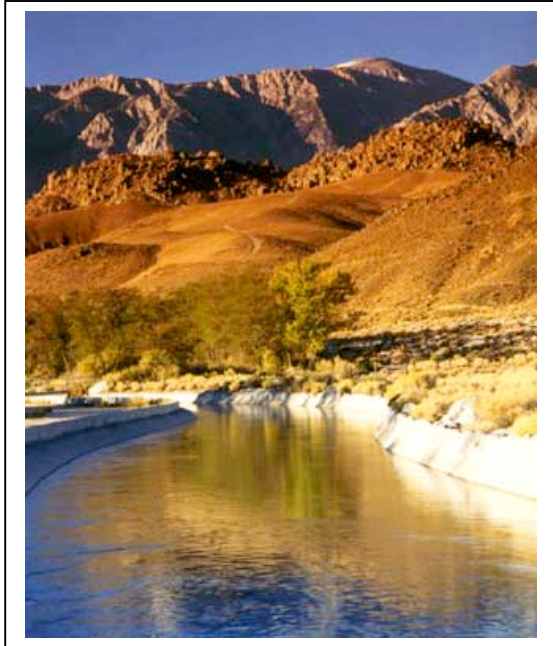


Module 5 – Lesson 3: *The Challenge of Clean Drinking Water*

No other resource is as important to the health of a city than clean drinking water that is free of toxic chemicals. The demand for clean water often outstrips the supply for even small cities. A big city such as Los Angeles serves nearly four million residents that use 200 billion gallons of clean drinking water every year. In order to meet this demand, the Los Angeles Department of Power and Water gets water from many sources. Only 11% of the County's water comes from its own groundwater supplies

Nearly half of the City's water comes from the Sierra Nevada Mountains via the two Los Angeles Aqueducts (see picture below). The first aqueduct, completed in 1913 is over 200 miles long and includes fifty miles of tunnel. The second aqueduct was completed in 1970 and stretches 137 miles.



As the City's need for water continues to expand, Los Angeles has begun an ambitious program of water recycling and conservation. Nearly 20 million gallons are

reclaimed from the Glendale Plant each day for industrial and agricultural use.

Los Angeles is not unique. Cities around the world are struggling to provide enough water for its inhabitants. And remember, supplying the water is only half the battle. Cities must deal with all of the water as waste once it has been used.

Wastewater is a real threat to public health if it is not handled properly and kept away from the drinking water. Wastewater contains toxins from industry as well as human sewerage. The systems to remove water from cities need to be as sophisticated as those that deliver it, as seen in the image of a wastewater treatment plant in Ann Arbor, Michigan.



The urban ecosystem can be permanently damaged if the toxins from wastewater enter the existing groundwater supplies or mix with local rivers and bays. Human health, and the health of all organisms will degrade if sewerage and runoff are not managed effectively.

Public health got its start as a science in the European Cities of the 19th Century that were literally drowning in their own sewerage. Health researchers found that the most important public health amenity that a city could provide was clean drinking water. The hallmark of a healthy and sustainable modern city is a safe water supply and the means to handle the waste.

Closer to Home Boston Metropolitan Area: *Boston Outgrows the Charles River*

Boston is one of America's oldest cities. Founded in the early 17th century, the city remained relatively small for nearly two centuries and relied on the Charles River for its drinking water. However, the advent of the industrial revolution in the 19th Century and automobile in the 20th century permitted more people to work in Boston and to live farther and farther away from the urban core. As a result, the city and metropolitan area has grown dramatically in physical size and its need for fresh drinking water has also grown.

The Massachusetts Water Resources Authority is charged with supplying over 2 million people in 48 communities in Metro Boston with 220 million gallons of water each day. In order to achieve this goal, water is drawn from the Quabbin Reservoir that is 65 miles west of the city. From the Quabbin, water flows through tunnels to the Wachusett Reservoir where it circulates for about eight months before continuing on its way to Boston. From these reservoirs, the water flows to a treatment facility in Marlborough where the already high quality water is treated to adjust its pH. Treatment with ozone is applied as a final step to assure that the water is completely clean and safe. A map of the MWRA water system is found below.

As a result of the MWRA water system, Boston enjoys some of the highest quality municipal water in America. But, the efforts to deliver and protect the water supplies are a huge undertaking.

The Quabbin Reservoir was created in 1939 to serve the water needs of Boston. Nearly 40 square miles of towns and farmlands were flooded with 400 billion gallons of water. The land around the reservoir was put into permanent protection so that the water supply can remain safe. An aerial view of the reservoir is below.



Providing safe and clean drinking water remains one of the biggest challenges for the Boston Metropolitan Area. The cost of running the systems continues to grow and is now approximately \$700 million per year. The average homeowner in Boston pays about \$1000 per year for their water delivery and sewerage removal.

