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Chapter 1 : NPR Choice page

The Chronology of Water is ripe with shock-jock language and imagery. It is angry a It is so fitting that the original cover of this book, which you see depicted here, arrives from the library marred by a plain, gray wrapper around the offensive bitâ€”you know, a woman's bare breast.

I might have to admit I really love memoirs. Then I heard about the book from a friend so I ordered it and the book arrived and I read it almost immediately and then I read it again and one more time for good measure. The book itself is a fine, heavy object both literally and figuratively. But even more than that, the paper is thick and slick and the design is clean and the cover has a nice matte coating. I enjoy these small details that contribute to a sensual, in the very sense of the word, reading experience. Gender is not irrelevant in this text. Beauty will no longer be forbidden. All of these descriptions are precisely detailed, presenting bodies as they are but there is a real sense of celebration in the frankness that you do not often see in writing on the body. These confessions created the resonant vision Cixous speaks of, reaching for the beauty that cannot be forbidden. In graduate school one of the questions I asked most was about how to apply the highly theoretical work we often read in seminars in practical ways. I tend to think of memoirs as closed texts. That is not a bad thing. I enjoy closed texts, and the satisfaction of a finite way of interpreting that text. In a memoir, a writer is saying this is a story about some part of my life and this is what I need you to understand from my telling of this story. That is a fairly closed approach. I would argue, though, that The Chronology of Water is a very open text for a few reasons. And yet, as much as Yuknavitch reveals in this book, as much of her skin as she peels back, there is also a marked sense of absence in what she does not reveal. Throughout the memoir, she writes about her mother and her sister and her abusive father and there is no doubt, whatsoever that very bad things have happened. However, the abuse is not named. There is an absence of information. We are voyeurs without the ability to see. The absence of detail tells its own story. That use of absence was such an interesting choice for a memoir because so often in memoirs about abuse and incest, it is the naming of the abuse that is the point of the thing. In most of those memoirs, there is an almost fetishistic and confessional need to detail, explicitly the where and what and how of all the terrible things that can happen to a girl or boy child. It is a bold choice to create that absence without acknowledging it. That absence also creates a sense of presence like the one Christopher describes in talking about absence and how difficult it is to render. This is not a memoir that can be read passively or in a contained way and I really liked how the text invited the reader to work with the absences and openness. The book is marked by a density of prose that is almost erotic. The writing is relentless and the ferocity of the language is so immediate that the experience of reading the book is physical and, at times, overwhelming. There were instances where Yuknavitch developed her own language to tell her story, a personal vernacular that could better express her hi story more than any other language. I love books that teach you how to read them as you are reading them and this one has that going on. Structure How do you tell a life story? I imagine that must be the overarching question of anyone who sets to tell the story of their life. I was born, I lived and eventually I will die. Is that how we reflect on our lives though? I remember things in retinal flashes. Events dont have cause and effect relationships the way you wish they did. Language and water have this in common. By the end of the book, I got the sense that I was looking at the whole of something and not just fragments. Another device I noticed was how a story would be told and then retold. The best way to describe it, I think, is that the book is structured like a stereogram. Emotion One of the main things Yuknavitch writes about in this book, this memoir, is the rage so many women hold in their skin, rage that starts when we are girls and just grows and grows and becomes this all-consuming thing. When she writes about her rage, the pages are practically incandescent. This book is wild with rage but it is also wild with joy and love and sorrow. It just serves the story. It is really that beautiful and brilliant and any number of superlatives I will spare you from for the sake of decorum.

Chapter 2 : H2O - The Mystery, Art, and Science of Water: Water in History

"Lidia Yuknavitch's memoir The Chronology of Water is a brutal beauty bomb and a true love song. Rich with story, alive with emotion, both merciful and utterly merciless, I am forever altered by every stunning page.

