

**History of the Kayaderosseras
Watershed: An Environmental
Approach**

Conor Taff

Jon DeCoste

Introduction to the Group Kayaderosseras Study

This report is a part of an effort to gain baseline data on the Kayaderosseras Watershed in Saratoga County, New York. Skidmore Environmental Studies students are beginning a five year project which will examine this water resource from an interdisciplinary perspective in order to provide a synthesized view of the current situation and an outlook for the future. In addition to this environmental history of the watershed, baseline studies are being conducted on current land use, riparian zones, biological and chemical water quality and economic indicators within the watershed. The combination of these studies will provide a comprehensive first look at the area and illuminate further areas of study while helping in the process of developing plans of action for sustained use of this valuable resource.

Why Environmental History

When considering ecological and environmental issues it is important to understand the historic perspective. A comprehensive environmental history of a study area provides a clear story of the trends over time and allows responsible predictions to be made about the future. Understanding these trends informs our current relationship with the land. Foster (2002) argues that the environmental history approach provides three important services that other analyses miss. First, it can reveal key forces that have contributed to shaping the modern environment. Second, it can provide insights into long unfolding processes which are too slow to be seen in the present day, and, finally, it can

expand the observed samples beyond the modern landscape to provide a more accurate and detailed assessment of any issue (Foster 2002, pg. 1270). This last point is especially important for ecological issues because so many of the important ecological processes proceed at rates much too slow to allow any valuable assessments to be made based only on a present day snapshot of data (Cronin 1983, pg. 2).

Undertaking an environmental history created large questions that had to be answered, or at least considered, before beginning our investigation. Perhaps the largest question was whether human beings should be considered as ‘a part’ of nature or as somehow removed from nature? No obvious answer presents itself to this question and convincing arguments can be made for both sides of the debate. An environmental history describes the ways that cultures have shaped the environment and ways that it in turn has shaped culture. By examining this history it may be possible to reach some conclusion about our own place in nature today. Regardless of the conclusion, the answer holds serious consequences as far as the way that humans view the environment and their right or ability to exploit, live sustainably, or destroy ecosystems (Cronin 1983, pg. 12). These different ways of interacting with the environment may seem strange today but in historical times different cultures have had many different human relationships with the land. The concept of the ecological Indian has been largely debunked but no one can argue with the fact that Native American land uses had drastically different effects on the environment than those of European colonists (Cronin 1983, pg. 4). The important thing to understand is that all cultures and societies have certain ways of viewing and using the environment. Even within a single culture these values change over time. When living inside one culture it is difficult to perceive other

ways of envisioning the land but an environmental history seeks to explain the land use changes with as little cultural bias as possible. The goal of this type of study is to examine historical changes in our relationship with the land and to determine the impacts that those changes have had on both environmental and human communities.

Despite the powerful analysis that an environmental history can provide there are some limitations and it is important to understand these when writing or reading environmental history (or any history). When telling a story we generally have a pre-conceived goal in mind and that goal alters the emphasis of points and the tone of a history. In this report we seek to present an environmental history in as objective a way as possible by trying to avoid any pre-conceived bias about 'good' versus 'bad' land use types. However, complete objectivity is impossible. It is also important to understand that all historical information comes second hand at best. Even original documents of the landscape are altered by the goals and world view of the people who wrote them. This makes it difficult to discern history accurately and it is important to consider as many distinct sources as possible before drawing conclusions (Cronin 1983, pg. 14). Despite these limitations, careful analysis and consideration of sources can yield a product with powerful insight for the current world.

Another important concept to understand when beginning an environmental history is the consistency of change. Today many environmental advocates call for restoration of damaged ecosystems to some former state. In the Kayaderosseras basin this argument could be used against development of housing, strip mining, agriculture, etc. Although there may be little doubt that certain natural communities and functions are maimed in the present day, the goals of restoration are slightly more elusive. The fact

is that as long as humans have lived in ecosystems they have changed ecosystems. The degree of change and type of change has varied drastically. Some land uses have proved entirely unsustainable and some have appeared to be sustainable, but all have affected the land (Cronin 1983, pg. 10). With this in mind it is important to consider where we start the story of our environmental history, because different starting and ending points can produce drastically different themes. There is no pristine ecosystem, the concept is an ideal and a fallacy when creating real world plans. It is more important to consider what functions we value in an ecosystem (biodiversity, clean water, aesthetics etc) and plan restoration efforts to provide these services rather than seeking to create exact replicas of long gone ecosystems.

