ANALYZING AND SAMPLING LITTER ALONG MONTLIMAR CANAL

Marine Karapetyan, Department of Geography, University of South Alabama, Mobile, AL 36606. E-mail: hyemarqush@aol.com. Analyzing and Sampling Litter along Montlimar Canal.

Urban litter is often the cause of diseases, undrinkable water, and loss of habitat for animals in streams and rivers. The Dog River Watershed located in Mobile, AL has major issues with urban litter. Montlimar Canal, which is a tributary of the DRW, has been increasingly getting worse as the amount of litter washed into the stream increases. In this paper, I did something that has not been done before in the Montlimar Canal: I sought to sample numerous sites within the canal, and find out which areas had the heaviest densities of litter and trash, and what their source was. Once sites were analyzed, and results were produced, a decision was made by me as to whether the canal was in need of a trash barrier, the location for it, and also what the most efficient type of trap would be suitable for the current condition of Montlimar Canal.

Keywords: urban litter, dumping, trash barrier

Introduction

Water pollution is a global issue that is one of the main killers of both humans and animals (Norman, 2011). The smallest acts of littering, such as throwing a plastic bottle in the streets, can pollute and contaminate our waters in such a way that can be fatal for all. Urban litter is often the cause of diseases, undrinkable water, and loss of habitat for animals. What is urban litter? Urban litter includes plastics (cups, bags, polystyrenes, etc.), paper (wrappers, containers, cardboard, etc.), metals (foils, cans, etc.), glass, vegetation (rotten fruits, leaves, branches), construction material, such as shutters and concrete, and miscellaneous items such as oil filters, tires, clothing, etc. (Armitage et al., 2000). “Litter and debris from the land surrounding the Dog River Watershed is a major source of pollution (dogriver.org, 2012)” in Mobile, AL. My project intends to do something that has never been recorded before along the Montlimar Canal, which is within the Dog River Watershed (Figure 1). Although it is known that Montlimar Canal suffers from litter, no one has actually quantified the amount and type of trash within this

area. Litter is a serious issue in the Montlimar Canal, and is becoming increasingly worse. When litter goes downstream, items are entangled amongst the vegetation along the banks, or strewn along the beaches to become an eyesore and a potential health hazard (Armitage et al., 2000). The community needs someone to provide data and documented evidence of litter within the canal, and a plan to reduce it. In an attempt to help mitigate this problem, I sought to find the heaviest litter area (s) within the canal, and based on this finding, suggest whether Montlimar Canal needs a trash barrier or not. Trash barriers are traps that are "installed to collect gross pollutants, and can be located at street channel entry pits, within main drains, and in slow moving receiving waters (R.A. Allison et al., 1998)." Also, depending on location, quantity and quality of trash, I hoped to help the community answer the cause and origin of it by considering other streams that merge with Montlimar Canal, as well as other actors.