People back than knew that heating water might purify it, and they were also educated in sand and gravel filtration, boiling, and straining. The major motive for water purification was better tasting drinking water , because people could not yet distinguish between foul and clean water. Turbidity was the main driving force between the earliest water treatments. Not much was known about micro organisms, or chemical contaminants. After BC, the Egyptians first discovered the principle of coagulation. They applied the chemical alum for suspended particle settlement. After BC, Hippocrates discovered the healing powers of water. The main purpose of the bag was to trap sediments that caused bad tastes or odours. In BC, Rome built its first aqueducts. Archimedes invented his water screw. Aqueducts The Assyrians built the first structure that could carry water from one place to another in the 7th century BC. It was 10 meters high and meters long, and carried the water 80 kilometres across a valley to Nineveh. Later, the Romans started building many of these structures. They named them aqueducts. Roman aqueducts were very sophisticated pieces of engineering that were powered entirely by gravity, and carried water over extremely large distances. They were applied specifically to supply water to the big cities and industrial areas of the Roman Empire. In the city of Rome alone more than km of aqueduct were present, and it took over years to complete all eleven of them. Most of the aqueducts were underground structures, to protect them in times of was and to prevent pollution. Together, they supplied Rome with over one million cubic meters of water on a daily basis. Today, aqueducts can still be found on some locations in France, Germany, Spain and Turkey. The United States have even taken up building aqueducts to supply the big cities with water again. Many of the techniques the Romans used in their aqueducts can be seen in modern-day sewers and water transport systems. One of his findings was a device to transport water from lower water bodies to higher land. He called this invention the water screw. It is a large screw inside a hollow pipe that pumps up water to higher land. Originally, it was applied to irrigate cropland and to lift water from mines and ship bilges. Today, this invention is still applied to transport water from lower to higher land or water bodies. In The Netherlands for example, such structures can be found in the city of Zoetermeer see picture , in the west close to The Hague. The water screw formed the basis for many modern-day industrial pumps. During the Middle Ages AD , water supply was no longer as sophisticated as before. These centuries where also known as the Dark Ages, because of a lack of scientific innovations and experiments. After the fall of the Roman Empire enemy forces destroyed many aqueducts, and others were no longer applied. The future for water treatment was uncertain. Than, in the water treatment history continued as Sir Francis Bacon started experimenting with seawater desalination. He attempted to remove salt particles by means of an unsophisticated form of sand filtration. It did not exactly work, but it did paved the way for further experimentation by other scientists. Experimentation of two Dutch spectacle makers experimented with object magnification led to the discovery of the microscope by Antonie van Leeuwenhoek in the s. He grinded and polished lenses and thereby achieved greater magnification. The invention enables scientists to watch tiny particles in water. In , Van Leeuwenhoek first observed water micro organisms. In the s the first water filters for domestic application were applied. These were made of wool, sponge and charcoal. In the first actual municipal water treatment plant designed by Robert Thom, was built in Scotland. The water treatment was based on slow sand filtration, and horse and cart distributed the water. Some three years later, the first water pipes were installed. The suggestion was made that every person should have access to safe drinking water, but it would take somewhat longer before this was actually brought to practice in most countries. In it was discovered that a cholera epidemic spread through water. The outbreak seemed less severe in areas where sand filters were installed. British scientist John Snow found that the direct cause of the outbreak was water pump contamination by sewage water. He applied chlorine to purify the water, and this paved the way for water disinfection. Since the water in the pump had tasted and smelled normal, the conclusion was finally drawn that good taste and smell alone do not guarantee safe drinking water. This discovery led to governments starting to

install municipal water filters sand filters and chlorination , and hence the first government regulation of public water. In the s America started building large sand filters to protect public health. These turned out to be a success. Instead of slow sand filtration, rapid sand filtration was now applied. Filter capacity was improved by cleaning it with powerful jet steam. Fuller found that rapid sand filtration worked much better when it was preceded by coagulation and sedimentation techniques. Meanwhile, such waterborne illnesses as cholera and typhoid became less and less common as water chlorination won terrain throughout the world. But the victory obtained by the invention of chlorination did not last long. After some time the negative effects of this element were discovered. Chlorine vaporizes much faster than water, and it was linked to the aggravation and cause of respiratory disease. Water experts started looking for alternative water disinfectants. In calcium hypo chlorite and ferric chloride were mixed in a drinking water supply in Belgium, resulting in both coagulation and disinfection. In ozone was first applied as a disinfectant in France. Additionally, people started installing home water filters and shower filters to prevent negative effects of chlorine in water. In water softening was invented as a technique for water desalination. Cations were removed from water by exchanging them by sodium or other cations, in ion exchangers. Eventually, starting drinking water standards were implemented for drinking water supplies in public traffic, based on coliform growth. It would take until the s before drinking water standards applied to municipal drinking water. The general principle in the developed world now was that every person had the right to safe drinking water. Starting in , public health concerns shifted from waterborne illnesses caused by disease-causing micro organisms, to anthropogenic water pollution such as pesticide residues and industrial sludge and organic chemicals. Regulation now focused on industrial waste and industrial water contamination, and water treatment plants were adapted. Techniques such as aeration , flocculation , and active carbon adsorption were applied. In the s, membrane development for reverse osmosis was added to the list. Risk assessments were enabled after Water treatment experimentation today mainly focuses on disinfection by-products. An example is trihalomethane THM formation from chlorine disinfection. These organics were linked to cancer. Lead also became a concern after it was discovered to corrode from water pipes. The high pH level of disinfected water enabled corrosion. Today, other materials have replaced many lead water pipes.