In the case of the Kayaderosseras it seems appropriate to begin our study with Native American land uses just before European settlement of the area. This starting point is convenient for two reasons, first it allows the entire breadth of post European settlement to be examined and second the historical sources become much more scattered and less reliable before this point. The Native American populations living in the watershed were certainly not living in an untouched environment. Burning practices, hunting, fishing and dwellings all had their effects on nature (Davies 1994). These practices stretched back in history at least as far as historical records can perceive and may even have been more intense a few hundred years earlier if current estimates of pre-contact Native American populations are any indication. However, this time is a good place to start because historical data becomes increasingly difficult to find with any reliability beyond here. Also, starting with Native Americans brings an entire cultural shift, complete with unique views of nature and methods of production, into the story by

including the transition from Native Americans to European immigrants. Although land use continued to change, and sometimes change drastically, there may have been no period with so much consequential change as that of the early European colonization of the watershed.

Overview of Kayaderosseras History

The Kayaderosseras Creek Watershed encompasses much of Saratoga County in upstate New York. The towns of Greenfield, Milton, Galway and Saratoga Springs contribute the largest area and the rest of the watershed contains small parts of Wilton, Corinth, Providence, Charleton, Ballston Spa and Malta townships. The watershed drains into Saratoga Lake before making its way to the Hudson. The Iroquois called the Kayaderosseras watershed the “land of crooked water” because of the crisscrossing drainage pattern across the basin (Aulenbach et al. 1980). The watershed is rich in natural resources including good timber, fish, clean water and arable land. In addition to rich resources its geographic position and valleys has made it historically significant as an area of traffic flow in peace times and a strategic location in times of war (Sylvester 1878, pg. 9). This location made the area around the watershed especially important in both the French and Indian War and the American Revolution.

This area has been inhabited since pre-colonial times and the land and water use has changed drastically over recorded history. The earliest known inhabitants were Native Americans from the Algonquin and Mohawk (Iroquois) tribes whose paths crossed the watershed. The resources were an important source of food and water for

these early people (Aulenbach et al. 1980). In the 1500s a fur trade was established with European traders and over the following century colonists gradually gained more direct links to the area. By the mid eighteenth century the area of Saratoga County had been granted to European settlers in the form of patents from the English Monarchy and direct acquisition from Native Americans (Johnstone 1980).

After the American Revolution the population began a steady growth that never stopped. Land was converted to farms as logs were milled and sent down the Hudson River for processing. Paper mills and industrialization also became increasingly important. In the late 19th and early 20th century these industries began to die down and much of the deforested land was allowed to grow back. Although some industries remained, land use in this time became increasingly characterized by tourism, especially in the summer months. With the construction of the Northway in 1966 Saratoga County also became an outlet for suburban expansion from Albany and Troy to the south (Johnstone 1980).

When observing this summary of the watershed it becomes apparent that many land uses have overlapped within the history of the land. In organizing this paper we found it useful to divide sections based on relatively distinct groups of land use patterns rather than following a strict chronological order. In order to clarify the chronological relationships of each land use, Figure 1 shows a historical timeline of approximate dates during which each land use type was practiced. Please refer back to it throughout the paper to maintain a better understanding of how each semi-distinct group fits into the larger picture of cultural land use at any given time.

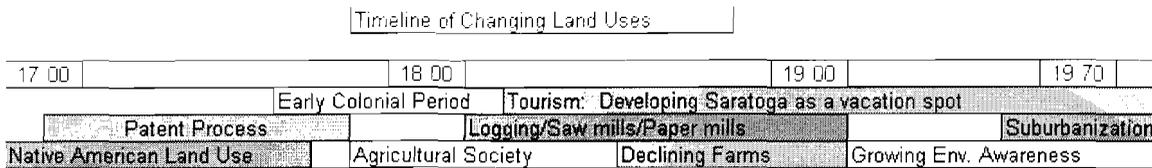


Figure 1: Timeline of historical land use groups.

Today the watershed is a fast developing area. Saratoga Springs and the surrounding countryside draw large tourist crowds every summer. The land is also being used for an increasing number of middle class developments. This influx of people is creating new pressures on social and physical systems already in place. Conflicts over land use and politics are often divided down lines which split long-time residents from recent immigrants. There is a major concern over the availability of a continued fresh water supply if population continues to grow at the rate that it has been. With issues such as these gaining ever more attention it is important to understand the historical perspective of land use within the basin and the way that resources have been partitioned in the past.

