Seven Peaks At Mountain Road:
An Ecological Economic Assessment

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Introduction

The Town of Mamakating is facing a classic development dilemma: how to improve its economy and opportunities for its residents, while maintaining a high quality of life and its ecological resources. The Seven Peaks Development Project presents an opportunity that could potentially generate jobs and revenue for the town. However, the information presented by the project sponsors, in the DEIS dated 1/26/10, and supporting materials, does not clearly indicate that the project will yield concrete benefits for the town when examined with a systems-based approach. Major areas of concern include inadequately assessing environmental impact and how significantly the project may negatively affect the community and quality of life for its permanent residents. I urge the Planning Board to carefully measure these elements when making their decision for the Seven Peaks project.

As an Ecological Economist, I have analyzed numerous Environmental Impact Statements and provided policy recommendations for more complete decision-making for land use planning. Ecological economics (EE) is an emerging field that addresses the relationships between ecosystems and economic systems, recognizing finite resources and the biophysical limits of the planet. Traditionally, the inability to recognize the intrinsic dependency of the economy on earth systems has led to incomplete decisions that cause and amplify environmental and social problems, particularly when pursing development agendas.

In fact, the importance and contribution of healthy ecosystems to human well-being has gained increasing awareness and attention in recent years. Ecosystems are defined as "a dynamic complex of plant, animal, and microorganism communities and the nonliving environmental interaction as a functional unit" (MEA 2005). The components in ecosystems, such as soil and trees, interact in complex processes that create functions that then lead to environmental goods and services. Ecosystem services are the benefits that people obtain, directly and indirectly, from ecosystems. There are various types of ecosystem services, including provisioning services, such as food, water and timber; regulating services that influence climate, water quality, floods and diseases; supporting services, including soil formation, photosynthesis and nutrient cycling; and cultural services that provide recreational, spiritual and aesthetic benefits. Table 1 provides descriptions and examples of ecosystem services.

However, despite the wide-scale acknowledgement that ecosystems are fundamental to Earth's life-support systems and vital to human welfare, the majority of the benefits yielded by ecosystem services are currently outside of the economic system, so their value is not equally weighted in decisions that directly impact their functioning and well-being. Traditional economics generally considers benefits derived from and impacts to ecosystems as externalities and often not accounted for in development and management decisions.

When ecosystems are healthy, they can provide valuable ecological services for free and in perpetuity. For example, healthy forests slow water runoff and, combined with sufficient flood plains and wetlands, they protect against flooding. When forest cover is lost and flood plains are filled, flooding downstream is increased. If natural flood prevention functions (provided for free) are destroyed, then flood damage will exact costs on individuals and communities. Private individuals, firms and governments will either suffer the costs of flood damage or they will have to pay for engineering structures and storm water infrastructure to compensate for the loss of ecosystem flood prevention, previously provided for free by specific geomorphological conditions and healthy ecosystems. Without healthy ecosystems, taxpayers, businesses and governments incur damage or costs to repair or replace these ecosystem services. For instance, recent research estimates that 80% of the damage caused by

Hurricane Katrina in New Orleans could have been avoided or mitigated if the wetlands - natural flood buffers – had been kept intact (Costanza *et al*., 2008).

Table 1: List of Ecosystem Services and Their Functions

Functions		Ecosystem Infrastructure and Processes	Goods and Services (Examples)
		Regulating Services	
1	Gas regulation	Role of ecosystems in biogeochemical cycles	Provides clean, breathable air, disease prevention, and a habitable planet
2	Climate regulation	Influence of land cover and biologically mediated processes on climate	maintenance of a favorable climate promotes human health, crop productivity, recreation, and other services
3	Disturbance prevention	Influence of ecosystem structure on dampening environmental disturbances	Prevents and mitigates natural hazards and natural events, generally associated with storms and other severe weather
4	Water regulation	Role of land cover in regulating runoff and river discharge	Provides natural irrigation, drainage, channel flow regulation, and navigable transport
5	Soil retention	Role of vegetation root matrix and soil biota in soil retention	Maintains arable land and prevents damage from erosion, and promotes agricultural productivity
6	Nutrient regulation	Role of biota in storage and recycling of nutrients	Promotes health and productive soils, and gas, climate and water regulations
7	Waste treatment	Role of vegetation and biota in removal or breakdown of nutrients and compounds	Pollution control/detoxification, filtering of dust particles through canopy services
8	Pollination	Role of biota in movement of floral gametes	Pollination of wild plant species and harvested crops
9	Biological control	Population control through trophic-dynamic relations	Provides pest and disease control, reduces crop damage
		Supporting Services	
10	Soil formation	Weathering of rock, accumulation of organic matter	Promotes agricultural productivity, and the integrity of natural ecosystems

		Provisioning Services	
11	Water supply	Filtering, retention, and storage of fresh water (e.g. in aquifiers and snow pack)	Provision of water for consumptive use, includes both quality and quantity
12	Nursery function	Suitable reproduction habitat	Maintenance of commercially harvested species
13	Refugium function	Suitable living space for wild plants and animals	Maintenance of biological and genetic diversity (and thus the basis for most other functions)
14	Food	Conversion of solar energy into edible plants and animals	Hunting, gathering of fish, game, fruits etc.; small scale subsistence farming and aquaculture
15	Raw materials	Conversion of solar energy into biomass for human construction and other uses	Building and manufacturing, fuel and energy, fodder and fertilizer
16	Genetic resources	Genetic material and evolution in wild plants and animals	Improve crop resistance to pathogens and pests
17	Medicinal resources	Variety in (bio)chemical substances in, and other medicinal uses of, natural biota	Drugs, pharmaceuticals, chemical models, tools, test and essay organisms
		Cultural Services	
18	Ornamental resources	Variety of biota in natural ecosystems with (potential) ornamental use	Resources for fashion, handicraft, jewelry, pets, worship, decoration and souvenirs
19	Aesthetic information	Attractive landscape features	Enjoyment of scenery
20	Recreation	Variety in landscapes with (potential) recreational uses	Travel to natural ecosystems for ecotourism, outdoor sports etc.
21	Cultural and artistic information	Variety in natural features with cultural and artistic value	Use of nature as motive in books, film, painting, folklore, national symbols, architecture, advertising etc.
22	Spiritual and historic information	Variety in natural features with spiritual and historic value	Use of nature for religious or historic purposes (i.e., heritage value of natural ecosystems and features)
23	Science and education	Variety in nature with scientific and educational value	Use of natural systems for school excursions, etc. Use of nature for scientific research.
24	Navigational	Variety in nature with	Use of bodies of water, land and

	services	navigational value	natural objects for movement, travel, trade, etc.

In a 1997 seminal work, Costanza *et al*. argue that ecosystem services should be embodied within the complete economic worth of the Earth, and estimated that 17 ecosystem services produced or supported by 16 biomes are worth, on average, $33 trillion annually, with most of this value accruing outside traditional markets (Costanza *et al*. 1997). For comparison, global GNP was approximately $18 trillion. Ecosystem Services Valuation (ESV) has since emerged as an ecological-economic approach to identifying and valuing the functions, goods, and services produced by ecosystems that benefit human populations but which are not currently traded, and therefore ascribed value, in markets. The approach is increasingly gaining recognition as a way to integrate the value of natural systems into an otherwise incomplete analyses and decision-making processes.

Ecosystem Services Valuation attempts to capture the aspects of ecological impact that have previously been unacknowledged in the same framework as costs and benefits are analyzed in development, land use and other projects. For example, the New York City concluded that protecting the Catskills watershed ecosystem services would be more cost effective for clean water provision than building a filtration plant. Hence, the city invested $1.5 billion in the protection of natural capital, by acquiring critical watershed lands, reducing contamination and other maintenance measures. On a national level, Costa Rica's Payment for Ecosystem Services Program pays upstream landowners to conserve and manage their forests (Daily and Ellison, 2002). These initiatives highlight ESV as a valid and more complete approach to decision-making with the basis that human-well being is entirely dependent upon healthy ecosystems, for which there is no absolute substitution.

It is critical to note that although advances have been made on placing economic value on ecosystem services to demonstrate their worth, much understanding is lacking about how marginal or seemingly small changes in land use and landscape affect the provision of ecological services on local and global scales. For example, we have a generally good comprehension that clear cutting forests will significantly damage ecosystem services such as water purification, habitat provision, floodwater control and climate regulation. However, we have much less of a grasp on understanding how converting 30% of a wetland will impact water quality or local bird populations.

Ecosystem analyses can be combined with socio-economic analyses to give a better picture of both the ecological and market-based costs and benefits of management options. Fundamentally, the purpose to expand traditional socio-economic analysis is to improve the information available to decision-makers and secure better policy, better quality of life, better restoration and better economic decisions. Currently economic value is limited to values of exchange (market prices) and value in use (willingness to pay or willingness to accept compensation). Yet research increasingly demonstrates that these narrow economic parameters do not correspond well with improving quality of life (QOL) and well-being. EE incorporates a much broader view of values to include social, aesthetic, life support, intrinsic and energy values.

In fact, issues of equity are often overlooked in traditional studies. One equity issue is leaving healthy ecosystems and the substantial economic benefits they produce for future generations. Another issue is the differential effects on landowners and QOL. The Seven Peaks Project has significant socio-economic implications for stakeholders in the present and future that merit serious consideration. Therefore, the identification and valuation of ecosystem services provided by the region's natural capital provides decision-makers with critical economic information. It presents the first opportunity to take stock of the economic value of natural assets within the region. Without considering the full socio-economic value of these ecological assets and the goods and services they produce, relying solely upon economic projections would be incomplete and inefficient.

Impacts To Ecosystem Services

The Ecological Consultant J.G. Barbour provided important feedback on ecological aspects and of deficiency in the Draft Scope, (see Barbour Comments on Seven Peaks Development Project). I will not replicate his efforts but provide an ecological economic perspective to them.

The DEIS only lists 3 special concern species (eastern bog turtle, barrens buckmoth and cerulean warbler), and it claims there are no rare, endangered, threatened or otherwise protected plant or animal species identified onsite. However, as noted in Barbour's comments, the Natural Heritage Program (NHP) for the Town of Mamakating shows 19 rare elements, including chestnut oak forests. As noted above, it is not fully understood what partial damage to ecosystems, particularly fragmenting habitat, can cause to vegetation and wildlife.

Current regional and national trends increasingly demonstrate that concrete economic benefits can be derived from intact ecosystems. New York State is one of ten states participating in the Regional Greenhouse Gas Initiative, the first cap-and-trade program in the United States to reduce greenhouse gas emissions as is therefore poised to be a provider of services that yield offset credits. Wetlands such as the Basha Kill are one of the planet's most biologically productive and diverse natural systems, and play an important role in carbon sequestration. Thus, there is a high potential for becoming an offset provider and deriving significant economic benefits for participating such a program. Moreover, carbon markets, where carbon offsets are traded to meet cap-and-trade limits, have gained important traction and are paving the way for other types of ecosystem services markets as well. These expanded markets, such as water quality and endangered species habitat banking, provide economic incentive for conservation and enable local and regional participation.

In fact, Section 404 of the Clean Water Act established wetland mitigation banking, defined as "the restoration, creation, enhancement and, in exceptional circumstances, preservation of wetlands and/or other aquatic resources expressly for the purpose of providing compensatory mitigation in advance of authorized impacts to similar resources". This device has proven so successful as a conservation mechanism that in 2005, four hundred and fifty (450) wetland banks were established and 59 entities sold out of credits completely.

Wetland banking provides a long-term economic incentive to protect important wetland and aquatic resources. A local example of a successful wetland banking initiative is Monroe County, Pennsylvania, where a viable wetlands protection program has evolved to balance landuse demands – including second home development – and generate revenue. Given important proposed legislation on the regional and national level (eg. the Waxman-Markley American Clean Energy and Security Act), the value of conserved spaces has the potential to significantly increase in the near- to medium-term and should not be underestimated.