Chapter 3 : The Chronology of Water by Lidia Yuknavitch

Lidia Yuknavitch's The Chronology of Water is the kind of book that people don't just read, but become converted to. "Viral" is a good meme for a memoir about the body, and seems appropriate for a.

BOX Water Supplies for the City of Boston On April 7, , a fire that destroyed homes and stores in central Boston led to a debate that lasted for more than 20 years before a decision to finally bring a supply of water to the city adequate in quantity and quality was reached. The issue was not whether the provision of water for the rapidly growing city was desirable; every candidate for mayor over the two decades promised to bring water to the city. The issue that delayed the decision was whether the water should be supplied by the city government or by one or more private companies. The water from the wells serving individual homes, as well as from those made available by private entrepreneurs who provided keys to the locks on the pumps for a price, was contaminated by infiltration of wastes from nearby privies. Sewers became accessible for the receipt of household wastes during the middle and late nineteenth century. The storm sewers discharged to local drainage ditches, which extended contamination of the groundwater. The situation was further aggravated when small companies set themselves up to distribute water from private wells to some homes and businesses. The Aqueduct Corporation brought water from a small pond within the city. The Boston Hydraulic Company, through the Massachusetts legislature, took water from ponds north of the Charles River and within 12 miles of the city. However, the Boston City Council rejected the requirement that it be obliged to subscribe to stock in the Boston Hydraulic Company. In , it brought the issue to a public referendum, and the public, despite opposition of the two companies, overwhelmingly endorsed the proposition that the city should build and operate the waterworks. Although this decision took more than 10 years of discussion and debate, it was only the beginning. In , Congress passed legislation to develop regulations to prevent the introduction, transmission, or spread of communicable disease from foreign countries or from state to state. However, it was not until that the first water regulations were promulgated under this legislation AWWA, These early federal regulations prohibited the use of common water cups on interstate common carriers. Water and Wastewater Systems. Privatization of Water Services in the United States: An Assessment of Issues and Experience. The National Academies Press. The private companies, by then also including Boston Aqueduct Corporation and the Spot Pond Aqueduct Company, owned the small nearby ponds. The proponents of public ownership preferred Long Pond later known as Lake Cochituate , which was larger and further from the city. The water companies preferred investing in water supply at a lower immediate cost, rather than committing to a larger source they did not own that was more costly and for which the companies did not have the financial resources. A second referendum again supported public ownership, but this time by a smaller margin. Meanwhile, the city was growing. The Boston Aqueduct Company had so extended its distribution system that the customers complained of low pressures and being without water much of the time. The city had done nothing, and the controversy continued. In , the city finally decided to enter into the provision of water from Long Pond. But the water companies were not doneâ€”they had the ear of the state legislature. The legislature agreed that the city should go ahead with its scheme but only if supported by another referendum. This time, the Long Pond option with public ownership was narrowly defeated. Machinations of the Spot Pond Aqueduct Company, however, delayed the commitment to the private option, and the decision to privatize was aborted. Finally, consultants employed by the city reported that Spot Pond would provide only 1. In April it was put to a vote, and the citizens again overwhelmingly supported the Long Pond project and public ownership. In the final analysis, financial resources available to the private companies could not compete with those of the municipality, which had the financial support of its state legislature. At the time, long-term investments were more readily made by public bodies than by private companies. Since then, water and sewerage and wastewater treatment systems in the Boston metropolitan area have largely been regionalized and are now the responsibility of the Massachusetts Regional Water Authority MWRA. Some cities in the region, such as Cambridge and Worcester, have their own water systems, and most of the cities own and operate their own sewerage and water distribution systems. The state controls the MWRA watersheds. The MWRA makes