Native American Settlement and History

The first known inhabitants of the watershed were Native Americans of the Iroquois Nation. The predominant tribe within the watershed was the Mohawk but Algonquin, Oneida, Onandaga, Cayuga, and Seneca also entered the area from time to time in search of game (Sylvester 1878, pg. 14). These inhabitants used the Kayaderosseras watershed as a semi-permanent settlement and for hunting, gathering and agriculture. The name “Kayaderosseras” is an Iroquois name meaning “the country of the crooked stream” in reference to the vast network of streams and creeks throughout the

watershed (Sylvester 1878, 74). The watershed was known for its sparkling clear water, abundant game and good fishing.

For the Mohawk, the watershed was used as one of their primary hunting grounds. The land proved ideal habitat for both large and small game and was criss-crossed with well traveled hunting paths that persisted into colonial times (Johnstone 1980). Some of the game was attracted to the area by the saline properties of the natural mineral springs in present-day Saratoga Springs and Ballston Spa (Sylvester 1878, pg. 14). The Native Americans knew of this attraction and used it for their hunting advantage. In addition to attracting animals, the natives believed that the water from these springs had medicinal properties and they were highly valued (Hotaling 1995).

This land also proved to be an ideal location for semi-permanent settlements. In the fertile valley of the watershed, bands of Mohawk established villages in “long houses” of wood and bark (Sylvester 1878, pg. 19). Around these villages, the Mohawks cleared land to grow many different varieties of corn, beans, and squash (Sylvester 1878, pg 16). These crops were the staples of the North American diet and were referred to as “our life” or “our supporters” by the local trides (Sylvester 1878, pg. 17). As is true in many aboriginal cultures, the Native Americans of this region believed that each part of the earth had its own spirit and that in order to live a meaningful and healthy life, one must live in harmony with these spirits (Sylvester 1878, pg. 20). This belief surely had implications on land use patterns and the Native American relationship with the land.

We believe Native Americans in this region lived much like this long before the arrival of Europeans in the New World. However, it is difficult to determine what happened before colonial settlement and it is possible that Native American society in the

region was drastically altered by disease soon after European arrival in the Americas (Crosby 1986). The first known direct contact in the region occurred around 1534 when French fur trappers from the north came in search of pelts (Johnstone 1980). Historically accurate sources are rare this far back but the fur trade continued to grow and flourish well into colonial times. Despite the negative effects that this trade had on some animal populations, such as beaver, many Native Americans were willing participants in the trade relationship and received materials that they could only obtain from the Europeans in exchange for pelts.

Native American Land Use Patterns and Effects

It has often, and wrongly, been believed that Native Americans lived in perfect harmony with nature. Past conceptions of Pre-European natives in North America have often been drastically different from the actual relationship between natives and the land. Although Native American land use patterns were drastically different from those employed by settlers, they still created large scale changes in the environment. Perhaps the most direct means of altering their environment was the practice of forest burning in order to increase resource yields. These burns were well controlled and contained, and seem to have been fairly well adapted to native agriculture and local ecosystems. The result of these burns could have been as great as 20-100% greater vegetable food production and 100-400% greater animal food production (Davies 1994). These results were achieved by adding burned nutrients to the soil and by creating an abundance of

forest edge habitat which can support more game. The open woods also allowed greater nut production and this food was a staple of the Native American diet.

Depending of the slope, time of year, and moisture, it is possible that these burns could have resulted in unwanted erosion but no evidence of this trend exists today. If done correctly, the burns appear to have been extremely beneficial to the Native Americans (Davies 1994). The major impact of the burns was probably the alteration of the distribution of local plants and animals. Plants that were more flame resistant tended to persist and increase in numbers while non-resistant species may have become locally extirpated (Davies 1994). The 'open park' type woods that resulted from controlled burns allowed much greater fruit production in nut bearing trees and this certainly changed ecosystem dynamics and community composition (Davies 1994). Many of the first European settlers commented on the open appearance of the woods and the abundance of fruit and game in the North East. They mistakenly believed this abundance to be a naturally occurring bonanza that was left unexploited and wasted by the Native Americans. In fact this abundance appears to have been a well managed phenomena brought about by Native American land uses (Davies 1994).

