Plan (Environmental Design & Research 2008, p. 50-51) and include the following:

- View from center of Cazenovia Lake: View from lake showcases the water and lakefront homes and parks in the foreground, the Village rooftops and steeples in the middle ground and the rolling agricultural landscape in the distance. This serene view captures the essence of a quaint, rural lakefront community.
- View from Lorenzo: One of the few places that community residents and passersby may experience a significant, open view to the lake. This view of the lake (which is often painted by local artists) acts as an announcement that one has arrived in or is exiting Cazenovia. Coupled with the historic Lorenzo estate, it establishes a historic atmosphere and sense of timelessness. The view of natural scenic beauty of the water nestled among rolling hills anchors the quaint and unique character of the town.
- Village Center looking west toward Cazenovia Lake: The view from the center of the Village towards the Lake is significant. U.S. Route 20 creates a visual axis to the Lake. This visual framing of the Lakeland Park is essential to the identity of Cazenovia. Attention should be paid to maintain or enhance this relationship. If the intersection at Lakeland Park is reconfigured for safety purposes, the framed view to the lake should not be compromised and if possible, accentuated.

Figure 2.—View from Lorenzo State Park. Photo by R. Smardon, used with permission.

Figure 3.—View from Route 20 in Cazenovia looking toward the lake. Photo by R. Smardon, used with permission.

Figure 4.—View from Route 20 on the eastern entrance to Cazenovia. Photo by R. Smardon, used with permission.

In addition, there are visual corridors (Environmental Design & Research 2008, p. 51-52) such as the following:

- View from U.S. Route 20 West, driving eastward into Cazenovia: This is one of the most historically presented entrances into the community. Late 19th century paintings and photographs exist of this view to the lake with the lake in the mid-ground and the Presbyterian Church steeple in the background. Looking to the east one can see U.S. Route 20 East and the Romagnoli homestead, built in late 1700s and patterned after Mount Vernon as well as the CPF/Ambrose farms and the fields behind South Cemetery. The Town should consider a scenic byway lookout stop at this site near Lorenzo Farms. (See William G. Boardman, Cazenovia from West Hill, 1848 and Dwight Williams, Cazenovia Lake, 1910. Both oil paintings are on display at Lorenzo State Historic Site.)

Both viewsheds and scenic corridors add quality of life benefits for residents and are part of the draw for visitors.

DISCUSSION AND SUMMARY

In this paper, the author addressed the questions: How do we incorporate cultural ecosystem services as a method for scenic/visual/aesthetic landscape assessment/valuation? And should we? Answers, based on the literature review and a case study, include the following:

- We can use a mixed methods approach for quantifying economic benefit streams and tracking more intangible benefit streams.
- We can address the overlapping nature of aesthetic, recreation, education, and inspirational cultural ecosystem services.
- We can engage stakeholders via multiple means such as focus groups, surveys, workshops, public participation GIS (PPGIS), and social media to yield data, which substantiate different benefit streams.
- We can address tradeoffs and ethical issues related to benefit flows (e.g., some residents are closer to high value aesthetic landscapes than others but could benefit from greater access).
- We can address the scale of the relationships between resources and ecosystem services (e.g., some scenic resources are regional while others are more community or local scale).

Such assessment and valuation approaches open the door for more research and application of cultural ecosystem services as part of visual scenic resource assessment and management. Similar approaches have already been used for the Lake Champlain Management Conference (Smardon 1996).

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