liberal use of private consultants, private laboratories, and other private establishments for capital and operational purposes. This box draws from Blake Service Drinking Water Standards were first adopted in , with bacterial limits to protect the traveling public. Water supplies in cities that provided water for interstate carriers needed to be approved by the U. Many states adopted these or similar standards for their communities. The use of chlorine as a disinfectant in water treatment became common in the United States around In the nineteenth century, the number of water supplies grew exponentially from a total of about in to about 3, in Ownership was evenly divided between public and private ownership. Beginning about , the number of publicly owned systems began to exceed the number of private systems. The years following World War II saw the development of new approaches to ensure safe water supplies. Organic chemicals that were used heavily during the war found a place in a range of civilian applications. Many of these chemicals eventually made their way into surface and groundwater systems. In her book, Silent Spring, Rachel Carson expressed concerns regarding environmental quality, including the quality of drinking water, caused by synthetic chemicals Carson, These new chemicals were dissolved in minute quantities in water and could not be detected by the analytical techniques of the day Dougherty et al. New analytical tools were developed, and they fostered even greater concerns over water pollution. There was public clamor for federal standards to be applied to all water supplies. Environmental Protection Agency is responsible for establishing drinking water standards under the Safe Drinking Water Act. But this often polluted the groundwater that was being used for water supply. Sewerage systems were thus introduced to remove wastewater from homes and other buildings for discharge to the nearest waterbodies. Local governments constructed sewerage lines, as well as streets, drainage systems, and infrastructure for other utilities. These sewerage systems, while sanitizing homes, also often created nuisances and health hazards in the receiving waters, as these were also being used for water supply. Comprehensive sewerage systems were being built throughout Europe and the United States in the mids. Because receiving waters often played multiple roles as sources of food, places of recreation, and sources of drinking water, treatment of wastewater before discharge was initiated in the latter years of the century. Initial treatment consisted of diverting wastewater to farms for application to the land, where wastewater helped restore nutrients to the soil. With urban growth and the attendant larger volumes of water that needed to be processed, sedimentation alone was no longer sufficient, and various improvements in treatment were introduced. Chemical precipitation was introduced to enhance sedimentation, but that created problems with sludges. A major step was the introduction of biological treatment with trickling filters following sedimentation Box describes development of St. Many other types of secondary biological treatment processes are now available, with the aim of increasing their efficiency and reducing their space and cost requirements. Activated sludge and other modern biological processes can provide up to 95 to 98 percent removal of organic matter and suspended solids and bacteria. Passage of the Clean Water Act in made secondary treatment a requirement for all wastewater treatment plants in the United States. A federal construction grant program, which provided additional funds as Page 36 Share Cite Suggested Citation:

Chapter 4 : History of the Clean Water Act | Laws & Regulations | US EPA

Flooded with light and incandescent beauty, Lidia Yuknavitch's The Chronology of Water cuts through the heart of the reader. These fierce life stories gleam, fiery images passing just beneath the surface of the pages.

Outhouses in Brisbane , Australia, around A significant development was the construction of a network of sewers to collect wastewater. Instead of flowing to a river or the sea, the pipes have been re-routed to modern sewer treatment facilities. However, until the Enlightenment era , little progress was made in water supply and sanitation and the engineering skills of the Romans were largely neglected throughout Europe. This began to change in the 17th and 18th centuries with a rapid expansion in waterworks and pumping systems. The tremendous growth of cities during the Industrial Revolution quickly led to terribly overpolluted streets, which acted as a constant source for the outbreak of disease. As cities grew in the 19th century, increasing concerns were raised about public health. During the half-century around , these public health interventions succeeded in drastically reducing the incidence of water-borne diseases among the urban population, and were an important cause in the increases of life expectancy experienced at the time. During the s and s, this practice resulted in disastrous spread of waterborne diseases like cholera and typhoid. By the s the luxury of indoor plumbing , which mixes human waste with water and flushes it away, eliminated the need for cesspools. The odor was considered the big problem in waste disposal and to address it, sewage could be drained to a lagoon , or "settled" and the solids removed, to be disposed of separately. This process is now called "primary treatment" and the settled solids are called "sludge. From as early as there were efforts to stop polluting the River Thames in London. Beginning with an Act passed that year that was to prohibit the dumping of excrement into the river. Proposals to modernize the sewerage system had been made during but were neglected due to lack of funds. However, after the Great Stink of , Parliament realized the urgency of the problem and resolved to create a modern sewerage system. He designed an extensive underground sewerage system that diverted waste to the Thames Estuary , downstream of the main center of population. Three of these sewers were north of the river, the southernmost, low-level one being incorporated in the Thames Embankment. The Embankment also allowed new roads, new public gardens, and the Circle Line of the London Underground. Construction of the interceptor system required million bricks, 2. Sewers north of the Thames feed into the Northern Outfall Sewer , which fed into a major treatment works at Beckton. South of the river, the Southern Outfall Sewer extended to a similar facility at Crossness. The Paris cholera epidemic of sharpened the public awareness of the necessity for some sort of drainage system to deal with sewage and wastewater in a better and healthier way. Between and Eugene Belgrand lead the development of a large scale system for water supply and wastewater management. Between these years approximately kilometers of aqueducts were built to bring in potable spring water, which freed the poor quality water to be used for flushing streets and sewers. By laws were passed which made drainage mandatory. The treatment of Paris sewage, though, was left to natural devices as 5, hectares of land were used to spread the waste out to be naturally purified. Further, the lack of sewage treatment left Parisian sewage pollution to become concentrated downstream in the town of Clichy, effectively forcing residents to pack up and move elsewhere. Hamburg and Frankfurt, Germany[edit] The first comprehensive sewer system in a German city was built in Hamburg, Germany in the midth century. This was the beginning of the biological aerobic and anaerobic treatments which are fundamental to wastewater processes. As pollution of water bodies became a concern, cities attempted to treat the sewage before discharge. It needs to be connected to a sewer system though. Where this is not feasible or desired, dry toilets are an alternative option. Water supply[edit] Chelsea Waterworks , An ambitious engineering project to bring fresh water from Hertfordshire to London was undertaken by Hugh Myddleton , who oversaw the construction of the New River between and The New River Company became one of the largest private water companies of the time, supplying the City of London and other central areas. The Chelsea Waterworks Company was established in "for the better supplying the City and Liberties of Westminster and parts adjacent with water". The first screw-down water tap was patented in by Guest and Chrimes, a brass foundry in Rotherham. Sir Francis Bacon attempted to desalinate sea water by passing the