These agro-forestry techniques were developed locally and, in general, appear to have been much better adapted to the local landscape than those that the European settlers carried across the sea with them. The burns appear to have created a relatively sustainable system but, to be fair, population levels were fairly low, at least throughout recorded history (Davies 1994). On the small scale Native American agricultural practices were not as sustainable. With the exception of fish "manure" and nitrogen fixing beans, no fertilizers were used to replenish nutrients in the soil. After 5-10 years

of cultivation most fields needed to lie fallow for 10-20 years before they could be replanted (Davies 1994). Despite this depletion of fertility, the populations were small enough that they could shift their focus across the land in order to find fresh soil. In general it appears that Native Americans had a fairly vast knowledge of the workings of the land and their own impacts upon it.

Early Colonial Settlement

When compared to New England's coastal communities it took quite a while for the first settlers to get their foot in the door in upstate New York. Transportation was dangerous and difficult and there was no infrastructure established to help settlers move in. Another barrier to settlement was the fact that most of the land in the Kayaderosseras watershed was already inhabited, albeit lightly, by Native Americans who used it as hunting and fishing ground and for limited agriculture. Initially a European presence was established in the area through the fur trade. Although it took a while, the fur traders provided information about the area and eventually opened the watershed for colonial settlement. By the 1700s, the populations of the eastern seaboard were ready to push into the back country and the early stages of settlement began.

In 1703 a license was granted by the English monarchy for a group of citizens to purchase the area of present day Saratoga County. By 1704 the sachem of a local tribe had signed the license and in 1708, Queen Anne granted patents for the land to 13 citizens who would divide the claims equally (Sylvester 1878, pg. 15). Despite the grant of land there were no settlers for about 60 years as the region was still considered fairly

dangerous and became a battleground during the French and Indian war which pitted the French with Algonquin allies against the English with Iroquois allies. When the hostilities ended the heirs to the original land patents remembered their rights, and around 1764 they began issuing permits to settlers for the region. These first settlers were driven away by Mohawks who were shocked to learn that their land had been deeded away 60 years earlier and demanded proof of the claim (Sylvester 1878, pgs. 15, 95). After several legal disputes, most of the land that makes up present day Saratoga County was given to the settlers in 1768. The Mohawk were paid 5,000 dollars as compensation and were allowed to stay on some land north of the watershed. With the land safely in hand, the heirs of the 13 original patent holders surveyed and divided the area equally to make way for settlers (Johnstone 1980, pg. 5).

The earliest permanent settlement by Europeans within the watershed appears to have been around 1772. Up until this time the land had been part of the larger Albany County but now it was divided and the Saratoga and Kayaderosseras patents came to be called Saratoga County (Sylvester 1878, pg. 13). The settlers were very few in numbers at first and development was interrupted once again by the outbreak of the Revolutionary War. During this time Saratoga gained national interest when it became the site of a major battle and the consequential surrender of Burgoyne to the American army. This fact would be used in later years as an historic point of attraction when the area became a tourist destination. Soon after the war settlement began in earnest and the population began to grow (Johnstone 1980, pg. 6).

This was the time when new ideas and new associations with the land began to develop in the Kayaderosseras Watershed. By 1786 the first resident of Greenfield, in the

center of the watershed, had established himself. By 1792 the first saw mill, grist mill and major dam were erected on the Kayaderosseras in Greenfield (Sylvester 1878, pg. 130). The settlers did not just bring people with them. They brought materials, they brought organisms and they brought ideas. European houses and communities did not resemble anything that the watershed had seen before. They brought tools to increase production and luxuries from larger markets. The settlers also brought organisms, both intentionally and unintentionally. Domesticated animals, invasive weeds associated with farming and foreign plants brought in from cities open to the world all found their way into the continental interior. These introductions thrived on the changes occurring in the land and they fed those changes themselves (Crosby 1986). The ideas that settlers brought with them involved a different way of understanding the land, different goals for the land and a basically different world view on nature, development and almost every subject. The combination of these influxes, present everywhere that Europeans settled, can easily be seen in the Kayaderosseras basin today.

With the arrival of settlers and establishment of permanent populations, the immigrants were in power to change the land for the first time. New animal husbandry and agricultural practices were much more resource intensive than the Native American practices had been. Combined with higher population densities, the late 1700s saw a Kayaderosseras population poised to cause drastic environmental changes in the watershed (Aulenbach et al. 1980). In 1798 the first newspaper was established (the Saratoga Register or Farmers Journal) and by 1800 settlers were already trying to take manage the land and species around them. During this year some town governments began issuing one to two cent bounties on species which were considered nuisances such

as; striped squirrels, blackbirds, black squirrels, and gray squirrels (Sylvester 1878, pg 100). Ten to fifty dollar bounties were placed on wolf and mountain lion and their numbers in the wild quickly diminished (Schneider 1997, pg. 82). By 1805 a five dollar fine had been established for any land owner who allowed Canada thistles to go to seed on his property (Sylvester 1878, pg. 102). In addition to bounties, trappers were still making money on furs and by 1832 the once abundant beaver populations of upstate New York were nearly non-existent (Keller 1980, pg. 23). These bounties show that even early on the settlers were wrestling for control of their new land and trying to tame it. It also says something about their new ideas. Canada thistles and animal pests had never been a cause for bounties and extermination campaigns before European settlement. The goals of these settlers were profoundly different than the goals of the Native Americans who lived in their place before them and the settlers were prepared to work to achieve these goals.

Establishment of Farming

Along with other things, the early settlers of the Kayaderosseras brought with them a desire to establish farms. Although Indians had farmed before, the low population densities, low intensity farming methods and partial reliance on hunting and other food sources, had limited the environmental impacts up to this point (Davies 1994). These limits began to change soon after the first colonists arrived. In the beginning colonists often took over natural clearings or clearings that had been left over from earlier Indian farming (Bidwell 1941, pg. 60). It was hard work to clear land, and settlers would clear a

few acres each year by girdling trees, burning trees and clearing the stumps or leaving the stumps in the ground to rot (Bidwell 1941, pg. 78). Despite the difficulty of this clearing, the early farmers generally took poor care of their fields until they became unproductive and then left them fallow until they felt they could once again reap a good crop. There was little rotation of crops in this system and it was largely inefficient (Bidwell 1941, pg. 80). Because of the enormous labor required for comparably small returns, most farms were simply self-sufficient homesteads rather than profiting businesses (Bidwell 1941, pg. 82).

Even when farmers could produce there was a fairly small home market and European countries could grow the same crops without importing (Bidwell 1941, pg. 84). Despite these limitations farms were established and the Kayaderosseras watershed was no exception. The majority of farming was concentrated in the southerly parts of the basin, which possessed flatter terrain and richer soil (Sylvester 1878, pg. 95). The region was characterized by growing seasons of 160 days or more, warm, humid summers and relatively cold winters (Aulenback et al. 1980). These conditions, although not ideal, were good enough for many farmers to establish self-sufficient homesteads within the watershed and to keep the population growing into the early 1800s. In 1841 an agricultural society was formed and county fairs were held every year, eventually a headquarters was established in Saratoga Springs (Sylvester 1878, pg. 95). By 1875 over two thirds of Saratoga County had been transformed into 'improved land' used mostly for farming (Sylvester 1878, pg. 12). Despite any claims of progress, changing Saratoga County into an agrarian society from "its rude beginnings in the old howling wilderness

of more than 200 years ago” could not be accomplished without major consequences (Sylvester 1878, pg. 10).

Impacts of Farming

Widespread farming has several long lasting effects but the most visually apparent is the deforestation that accompanies clearing fields for crops. The 18th and 19th centuries in the Northeast were characterized by massive deforestation but the 19th and 20th centuries showed a dramatic increase in forest cover after many farms were abandoned as unprofitable ventures. Despite this apparent return to a more natural environmental state, there are lingering effects (Fuller et al. 1998, pg. 79). Piecing together evidence of historical vegetation change is even more difficult than putting human histories together. Accounts rarely mention the flora of an area in any comprehensive way and if they do it is difficult to determine the reliability of the source. However, some evidence of change in the North East has been drawn from pollen and charcoal deposited over time and from sedimentation rates (Fuller et al. 1998, pgs. 85-87). The evidence shows that although Northeastern ecosystems have been impacted by small and large scale events throughout history, the frequency and intensity of these impacts has drastically increased since colonization. These disturbances have paved the way for many invasive species which thrive on the early successional stages of habitats. Evidence also shows that the deforestation from farming has had major impacts on erosion of soil and has increased sedimentation rates in rivers because of the removal of stabilizing root systems. This problem is exaggerated even more by the use of farming

methods such as deep plowing and irrigation. Finally, the evidence shows that although woodlands have returned, the complete species composition and other characteristics of pre-colonial ecosystems have not returned with them (Fuller et al. 1998, pgs. 92-95). For better or worse, the Northeastern forests that existed before these agricultural changes are truly gone forever.

