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Dams and Dredging: An Overview Of Mount Holyoke College's Lake History

Dam Construction and Maintenance

Upper Lake

You might be surprised to learn that Upper Lake hasn't always existed. In fact, Upper Lake is a fairly recent addition to the campus landscape, having been created by the 1829 construction of a dam in Stony Brook (1, 3). The dam was constructed to provide more consistent hydropower to local mills than Stony Brook alone could supply. With minor adjustment, the dam continued to serve this purpose for almost a century. In 1911, however, it became clear that a taller, more powerful dam was necessary. For this reason, a new concrete dam was constructed, this one 18 inches taller than the original (3). Yet even this improvement soon proved inadequate as the College was stricken by a bout of serious flooding in the spring of 1940, so serious, in fact, that the dam had to be supplemented with 200 sandbags to keep the flooding under control (3). This chaos made it clear that it was once again time for a change. That very summer, modifications were made to the dam to prevent future flooding, namely a 10 foot widening of the dam opening, to allow more efficient water flow out of the lake during flood events (3). The Dams are now subject to inspection every other year, and repaired as needed. The water level in Upper Lake can be controlled manually using a sluice gate. This mechanism is to be updated by the end of June, 2018.

Lower Lake

Lower Lake, much like Upper Lake, exists mainly as a result of the damming of Stony Brook. Lower Lake dam was constructed nearly two decades after Upper Lake dam, in 1847 (3, 5). Lower Lake dam's history is comparatively far less tumultuous than that of Upper Lake dam, but it is not without its chaos. It experienced some severe flooding in May of 1984. Though no major modifications to the dam were necessary, a makeshift barrier of cinderblocks was needed to protect the pump house from the rising waters (5). The Dams are now subject to inspection every other year, and repaired as needed. The most recent repairs to Lower Lake Dam occurred in 2013 and 2014, on the west side of the dam. The water level in Lower Lake can be controlled manually using a sluice gate. This mechanism was updated in 2011.

Lake Ecological Health and Restoration

Water Chestnut Infestation

The *Trapa natans*, or Water Chestnut, is an invasive species of aquatic plant not native to New England. It was first noted in the area in 1859, having at some point been introduced from Europe (3). After its presence was initially acknowledged, it went unnoticed for many years, until it caught the attention of the Project Leader for the Massachusetts Waterfowl Survey in 1944. Even when a rapidly growing population of over 10 acres on the Concord River was made known to the proper officials in the Massachusetts Department of Conservation Division of Fisheries and Game, nothing was done to curb its impending takeover (3). By the time a new Project Leader took control of the issue in 1947, the plant had increased its coverage to over 40 acres of river. The magnitude of the problem now revealed, plans to contain and eradicate the plant became a priority of the Massachusetts Waterfowl Survey.

It was also around this time that Mount Holyoke became aware of the need to do something about their own Water Chestnut problem. Upper Lake contained, in 1949, roughly ten acres of Water Chestnut plants--a nuisance not only because of their ecological ramifications, but also in the danger they posed to those seeking to enjoy the lake (3). With the support of the Massachusetts Waterfowl Survey's Phillips Wildlife Laboratory, Mount Holyoke drained Upper Lake in June of 1949, allowing the sun to dry up the roots of the invasive plants (3). While this action was generally effective for several years afterward, with the occasional recurrence easily dealt with manually, the Water Chestnut was not gone for good (3).

The Water Chestnut population slowly crept upward in the decades following the first draining until it was once again time for serious action. Not only were the plants crowding the lake surface, their continuous cycle of decay at the bottom of the lake meant a growing silt problem to boot (3). Recognizing the increased urgency of the problem at hand, the College scheduled a round of dredgings for the summers of 1985 and 1986, this time for both Upper and Lower Lakes (1, 3, 4). These dredgings were effective in combating the Water Chestnuts, and also removed many decades worth of silt from the lake bottoms. However, the handling of waste transport (getting the silt from campus to a landfill) was a contentious issue. The first and most intensive dredging was that of Upper Lake, and the transport of its silt resulted in some spills en route to the landfill. By the time Lower Lake was to be dredged the following summer, there was concern about such incidents being repeated, though the significantly smaller quantity of silt to transport from Lower Lake alleviated some of this concern (3).

Today, Water Chestnut populations are far lower, owing to the College's continued maintenance of them. The method for controlling this weed is to periodically undergo mechanical raking in the summer, using an aquatic weed harvester (4, 6). After this process, remaining water chestnuts must be removed by hand to prevent the population from quickly recovering. It is at this juncture when the Restoration Ecology program at MHC pitches in, taking canoes onto the lakes each summer to remove all Water Chestnut plants by hand.

Restoration Ecology

Of course, the health of the lakes was dictated by more than just the status of Water Chestnut invasion. Indeed, the quality of the lakes was a concern to the greater community, as well as to students. As lake health deteriorated, the community was informed of a prohibition on swimming and other lake activities, as it was both dangerous and unsanitary to participate in such endeavors (3). Concerns about sanitation and pollution were of interest to the community, and were occasionally explained or confirmed in local news outlets. Even as the lakes were closed off for recreation, their value as scientific tools was retained. In the very same announcement about restricted lake access, there was an assurance that all scientific endeavors in the lakes would continue as normal. This prioritization of hands-on scientific learning -- or the use of the campus grounds as a living laboratory -- has been key at Mount Holyoke, having as much of a presence in the 50s as in the 80s (2, 3). Today, the Restoration Ecology program on campus is a perfect example of the continuation of this mindset. Many MHC science courses use the campus environment to learn, but Restoration Ecology takes it to the next level. Through programs like Project Stream, which is part of the Upper Lake water system, Restoration Ecology teaches students how to deal with nutrient pollution and invasive species in complex water systems. Students in the Restoration Ecology program contribute to monitoring water and soil quality on campus, as well as the organismal composition of campus ecosystems.

References

1. Mount Holyoke College Archives and Special Collections: Grounds, Lakes: Upper Lake, Box 5. Photographs 1813 - 1988, Box 5, Folder 1.

2. Mount Holyoke College Archives and Special Collections: Grounds, Lakes: Upper Lake, Box 5. Photographs, Dan, 1893 - 1992, Box 5, Folder 2.

3. Mount Holyoke College Archives and Special Collections: Grounds, Lakes: Lower Lake, Box 4. General Info on Dredging Work 1878 - 1987, Box 4, Folder 1

4. Mount Holyoke College Archives and Special Collections: Grounds, Lakes: Lower Lake, Box 4. Photographs, Lake Scenes 1879 - 1985, Box 4, Folder 3

5. Mount Holyoke College Archives and Special Collections: Grounds, Lakes: Lower Lake, Box 4. Photographs, Stony Brook Dam 1893 - 1984, Box 4, Folder 6

6. Houlihan, Peter. "Water Chestnut - A Non-Native Aquatic Plant." *Biodiversity and Natural History*, Mount Holyoke College Miller Worley Center For The Environment, 16 Apr. 2006, www.mtholyoke.edu/proj/cel/envmon/bio_nathist.shtml.

Research Methods and Protocol

While projects undertaken in this position are highly individualized, there are a few main principles that are helpful to keep in mind:

1. If doing research, first check the appropriate sources to see if much of this legwork has already been done by others. For instance, if you need historical information about the campus, the Mount Holyoke Historical Atlas, while rife with citation issues, is a good place to start when looking to narrow down a topic and find a starting point. Additionally, I have made a database of all of the photos that appear on the environmental portion of the Historical Atlas, and have inserted citations for about ⅓ of them.

2. If you end up going to the archives to do research, make a plan before you go, including how you'll record the information you find (photographing on your phone, extensive notes by hand or computer), what exactly you're looking for (subject matter, proper nouns, time periods, historical medium), and what kind of presentational format you'd like the research to be incorporated in (an exhibit, a pamphlet, a paper, a webpage).

3. When in the archives, make sure to record the exact location of every resource you make note of, including the box and folder numbers and titles. This ensures that when you are producing the final iteration of the research, you can cite everything correctly without returning to the archives to find it again.

4. When done discovering in the archives, if you took photos or other concrete notes in the archives, it can be useful to create some sort of database or annotated bibliography before you even start synthesizing information, so that as your work you can easily refer back to the sources you need most. Also, when you're done, you'll be able to easily convert it into a regular citation file, to accompany your work.

5. If you plan to write about or otherwise group, order, and synthesize the information you found, decide on a structure before you begin. This can be as simple as a small outline, or as intensive as several cited and annotated outlines with quotes, photos, and central themes, as well as formatting notes or coding instructions. Either way, it is important to decide where you're going before you hit the road, so to speak.

6. Once you've completed the outline and subsequent end product, decide which resources from your research will be included and how. For example, if including photos, do they need to be scanned in? If so, will you need to have the archives scan them in and check copyright status? Are you going to make a formal bibliography? Will you be citing in text, or is this less formal? Make sure you have this sorted out before trying to present your product.

7. After having the product reviewed, the physical reality of its distribution and presentation comes into play. Will it be on the website? Then you will need to sort out how it will be coded and arranged. Will it be in print? You'll need to have it formatted for printing and figure out the details of this process, including where the completed prints will be distributed from.

Sample Annotated Archival Source Database

This format is useful when working with archival data, especially if you photograph the sources you are planning to use. If you place the photos into some sort of ordered file (even an album on google photos will suffice), then you can refer back to them by their position in that file as you work through synthesizing that information. In this example, all bolded units refer to photos of box titles and folder titles, which precede all photographed information from that file. All unbolded units refer to the photographed information of interest, located within the bolded units that precede them. Each photo unit is labeled with its row number, the first numeral, and with its station within the row of photos, the second numeral, assuming left to right reading habituation.

Example;

25.1 - Grounds, Campus Maps And Plans, A-K, Box 1
25.2 - General, 1875 - 2001, Box 1, Folder 1
25.3 - First page of a larger work on MHC's Landscape plan
25.4 - Campus Maps and Designs, 1800s - 1933, Box 1, Folder 2
25.5 - Campus Map, 1932, illustrated
25.6 - Campus General Plan, illustrated, ca 1900
26.1 - Reverse side of 25.6, reads 'Olmstead Lithograph Collection, #256, General Plan 1900'
26.2 - Photo of the scale of an illustrated campus map, which is considerably large, and blue
26.3 - A more focused photo of the large campus map, noting the area around upper lake
26.4 - A more focused photo of the large campus map, noting the area around lower lake
26.5 - Reverse side of 26.2/3/4, reads '1934'

Here, we see that the box is "Grounds, Campus Maps And Plans, A-K, Box 1". We know that it occurs as a photo of the box label, and that that photo is stored in the photo folder as the first photo (on the left) in the 25th row of photos. We also see that the folder is "General, 1875 - 2001, Box 1, Folder 1". We know that it occurs as a photo of the folder title, and that that photo is stored in the photo folder as the second photo (on the left) in the 25th row of photos. Using this preceding information, we then know that unit 25.3 is a photo in the aforementioned box and folder, and occurs as a photo of the 'first page of a larger work on MHC's landscape plan', and that this photo is stored in the photo folder as the third photo (from the left) in the 25th row of photos. Referring to this photo in outlines and preliminary texts is now as simple as referencing this unit number parenthetically, and then replacing the unit number with a proper citation in the final product. All unit numbers under the same box and folder unit numbers would share the same the same final citation. For example, were I to cite both item 25.5 and item 26.3, I would use a single number to refer in text to their final product citation, even though they are separate resources, because they both originate from the same archival location. This reference style is at work on pages 2-4 of this pdf.

Working with Photos in the MHC Historical Atlas

It can be challenging to work with the MHC Historical Atlas, as many of the photos (and, to be honest, many of the overall sources) are cited improperly, if at all. That being said, this database can be a valuable source of inspiration for research, and works as a tremendous starting point for any project on the College's history. To facilitate future work with it, I have created a database of all the photos that appear in the environmentally tagged pages. This database facilitates both specific subject search, and a general search for documentation in the archives. I have confirmed the presence of about a third of these photos in the archive, and if you so choose to continue with that work, or to use the database in any way, there is a protocol structure in place to make it as direct and simple as possible to do so.

The database is formatted as a powerpoint document, which may seem strange at first, but actually allows for easier searching, browsing, sorting, and photo/text integration than most text platforms. Think of each slide as an index card, generally with a photo on it, and the information pertinent to that photo as well. These 'index cards' are sorted by the sections in which they appear on the Historical Atlas website. The typical format is that each section is marked by a title slide, which has no image on it, and denotes the section number, section title, opening page URL, and chapters within the section. Chapter slides generally bear photos, as the chapter opening pages tend to have photographs on them, so it is best to get your bearings primarily using the section slides. Every slide following a section slide is located within that section on the MHC Historical Atlas, somewhere.

Example:
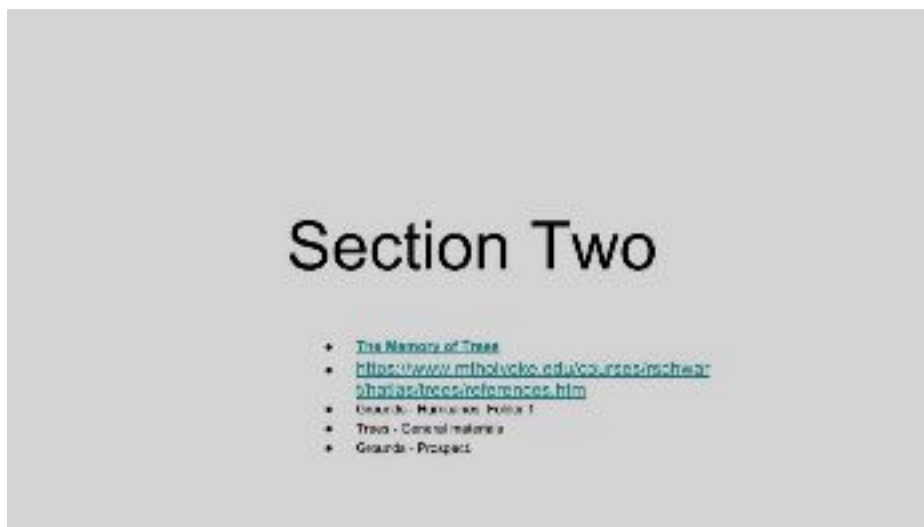
This is a typical section title slide, listing the section number, and bulleted active URL to the page of the table of contents link, as well as a live URL to the actual beginning of the section itself. It also lists the three subsection chapters it contains, as a sort of summary of what to expect in the following slides.

Example:

This is a typical unreviewed content slide. Unreviewed slides will always be white. Any slide must have 5 information fields, two of which MUST be filled for the slide to be viable. The URL data field must contain live URLs that lead to the photo's location(s) on the MHC Historical Atlas. Additionally, the 'Cited' field must also be filled. When making a new slide for a photo, you must determine whether or not it was cited on the website, and if it was in fact cited, you must include whatever citation you find, and any details about its possible accuracy. Some photos are cited in multiple locations, and all citations you find must be included. Some photos are cited in a way that is immediately dubious, or leads to dead web pages. This is to be expected; include your intuitions and observations on the slide for future researchers to use. The other three fields may or may not be filled. 'Caption' ought to be filled with whatever caption accompanies the photo on the website. There may be multiple captions at multiple locations for the same photo; you must include every caption iteration. If there is no caption, simply fill the field with 'none', so that it is understood that the caption is not missing, but is non-existent. The 'Citation' field will only be filled if there is a citation for the photo on the website. If there is a link in the citation, make sure to note whether or not the link is dead, and where it leads if it is a live link. The 'Confirmed' field is for when you search for the photo, either where it says it is, or where you think it might be. If the photo is where it claims to be, fill in with 'yes'. If the photo exists in the archives, but does not have any previous citation information, yes can still be an appropriate response, as it is rather a confirmation of existence than one of accuracy. The final field is 'Citation Amendments', which is also to be filled after doing archival research. If the citation on the website is in any way inaccurate, or fails to capture the entirety of the location, condition, and information that accompanies the photo, this is where such amendments to the citation can be made.

Example:

URL:
https://www.mtholyoke.edu/courses/rschwart/hatlas/trees/ph_history.htm

https://www.mtholyoke.edu/courses/rschwart/hatlas/trees/ph_skiing2.htm

Caption - The southern edge of Prospect Hill has remained cleared of trees since purchase. It is a favorite location for skiing, sledding and snowboarding. Notice Mandelle Hall at the far right. *Courtesy MHC Archives* [10]

The southern edge of Prospect Hill has remained cleared of trees since purchase. It is a favorite location for skiing, sledding and snowboarding. Notice Mandelle Hall at the far right. The use of this side of Prospect Hill is practically all that remains of the many activities that occured on the Hill. *Courtesy MHC Archives.* [10]

Cited? - Yes

Citation - 10. Skiing

Confirmed? -Yes

Citation Amendments - Physical Education Department, Series 5 sports/activities, scuba diving - sledding and tobagganing, box 11, folder 5 skiing photographs, photo labeled "Skiing on Prospect, above Mandelle. 1937. Reproduced in Cole, A. C.

This is a typical confirmed page. Confirmed pages will always be green. Confirmed pages will always include the completion of all five data fields (although sometimes excluding 'Citation', if it was not originally cited on the Historical Atlas). When you confirm a slide, make sure to fill in these data fields with as much detail as possible, including where exactly the photo was (Box name, number, folder name, number), what the photo seems to be of (if it is not already clear), and any accompanying information (anything written on the photo, including names, dates, numbers, etc). Also, make sure to turn the slide green after filling in these fields. If you are looking for pre-confirmed data that you are guaranteed to find in the archives, the green slides are definitely the place to start.

Example:

This is a typical unconfirmed content slide. Unconfirmed content slides can be yellow, orange, or red, but are most often orange. The color choice indicates the severity of the lack of confirmation. A red unconfirmed content slide indicates that, not only is the reference unconfirmed, the content is also not able to be located outside of the suggested location, *nor does it seem to ever have been in that location*. An orange content slide indicates content that is not in the referenced location, but may be possible to locate elsewhere, or at least seems to at some point have been in that location. This status is often characterized by dead links or unfound web pages, and by similar series of photos in a folder that happen to exclude the particular photo used. A yellow unconfirmed content slide indicates that the content may perhaps exist in some capacity in the location indicated in the citation, but not in the same capacity as before, or in a capacity that is similar to its online iteration, but unconfirmably so, due to size, quality, or other material impediment. The fields on unconfirmed content slides should be filled in the same way as confirmed content slides, with the citation amendment section being a place to explain why the content was unable to be confirmed.