Minnesota Zoo

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Organization Background

Established in 1978, the Minnesota Zoo is a zooalogical garden, accredited by the Association of Zoos and Aquariums. They care for 533 species of animal and conduct 133 conservation projects worldwide. Open 363 days of the year, the zoo's staff of 300 maintains strong bonds and devotion to their animals, while providing education and outreach programs to school age children. The zoo's mission is to employ sustainable practices as it connects guests to the natural world in order to preserve wildlife.

"My summer working with MnTAP and the Minnesota Zoo provided me with excellent project management and communication skills that will benefit me in my future career as an engineer. It was great knowing that my work will create a difference at the Minnesota Zoo and in the environment." ~ EM

Project Background

In 2017, the Minnesota Zoo used a total of 72,000,000 gallons of water. The Zoo utilizes water in many aspects, including in animal care and exhibits, domestic use, ground maintenance, recreation and HVAC purposes. Prior to the beginning of this project, the staff had envisioned many different ideas to implement more sustainable practices at the Zoo. The project helped investigate and refine these ideas into recommendations.

Incentives To Change

The Minnesota Zoo has developed a set of goals aimed at creating a more sustainable establishment. One of those goals is to reduce water usage by 15% by the year 2025. Creating changes directed towards sustainable processes at the Minnesota Zoo has become an ambition for the Zoo, not only to achieve those goals, but also to inform and educate the many guests that visit the Zoo about sustainability and conservation. As an establishment committed to animal conservation, initiatives and education funded by the Zoo have already provided positive impacts by creating a healthier environment for wildlife globally. The Minnesota Zoo intends to continue making positive impacts on animal preservation and the community by reducing water usage.

> "The Minnesota Zoo is a responsible steward of all resources entrusted to us. Our partnership with the MnTAP program gave us the opportunity to examine the Zoo's use of water and consider a variety of different ways in which we will be able to conserve this resource while maintaining the highest standards of animal welfare. Erin's work this summer laid the foundation for projects that will reduce our water usage and educate our guests on how they, too, can conserve water."
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> *~ Mary Ann Saurino, MA & EdS*
> *Internships & Youth Development Coordinator*
> *Minnesota Zoo*

Solutions

Circulation and Treatment to the Gibbon Pond

The Gibbon Pond is a 48,000-gallon body of water that flamingos and many species of ducks call home. To provide a safe and healthy environment, the pond changes water once a week. To reduce the number of water changes required, a circulation and treatment system were recommended. The circulation system would improve the quality of water by introducing oxygen. This would reduce bad smells, accelerate the breakdown of organic materials, and create more contact opportunities for the treatment system. The treatment system will also reduce both the cloudiness of the water, nitrogen, and phosphorous. These changes would result in a reduction of 1,300,000 gallons annually.

Install Solenoid Valves to Dump and Fill Pools

Many animal exhibit and holding rooms contain pools that require frequent water changes to maintain a healthy environment. Some of these pools are refilled with water manually by the zookeeping staff. It was recommended to implement an automated fill system on the Snow Monkey and Komodo holding pools by installing timers and solenoid valves. This change would conserve 190,000 gallons of water every year.

Re-Use Central Heat Plants Single Pass Cooling Water

The Central Heat Plant provides hot water to most of the buildings using two circulation pumps. To maintain the pumps at safe operating temperatures, a single pass cooling system is applied. Since this water remains uncontaminated, it is capable of being reused for the same purpose. By using a geo-exchange cooling loop to get the needed temperature drop, the system could be converted to a closed loop cooling system. This would amount to an annual water reduction of 1 million gallons.

Install Motion Sensors to Moose Cooling Showers

Five moose are cared for by Minnesota Zoo staff. To provide the moose with the best care possible during warm days, the zookeepers turn on misting showers in each of the moose's holding pens. Since the water may or may not be used by the moose, it was recommended to install motion sensors to detect when the moose are nearby and turn the water on. The estimated annual water reduction would be 100,000 gallons.

Reduce Backwashes on Grizzly Bear Sand Filter

The Grizzly Bear habitat is a beautiful, award winning exhibit that provides an excellent view to see the bears playing, and sometimes fishing in their 16,000-gallon pool. The water is run through an extensive filtration system that includes two sand filters. Due to the high amount of sediment that can run into the pool, the sand filters become dirty quickly and require extra backwashes or cleanings. By installing a fine screen filter prior to the sand filters, the amount of sediment entering the sand filters will be reduced and, in turn, will halve the number of backwashes on this system. This recommendation would result in 1,600,000 gallons of water being conserved every year.

Recommendation	Annual Reduction	Annual Savings	Status
Improve Water Circulation in the Gibbon Pond	1,300,000 gallons	$1,700	Implementing
Install Solenoid Valves to Fill Ponds	190,000 gallons	$3,000	Planned
Single Pass Cooling Water Re-Use	1,000,000 gallons	$5,300	Recommended
Motion Sensors for Cooling Showers	100,000 gallons	$600	Recommended
Reduce Sand Filter Backwashes	1,600,000 gallons	$9,300	Recommended

MnTAP Advisor: Michelle Gage, Engineer