flow through a sand filter. The first documented use of sand filters to purify the water supply dates to , when the owner of a bleachery in Paisley, Scotland , John Gibb, installed an experimental filter, selling his unwanted surplus to the public. The practice of water treatment soon became mainstream, and the virtues of the system were made starkly apparent after the investigations of the physician John Snow during the Broad Street cholera outbreak. Snow was sceptical of the then-dominant miasma theory that stated that diseases were caused by noxious "bad airs". His essay On the Mode of Communication of Cholera conclusively demonstrated the role of the water supply in spreading the cholera epidemic in Soho , [66] with the use of a dot distribution map and statistical proof to illustrate the connection between the quality of the water source and cholera cases. His data convinced the local council to disable the water pump, which promptly ended the outbreak. The Metropolis Water Act introduced the regulation of the water supply companies in London , including minimum standards of water quality for the first time. The Act "made provision for securing the supply to the Metropolis of pure and wholesome water", and required that all water be "effectually filtered" from 31 December This legislation set a worldwide precedent for similar state public health interventions across Europe. The Metropolitan Commission of Sewers was formed at the same time, water filtration was adopted throughout the country, and new water intakes on the Thames were established above Teddington Lock. Automatic pressure filters, where the water is forced under pressure through the filtration system, were innovated in in England. In a paper published in , Moritz Traube formally proposed the addition of chloride of lime calcium hypochlorite to water to render it "germ-free. Alexander Cruickshank Houston used chlorination of the water to stem the epidemic. His installation fed a concentrated solution of chloride of lime to the water being treated. The chlorination of the water supply helped stop the epidemic and as a precaution, the chlorination was continued until when a new water supply was instituted. From Chlorination of Water by Joseph Race, The first continuous use of chlorine in the United States for disinfection took place in at Boonton Reservoir on the Rockaway River , which served as the supply for Jersey City, New Jersey. The treatment process was conceived by Dr. Leal and the chlorination plant was designed by George Warren Fuller. According to his own account, "It occurred to me that chlorine gas might be found satisfactory The next important question was how to render the gas portable. This might be accomplished in two ways: By liquefying it, and storing it in lead-lined iron vessels, having a jet with a very fine capillary canal, and fitted with a tap or a screw cap. The tap is turned on, and the cylinder placed in the amount of water required. The chlorine bubbles out, and in ten to fifteen minutes the water is absolutely safe. This method would be of use on a large scale, as for service water carts. Shortly thereafter, Major William J. Lyster of the Army Medical Department used a solution of calcium hypochlorite in a linen bag to treat water. This work became the basis for present day systems of municipal water purification.

Chapter 5 : A History of Water

The Chronology of Water is astonishingly beautiful, and, as a writer, Yuknavitch is a force. Her writing hits you, hard. Her writing hits you, hard. It rocks you.