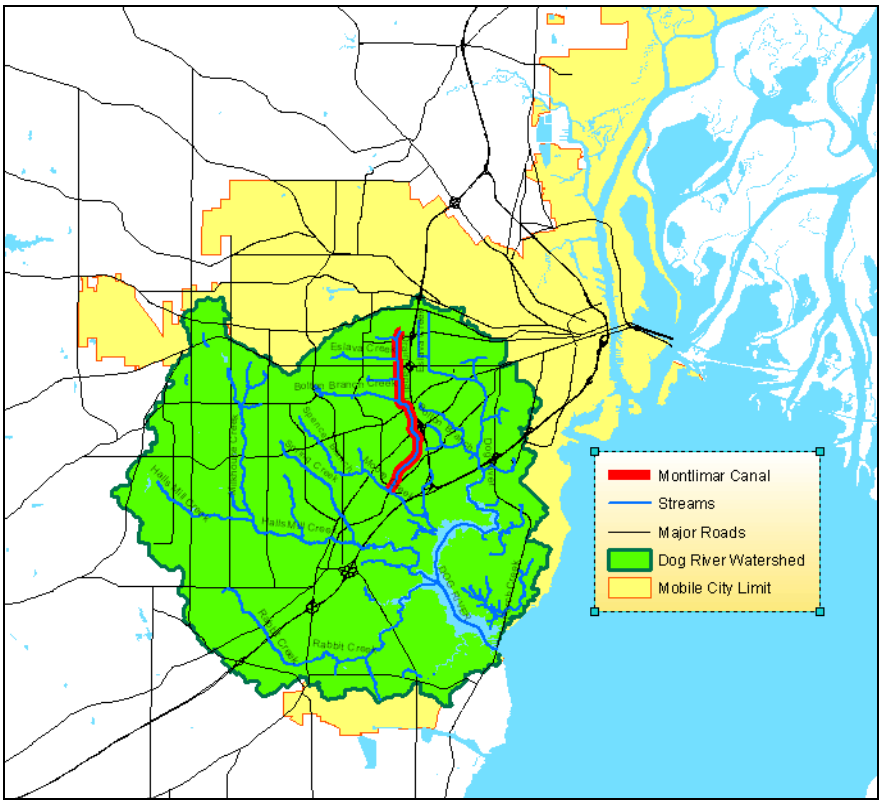

Figure 1: Montlimar Canal within the Dog River Watershed

Research Question

Is the Montlimar Canal in need of a trash barrier? If so, where would be the best place for it? What type of trash barrier would be most suitable? There are six popular trapping systems for three types of trapping locations: Side Entry Pit Traps at street entry pits; trash racks, Litter Control Devices, Continuous Deflective Separation devices and Gross Pollutant Traps within main drains; and Floating Debris Traps in slow moving receiving waters (Allison et. al, 1998). According to dogriver.org, a floating debris trap called "Bandalong Litter Trap" proves to be the most successful tool in collecting litter and debris in creeks and streams before it can be carried downstream to Dog River, then to Mobile Bay and out to the Gulf of Mexico." How effective would this trap be? This project will help the community determine areas of focus for protecting its streams and canals from pollution, particularly Montlimar Canal.

Methods

I first studied the length of Montlimar Canal using a virtual city map obtained from cityofmobile.org. Next, with the assistance of a friend, we drove the entire length of the canal for the purpose of finding accessible sites I could study and analyze. A total of six suitable sites were accessed, and later mapped out in ArcMap (Figure 2) using GIS software and data accessible to students at the University of South Alabama. We walked approximately 500 feet left and right of each site. Litter issues were analyzed by writing down both the litter intensity, and type of trash found for each location. Litter intensity, which was based on visual interpretation, was classified into categories of heavy, medium, and light while litter quality was classified as commercial or personal. Litter

that fell into the commercial category included plastics (cups, bags, polystyrenes, etc.), paper (wrappers, containers, cardboard, etc.), metals (foils, cans, etc.), glass, and others. Litter classified as personal were predominantly miscellaneous items such as shoes, rags, clothing, toys, brushes, tires, etc. Finally, I photographed each area for documentation as sites were accessed.

