

Time & Tide

A select history of water and people

Over millennia, our relationship with water has been richly kaleidoscopic – somatic, cultural, and spiritual. About 60% of our body is water, the food that we eat comes from a magic alchemy of water, sunlight and soil. Water has been an integral part of our daily lives from the very beginning – in food, drink, cleansing, in rituals of birth and death, and everything in between. It's not surprising therefore, that many of the great, early civilizations flourished around rivers – the Tigris, the Euphrates, the Indus, the Nile, and the Ganges.

The answer to how we can resolve the emergent water crisis, perhaps lies in our learnings from the past. In tribute to humanity's ever evolving relationship to water, our report carries a special feature highlighting several sterling narratives on this aspect. The ingenuity of the Mayans, the engineering genius of the aqueducts of ancient Rome, and a 5,000 years old drainage system in Harappa that is marveled at even today; these are just a few examples of the featured stories that serve to inform and inspire. 'Time and Tide' tries to capture a small part of this long history, as the human race tries to keep the global water crisis at bay.

Scarcity of water tops the World Economic Forum's suggested list of risks to our planet. At Wipro, our engagement with water goes back more than a decade and spans a range of initiatives both, within our campuses, as well as outside with the larger community. Our initiatives around water efficiency, recycling and harvesting have resulted in a cumulative savings of more than 3,000 million liters over the last four years. In parallel, acting on the fundamental axiom that water is a collective resource that needs collaborative governance with other stakeholders, we started a program three years back in our campuses in Bangalore (Sarjapur) and Chennai, that sought to critically understand the larger picture of our water trail.

Water is the ultimate renewable resource as it cycles perennially through land, the oceans and the atmosphere. Yet, its delicate balance across geographies and seasons is disrupted easily, affecting the fates of millions. We hope that this leaflet is a small step towards information, education, and bringing about progress towards the changes that we want in our future.



Time and Tide

A select history of water around the world

North America

01 Ancient Mayan water technology
► ca. 500 AD, Yucatán Peninsula

Water had always been a pressing concern for the Mayans as the Yucatán Peninsula had little surface water. They devised several water supply technologies to adapt to this environment. *Cenotes* or underground caves, were prized sources of water so much so that the Mayans kept their existence a secret from colonial powers. Above the *cenotes*, on the surface, they had *aguadas* — reservoirs made in the craters they dug, using the mud to build their homes. In other places, elaborate cisterns called *chultunes* were engineered to re-direct run-off rainwater to various Yucatán towns. These simple, low cost sustainable methods are as relevant today when water shortage isn't limited to naturally arid regions.

02 The Great Lakes and America's first people
► 1500 AD, USA, Canada

The Great Lakes, a chain of five lakes — Superior, Michigan, Huron, Erie, and Ontario — together form the largest group of freshwater lakes on earth. Stretching from New York to Minnesota, they are home to centuries-old Native American tribes. The first "foreigners" entered these lands in the 1500s, bringing with them new items of trade, strange diseases, and an alien culture. Over the years, the Native Americans became pawns in the war for the control of North America, first bullied and then appeased by the colonizing Europeans. The years after the American Revolution saw relocation and assimilation policies by the US government both forced on and subsequently rejected by the natives. For the last 25 years, the Great Lakes Indian Tribes have been fighting for their political sovereignty with significant success.

03 Present day Mexico City rests on a dry lake, drained of its former glory
► 1521 AD, Mexico City

Thousands of years ago, a large lake called Texcoco occupied the region roughly around what is today's Mexico City. The area served as a cradle for successive Mesoamerican civilizations. The Aztecs arrived in the 13th century and made Tenochtitlan their capital. They built a network of

canals and dykes, fertile gardens and massive temples. In 1521, the invading Spaniards destroyed the city, building a new capital in its place. Mexico rested on drained canals and lakes of Tenochtitlan, and wasn't a patch on its predecessor. Water shortage was a direct consequence, something which the city is still grappling with.

04 The development of the Mississippi
► 1673 AD, USA

The banks of the Mississippi have been home to generations of natives, who lived, farmed and built their lives along it. The French were the first among many foreigners to foray into the Upper Mississippi region, turning the river into a pulsating trade and transport route. Fortunes changed when railroads and ships came into the picture, sidelining river transport which was already considered risky. It was then that the US government decided to build wing dams and closings dams to control river flow, followed by levees to check flooding. Not everyone was happy with the growing intervention — conservationists voiced their concerns initiating the continuing battle for control over the Mississippi.

05 New York City, home to the world's largest water supply system
► 1842 AD, New York City, USA

A network of tunnels and aqueducts in the Big Apple meets the daily water needs of eight million New Yorkers with ease. In 1842, the Old Croton Aqueduct was built, carrying almost 90 million gallons of water into the city per day. The following years saw newer reservoirs and the New Croton Aqueduct in 1890. The consolidated distribution system in New York City today provides uninterrupted supply of clean, potable water across the five boroughs of the city.

06 Hoover, the world's tallest dam
► 1935 AD, Arizona-Nevada border, USA

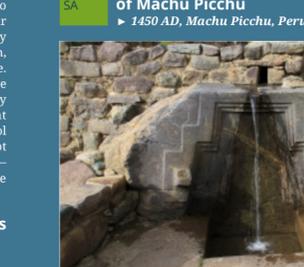
The Hoover Dam stands 725 feet tall with a base comparable to the length of two foot ball fields. It took five years and 21,000 men to build the dam, which confines the rough waters of the Colorado River to Lake Mead, protecting southern California and Arizona from disastrous floods. Its



sheer size and appearance draws tourists from the world over, who come to see the great dam America built way back in 1935, while in the depths of the Great Depression.

South America

07 A network of fountains supplied clean water to the ancient city of Machu Picchu
► 1450 AD, Machu Picchu, Peru



08 After over 11 million years, the Amazon has begun to shrink
► 1541 AD, Amazon

If one goes by the geological clock, the desire to control the Amazon is relatively new. For the basin of the world's longest river has been inhabited for ten thousand years — by tribes, both big and small. Foreigners came in 1541 and yet it was only when the value of natural latex was realised that the world turned its eyes to the Amazon. The demand continues to be high, with Brazil controlling the world rubber monopoly. In an effort to secure this control, the government is building roads through the jungles of Amazon today, causing widespread deforestation in the process. As the tree cover thins, the waters of the Amazon keep dwindling.



09 The pristine waterfalls of Igazu have awed tourists for centuries
► 1541 AD, Brazil-Argentina border

10 Paraguay and Brazil equally reap the benefits of the Itaipu Dam, which they jointly built
► 1991 AD, Paraguay and Brazil

11 Hamza, an underground river, as long as the Amazon, but wider
► 2012 AD, Brazil

The Rio Hamza was probably one of Amazon's best kept secrets, until it was discovered in 2012. Flowing four kilometres under the Amazon, the "underground" River Hamza equals it in length but is at least a hundred times wider. Named after and discovered by Vallya Mannathal Hamza and his team at the National Observatory in Rio, the river flows west to east, from the Andean foothills to the Atlantic coast. The fact that it flows in the same direction as the Amazon, is enough to qualify them as twin rivers, but there are marked differences between the two especially when it comes to width and flow speed.

12 Many believe that submerged ancient cities lie beneath the waters of Lake Titicaca
► Present day, Bolivia-Peru border

Europe

13 2000 year old Roman aqueducts are still functional today
► ca. 300 BC, Rome, Italy

While the rich and the poor of ancient Rome led very different lives, they did have equal and uninterrupted access to one thing: water. The Romans were skilled engineers and conceptualized an elaborate system of winding aqueducts which carried water to all parts of this ancient city. Be it a private villa, or a public bath, water reached these places from a seemingly invisible network of underground aqueducts built from a special combination of stone, brick, and cement. Ducts concealed in colossal



bridges and arches, crisscrossed the city, feeding water into fountains and fields. Today, one can still find the residents of Rome, just like their ancestors, filling bottles from the Trevi Fountain, which gets its water from the Acqua Vergine, revived during the Renaissance.

14 In medieval Europe, technology replaced manual labour as waterwheels began to crop up in the countryside
► ca. 1100 AD, England, Germany, France

15 In 19th century England, the river Thames was filthy and homes lacked plumbing and running water
► ca. 1800 AD, England

16 The Rhine, lifeline of the Roman Empire
► Present day, Central and Eastern Europe

The Rhine, the second longest river in Europe, was once bridged and crossed by the great Julius Caesar. This easily navigable river was the lifeline of the Roman Empire. When the empire declined, many powers fought to control it. While centuries of political realignments continuously changed the borders of the countries along the Rhine, the castles along the river survived them all. Built by Roman emperors to protect their lands, they tell the history of the region nourished by the mighty river.

17 The Danube has seen the rise and fall of many empires
► Present day, Central and Eastern Europe

Once an invincible frontier for the mighty Roman Empire, the Danube today forms the boundaries of eight different European countries. It is the longest river of the European Union, rising in the Black Forest mountains of Germany and flowing for almost 3,000 km before it finally drains into the Black Sea. While the Rhine has always been given economic precedence over the Danube, the latter did support the growth of two major empires: the Austrian and Hungarian.

18 Thousands flock to Lourdes every year for a touch of its "miracle water"
► Present Day, France



Africa

19 The Masai of Kenya worship Engai, the rain god, who has both a destructive and benevolent side

20 Aquifers have been installed across Libya to access its precious underground fossil water
► 1983 AD, Libya

21 How Namibia secured her water supply
► 2002 AD, Windhoek, Namibia

In Namibia, droughts are commonplace and rainfall, scarce. Water shortage is a perpetual concern in its capital, Windhoek, which has battled the problem with a secret weapon: waste water reclamation. It was first put into practice in 1968 with the building of the Goreangab Water Reclamation plant. The city continues to innovate in the face of climate change. Built in 2002, the New Goreangab Reclamation Plant is a great example of internationally compliant advanced technology in water reclamation.

22 Political interests dominate the Nile
► Present day, Egypt/Ethiopia

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23 Lake Chad shrinks to a twentieth of its original size
► Present day, West Africa

As the waters of the once large Lake Chad in West Africa begin to evaporate, communities and countries fight over the remains. Besides an imbalance in the demand-supply ratio, climate change is a major contributor to the plight of Lake Chad today. Loss of jobs and increasing poverty are direct outcomes, forcing many communities to migrate to cities.

24 In Chinese mythology, weather and water are commanded by fire-breathing dragons

25 The world's first civilization thrived on the banks of the Tigris-Euphrates
► 5000-3500 BC, Mesopotamia

Asia

26 The Indus Valley's efficient drainage system
► ca. 3000 BC, Mohenjo-daro, Dholavira, Present day Pakistan and India

27 The mystery of the Saraswati
► 1500 BC, Rajasthan, India

28 The Grand Anicut Dam, built 2000 years ago is still in use
► ca. 1000 AD, Tamil Nadu, India

The Saraswati used to flow through the Thar desert back when it was a fertile land inhabited by flourishing civilizations. Sometime around 3000 BC, the river began to dry up giving way to a vast desert. Earthquakes, climate change, and tectonic shifts contributed to its decline. Although physically absent, the Saraswati is the third river of the *Triveni Sangam*, or the holy confluence of three rivers in north India, which is the site for the historic *Maha Kumbh Mela*.

29 An advanced hydraulic engineering system existed on an ancient rock in Sri Lanka
► 475-495 AD, Sri Lanka

30 Water never runs dry in Mecca's famous Zamzam well
► 771 AD, Saudi Arabia

31 Stepwells were ideal pitstops for tired travellers in ancient India
► 1499 AD, India

32 Redirecting rivers in China
► 1952 AD, China

The Chinese government's South-North Water Transfer initiative diverts large volumes of water from the Yangtze River in the south to the Yellow River in the north through a \$62 billion project. This will ease the water crises in cities like Beijing and Tianjin in the north but at least 330,000 people will lose their homes and jobs down south. Pollution levels will rise and water will become unfit for consumption. Though the transfer has already started, the emphasis on sensible approaches like rainwater harvesting by some has inspired locals to adopt it in their daily lives.

While the Early Cholas ruled ancient India only for a century, they created something which has lasted many more. The Grand Anicut dam, built by them in the 2nd century AD, diverted waters of the Kaveri river, irrigating

Africa

33 21 million Chinese get their drinking water from rainwater harvesting in Gansu
► 1980 AD, Gansu, China

34 In the conflict-ravaged middle east, the Jordan River is an arbiter of cooperation
► 2010 AD, Jordan, Syria, Israel

35 In the deserts of Rajasthan, rain water runs deep
► Present day, Rajasthan, India

Across the Thar, besides *palar pani* (rain water) and *patal pani* (underground water), villagers are nourished by *rehwani pani* (surface water that doesn't make it to the water table). The mineral rich lands have an impervious layer of gypsum, formed almost 30 lakh years ago. The layer hardens when it comes in contact with water, keeping it from trickling down to the water table while the sand prevents the trapped humidity from evaporating back into the atmosphere. The cavity of a specially constructed *kuan*, a small and narrow well, turns the humidity into drops of water. The *kuan's* circumference is kept to a minimum to prevent evaporation. In places like Jaisalmer, which witnessed its lowest annual average rainfall last year at 7mm, *kains* serve as efficient water retainers. Like a *kain*, Lake Jaseri has a *bittu ro ballo*, or a layer of stone which prevents rainwater from escaping, thereby maintaining a fixed water level all year around.

36 The shrinking Aral Sea
► Present day, Russia

37 Rainwater harvesting in a traditional sumo arena
► Present day, Tokyo, Japan

38 The world's deepest lake is home to unique species of flora and fauna
► Present day, Siberia

39 Millions visit the mighty Ganges, flowing through the heart of India, to attain salvation
► Present day, India

40 The rainbow serpent tickled a frog to produce streams and lakes, say Aboriginal Dreamtime myths
► Australia

41 New Zealand's first public water supply project couldn't cope with rising demand
► 1874 AD, Wellington, New Zealand

42 Wellington's second attempt at adequate water supply fails with the Waiuomata dam
► 1884 AD, Waiuomata, New Zealand

43 Australia tackles water shortage with citizens' cooperation
► Present day, Australia

44 The health of the Murray and Darling rivers suffers while their diverted waters bring prosperity to their banks
► Present day, Australia

45 The two ends of the polar region are truly poles apart
► Present day, Both the Arctic and the Antarctic

46 The world's freshwater, frozen at two ends
► Present day, Both the Arctic and the Antarctic

47 Global warming and melting polar ice
► Present day, Both the Arctic and the Antarctic

48 The world's longest river flows through eleven African countries, many of which have been involved in protracted disagreements over it. Egypt and Sudan signed an agreement in 1959, settling issues over water sharing rights for good. However, new projects are still a cause of conflict among most Nile basin countries, who are already struggling to meet their water needs. While Egypt functions unilaterally, diverting billions of cubic meters of Nile water to the Sinai desert, Ethiopia is busy signing water sharing agreements with other nations.

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