The enormous Valles Marineris canyon system is named after Mariner 9 in honor of its achievements. Warrego Valles , as seen by Mariner 9. Viking program[edit] By discovering many geological forms that are typically formed from large amounts of water, Viking orbiters caused a revolution in our ideas about water on Mars. Huge river valleys were found in many areas. They showed that floods of water broke through dams, carved deep valleys, eroded grooves into bedrock, and traveled thousands of kilometers. The flanks of some volcanoes are believed to have been exposed to rainfall because they resemble those occurring on Hawaiian volcanoes. When they were formed, ice in the soil may have melted, turned the ground into mud, then the mud flowed across the surface. It does not flow across the surface, going around obstacles, as it does on some Martian craters. The amount of water involved was almost unthinkableâ€"estimates for some channel flows run to ten thousand times the flow of the Mississippi River. The images below, some of the best from the Viking Orbiters, are mosaics of many small, high resolution images. Click on the images for more detail. Some of the pictures are labeled with place names. Bahram Vallis, as seen by Viking. It lies nearly midway between Vedra Valles and lower Kasei Valles. Streamlined Islands seen by Viking showed that large floods occurred on Mars. Image is located in Lunae Palus quadrangle. Tear-drop shaped islands caused by flood waters from Maja Valles, as seen by Viking Orbiter. Image is located in Oxia Palus quadrangle. The islands are formed in the ejecta of Lod , Bok , and Gold craters. Scour Patterns, located in Lunae Palus quadrangle , were produced by flowing water from Maja Valles, which lies just to the left of this mosaic. Detail of flow around Dromore crater is shown on the next image. Great amounts of water were required to carry out the erosion shown in this Viking image. The erosion shaped the ejecta around Dromore crater. Image is located in Lunae Palus quadrangle and was taken by Viking Orbiter. The ejecta from Arandas crater acts like mud. It moves around small craters indicated by arrows , instead of just falling down on them. Craters like this suggest that large amounts of frozen water were melted when the impact crater was produced. Image is located in Mare Acidalium quadrangle and was taken by Viking Orbiter. Some channels are associated with lava flows; others are probably caused by running water. A large trough or graben turns into a line of collapse pits. Image is located in Arcadia quadrangle and was taken by Viking Orbiter. Branched channels in Thaumasia quadrangle , as seen by Viking Orbiter. Networks of channels like this are strong evidence for rain on Mars in the past. The branched channels seen by Viking from orbit strongly suggested that it rained on Mars in the past. Image is located in Margaritifer Sinus quadrangle. Ravi Vallis , as seen by Viking Orbiter. Ravi Vallis was probably formed when catastrophic floods came out of the ground to the right chaotic terrain. Image located in Margaritifer Sinus quadrangle. Results from Viking lander experiments strongly suggest the presence of water in the present and in the past of Mars. All samples heated in the gas chromatograph-mass spectrometer GSMS gave off water. However, the way the samples were handled prohibited an exact measurement of the amount of water. Some chemicals in the soil contained sulfur and chlorine that were like those remaining after sea water evaporates. Sulfur was more concentrated in the crust on top of the soil, than in the bulk soil beneath. So it was concluded that the upper crust was cemented together with sulfates that were transported to the surface dissolved in water. The sulfur may be present as sulfates of sodium , magnesium, calcium, or iron. A sulfide of iron is also possible. These minerals are typical weathering products of mafic igneous rocks. The presence of clay, magnesium sulfate, kieserite, calcite, hematite, and goethite strongly suggest that water was once in the area. Viking 2 found similar group of minerals. Because Viking 2 was much farther north, pictures it took in the winter showed frost. Frost at the landing site. This data was used to target the landing of Opportunity Rover. Hematite is usually formed in the presence of water. Opportunity landed here and found definite evidence for water. Mineral composition gives information on the presence or absence of water in ancient times. TES identified a large 30, square-kilometer area in the Nili Fossae formation that contained the mineral olivine. It is thought that the ancient impact that created the Isidis

basin resulted in faults that exposed the olivine. Olivine is present in many mafic volcanic rocks ; in the presence of water it weathers into minerals such as goethite , chlorite , smectite , maghemite , and hematite. The discovery of olivine is strong evidence that parts of Mars have been extremely dry for a long time. Olivine was also discovered in many other small outcrops within 60 degrees north and south of the equator. That is 11 times larger than the five volcanoes on the Big Island of Hawaii. These gullies occur on steep slopes and mostly in certain bands of latitude. Group of gullies on north wall of crater that lies west of the crater Newton Image is located in the Phaethontis quadrangle. Gullies in a crater in Eridania quadrangle , north of the large crater Kepler. Features that may be remains of old glaciers are present. One, to the right, has the shape of a tongue. Gullies on one wall of Kaiser crater. Gullies usually are found in only one wall of a crater. Location is Noachis quadrangle. Full color image of gullies on wall of Gorgonum Chaos. A few channels on Mars displayed inner channels that suggest sustained fluid flows. The best-known is the one in Nanedi Valles. Another was found in Nirgal Vallis. Image from Lunae Palus quadrangle. Many places on Mars show dark streaks on steep slopes, such as crater walls. Dark slope streaks have been studied since the Mariner and Viking missions. Often they originate with a small narrow spot, then widen and extend downhill for hundreds of meters. Streaks do not seem to be associated with any particular layer of material because they do not always start at a common level along a slope. Mars Global Surveyor found that new streaks have formed in less than one year on Mars. Several ideas have been advanced to explain the streaks. Some involve water, [23] or even the growth of organisms. Bright dust settles on all Martian surfaces after a period of time. Layers in Tikhonravov crater in Arabia. Layers may form from volcanoes , the wind, or by deposition under water. The craters on the left are pedestal craters. Dark slope streaks are seen to originate from certain layers you may need to click on image to see the streaks. Tikhonravov crater floor in Arabia quadrangle. Click on image to see dark slope streaks and layers. Dark streaks in Diacria quadrangle. Dark Streaks in Arabia quadrangle. Some parts of Mars show inverted relief. This occurs when materials are deposited on the floor of a stream then become resistant to erosion, perhaps by cementation. Later the area may be buried. Eventually erosion removes the covering layer. The former streams become visible since they are resistant to erosion. Mars Global Surveyor found several examples of this process. These streams begin at the top of a ridge then run together. Mars Pathfinder[edit] Pathfinder found temperatures varied on a diurnal cycle.