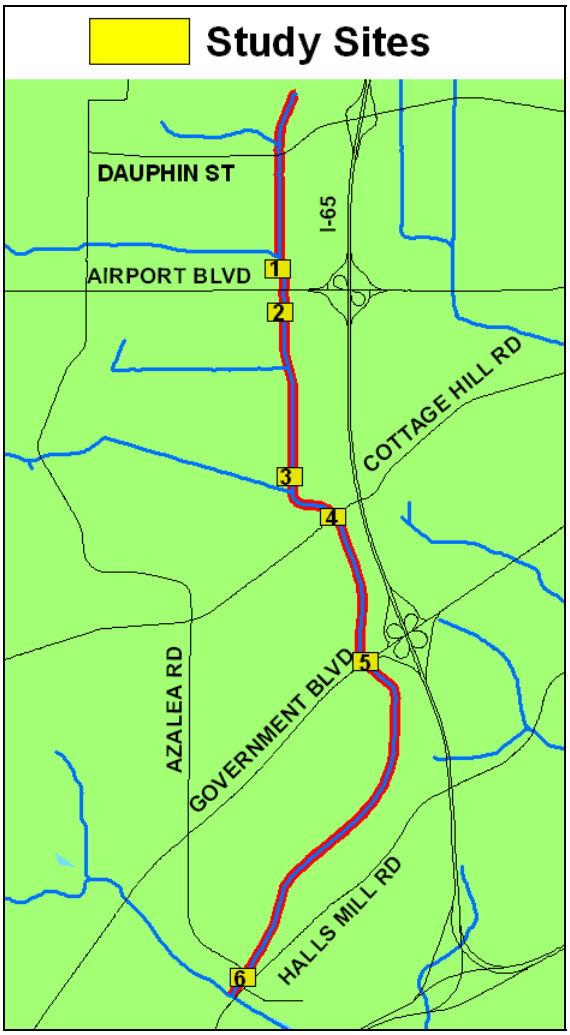

Figure 2: Highlighted numbers represent sites accessed for litter analysis

Results

After thoroughly examining sites for litter and trash, it became apparent which areas were suffering most from litter. As Table 1 below shows, two out of the six locations studied proved to have very serious litter issues. The first location, Site 1 (Airport Boulevard), was one of those two. Located in a dominantly commercial area, it had primarily commercial litter from surrounding restaurants, shops, and gas stations along the banks (Figure 3). However, moderate amounts of personal litter were found as well from an apartment complex located adjacent to the stream.

Site 2 was across from the bridge of Site 1. I wanted to see if the trash from Site 1 was carried over, and some of it was. Right above, and under the bridge carried the greatest amount of trash, but became less the more I followed the stream. Site 3, located at Montlimar Dr. and Michael Blvd., had very light litter mainly from fishers, as observed twice at the site. Evidence of abandoned homeless settlement was also observed from a torn mattress and clothes under bridges. Site 4 on Cottage Hill and the Service Road, also had fairly light litter, except for directly under the bridge. Plastic cups, bottles, bags, and other items were found in parking lots, caught on the outer banks.

Site 5 (Government Blvd./ I-90) had an overwhelming amount of personal litter from the homeless residing under the bridge, and was the second area for heaviest litter present. Massive trash bags full of garbage, clothes, shoes, mattresses, food containers, paper, cans, plastic bottles, towels, etc. were found directly under the bridge as seen in Figure 4. Walking away from the bridge, litter was still heavily prevalent, but the majority of it was plastic, and glass bottles on either side of the bridge (Figure 5). Finally, at site 6 (Azalea Rd/ Halls Mill Rd), a medium level of litter was present, mainly from

personal dumping from surrounding apartments. Water flow and movement was slow (even stagnant at times) for the most part of the canal.

Table 1: Litter intensity ad quality of all six sites studied within Montlimar Canal

Site	Location	Litter Intensity	Litter Quality
1	Airport Blvd 1	**Heavy**	Commercial/Personal
2	Airport Blvd 2	Medium	Commercial
3	Michael Blvd/ Montlimar Dr.	Light	Personal
4	Cottage Hill Rd/ Service Rd.	Light	Commercial
5	Government Blvd/ Highway 90	**Heavy**	Personal
6	Azalea Rd/ Halls Mills Rd.	Medium	Personal

Figure 3: Commercial trash caught on the outer banks of the canal on Airport Blvd.

Figure 4: Heavy litter found under bridge produced by homeless groups.

Figure 5: Plastic and glass bottles contributed the greatest amount of litter away from the bridge on Site 5.

Discussion and Conclusion

My results for this project indicate that both commercial and personal littering are both equally large issues. When first starting, I expected the majority of litter to come from commercial areas. However, the bridge intersecting the canal on Government Boulevard showed a different scenario. The homeless groups residing under bridges contribute a significant amount of litter into the stream. Their personal items, clothing, food containers, bags, boxes, and beverage containers are all left behind and washed into the stream because they have no other option, or see it as inconvenient to properly dispose of their trash. This could possibly be mitigated if trashcans were accessible, and placed under bridge sites. On the other hand, while commercial areas have plenty of trashcans outside and inside restaurants and shops, litter still continues to be a major issue as observed on Airport Boulevard.

Based on these findings, I came to the conclusion that the litter within Montlimar canal is not contributed from merging streams, but rather from the parking lots of commercial areas, and also homeless residents along the canal. Finally, I would suggest a trash barrier at the end of the canal at Site 6, as the heaviest litter areas are the start of the canal, and also at the end of it. What type of barrier should be placed here? After intensive research, I came to the conclusion that a floating debris trap, also known as a litter boom, would be best suitable for the current situation of Montlimar Canal. More specifically, my preferred choice would be the Bandalong floating debris trap, as mentioned previously. These traps are “constructed by stringing partly submerged floating booms across waterways. It collects floating objects as they collide with it. The performance of any boom is greatly influenced by the flow conditions of the waterways.

They are best suited for very slow moving waters, and perform best with floating objects such as plastic bottles, and polystyrene. The traps use floating polyethylene boom arms with fitted skirts to deflect floating debris through a flap gate into a storage compartment. (Allison et. al, 1998)." Later, litter caught in the trap is removed by raising the sliding gate (Figure 6), allowing the caught objects to flow out into a basket, which will then be properly disposed of by authority. Montlimar Canal is very slow moving, and the largest amount of litter comes from plastic, and polystyrene objects; both suitable conditions for this trap, thus the best. The "efficiency for this trap is proportional to the percentage of the waterway width it spans. A 100% coverage is assumed to have a 50% efficiency for floating material." Estimates for the trap cost between $15,000 to $20,000 (Allison et. al, 1998). However, there are numerous other possibilities for trash traps in different locations in Montlimar Canal that could help reduce litter, and should be thoroughly researched.

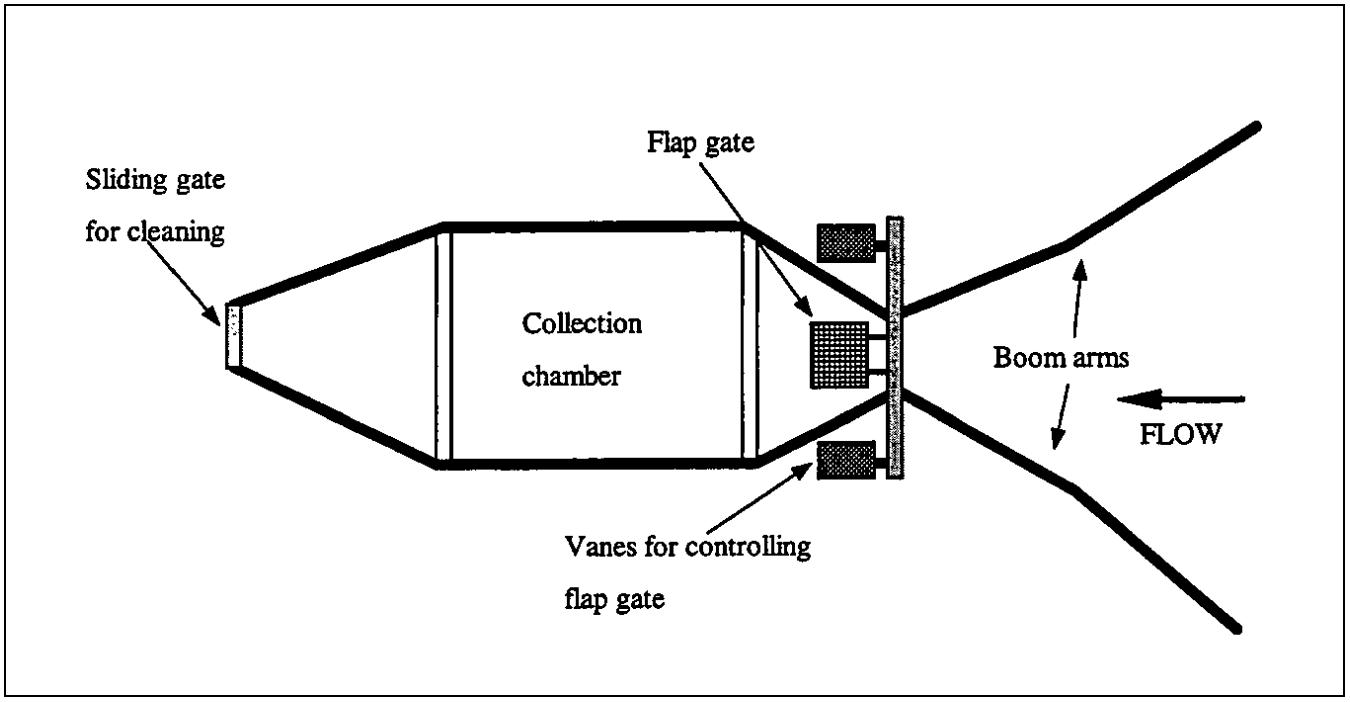

Figure 6: Plan view of Bandalong floating debris trap

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