

# Tourism and the Seneca Lake Wineries: Assessment of Water Impacts

T.L. Griffin

HUID: #30718119

ENVR E-118: Environmental Management of International  
Tourism Development

Instructor: Megan Epler Wood

Date: December 15, 2011

## **Executive Summary**

Seneca Lake and the Finger Lakes Region attract a significant number of tourists to New York State each year, and the wineries are key to maintaining the \$2 billion revenue generated annually by these tourists (Halfman, 2009). The impact of these wineries, however, has a negative impact on the water in the region, given the amount of runoff and the lack of water conservation measures by these wineries.

Over the past 20 years, the water quality of Seneca Lake has declined, mainly due to the impacts from agricultural activities, primarily winery operations. Seneca Lake is the primary drinking water supply source for its surrounding community, and the declining water quality is concerning for present and future generations. Winery operators and local community members, however, have not become actively involved in changing this trend; yet, they are essential in helping wineries to improve their operations and to change the trend of declining water quality in Seneca Lake.

Helping the Seneca Lake wineries to improve their impact on the water in the region is crucial for ensuring the long-term sustainability of these wineries and for maintaining the quality of water in Seneca Lake. These wineries need to improve their impact on water through implementing water conservation measures, reducing their runoff, improving the awareness of water issues among community members, and instituting a partnership-based program with other organizations that support sustainability measures. By implementing these practices, the Seneca Lake wineries will continue to attract tourists and support the local economy, and most importantly, they will do so without negatively impacting the water of Seneca Lake.

## Table of Contents

<b><u>Introduction</u></b> .....	<b>5</b>
<b><u>Wine Industry – Finger Lakes Region</u></b> .....	<b>7</b>
<u>Current Situation</u> .....	7
<u>Trends</u> .....	8
<u>Challenges</u> .....	8
<b><u>Environmental Management Issue – Water Pollution</u></b> .....	<b>9</b>
<u>Finger Lakes Region</u> .....	9
<u>Seneca Lake</u> .....	11
<b><u>Regulatory Challenges</u></b> .....	<b>13</b>
<b><u>Best Management Practices</u></b> .....	<b>15</b>
<u>Programs</u> .....	15
<u>Methods – Soil Conservation and Water Management</u> .....	17
<b><u>Conclusions</u></b> .....	<b>19</b>
<b><u>Recommendations</u></b> .....	<b>22</b>
<u>Winery Activities</u> .....	23
<u>Community Awareness</u> .....	24
<u>Partnerships</u> .....	24

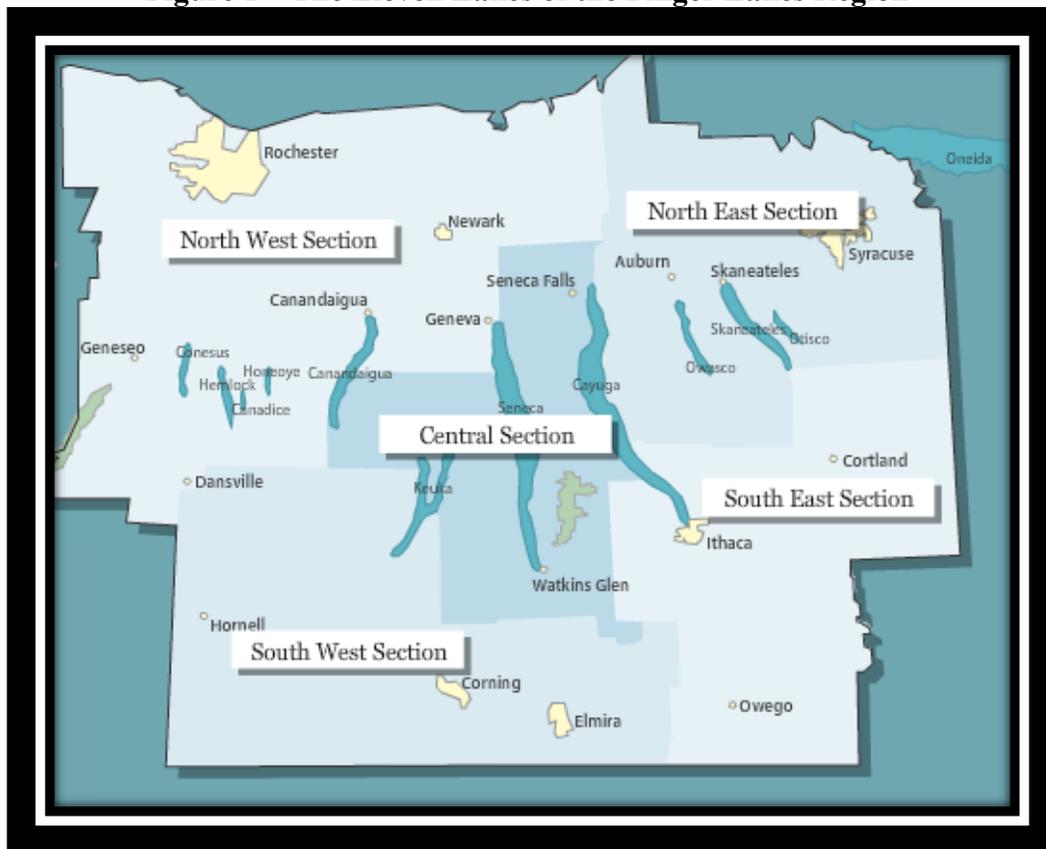
**List of Figures**

[Figure 1 – The Eleven Lakes of the Finger Lakes Region](#) .....5  
[Figure 2 – Finger Lakes Land Use](#).....10

## Introduction

The objective of this paper is to identify water pollution issues caused by the wineries surrounding Seneca Lake in the Finger Lakes Region and to make recommendations for minimizing the water impact caused by these wineries in order to improve the region's water quality and maintain the region's tourism. The Finger Lakes Region is located in the western part of New York State between Syracuse, Rochester, and Elmira-Corning ("Lake Information," 2011). As shown in Figure 1, there are 11 Finger Lakes in the region, which include Conesus, Hemlock, Canadice, Honeoye, Canandaigua, Keuka, Seneca, Cayuga, Owasco, Skaneateles, and Otisco ("Lake Information," 2011).

**Figure 1 – The Eleven Lakes of the Finger Lakes Region**



The appeal of tourism to this area is based on the variety of lakes, the beauty of the area, and the diversity of activities available to visitors in the surrounding communities. The Finger Lakes have three of the largest 10 lakes in New York, and the lakes range in size (“Water Quality Study,” 2011). Cayuga is the longest lake with a length of 40 miles; Canadice is the shortest lake at 3 miles; Seneca is the deepest lake with a depth of 618 feet; and Honeoye is the shallowest lake at 30 feet (“Lake Information,” 2011). The combination of these lakes proves to be a significant asset for the Finger Lakes Region, western New York, and the state in general.

The number of lakes and the diversity of these lakes have helped to make the Finger Lakes Region a well-known tourist destination. However, the numerous wineries in the region have enhanced the appeal of the area and have significantly contributed to the economic stability of the region. Seneca Lake, specifically, has benefited economically from the winery industry since the lake has 34 wineries surrounding it, which is more than any other lake in the Finger Lakes Region (Catillaz, 2006).

Although the wineries provide a strong economic base for the communities in the Finger Lakes Region, the environmental impacts from these wineries is a concern. Most notably, water pollution from these wineries has a significant impact on the water quality of the lakes. Ten of the 11 Finger Lakes are primary sources of drinking water for the communities surrounding the lakes, so ensuring a high quality of water is essential (“Water Quality Study,” 2011). For the Finger Lakes Region to continue to be a highly desired vacation spot for tourists, as well as a reliable economic source for the region, identifying ways to resolve the water impacts from these wineries is imperative.

This paper will focus on Seneca Lake for a variety of reasons. It is one of the two largest lakes in the Finger Lakes Region; it has the most wineries surrounding it; and there have been

water impacts from the wineries surrounding the lake (“Water Quality Study,” 2011). The following sections of this paper will provide an assessment of the wine industry in New York State and the Finger Lakes Region, the current state of water quality in the Finger Lakes Region with a focus on the water quality of Seneca Lake, challenges faced by the wineries in improving their water impacts, best management practices from wineries in other parts of the world, and recommendations for how wineries around Seneca Lake can decrease their negative impacts on water in the Finger Lakes Region.

## **Wine Industry – Finger Lakes Region**

### ***Current Situation***

The wine industry is a very important component of New York State’s economy; wineries provide job opportunities and create a significant economic impact for the entire state. In 2005, the combination of wine, grapes, and grape juice created \$6 billion in economic impact for the entire state (Catillaz, 2006). In 2006, the wine industry in New York provided 36,000 full-time jobs (Catillaz, 2006). Compared to the other states in the United States, New York State is the second largest producer of wine. The wineries in New York generate approximately 16 million cases of wine each year (Catillaz, 2006).

The wine industry is significantly important to New York State for its appeal to tourists. Per a report conducted by the Finger Lakes Institute in 2009, the attraction of tourists to wineries is particularly important to the Finger Lakes Region, as this region generates over \$2 billion annually from tourism and attracts approximately 22 million tourists each year (Halfman, 2009). The majority of tourists are from within New York State; however, approximately four million winery visitors come from other states (Catillaz, 2006).

Within New York State, the Finger Lakes Region is the prominent wine area. Over 85 percent of the wine produced in New York State is produced in the Finger Lakes Region, and within the region, the majority of wine is produced around Seneca Lake, as it has 34 wineries – the most wineries of any of the Finger Lakes (Catillaz, 2006). Currently, there are over 30 varieties of grapes growing on approximately 10,000 acres in the region (“Strategic Plan,” 2001). The varieties of grapes include native types, hybrids, and cultivars, of which 65 percent are natives, 25 percent are hybrids, and 10 percent are cultivars (“Strategic Plan,” 2001). The grapes are grown on farms that range in size from 50 to over 100 acres; 75 percent of farms are 50 to 100 acres and 25 percent are larger than 100 acres (“Strategic Plan,” 2001). After the grapes are grown, they are then processed at several large, local processors and at the small wineries in the area (“Strategic Plan,” 2001).

### ***Trends***

Due to the tourism in the Finger Lakes Region, the wine industry is changing. Tourism is causing growth in the small winery segment of the industry. In 2001, it was estimated that sales at small wineries was growing at 10 to 20 percent per year (“Strategic Plan,” 2001). Currently, there are 50+ wineries in the Finger Lakes Region, but this number is expected to grow as more tourists visit the area and more growers come to the area to open new wineries. The expected growth of new, small wineries is due to the demand from tourists and the inexpensive cost of land in the region.

### ***Challenges***

A variety of challenges exist for the wine industry in the Finger Lakes Region in maintaining profitability and competitiveness with wines from other parts of the world. These challenges include:

- *Growth in inexpensive but high quality wines* – Other parts of the world are growing high quality wine grapes and selling them at inexpensive prices, which puts pressure on wineries in the Finger Lakes Region to produce quality grapes at lower costs (“Strategic Plan,” 2001). If the wineries in the Finger Lakes Region do not do this, the wineries will lose their competitiveness in the national and international market, and they will become less appealing as a tourist attraction.
- *Aging population of grape growers* – Many grape growers in the region are over 50 years old and expect to retire within the next five years (“Strategic Plan,” 2001). Some of these growers will pass on their farms to the next generation and some will sell them. Regardless, there will be changes in ownership in the next decade or so. The farming expertise and local knowledge of these new owners is unknown and will have an effect on the operation of the wineries and the impact of these wineries on the environment and the surrounding community.
- *Lack of communication with neighbors of the wineries* – The wineries in the Finger Lakes Region face a challenge in communicating with their neighbors, as the majority of these neighbors are unfamiliar with farming practices and winery operators do not make it a priority to educate their neighbors (“Strategic Plan,” 2001).

## **Environmental Management Issue – Water Pollution**

### ***Finger Lakes Region***

The watersheds of the 11 Finger Lakes span a 14-county region and occupy 2,630 square miles (Halfman, 2009). These lakes provide drinking water to over 1.5 million residents living in the communities surrounding these lakes (Halfman, 2009). All of the Finger Lakes, except

Honeoye, are the primary drinking water source for their surrounding communities (Halfman, 2009). All of these communities combined withdraw approximately 190 million gallons of water per day from the Finger Lakes for their drinking water (Halfman, 2009).

The land surrounding the Finger Lakes is dominated by agricultural activities, primarily for grape growing and wine production. Agriculture covers 46.5 percent of the region; forests cover 38.3 percent; lakes cover 9.4 percent; and urban areas cover 4.3 percent (Halfman, 2009). Figure 2 shows land use in the Finger Lakes Region (Halfman, 2009).

**Figure 2 – Finger Lakes Land Use**

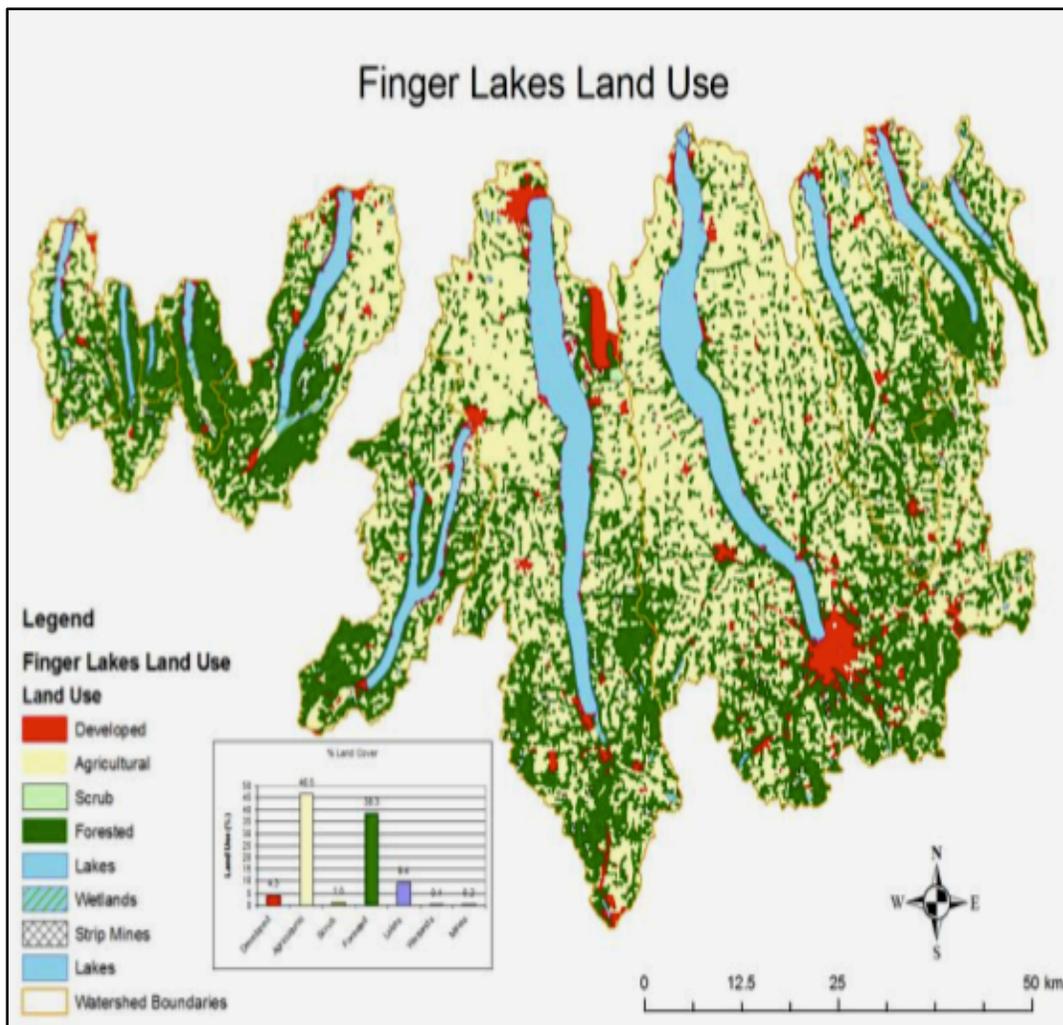


Figure 2 shows that there are significant amounts of agricultural land use along the banks of many of the lakes. However, Seneca Lake, which is the lake in the center of the figure, has one of the greatest amounts of agricultural activities along its shores, especially on the western side of the lake, which is dominated by wineries. These agricultural activities are a concern because they can lead to nutrient loading in the lake, since this is caused by agricultural runoff and the decomposition of organic wastes (Halfman, 2009).

### **Seneca Lake**

Seneca Lake is located within the Seneca-Oswego River Basin (“Water Quality Study,” 2011). It is the primary drinking water supply source for the City of Geneva and the Villages of Ovid, Waterloo, and Watkins Glen (“Water Quality Study,” 2011). The quality of water from Seneca Lake is a valuable resource for the residents of these communities, and maintaining the quality of the water from this lake is imperative given the amount of water and the water’s residence time. Seneca Lake contains over 50 percent of the water in the Finger Lakes and the water has a residence time of 20 years, which is the longest water residence time of the Finger Lakes (Halfman, 2009). Other lakes have residence times of only a few years (Halfman, 2009). If the water quality declines in Seneca Lake, it will take generations, not just years, to rectify the situation.

Due to concerns of impacts on Seneca Lake’s water quality, water quality studies were performed on the lake. A study was performed that assessed data from the past 20 years, and the study showed that the water quality in Seneca Lake has steadily declined over the past two decades (Halfman, 2010). Sampling from tributaries of the lake show that nutrient concentrations in these tributaries are 100 times greater than the concentrations in the lake

(Halfman, 2010). Some of the possible point and nonpoint sources of pollution of these nutrients include wastewater treatment facilities, septic wastewater treatment, crop agriculture, and stream bank erosion. However, given the large amount of agricultural land in the area that is dominated by wineries, agricultural runoff from wineries is assumed to be the dominant factor in the nutrient loading of these tributaries (Halfman, 2010).

The 34 wineries around Seneca Lake are the source of a significant amount of runoff. Most of the wineries are very close to the shores of Seneca Lake, so there is not a great distance from the wineries to the lake. The water flowing from these wineries carries the fertilizers and pesticides used on these wineries to surface waters, and ultimately this contaminated water gets into the tributaries that lead to Seneca Lake. Since only one of the wineries around Seneca Lake, Four Chimneys, is an organic winery, the use of pesticides is a concern for surface waters and causes significant, negative environmental impacts to the water quality of Seneca Lake (Martinson, 2006).

The wastewater discharge from these wineries is another concern. The general operations of wineries, including: grape crushing, barrel cleaning, and bottling, create a high volume of winery wastewater. Although this wastewater does not contain pesticides, it is still harmful to nearby water supplies due to high levels of sugar. These sugars dissolve easily in water and cause the depletion of oxygen in water. These sugars are measured as the Biochemical Oxygen Demand (BOD), and if the BOD reaches a high level in winery wastewaters and these wastewaters are then discharged to nearby streams, the oxygen will be consumed. The ultimate effect is that aquatic life in these waterways will not be able to survive due to the lack of oxygen (Favro, 2007).

One of the concerns for Seneca Lake is that the wastewater from the wineries surrounding the lake is mostly exempt from EPA regulations. Regulations exist for wineries that discharge more than 10,000 gallons of wastewater per day, but since the majority of wineries around Seneca Lake are small and discharge less than 10,000 gallons per day, they are exempt from these regulations (Favro, 2007). Also, these wineries still mainly rely on septic tanks to treat their winery wastewater, which is an old technology for treating wastewater.

### **Regulatory Challenges**

The United States Environmental Protection Agency (EPA) defines the legislation that oversees the protection of the quality of water. This legislation regulates point-source polluters, as well as non-point source polluters. The legislation for non-point source polluters focuses on controlling land use options to reduce the impacts to water quality from such sources as runoff from agricultural land (Halfman, 2009). The legislation defined by the EPA sets a minimum standard that must be met; however, within each state, regions have begun identifying more stringent regulations to ensure that the quality of water is maintained.

For example, the Catskill Watershed Cooperative, which oversees the drinking water supply for New York City, defined more stringent water quality legislation to ensure that the water that serves New York City would be adequately protected (Halfman, 2009). Since over 90 percent of the water for New York City comes from nineteen reservoirs and three lakes north of the city, it was imperative that the water was protected. A major incentive was that it was going to be cheaper to protect these sources of water rather than build water filtration plants that EPA was mandating. Therefore, the cooperative gained the support of local citizens and began

implementing best management practices and creating public educational materials (Halfman, 2009).

Other parts of the state, however, like the Finger Lake Region, have not had the same level of success in garnering local support and implementing more stringent water quality legislation. In the Finger Lakes Region, regulations to maintain water quality are defined for each watershed (Halfman, 2009). The application of these regulations depends on the citizens within these watersheds. These citizens need to have an awareness of water quality issues in the region and to decide to implement more stringent regulations. Defining more stringent regulations is the first hurdle, and then implementing these new standards is an even greater obstacle.

The Finger Lakes Region, especially the communities surrounding Seneca Lake, struggle in obtaining community involvement and acceptance in developing more stringent standards. Two other watersheds in the Finger Lakes Region have better water quality protection measures; the Skaneateles Watershed implemented stricter standards through its land protection, environmental management, and public outreach programs, and the Canandaigua Lake Watershed implemented more stringent regulations to control runoff through its reliance on agricultural programs. The Seneca Lake Watershed, however, only has poorly supported county programs that offer a minimal amount of protection to Seneca Lake (Halfman, 2009).

The challenge for Seneca Lake is that its watershed spans over five counties, which include: Chemung, Ontario, Schuyler, Seneca, and Yates, and over 40 cities, towns, and villages (Halfman, 2009). The greatest obstacle is that New York is a home-rule state, which means that local communities define legislation. The New York State Department of Environmental Conservation has defined a minimum level of water quality protection standards that all

communities must follow, but then these communities can define more stringent regulations than these standards if that is what the community members would like to do (Halfman 2009). If community members agree to increase the protection of water quality, then all communities within the watershed must abide by the same, new standards. This is what makes it difficult for creating more stringent standards for Seneca Lake. With such a large watershed and community members from such diverse areas within the watershed, it is not easy to obtain support from all citizens, since each community, regardless of size and location, would have to follow the same, stricter standards.

## **Best Management Practices**

### ***Programs***

Around the world, there are various winery areas that are implementing best practices, but the program in Napa Valley, called the Napa Green Program, is considered to be the most comprehensive program for best practices in land use and wine production (“Napa Green Program,” 2011). This program is not mandatory for the wineries in Napa Valley but is offered voluntarily to those wineries in Napa Valley that want to implement more environmentally friendly and sustainable practices and be recognized for these practices. This program has two different components, one focused on winery operations and the other on farming practices. Vintners can choose to participate in one or both of these programs (“Napa Green Program,” 2011).

The Napa Green Certified Land program focuses on the winery’s regional watershed and how the winery can implement practices to restore, protect, and enhance the watershed. The specifics of the program are to help the winery restore wildlife habitats and institute sustainable

agricultural practices. The success of this program is that over 19,000 acres have been certified by an independent, third party auditor and approximately 45,000 acres are enrolled in the program (“Napa Green Program,” 2011).

The Napa Green Certified Winery program was established in 2007 to provide a certifiable model for wineries in the region. The model is based on the Association of Bay Area Government’s Green Business Program and was developed by the Napa Valley Vintners and the Napa County Department of Environmental Management. This model has a specific checklist that includes water conservation, energy conservation, pollution prevention, and solid waste reduction. The wineries must meet the requirements of this checklist in order to attain the status as a Napa Green Certified Winery. The Department of Environmental Management handles the inspections and certifications (“Napa Green Program,” 2011).

There are multiple reasons that the Napa Green Program has been successful and is a valuable program for other wine regions to emulate, including:

- *Its tailored approach* – Both the Napa Green Certified Land and Certified Winery programs are tailored to each specific winery. The practices that are suggested for winery operations and farming practices take into consideration the unique situation of each property, rather than suggesting a practice that may work for the majority of wineries in the area but may not be the best solution for the individual winery (“Napa Green Program,” 2011).
- *Its partnerships with other organizations* – Both the Napa Green Certified Land and Certified Winery programs are conducted in partnership with other organizations. The Certified Land program partners with a variety of organizations, including: the Napa

County Department of Agriculture’s Department of Pesticide Regulation, the Regional Water Quality Control Board, Fish Friendly Farming, and National Marine Fisheries Service. The Certified Winery program partners with the Napa County Department of Environmental Management (“Napa Green Program,” 2011). These partnerships provide greater credibility to the program and provide support for the wineries in the implementation of sustainable practices.

- *Its comprehensive approach* – Both the Napa Green Certified Land and Certified Winery programs encourage going beyond compliance of regulations and focus on a comprehensive list of areas, including water, energy, and solid waste. To be recognized as a certified winery, the winery must implement a variety of sustainable practices in all the major areas of concern, which makes those wineries that achieve certification more credible as a sustainable winery (“Napa Green Program,” 2011).

### ***Methods – Soil Conservation and Water Management***

To reduce the negative impacts on water quality surrounding wineries, implementing soil conservation measures and managing water flow on the vineyards are essential practices. According to Mike Schnelle at the Red Tail Winery on Seneca Lake, controlling water flow is the most important step in reducing a winery’s negative impacts on water quality. He says, “If at all possible, get all your ground work done before you plant” (Martinson, 2006). What he emphasizes is the importance of maintaining the topsoil on the property. Topsoil is essential in growing quality grapes, and if water is not managed properly, runoff can significantly impact water quality (Martinson, 2006).

There are a variety of best management practices for soil conservation and water management, including:

- *Building diversion ditches* – Diversion ditches help to slow water flow through the vineyard and to reduce the amount of runoff that leaves the vineyard. The concern with the runoff from the vineyard is that it carries pesticide residues and other particles away from the vineyard and deposits them into local streams and waterways. These ditches are helpful especially in areas where the vines are growing on slopes or in a hilly area. It has been estimated that these ditches can reduce the water flow on a vineyard by 80 percent (Martinson, 2006).
- *Vineyard layout* – The layout of a vineyard is also a key element in reducing water flow through a vineyard. Especially on vineyards that have sloping land, how the vines are planted is very important in determining how the water flows and how much water flows away from the vineyard. As a best management practice, the rows of vines are planted across the slope, which helps to reduce erosion by approximately 50 percent. Currently this practice is widely used in the Finger Lakes Region, including around Seneca Lake (Martinson, 2006).
- *Vineyard floor management* – This best management practice is considered to have had the greatest effect in improving water quality. This practice involves the maintenance of the land between the vineyard rows. Until 20 years ago, this land was tilled four to five times a growing season, causing a significant amount of soil erosion (Martinson, 2006). Now there are different floor management options to help reduce erosion and prevent weeds. These options include applying mulch, like straw mulch,

to the row middles and seeding the row middles with cereal rye or other seed crops (Martinson, 2006).

Other key soil conservation and water management practices that are effective in improving water quality include: using buffers to filter out particles from runoff, using drip irrigation to reduce the amount of water used for the vines, and using subsurface drainage tiles to help filter water through the soil and reduce runoff (Martinson, 2006). Each of these practices helps to reduce water flow and erosion from the vineyards, and combined, these practices offer a significant reduction in negative impacts to water quality in the surrounding area.

Conserving water in the vineyard operations, thereby reducing the amount of winery wastewater generated, is another essential component in reducing the negative impacts on water quality. One best management practices for conserving water is to install meters on operational equipment to show where water is used and to raise awareness among employees of water usage (Franson, 2008). Another practice is to use water-efficient technologies, like water-efficient nozzles, to reduce the amount of water used (Franson, 2008). A third practice is to reduce the use of chemicals in winery operations. For example, Fetzer Vineyards in California uses an ultraviolet filtering system to treat water on site, thereby eliminating the use of chlorine (Franson, 2008). Erath Winery in Oregon uses a similar system and is able to reuse 97 percent of its winery wastewater (Franson, 2008).

## **Conclusions**

Ensuring a sustainable future for the wineries in the Finger Lakes Region is very important in continuing to attract a significant number of tourists to the region. To ensure that

these wineries can continue to operate into the future, the wineries need to be aware of their negative impacts on the water quality of the Finger Lakes and implement solutions that minimize these impacts. Community members need to be aware of these concerns and support the wineries in the implementation of sustainable measures, as these wineries are a key component of the economy of the region.

As one of the largest lakes in the region and the lake with the most wineries surrounding it, Seneca Lake should be the example for how to decrease impacts on water quality from the surrounding wineries. The Seneca Lake winery operators need to be aware of the current situation, trends, and upcoming challenges that face these wineries and implement solutions that eliminate the negative impacts on the water quality of Seneca Lake. Specifically, the continued success of the wineries surrounding Seneca Lake and more importantly, the improvement of water quality in Seneca Lake depend on the following key points, which include:

- *Not enough is being done to manage the runoff and wastewater from the wineries* – All of the wineries surrounding Seneca Lake, except one, use pesticides on their vines. These pesticides get into the runoff from the vineyards and are carried into the streams and local waterways that lead to Seneca Lake. The lake has an increased level of nutrient concentrations, and data from the past 20 years shows a trend of declining water quality. Since the vineyards occupy the majority of land around the lake, reducing runoff would help to reduce this negative trend. However, given the continued decline of the lake's water quality, not enough measures have been implemented to reduce this negative impact. Also, the wastewater discharged by the wineries has high levels of BOD, which affects the oxygen levels in the lake. The concern is that these wastewaters are not

regulated, so wineries are not incentivized to change their operations to more adequately filter these waters or reduce their use of water in their operations in order to reduce their wastewaters.

- *The trends occurring around Seneca Lake could positively affect the lake's water quality*
  - The aging population of grape growers will soon pass on their farms to other growers. If these new farmers are educated on sustainable practices and encouraged to be more aware of their operations and how they affect their local surroundings, especially water quality, this could have a significant positive effect on the lake's water quality. The current, older farmers have not instituted measures to improve water quality, but it is possible that more educated farmers will take over the farms.
- *There is a lack of community involvement* – The communities surrounding the wineries are not involved with the wineries, nor admittedly, are the wineries reaching out to the communities for support or to educate them on winery operations. This disconnect between the surrounding communities and the wineries creates a significant gap in knowledge that would be useful in creating an awareness in the community of the wineries' impacts on water and as a way for the community to hold the wineries accountable for their actions such as negatively impacting water.
- *There is a lack of local regulations* – New York is a home rule state, in which local communities can institute stricter water regulations, but more stringent regulations have not been passed for the Seneca Lake Watershed. Primarily, this is due to the large size of the watershed and the number of counties, cities, towns, and villages that are part of this watershed. Gaining community support for stricter regulations, however, is imperative to

improve the water quality of the Seneca Lake Watershed and the Finger Lakes Region overall.

- *There are successful programs and methods from other wineries around the country that would benefit the Seneca Lake wineries* – The Napa Green Program is a valuable resource for the Seneca Lake wineries. This program provides a comprehensive approach for addressing sustainable practices in all major areas – not just water; it shows how to define a program that is unique to individual wineries rather than making one solution work for all wineries; and it provides a great model for how to partner with other local and state-wide organizations and utilize their support. There are also a variety of proven technologies and practices that would be useful for the Seneca Lake wineries to implement to conserve water and to reduce the impact from runoff.

## **Recommendations**

Minimizing the water impact from the wineries surrounding Seneca Lake is essential in maintaining the water quality of the lake. To do so, a variety of recommendations should be implemented that will achieve the following objectives:

- Improve activities that occur on the winery to decrease negative water impacts,
- Increase the awareness of the communities surrounding Seneca Lake regarding water quality issues, and
- Help to create partnerships between the wineries and other organizations in the region and state in order to implement more sustainable practices that decrease the negative water quality impacts.

## Winery Activities

The two major activities at the wineries that cause negative water quality impacts are water usage and water runoff. Therefore, the general recommendations for the wineries are to conserve water and to reduce runoff. To do so, wineries should implement these specific recommendations:

- *Install water-efficient technologies* – Wineries need to install water-efficient nozzles on their equipment to ensure that the minimal amount of water is used and therefore the least amount of water becomes winery wastewater or runoff. The wineries also need to install meters on operational equipment as a way to use less water and to increase the awareness of employees of the need to conserve water.
- *Install ultraviolet filtering systems* – The wineries need to implement these types of systems as a way to treat water on site and eliminate the use of chlorine in treating wastewater. This system could help wineries reduce their wastewater by up to 97 percent, as is the case at Erath Winery in Oregon, and thereby significantly reduce the amount of water that is discharged to the local waterways.
- *Implement vineyard floor management* – Since this practice has the greatest positive effect on water quality, it is imperative that the Seneca Lake wineries implement this type of management, if nothing else. The wineries should use either straw mulch or seed crops between the vineyard rows, thereby allowing water to absorb into the ground rather than become runoff and contaminate the nearby waterways and eventually Seneca Lake with nutrients from the vineyards.

## **Community Awareness**

Local community members around Seneca Lake are essential in improving the water quality of Seneca Lake through their support of stricter water regulations and through their support of more sustainable measures by the wineries. Recommendations for improving community awareness include:

- *Educating winery neighbors* – Winery operators need to educate their neighbors on their operations, specifically those that affect the local water quality and impact the livelihood of their neighbors. To do so, wineries need to organize annual conferences that address the latest issues of water in the region and invite community members to attend. Wineries also need to provide quarterly updates on their activities, via newsletters or email updates, to ensure that community members are aware of the latest activities occurring at the wineries.
- *Educate new winery operators* – Given that new winery operators will take over a portion of the Seneca Lake wineries in the upcoming years, it is crucial to take advantage of this opportunity and institute training programs that encourage sustainable practices for water usage. Local organizations should be involved in this training process, and the education should include seminars, forums, and training sessions that involve the winery operators and local organizational members, as well as interested community members.

## **Partnerships**

A final recommendation for the Seneca Lake wineries is to create a partnership-based program that would support the wineries in their efforts to implement more sustainable measures. This program should be based on the Napa Green Program and include a certification process

that not only evaluates the specific winery's water impacts but also considers the winery's impacts on other areas, such as energy, pollution prevention, and solid waste. By instituting such a program, the wineries are held accountable by other organizations and by each other in such a way as to encourage even greater sustainable measures that would continue to reduce the wineries' impacts on water quality.

## Bibliography

- Catillaz, C. (2006). An analysis of environmentally sustainable development and policy for the Seneca Lake wine industry. Finger Lakes Institute. Retrieved October 14, 2011, from [http://fli.hws.edu/pdf/catillaz\\_3\\_29\\_06.pdf](http://fli.hws.edu/pdf/catillaz_3_29_06.pdf)
- Favro, T. (2007, February 21). Water quality issues in the US wine industry affects small communities. Commons Learning Alliance. Retrieved October 1, 2011, from <http://www.commonlearningalliance.org/sites/default/files/Water%20quality%20issues%20in%20the%20US%20wine%20industry%20affect%20small%20comunities.pdf>
- Franson, P. (2008, December 15). Water use in the winery. Wine Business Monthly. Retrieved November 15, 2011, from <http://www.winebusiness.com/wbm/?go=getArticle&dataId=60129>
- Halfman, J. (2009, March 2). Water quality of the Finger Lakes, New York: 2005-2008. Finger Lakes Institute. Retrieved October 1, 2011, from <http://fli.hws.edu/pdf/Halfmanreport05-08.pdf>
- Halfman, J. (2010). Water quality degradation in Seneca Lake, New York. Geological Society of America. Retrieved October 15, 2011, from [http://gsa.confex.com/gsa/2010AM/finalprogram/abstract\\_179011.htm](http://gsa.confex.com/gsa/2010AM/finalprogram/abstract_179011.htm)
- Lake Information. (2011). Finger Lakes Tourism Alliance. Retrieved October 1, 2011, from <http://www.fingerlakes.org/about-the-region>
- Martinson, T. (2006, August). Soil and water conservation practices for vineyards. Sustainable Viticulture in the Northeast. Retrieved November 18, 2011, from <http://www.vinebalance.com/pdf/newsletters/SustainableViticulture2.pdf>
- Napa Green Program. (2011). Napa Valley Vintners. Retrieved October 1, 2011, from [http://www.napavintners.com/wineries/napa\\_green\\_wineries.asp](http://www.napavintners.com/wineries/napa_green_wineries.asp)
- Strategic Plan: Finger Lakes Grape Program. (2001, August 21). Cornell University Cooperative Extension Finger Lakes Grape Program. Retrieved November 15, 2011, from <http://flg.cce.cornell.edu/Strategic%20Plan.pdf>
- Water Quality Study of the Finger Lakes. (2011). New York State Department of Environmental Conservation. Retrieved October 1, 2011, from <http://www.dec.ny.gov/lands/25576.html>