Chapter 6 : history of drinking water treatment

The history of water supply and sanitation is one of a logistical challenge to provide clean water and sanitation systems since the dawn of www.nxgvision.com water resources, infrastructure or sanitation systems were insufficient, diseases spread and people fell sick or died prematurely.

Longer than that even. With Anne Sexton and Sylvia Plath drink at the bar. Laugh the dark laughter in the dark light. Sing a dark drunken song of men. Make a slurry toast. Rock back and forth, and drink the dark, and bask in the wallow of women knowing what women know. Just for a night. When you need to feel the ground of your life and the heart of the world, there will be a bonfire at the edge of a canyon under a night sky where Joy Harjo will sing your bonesong. Go ahead-with Anne Carson - rebuild the wreckage of a life a word at a time, ignoring grammar and the forms that keep culture humming. Make word war and have it out and settle it, scattering old meanings like hacked to pieces paper doll confetti. The lines that are left â€¦ they are awake and growling. With Virginia Woolf there will perhaps be a long walk in a garden or along a shore, perhaps a walk that will last all day. She will put her arm in yours and gaze out. At your backs will be history. In front of you, just the ordinary day, which is of course your entire life. The small backs of words. I am in a midnight blue room. With a blood red desk. A room with rituals and sanctuaries. I made it for myself. It took me years. I reach down below my desk and pull up a bottle of scotch. I pour myself an amber shot. I close my eyes. I am not Virginia Woolf. But there is a line of hers that keeps me well: Arrange whatever pieces come your way. I am not alone. Whatever else there was or is, writing is with me.

Chapter 7 : Water: H20 = Life Exhibition | AMNH

In The Chronology of Water, the abuse and the pervasive reach of the abuse are ever present but we are left to wonder about what happened and why the author made that choice to create such deliberate absence. It is a bold choice to create that absence without acknowledging it.

Visit Website Today, the leading cause of air pollution in the U. Auto emissions also increase the amount of greenhouse gases in the atmosphere, which in turn contribute to global warming. In , in an effort to reduce air pollution, the U. Congress passed the Clean Air Act, legislation which has been amended and strengthened in the ensuing decades. However, in , almost half 46 percent of all Americans resided in counties with unhealthy levels of either ozone or particle pollution, according to the American Lung Association ALA. In the eastern U. In the western U. It causes many other health effects, premature births to serious respiratory disorders, even when the particle levels are very low. It makes asthma worse and causes wheezing, coughing and respiratory irritation in anyone with sensitive airways. It also triggers heart attacks, strokes, irregular heartbeat, and premature death. For centuries, humans unknowingly contaminated sources of drinking water with raw sewage, which led to diseases such as cholera and typhoid. Water pollution intensified with the advent of the Industrial Revolution, when factories began releasing pollutants directly into rivers and streams. In the developing world [according to UNESCO] as much as 70 percent of industrial waste is just dumped untreated into the rivers and lakes. China is a perfect case in point. Leaky septic tanks, pesticides and fertilizers are among the other sources that can contaminate groundwater. Over half the American population including the majority of those living in rural areas relies on groundwater for drinking water, according to The Groundwater Foundation www. In , Congress passed the Clean Water Act to reduce water pollution. Various pieces of anti-pollution legislation have followed since that time and today the U. However, water pollution is still a problem. The disaster, which created a 3,square-mile oil slick, instantly killed hundreds of thousands of birds, fish and other wildlife and devastated the area for years afterward.