Ecosystem Services Valuation

A preliminary ecosystem services valuation was performed for the 678 acres that will be affected by this project. The value of ecosystem services was estimated using a refined "benefits transfer method." Benefits transfer is a way to estimate economic values for ecosystem services by transferring available information from studies already completed in another location and/or context to the area or context in question. Specific information from the Seven Peaks Project was utilized to derive estimated dollar figures. The overall process consists of three steps:

1. Allocate the project land to 8 biomes (Open Water, Rock and Ice, Urban, Forest, Shrub/ Scrub, Grassland, Crops and Wetlands) as identified in the DEIS and Appendix K and convert acres into hectares (275 total ha). Two biomes – rock and ice and agriculture – were excluded because they were not designated any acreage in the DEIS.
2. Establish a baseline indicator of ecosystem health and, thereby, an indicator of baseline productivity relative to 24 ecosystems services (see Table 1 for a list and description of ecosystems). In this step, the underlying ecosystem service productivity estimates were adjusted by biome according to the biome health estimates. The underlying productivity estimates are extracted and, in some cases, interpolated from Costanza *et al.* (1997) and indicate the relative effectiveness of the various biomes for generating or harboring each of 24 ecosystem services. For example, Forests score a one for the ecosystem service of climate regulation, meaning forests do as well as any biome could to regulate climate. The Shrub/Scrub biome, by contrasts, only scores 0.8. In the Northeastern U.S. the health indicators for these biomes are .59 and .58, respectively, yielding adjusted climate regulation productivity of 0.59 (1.0 x 0.59) for forests and 0.46 (0.8 x 0.58) for shrub/scrub areas. Given the conserved status and pristine state of much of the project land, ecosystem health was determined to be fairly high.
3. Determine a range of dollar-valued estimates of the value of the ecosystems services per hectare and multiply hectares by baseline productivity by dollars to estimate baseline ecosystem service values. The Millennium Ecosystem Assessment (2005), IPCC: North America and the Cost of Policy Inaction: The Case of Not Meeting the 2010 Biodiversity Target – with the estimates for the Northeast extracted - are the data sources for dollar values for specific ecosystem services. Values were also updated from the Costanza *et al*. 1997 paper to 2010 dollars using the Consumer Price Index. Multiplying hectares per biome (from step one) times ecosystem service productivity per biome and ecosystem service times ecosystem service value per hectare yields an estimate of the total value for each ecosystem service for the project area.

Table 2 demonstrates the summary of the ESV results. These figures are not meant to be precise dollar amounts, but illuminate the true value of these ecological services. At a minimum, the ecosystem services derived from the proposed project yield $257,713.86 per year, and at the highest end, $7,205,933.56. I recognize that these figures do not translate into directly accrued economic benefits, but by explicitly stating their values I hope to convey their import. The proposed project of 678 acres will significantly impact ecosystem services in the area and perpetuate a sharp decline in value.

Socio-Economic Considerations

Section 2.2.3 of the DEIS states that there are no mitigation measures necessary to reduce impact to community services, fiscal and economic resources because the project will only yield positive benefit. It is estimated that the project will yield an increase in real property taxes, with little service demands due to private infrastructure. Substantial research, however, demonstrates the contrary. For example, using a holistic model of fiscal impact to ascertain the economic effects of recreation housing, Deller *et* *al*. determined that a housing development just "pays for itself" in terms of generating governmental revenue, when considering expenditures such as general government operations, police and fire protection, road maintenance, waste disposal, health and human services and cultural and education services. Indeed, although the Seven Peaks Development might maintain some private roads, the main access roads in and out of town are publicly owned, and increased traffic from 62 residential units - and possibly a luxury hotel and further homes - would place substantial infrastructure burdens on the town. Often projects of this scope and nature incur unforeseen consequences - particularly causing significantly more detrimental impacts to the community and environment than anticipated - to claim there will be no negative impact to the community is shortsighted and unrealistic.

Community recreation, and subsequently tourism, may be considerably impacted as well. The DEIS states that public would have access to community land that will be controlled by the homeowners association. Without any binding agreements stipulating the terms of this land use, there is real potential for the association to limit, restrict or prohibit continued use of this land. Aesthetic issues also come into play, as the viewshed will be impacted, both aesthetically and due to increased light pollution, and birders, tourists and those pursuing other recreational activities may opt to go to a less developed area. As tourism is a major economic driver to the town, this possibility should not be considered lightly.

Further, the cultivation of a second-home community can have significant long-term impacts, both economically and on the community. Robust research demonstrates that:

1) Second home ownership can lead to an increase in the cost of housing, which often perpetuates the displacement of younger residents who cannot afford those rising costs. This trend can cause a change in town demographics as well a decline in school attendance, thereby reducing overall funding available for public schooling.

2) The influx of higher wage-earners to the community can drive up cost-of-living prices and become increasingly difficult for permanent residents to afford goods and services locally.

3) The presence of wealthy second home owners, who are not as invested in community affairs and tend to not vote for increases in public school spending or social services, contribute to a decline in a sense of community and social capital, tangibly impacting quality of life for permanent residents.

4) Communities with a presence of second home ownership have been proven to have higher rates of under- and unemployment, as the economy becomes more focused on seasonal and service-based employment. There is no demonstrated plan that assures local labor will be used for construction, and will only be temporary, minimizing the potential benefits to locals.

5) Second homes can reduce the availability of affordable housing in rural communities, causing workers to move further away from their employment and the community.

6) Large business owners (such as the private homeowners association and potentially the luxury hotel) are able to negotiate tax breaks and other economic incentives that could drastically reduce the projected revenues.

See Miller, 2002; Salamon, 2003 and Sharpley and Sharpley, 1997; Venturoni et al., 2005 for in-depth detail.

In closing, I firmly believe that economic development can be pursued in balance with ecological protection and fostering a healthy community and quality of life, and respectfully offer my comments with the intent to add another dimension to the considerations for the Seven Peaks Project.

Summary/talking points:

- Ecosystem services are the benefits that people obtain, directly and indirectly, from ecosystems. Because these services are provided free from nature, they are most often excluded from the market and traditional economic frameworks.
- Increasingly the economic value of ecosystem services is being recognized. For example, City of New York invested $1.5 billion in acquiring and maintaining watershed lands in the Catskills, so users upstream would protect water supplies instead of paying even more on a mechanical water treatment system.
- While we understand more about whole ecosystems and their services, little is known about marginal or seemingly small changes to ecological services on local and global levels. This project will impact habitat for species of concern and rare elements.
- Issues of equity with land-use decision-making include considering the economic and life-supporting benefits of ecosystems for future generations.
- Other revenue-generating activities that leave the land undeveloped include the potential to participate in carbon offset and wetland mitigation banking programs, which are most likely going to expand in the next several years.
- An ecosystem services valuation was performed for the 678 acres to be affected by the project. At a minimum, the ecosystem services derived from the proposed project yield $257,713.86 per year, and at the highest end, $7,205,933.56. The proposed project of 678 acres will significantly impact ecosystem services in the area and perpetuate a sharp decline in value.
- Robust research on community impacts of 2nd home ownership demonstrates that:
    - Governments do not generate revenue and second home communities just barely “pay for themselves” when service provision, including road maintenance, police and fire, waste disposal, health and human services and education.
    - Often projects of this scope and nature incur unforeseen consequences - particularly causing significantly more detrimental impacts to the community and environment than anticipated - to claim there will be no negative impact to the community is shortsighted and unrealistic.
    - Community recreation, and subsequently tourism, may be considerably impacted due to limited access to recreational lands.
    - The viewed will be impacted by light pollution and through aesthetics, potentially driving tourists and those recreating to other towns/areas.
    - Second home ownership can lead to an increase in the cost of housing, which often perpetuates the displacement of younger residents who cannot afford those rising costs. This trend can cause a change in town demographics as well a decline in school attendance, thereby reducing overall funding available for public schooling.
    - The influx of higher wage-earners to the community can drive up cost-of-living prices and become increasingly difficult for permanent residents to afford goods and services locally.
    - The presence of wealthy second home owners, who are not as invested in community affairs and tend to not vote for increases in public school spending or social services, contribute to a decline in a sense of community and social capital, tangibly impacting quality of life for permanent residents.
    - Communities with a presence of second home ownership have been proven to have higher rates of under- and unemployment, as the economy becomes more focused on seasonal and service-based employment. There is no demonstrated plan that assures

local labor will be used for construction, and will only be temporary, minimizing the potential benefits to locals.

- Second homes can reduce the availability of affordable housing in rural communities, causing workers to move further away from their employment and the community.
- Large business owners (such as the private homeowners association and potentially the luxury hotel) are able to negotiate tax breaks and other economic incentives that could drastically reduce the projected revenues.

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