Perhaps even more relevant to the Kayaderosseras watershed are the impacts that farming can have on water bodies and aquatic ecosystems. Pesticides and other chemicals used for fertilizers on large areas of farmland can easily be swept into rivers where they can potentially harm organisms and cause cultural eutrophication. Although this pollution can be limited with planning, early farmers generally gave little forethought to long term environmental concerns (Quigly 1967, pgs. 128-130). The runoff from farms also increases sedimentation rates in aquatic ecosystems and increases the salinity levels of the water. By the early to mid 1900s these effects were being felt; algae and oxygen depletion became apparent in the Northeast because of the long use of water resources for ventures such as farming, drinking and sewage discharge (Verduin 1967, pgs. 169-171). These impacts could clearly be seen in Saratoga Lake by the mid 1900s when recreational activities were limited by dense algae resulting from cultural eutrophication (Aulenbach et al. 1980).

Decline and Abandonment of Farms

In the early 1800s farming seemed to be firmly established in the Northeast and in the Kayaderosseras watershed. However, as quickly as the farms grew, they would

disappear. The first blow came with reduced yields in the region. By the 1830s soil depletion in the entire Hudson Valley was apparent (Bidwell 1941, pg. 320). Farmers had spent too long pulling crops from the fields while the soil washed downstream and the nutrients were not replaced. Crop yields often fell over fifty percent and farmers were forced to begin employing more scientific agricultural management or simply abandon their fields (Gras 1925, pgs. 292-295).

In addition to the condition of the fields, outside influences began to affect the traditionally self-sufficient farmers. By the 1850s large systems of canals, turnpikes and railroads were being constructed and linking farmers to markets where they could sell their produce for profit (Bidwell 1941, pg. 308). By 1900 national trade was truly opened and many Northeastern farmers could not compete with the larger Midwest farms (Johnstone 1980, pg. 7). The period from 1840 to 1860 was also filled with agricultural inventions designed to increase efficiency and increase production (Bidwell 1941, pg. 215). Despite the apparent benefit of these inventions, the capital outlay required and the acreage needed made them more suitable for large, commercially minded farms. Many traditional Northeastern farmers, used to their practices and their self-sufficient lifestyle, did not buy into the agricultural revolution and they dwindled and were replaced by more profit-minded farmers (Danhoff 1969, pgs 278-284). The end result of these changes was the shift from cleared and farmed land back to forested land starting in the late 1800s. From a peak of almost 80% farm land in the 1800's the North East has reverted to almost 80% forest today and the Kayaderosseras basin itself is now over 70% forested. These events have had profound effects on the way that we see the watershed today and the way that we hope to see it in the future.

Early Industries

Concurrent with farming in the watershed was the development of new industries along the Kayaderosseras Creek. These first industries often relied on the creek to turn mills and were fairly resource intensive when compared to pre-industrial land use. The north-western portion of the watershed was logged for timber on a limited scale but most major logging was located north of the watershed in the Adirondacks. Along the Kayaderosseras gristmills, sawmills, tanneries, and paper mills were constructed by early citizens. Dams were laid across the Kayaderosseras Creek and its tributaries to provide power for these mills (Sylvester 1878).

In addition to clearing for agriculture and timber, trees were cut for paper, charcoal, corduroy roads, railroad ties, potash, cooking, steam, and heat (Schneider 1997, pg. 202). After many of the largest trees were cut for lumber, trees of diameters too small to be worth cutting were left standing. These small trees were untapped until 1868 when the “wood-pulp-based” paper industry began. With this process trees as small as five inches in diameter could be used to make pulp for paper (Schneider 1997, pg. 217). By the 1920s and 1930s, many of the saw mills were closed in the area because widespread timber harvesting had stripped the surrounding areas of usable trees. Paper mills were able to stay open as these industries closed because of their ability to use lower quality tree harvests and still produce reasonable products. The paper mills were also more successful in implementing reforestation and timber management plans at this time (Johnstone 1980).

Impacts of Industry

The practice of logging has long been known as the cause of several environmental problems. To reach the mills along the Kayaderosseras Creek and its tributaries, logs traveled downstream in the spring in large “drives.” These drives churned the water, scraped the bottoms of the streams, and dragged fish along with them, causing large fish kills (Keller 1980, pg. 91). Fish numbers were further reduced by the dams that were built at the mills to “corral” the timber or provide power (Keller 1980, pg. 98).

At the sites where the timber was being harvested, mountainsides were stripped nearly bare. This absence of trees drastically increased the erosion rates on steep slopes. Not only did the increase in erosion cause peaks in the turbidity of the waterways, but the soil loss reduced the ability to re-grow mature old growth forests (Keller 1980, pg. 97). Without trees the habits, distribution, and food supplies of many animals were thoroughly disrupted. Finally, areas cleared for logging experienced a sharp increase in the occurrence of wild fires (Keller 1980, pg. 98). This further disturbed wildlife populations, increased soil erosion, and drastically altered species distribution in the area.

Tourism: Saratoga Springs as a Vacation Destination

As early as the 1770s, Saratoga Springs was considered a potential tourist destination. In fact, George Washington attempted to purchase and develop the land for

commercial purposes just after the Revolutionary War (Hotaling 1995, pg. 3). By 1787, the town was being labeled as the nation's first "summer home" location for the upper class. Originally people were drawn to Ballston Spa in at least equal numbers as Saratoga Springs, however, the eventual failure of the Ballston springs made Saratoga Springs the center of tourism development. The springs, which initially attracted Native Americans to the area were the first major attraction of the town and their medicinal properties were highly praised. Grand hotels were rapidly constructed along the length of Broadway to accommodate the influx of tourists in the mid to late 1800's (Hotaling 1995, pg. 8).

By the 1830s, railroads had connected Saratoga to Schenectady and Rensselaer (Sylvester 1878, pg. 129). Eventually, the rails extended to Rutland, Vermont, and Troy and Salem, New York. This transportation allowed easier access to the area and tourists flocked to the springs in ever increasing numbers. Without the railroads, the development of Saratoga Springs into a tourist destination would not have been much more difficult (Sylvester 1878, pg. 131). Large scale land modifications were made to achieve the desired grade for the railroads, and massive quantities of lumber was used to lay the ties (Allen 1978, pg. 161). The introduction of the railroads into this region marks the beginning of the modern era of Saratoga Springs.

Tourism was further bolstered by the advent of thoroughbred horse racing. For most of the 1800's state law forbid horse racing but by 1863 laws had changed and racing began in earnest. The races quickly became a prominent tourist attraction, drawing larger and larger summer populations (Hotaling 1995, pg. 42). The risk and big money associated with racing fit in well with the bolstering crowds of upper class tourists. The

advent of racing resulted in a sharp rise in gambling, drinking, prostitution and hotels. Many people considered Saratoga Springs to be a hot bed of immoral activity at the time. Ironically (or perhaps expectedly) the area was also the home of some of the first temperance movements in the country. The tourists, gamblers, jockeys, trainers, spectators, and service industry combined to cause a huge influx of people during the summer months and often vexed the local residents. This period marked the peak of Saratoga Springs as a vacation destination and many prominent national figures could be found in the streets and bars downtown (Hotaling 1995, pg. 44).

Tourism Impacts

Tourism succeeded in bringing large populations to the watershed but they were generally fairly transient, arriving for the booming summer and clearing out by winter. Despite the seasonality of the system, tourists contributed to environmental impacts in their own way. The biggest problem was the sheer number of people. Town plans, if they even existed, did not account for the huge summer booms. The recreational pursuits of tourists also had different environmental impacts than normal residential land use. Particular stress was placed on these recreational resources. The Kayaderosseras Creek surely received more visits in the summer months but the most attention was given to Saratoga Lake at the outlet of the Kayaderosseras watershed. Recreational activities here included swimming, boating and picnicking. These uses placed increasing stress on the water resources and contributed to the cultural Eutrophication of the once sparkling clear waters throughout the late 19th and early 20th centuries. Between 1940 and 1970 the

focus of the area would begin to shift away from tourism and toward suburbanization (Johnstone 1980, pg. 7).

As transportation improved it became possible for people living and working in Albany and Troy to the south to move their homes farther and farther into the country. By 1940 the Kayaderosseras watershed was becoming suburbanized and new houses and developments began going up (Johnstone 1980, pg. 8). Suburbanization truly exploded with the construction of the Northway in 1966 which provided fast, reliable and affordable transportation to the area. The suburbanites were often wealthier and possessed different political and environmental views from the citizens who had been long-entrenched in the watershed. Their arrival marked the beginning of conflicts of interest that would split long time residents from newcomers. This split is still being played out today in town politics within the watershed. In addition to ideas, the suburbanites brought new environmental issues associated with larger permanent populations, these included the development of roads, increasing resource use and increased impervious surface cover.

Roads, although they may seem rather tame, are a serious environmental issue. The construction of road corridors in the Kayaderosseras watershed began long ago with the first railroads but during this period of suburbanization the pace was accelerated. In the first place, roads represent development and the construction of a road is often followed by the influx of new people and houses which put additional stress on natural resources. From an environmental perspective, the negative effects of roads include organism mortality from construction, mortality from road kill, modification of animal behavior, alteration of the physical environment, alteration of the chemical environment,

spread of exotic species and increased use of an area by humans (Trombulak 2000,pg. 23). These effects have certainly occurred to various degrees within the watershed and most of them are only further exacerbated by the construction of new houses, stores and businesses. In addition to impacts on ecological community composition, roads and buildings can effect hydrologic patterns and cycles. Increasing the impervious surfaces within the watershed has changed the amount that water is allowed to run off infiltrate to replenish ground water supplies. This is especially true during storm events. Impervious surfaces force a large amount of water to run across the land rather than seeping into the ground. This water changes flood patterns, carries road salts, chemicals and nutrients into water bodies and increases soil erosion and sedimentation downstream of the surfaces (Forman 1998, pg. 210). Despite the fact that only 1% of the U.S. is road, 15-20% of the land nationwide is impacted and these numbers are certainly applicable in the Kayaderosseras watershed which lies in the relatively heavily developed Northeast (Forman 2000, pg. 214).

Early Environmental Concerns

By the turn of the 20th century people were beginning to realize that their land use had created serious changes in the natural environment. In 1899 cultural eutrophication became apparent in Saratoga Lake and Governor Theodore Roosevelt issued the “Saratoga Lake Nuisance”. This document forced the creation of waste water treatment facilities for the municipalities of Saratoga Springs and Ballston Spa and is a clear indication that the human impact on local water bodies was at least partially

understood (Aulenbach et al. 1980). Throughout the early part of the century environmental awareness continued to grow and by mid century it was generally accepted that human activities such as farming, logging, waste production and industry had changed the environment. Evidence now shows that throughout the 19th and early 20th centuries Nitrogen, Phosphorous and other human pollutants levels were rising in nearly all North Eastern rivers and water bodies (Robinson et al. 2003). Despite this recognition of the need for responsible planning, environmental considerations continued to be retroactive at best.

In 1935 the shore of Saratoga Lake had been defiled by the waste from shorefront properties. This treat to a valuable tourist attraction resulted in the correction of some of the more serious sources of pollution but effluent from three towns in the watershed continued to enter the Kayaderosseras and make its way to Saratoga Lake until the mid 1970's (Aulenbach et al. 1980). At this time recreational activity in the lake was limited by cultural eutrophication which had caused dense algae and aquatic plants to multiply across the lake. In response to cultural eutrophication a county sewage plan was enacted in the mid 1970's. This system finally stopped the discharge of raw sewage into the lake but it was not enough to bring the water back to its historic state (Aulenbach et al. 1980). Although it may not be possible or even desirable to return the watershed to some historic ideal, the problems and inadequate solutions of the 20th century led many people to embrace the idea that limits must be placed on human land use in order to ensure sufficient natural resources for the future.

Summary of Trends and Implications for the Future

This paper provides a basic outline of the environmental history of the Kayaderosseras watershed. Because of the breadth involved and the time limitations it is necessarily shallow in the details of each land use section. Entire papers could be written on many subjects which receive only a paragraph mention here and further study into these areas would be a valuable undertaking for the future. Despite these shortcomings there are a few trends that have become clear in the course of this project. First is the consistency of change across historic time. When living in the present day it is easy to believe that we will continue using our land in much the same ways long into the future. Our study shows that this has never been the case. New types of resource extraction are always emerging as others are abandoned. Several land uses are often co-occurring, the synergistic effects of these patterns are in constant flux and are poorly understood. Second is the general trend towards more intensive extraction of resources in the Kayaderosseras watershed. Although there have been times when intensive land uses lapsed, the predominant pattern has been towards higher yields, more efficiency and predictably greater environmental impacts. Perhaps the greatest contributor to this trend is simply the population growth that has persisted throughout our history of the watershed. Understanding the effects that this growth has had can have profound implications on the ways in which we plan for future growth.

Finally, the careful examination of environmental history provides valuable information for decision making within the watershed today. It appears that the current situation within the watershed is a period of fairly rapid land use change. Despite 200 years of separation, our current situation is not dissimilar from the arrival of the first

European colonists in the watershed. A large influx of suburbanites and wealthy property owners are settling in the watershed and bringing new ideas and land use patterns that are often in conflict with those possessed by older inhabitants. Recognizing this transition while it is still in progress provides an opportunity to plan for the future of the environment before changes are forced upon us against our will. This environmental history can inform us of the implications that our choices will have but only responsible planning and community participation will allow us to create our own environmental future.

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