Chapter 8 : History of water supply and sanitation - Wikipedia

The Chronology of Water Quotes (showing of 57) "If I could go back, I'd coach myself. I'd be the woman who taught me how to stand up, how to want things, how to ask for them.

Since water is absolutely essential to human life, it should not be surprising that it is an important component of human history. Yet it is surprising how little attention water receives in historical accounts. Humans have generally settled near convenient sources of water. Most of the great ancient civilizations depended on a particular source of water. For example, the Egyptians centered their civilization on the Nile. Mesopotamia Greek for the land between the rivers, the Tigris and the Euphrates was the home of several important ancient empires. Chinese civilization was located principally in the Yellow and Yangzi river basins. In the case of these great civilizations, there usually is considerable discussion of water as a fundamental aspect of the civilization in question. Water facilitated relatively rapid transportation prior to about C. In the era of exploration and discovery from the late 15th through the 18th centuries, Europeans explored all the major oceans and seas. Water was also thought to be an essential aspect of imperialism from the 16th century on this is known the "salt water fallacy," the idea that an empire must be separated from the mother country by an ocean; this is why neither the Russian nor the American continental empires were seen as comparable to the Spanish, Portuguese, British, French, and Dutch empires. The history of exploration and trade remains a major area of historical scholarship dealing with water. Some of the most innovative scholarship concerns the way in which a body of water ties together what might otherwise be disparate areas and provides the backbone for a common culture. A recent example, shorter and less scholarly but highly readable, is Neal Ascherson, Black Sea, Water was also an important source of power in the period before the Industrial Revolution. Even though steam power made water power less necessary, water remained an essential component in all kinds of manufacturing processes. Beginning with the Industrial Revolution, however, water increasingly becomes a hidden factor in human history. For many, it quite literally went underground, hidden from sight until one turned on a faucet or flushed a toilet. Increasing, there was a tendency to view it as something to master and control. This is, of course, in accord with a more general approach to nature as a whole: Under the street in Paris, Anyone contemplating the rubric "Water in History" is faced with a sea of possible topics. I will be looking at two in particular. The other, Soviet efforts to construct canals and dams as part of the Five-Year Plans of the s, mostly illustrates the follies humans commit in their attempts to master and control water. Between the two, we should get some insights into present-day dilemmas concerning the use of water in industrial societies.

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Find out more about water, which is named in every language and without which no living thing exists.

History of drinking water treatment History of drinking water treatment History of drinking water treatment Humans have been storing and distributing water for centuries. When people permanently stayed in one place for a long period of time, this was usually near a river or lake. When there were no rivers or lakes in an area, people used groundwater for drinking water purposes. This was pumped up through wells. When the human population started growing extensively, the water supply was no longer sufficient. Drinking water needed to be extracted from a different source. People also started to develop drinking water transport systems. The transport took place through simple channels, dug in the sand or in rocks. Later on one also started using hollow tubes. Egypt used hollow palm trees and China and Japan used bamboo strunks. Eventually one started using clay, wood and even metal. In Perzia people searched for underground rivers and lakes. The water went through holes in rocks into the wells on the plains. In this city there were public bathing facilities with water boiler installations and bathrooms. In ancient Greece spring water, well water, and rainwater were used very early on. Because of a fast increase in urban population, Greece was forced to store water in wells and transport it to the people through a distribution network. The water that was used was carried away through sewers, along with the rainwater. When valleys were reached, the water was lead through hills under pressure. The Greek where among the first to gain an interest in water quality. They used aeration basins for water purification. They used river, spring or groundwater for provisioning. The Romans built dams in rivers, causing lakes to form. The lake water was aerated and than supplied. Mountain water was the most popular type of water, because of its quality. For water transport the aquaducts where built. Through these aquaducts water was transported for tens of miles. Plumming in the city was made of concrete, rock, bronze, silver , wood or lead. Water winnings were protected from foreign pollutants. From to A. In the Middle Ages countless cities were manifested. In these cities wooden plumming was used. The water was extracted from rivers or wells, or from outside the city. Soon, circumstances became highly unhygenic, because waste and excrements were discharged into the water. People that drank this water fell ill and often died. To solve the problem people started drinking water from outside the city, where rivers where unpolluted. This water was carried to the city by so-called water-bearers. The first drinking water supply that supplied an entire city was built in Paisley, Scotland in by John Gibb, in order to supply his bleachery and the entire city with water. Within three years, filtered water was transported to Glasgow. In Paris operated a large water treatment plant. The water settled for 12 hours, before it was filtered. Filters consisted of sand and charcoal and where replaced every six hours. In , the Englishman James Simpson built a sand filter for drinking water purification. Today, we still call this the number one tribute to public health. More information on water disinfection?: