



the  
**AVA** project  
a FEZANA initiative

# Water is Life !

## The AVA Project

**Guest Editor: Afreed Mistry**

**The** FEZANA Ava Project was started in January 2021 after a very successful *NAMC* talk on “Deep Ecology in Zoroastrianism” by Ervad Tehemton Mirza. The *NAMC* session encouraged and motivated many of the attendees to “do good”, “make a difference” and “contribute to society”. Hence, FEZANA’s United Nations Non-Governmental Organization (UN-NGO) Committee started the Ava Project.

The objective of this project is for Zoroastrians all over the world to contribute towards taking care of the environment and to create a learning community where each of us can learn from each other. Our ancient Iranian Zarathushti culture is to care for all creations. We intend to execute these dreams by promoting the concept of Glocalization -To Think Globally and Act Locally. This project will continue for ten years, until 2030, which is when the United Nations Sustainable Development Goals are also due.

We have over 185 volunteers across 10+ countries signed up for the Ava project. Volunteers include a diverse group of our global diaspora: engineers, priests, authors, entrepreneurs, doctors, scientists, school teachers, undergraduate and graduate students, journalists, editors, mothers, grandmothers, botanists, artists, musicians, all ranging from ages 12 to 80, each bringing their own unique talents and thinking to the table.

At the first Ava Project meeting in January 2021, Necklin Pithawala, Parinaz Dastur and Delzin Choksey were three people who were very inspired by what they heard at the meeting. Necklin, who is a botanist from India, advised everyone that when a river dries up, there are certain trees that can be planted to raise the water levels of the river and bring the river back to life. There are some examples of this in India. Upon hearing this, one of the sub-groups formed was the Water and Trees group. Parinaz, a 12 year old girl in California, heard all this while her mom was attending the first meeting and she was inspired to paint a scene of water and trees which then got us to plan the Family Paint Event that occurred on June 5<sup>th</sup>. You can read about this in the Children’s Section. Our very talented graphics artist, Delzin Choksey, who also attended the first Ava Project meeting, heard us all and was inspired to create a logo for us. The logo you see in this editorial has been created by her.



## Some Ava Project Ideas

### Local Water Clean Up

Volunteers are gathering in smaller groups in all areas of the World to do local water clean ups.

### Partnering with Companies

Working on partnering with like minded companies so the volunteers get a chance to make a difference.

### Educating the Children

A package has been put together on water – it's importance, and conserving water. This package is available through FEZANA's website under Resources. We hope that parents and religion class teachers everywhere will use this in their homes and classes to teach the children and students of all ages.

### Educating the Community

To educate the Zoroastrian community through various formats like educational workshops, videos, pamphlets, quarterly articles, and providing tools to communities to host educational game shows such as Jeopardy, Family Feud, etc.

### Bringing Clean Water

Looking into how we can bring clean water to areas that do not have it. Looking into better solutions than building wells as that takes a lot of effort, money and time.

### Water and Trees

Planting the right trees can raise the level of the water. There are numerous examples in India where this has worked.

The articles in this journal are divided into three categories, starting with scriptures and ancient Iranian traditions, then actions into programs, which are living examples of how the people in the World are making a difference. Lastly, we have the children's section because the children can make the difference the World needs and they need to be encouraged to contribute.

We have high hopes that the readers of this journal will want to make a difference, or have an idea relating to the UN SDG's and/or want to join in the Ava Project, if so, please connect with us: <https://bit.ly/2KMqrur> or email: [Avaproject@fezana.org](mailto:Avaproject@fezana.org)



*Afreed Mistry (Toronto, Canada) has been volunteering for the Zoroastrian community since 1989. She has been a board member of her local association in Toronto and has been teaching religion classes for the past 23 years. Afreed has been involved with WZCC since it's inception in 2001 and with FEZANA since 2002. She was the President of the local WZCC Toronto chapter and has been the co-chair of ZYNA. She co-chaired the 10<sup>th</sup> North American Zoroastrian Youth Congress in Toronto (2003) and the 11<sup>th</sup> North American Zoroastrian Youth Congress in Miami (2005). Afreed has attended twelve Zoroastrian congresses all over the World and has been a speaker at six of them. Most recently, Afreed was one of three Master of Ceremonies at the 11<sup>th</sup> World Zoroastrian Congress in Perth, Australia (2018). Afreed, along with Dr. Behram Pastakia, co-chairs the FEZANA UN-NGO Committee. She is also the main representative for FEZANA at the United Nations. When she is not volunteering, Afreed works at a bank as a Network Design Specialist.*

*I would like to thank my Co-Chair of the FEZANA UN-NGO Committee, Dr. Behram Pastakia for helping me put together this issue on the Ava Project.*





## Children's Section of the Journal

Guest Editor: **Natasha Dungor**

This issue of the *FEZANA Journal* has a dedicated section on sharing the voices of children and youth in the Ava Project. In September 2015, the United Nations General Assembly adopted the resolution “Transforming our World: the 2030 Agenda for Sustainable Development.” In it, the UN identified developing the capacity of youth to effectively contribute to climate change-related planning and management, including conservation of water. It is important to recognize that children of today will be the leaders of tomorrow and they need to have their voices heard and prepared for leadership.

In this issue, we have included artwork that was contributed by children ranging in age from 5 to 16 years and includes a couple of articles by young writers.

*Natasha Dungor, age 15, is a 9<sup>th</sup> grader at Klein Collins High School in Spring, TX. She has been an active participant in the Houston Zarathushti community since childhood and is currently the Secretary of its Youth Group. Natasha shares a deep passion for the Zoroastrian community, religion, culture, and its history. She is interested in medicine as a future career. Natasha is also part of the Educating the Children group of the FEZANA Ava Project.*



## ZOROASTRIANISM – NATURE SPIRITUALITY

ERVAD TEHEMTON F. MIRZA

On December 26<sup>th</sup>, 1966, like many years before, most North Americans were busy buying frivolous stuff at “Boxing Day Sale,” while in Washington DC, Lynn Townsend White Jr., a Professor of Medieval History at the University of California, addressed the *American Association for the Advancement of Science’s* annual meeting. In doing so, he set off an intellectual explosion. His comments and allegations transformed the ecological discourse from a technological problem to a religious problem.

In his address (published as “The Historical Roots of Our Ecological Crisis” in *Science* 155: 1203 – 1207), he argued that “*what people do about their ecology depends on what they think about themselves in relation to things around them.*” Citing Genesis 1:26, he conveyed a simple but profound message that our current environmental crisis is a result of our religious worldview of **dominion** over our environment and not simply our technological abilities to impact and degrade it. He claimed, “*We shall continue to have worsening ecological crisis until we reject the ... (religious) axiom that nature has no reason for existence save to serve man*”. He concluded his address with this statement “***Since the roots of our trouble are so deeply religious, the remedy must also be essentially religious, whether we call it that or not.***”

Though Lynn Townsend White’s conclusion was provocative, it failed to inspire the world’s established religions into action. At best, they promoted environmental responsibility as one of their responsibilities, though significantly less critical than their “religious” responsibilities.

Some 24 years of relative inaction prompted Bron Taylor, Professor of Religion and Nature, University of Florida, to publish “Dark Green Religion” in 2010. He promoted the concept that Nature is sacred, imbued with intrinsic value and worthy of reverent care, that non-human species have worth regardless of their usefulness to human beings, and that humans have direct ethical obligations to Nature. During his interview with *Religion Dispatch* magazine, he warned the established religions of their inaction “... ***eventually their religions are likely to be supplanted (superseded or replaced) by naturalistic forms of nature spirituality***”.

It is encouraging that the first two decades of the 21<sup>st</sup> century have witnessed the emergence of a new crop of Eco-Theologians, who have taken up the cause of “nature spirituality.” Noteworthy amongst them are Rev. Michael Dowd, a progressive Christian minister, author, and eco-theologian who advocates Big History, sustainability and evolution and Dr. Leah Schade, who urges preachers to interpret scriptures with a green lens and become rooted in environmental theology.

Is modern-day Eco-theology a new revolutionary concept or recycled Zoroastrianism with “new and improved” packaging?

Let us examine.

### Relationship between Ahura Mazda and His Creations

Ahura Mazda (Lord of Wisdom) and his Ameshaspands (Archangels) and Yazatas (Angels) are the personifications of the elements of Nature. Spiritually, each Ameshaspand is assigned a segment of Nature.

Ameshaspand (Avesta / Pahlavi)	Spiritual Creation	Material Creation
Ahura Mazda / Hormazd	All Creations	Humans
Vohu Mana / Bahman	Good Mind	Animal
Asha Vahishta / Ardibheshet	Divine Law	Fire
Khashtra Vairya / Sharevar	Divine Kingdom	Metals
Spenta Armaity / Spandarmad	Holy Devotion	Earth
Haurvatat / Khordad	Perfection	Water
Ameratat / Amardad	Immortality	Vegetation



Polluting or mistreating nature results in displeasing or insulting the divine.

*“Whoever teaches care for all these seven creations, does well and pleases the Bounteous Immortals; Then his soul will never arrive at kinship with the Hostile Spirit. When he has cared for the creations, the care of these Bounteous Immortals is for him, and he must teach this to all humankind in the material world.” - Shayesht ne Shayesht (Proper and Improper) 15.6 (Likely written in later Sassanian times).*

### **Zoroastrian Calendar**

Far from being just a number, each day of the Zoroastrian calendar is dedicated to an Ameshaspand or Yazad and their respective element of Nature. Each day and each month mean something, says something, communicates something and conveys something. For example, the month and day of Avan is dedicated to water, Ardibehesht is dedicated to Fire, Bahman is dedicated to animals, and Amardad is dedicated to vegetation, to name a few. Zoroastrians are advised to pay special reverence to these elements of Nature on the day and month assigned to them. Environmental experts and dieticians advise us to consume less meat for the benefit of the environment and for good health. For generations, observant Zoroastrians refrain from consuming meat during the entire month of Bahman and the days of Bahman and its co-workers (Hamkara) Mohor, Gosh and Ram as these days are dedicated to animals. This leads to vegetarian meals for 74 days in a year or 20% of the year.

Our secular calendar celebrates April 22<sup>nd</sup> as “Earth Day.” In comparison, the Zoroastrian calendar celebrates *each day* as Earth Day.

### **Importance of Nature**

Zoroastrian teachings and practices emphasize the importance of Nature, its laws, and its treatment.

Arda-e-Vriaf Nameh records that, amongst others, the souls of those who brought prosperity to waters, fires, trees, and earth were exalted and adorned in heaven. But, on the other hand, the souls of polluters of Nature were punished in hell.

Vendidad describes how the earth is to be respected and treated and how the elements of Nature are to be kept pure. It prescribes hygiene, punishment to polluters, treatment of corpses, purity laws, treatment of dogs and much more.

Zoroastrians have preserved what is believed to be the most environmentally conscious method of disposing of their corpses.

### **Zoroastrian Prayers:**

Zoroastrian prayers instruct, advise, guide, and direct their devotees to live a virtuous life. Special Zoroastrian prayers are dedicated to elements of Nature... Fire, water, sun, moon etc.

Yasna ceremony (an inner liturgical ceremony) performed by Mobeds is dedicated to Nature. It starts out with *nivaêdhayemi*.... “I announce (and) carry out (this Yasna) for you, Fire, son of Ahura Mazda, together with all the fires, and for the good waters, even for all the waters made by Mazda, and for all the plants which Mazda made.” (Yasna 1:12).

Zoroastrians pray “*Namaz-i-Chahar nemag*: - (nemô ânghâm asanghâmcâ shôithranâmcâ .....)” while turning to each direction and pay homage to Nature.

*“Homage to these places and these lands, and for these pastures, and these abodes with their hayracks, and for the waters, lands, and plants, and for this earth and heaven, and the Asha-owning wind, and for the stars, moon, and sun, and the eternal stars without beginning, and self-disposing, and for all the Asha-owning creatures of Spenta Mainyu, male and female, the regulators of Asha.”*

At a Zoroastrian Jashan Ceremony, seven elements of Nature are represented, and their corresponding Ameshaspentas are praised.

Newlywed Zoroastrians are advised to keep the water clean, cultivate the land, plant trees, not cut down young trees and give herbs and medicines to the needy.

While repenting for sins in Patet Pashe Mani, Zoroastrians repent for sins against humans, animals, fire, metal, earth, water, trees and vegetation.



## Zoroastrian Celebrations

As Nature wakes up from its winter sleep, as beautiful first flowers start blossoming, as greenery returns to the landscape, as the birds start singing and the animals wake up from their hibernation, Zoroastrians renew themselves with “Navrooz” on the first day of spring.

Gahambars, six seasonal festivals, are aligned with changes in Nature during the year.

Jashan-e-Sadeh (mid-winter celebration) and Jashan-e-Mehergan (autumn festival) are aligned with Nature.

## World’s Religions (In) Action

In response to ecological challenges and pressure to act, the world’s religious leaders have issued climate crisis proclamations. They have signed letters, made formal statements, petitions to politicians, and supported some climate initiatives. Parliament of World’s Religions has issued proclamations for environmental responsibility.

Are religious proclamations of “Caring for God’s creations” or “having compassion for all sentient beings” sufficient? Critics call them superfluous and cosmetic.

## Zoroastrian Ecological Duty

First and foremost, Zoroastrians must make the most of Ahura Mazda’s gift of good mind. Recognize the importance of Nature, listen to science, care for the environment, and, most importantly, act.

### *Rethink Nature - Respect Zoroastrian divinities*

Ava (water): Stop water pollution – cease dumping refuse and garbage in bodies of water.

Zamyad (earth): Reduce consumption, repurpose, refuse over-packaging, and reduce landfill.

Bahman (animals): Respect animal habitats, reduce meat consumption and protect wildlife.

Amardad (vegetation): Preserve green space, forests, and plant species.

Most importantly, be mindful of exploding world population – all of Nature’s elements will be thankful.

Vote for the environment with credit cards. Buy environmentally friendly products.

Ponder a pre-purchase question: “*Can mother earth afford this and its consequences?*”

Consider Eco-friendly product swaps:

From single-use plastic disposable water bottles, straws, and cutlery to reusable

From plastic shopping bags to reusable cloth bags

From long-distance food to grow your own or buy local

From cars to feet or bikes for short trips and electric vehicles.

So, the principles of *nature spirituality* that Bron Taylor warned about and the likes of Rev Michael Dowd and Dr. Leah Schade promotes are rooted in Zoroastrian scriptures, beliefs, and practices.

A Zoroastrian must practice them and promote them.

Let the world explore them and benefit from them.

May Ahura Mazda grant humanity the wisdom to respect our environment and our mother, Mother Earth.



**Ervad Tehemton F. Mirza**

*Following rigorous religious training at the M.F. Cama Athornan Institute under Dasturji Dr. Firoze Kotwal, Tehemton was ordained Navar and Maratab at Iranshah Ateshbehram in Udvada. His professional career took him from Mumbai to Iran to Indonesia, and he finally settled in London, Ontario, Canada, where he owns and operates a CPA practice. As a Mobed, Tehemton volunteers religious and spiritual services to Zoroastrians in Southwestern Ontario and Michigan. Tehemton has published articles on Zoroastrianism in North American publications and spoken on Zoroastrian topics at Zoroastrian associations throughout North America. Tehemton currently heads the NAMC Institute of Zoroastrian Studies and serves as the Vice President of the North American Mobeds Council.*





*Parsees at prayer, the shorelines of Bombay in the distance. 1900*

Andrew Carnegie, a 19th Century American world-traveler, observations from “A Modern Zoroastrian” by Samuel Laing, 1890:

This evening we were surprised to see, as we strolled along the beach, more Parsees than ever before, and more Parsee ladies, richly dressed, all wending their way towards the sea. Here on the shore of the ocean, as the sun was sinking in the sea, and the slender silver thread of the crescent moon was faintly shining on the horizon, they congregated to perform their religious rites. Fire was there in its grandest form, the setting sun, and water in the vast expanse of the Indian Ocean outstretched before them. The earth was under their feet, and, wafted across the sea, the air came laden with the perfumes of ‘Araby the Blest’. Surely, no time or place could be more fitly chosen than this for lifting up the soul to the realms beyond seas ...

I could not but participate with these worshippers in what was so grandly

beautiful. There was no music save the solemn moan of the waves as they broke into foam on the beach. But where shall we find so mighty an organ, or so grand an anthem? How inexpressibly sublime the scene appeared to me and how insignificant and unworthy of the unknown seemed even our cathedrals made with human hands, when compared with this looking up through nature unto nature’s God! I stood and drank in the serene happiness, which seemed to fill the air. I have seen many modes and forms of worship — some disgusting, others saddening, a few elevating when the organ peeled forth its tones, but all poor in comparison with this. Nor do I expect in all my life to witness a religious ceremony which will so powerfully affect me as that of the Parsees on the beach of Bombay ...



## TIRGAAN CELEBRATIONS IN IRAN

MOBED MEHRABAN FIROUZGARY

The suffix Gaan is used to indicate the coincidence of Roj with Maah (Parabh). Thus Farvardingaan is the coincidence of Farvardin Roj in the month of Farvardin and so on. In the Iranian chronology all, such days, are considered as Festive days and apt rejoicing programmes are arranged, each in their own ways, most of them stretching over Five days and more. These bring people to get together, to pray, share their problems as well as celebrate.

All our Scriptural chronological events, like seasonal timings and conditions as well as historical, geographical and strategic conditions are based on the Ancient Iranian territory of Airyana Vaeja (Cradle land of the Nobles). Ancient Iran and its Caspian Sea northern territory.

### Scriptural Significances of Tirgaan

“Tishtrim Staarem Raevantem Khvarenang hantem Yazamaide”. We worship the Radiant and Glorious Star, Tishtrya.

Tishtrya, eventually reduced to Tir, is the only Yazata (Praiseworthy) who bears the same praise and adorations as AhuraMazda.

Within the Tir Yasht, especially Paras 25 to 50, Ahura Mazda points out, repeatedly, to Zarathushtra and confirms vide Para 51 – “I have created the Star Tishtraya as worthy of worship and adoration as Myself”.

On Earthly levels, Tishtrya, the Dogstar, is the astronomical Deity who is closely associated with rainfall. The Yasht (VII) dedicated to Him is a fine and forcible epic fragment. The account of His fight with Apaosha, the Demon of Drought and of his ultimate victory is noteworthy amongst the ancient Aryan Mythology.

Our mainly agriculturist ancestors, all around the drastically arid land and climates of Iran, had become expert star gazers and could expertly predict rainfall depending upon the changing brightness and other significant changes of the Dogstar.

Amongst the Seven Hamkaars (Co workers/collaborators) of AhuraMazda and 6 Amesha Spentas, the Yazatas Tir, Baad (Govad)

and Farvardin (ArdaFravesh) are associated with Khordad Amesha Spenta.

The attributes Of Khordad Amesha Spenta are:

Haurvataatem Ameshem spentem yazamaide. Yaairyam hu – shitim yazamaide; Sareda ashavana Ashahe rathavo yazamaide. (Haptan Yasht, Kangaji pp 170 (8):-

We praise Khordad Ameshaspand, We praise the timely advent of yearly beneficial festive (Hu shiti) seasons and the (Annual) periods of Holiness:-

Thus we see that the first Khordad Roj of the year is not only celebrated as Khordad Saal, the presumed birth date and accession to Prophecy of Asho Zarathushtra, but that this Day is associated with 72 other Auspicious events, and so on.

Based on this desire of the Khordad Amesha Spenta, be it as an excuse or given that culturally and inherently the Iranians possessed such advanced civilization and high standard of living, they devised Festive days, at almost regular intervals throughout the year. If one were to extract the number of specified Festive days out of an Iranian Zoroastrian Calendar, one can easily reach 85+ days per year. Added are their 5 day festive visits to each of over ten pilgrimage places (Peers). To these you add the Navjotes, engagements, weddings and other frequent get together parties arranged.

The above is not meant to indicate that all the Iranian Behdins are out of work, the whole year around, and feasting all along. However, every family does set aside periodic festive vacations. Besides the fact that every morning, when they wake up, their morale stays boosted remembering that that day is being celebrated cheerfully. An Ahuraic source of Positive energy!

Coming to “Tirgaan”. Equipped with the rich Indo Iranian Mythology, like the Yashts, they availed of the aspects of “Tir” the Rain Star (In Farsi Tir also stands for Arrow) and “Baad” the moving “Vaayou” i.e Wind, to create the symbolic Archer – Aarash – in order to decide the Fate of Iranian king Minoocher’s losing war with the Turanian king Afrasiab.

Considering that the result of all Epic wars were based on Dialogue, here it was decided that the Iranian border demarcation could be based upon the point of descent of an arrow shot from the top of a Central Iranian mountain.

Our renowned archer, the heroic and devoted Iranian patriot volunteered. He pulled on the bow and released the arrow all the time beseeching Ahura Mazda that his entire life be devoted for that mission. He fell dead at the release of that arrow.

In that episode the powerful Yazata Baad (Wind) helped by the Hero’s life energy infused powerful arrow



(Tir), released on the Tir Roj, to stay Airborne for Nine days (Until Baad Roj) before it reached the farthest possible distance, thus extending the Iranian border to an enviable and glorified territory gain.

In order to perpetuate this remarkable episode, Tirgaan Festivities start with Prayer sessions, in the open. The Yazata Vayoo is invoked vide Raam Yasht (Yasht XV, especially Para's 43 and 44).

The sanctified eatables, some prepared specially for the event, are distributed amongst the participants. Enjoyments start with spraying each other with what little water that can be found handy.

Thereupon the group gathers for the Fortune Telling game of "Chak o Dooleh" (Consulting the earthen jar).

For that every participant drops (unnoticed) a tiny personal item, the likes of a finger ring, bracelet, hair pin, coin, clothes button & etc. into a partly water filled enamelled earthen jar. Each participant will have



Photo Credit: Wikimedia Commons  
Arash the Archer Statue in Sa'dabad Palace.

prepared a sample of popular, but short, fortune telling item in prose or poetry.

A maiden girl is called in to sit at the pot. Her job is to pick, randomly, one

item from the jar contents and hold it hidden inside. Upon that one of the Fortune quotes are read out, with additional quotes of Good Wishes for the recipient.

Soon after the hand comes out of the pot and the owner of the object is revealed. Further blessings and good wishes are showered upon the recipient, with much singing and merry making. This is repeated until the jar is emptied out. The game does not end there and much more time is spent in merrymaking and festivity, sharing sweetmeats brought along for that occasion, as well as tying the woven rainbow coloured bracelet "Tir o Baad", such that every participant will have received one.

Rainbows indicate rainfall, the gifts of Yazata Tishtrya / Tir. The bracelets are untied after 10 days and offered to the Yazata Baad whose gift is the moving Air /Wind, thus ending the Tirgaan Festivities, which is in honour of the sacrifices of the Archer Arash who offered his life for the glory of Iran.

### **Mobed Mehraban Firouzgary**

is the senior most, living Mobed of Iran. He is the one who leads every Novzooty (Initiation of a Mobed born into a Mobed family), in Iran. He is a Senior Community Religious teacher for the last 45 years.

Mehraban has been a pioneer in Avesta recitations through the best researched pronunciations which he has spread through his conducted classes, teaching media, as well as audio recordings, together with his published Khordeh Avesta book, which has been standardized for teaching and public prayer recitations.

He also "spearheaded the basis and graduation of eight lady mobedyars (para mobeds) in Iran." Furthermore, being officiated in the Yasna rituals, he has trained five very proficient mobeds to replace him in that role.

He has been awarded the "Chehre Mandegar" (Everlasting personality) by the Tehran Zarthoshty Anjuman for his 5+ decades of selfless service to our community as well as humanity. Mehraban has been appointed, by the Iranian Ministry of Justice, as a Marriage Registrar for Zoroastrians, in Tehran,

since Feb. 2000 and the head of "Council for solving in-family disputes" since April 2018.

He has been repeatedly, and continuously, elected as a member of the Managing Committee to the Anjoman e Mubedan (Council of Iranian Mobeds) for the last 35 years.

Mehraban served as senior Service Engineer, for ten years with J N Marshall & Co, India. He held managerial and consultancy posts in, Iran based, International Data Processing Firms like the IBM and Honeywell as well as US and European

Medical Instrument Manufacturers like Technicon, Siemens etc. for 36 years. He has been a Consultant to leading Iranian Glass Plants as a Process Engineer.



## TIRGAN - THE LONGEST DAY – THE FESTIVAL OF WATER

FARIBORZ RAHNAMEEN

The first day of Summer, the longest day, the Summer Solstice was celebrated as TIRGAN and what better way to rejoice on a hot summer day than to douse each other with the life-giving water.

Tir or Tishtar is the brightest star visible from Earth when it is not hiding behind the sun. Its Greek name is Sirius and is located in the constellation Canis Major (Big Dog). The night sky fascinated ancient civilizations and many myths have developed. Ancient Egyptians noted that when Sirius rose before sunrise it was immediately followed by the annual flooding of the Nile River. The Nile got flooded because of the Monsoon rains at its source in Central Africa. So, they named it the Rain Star, although it did not rain anywhere in Egypt in summer. So also, in Tir Yasht, Tishtar is called the Rain Star but it does not rain in Iran during summer. “We sacrifice unto Tishtrya; We sacrifice unto the rains of Tishtrya.” (Tir Yasht 6:12).

Several cultures associated Tishtrya with the bow and arrow. The Chinese visualized a large bow and arrow across the southern sky, formed by the constellation of Puppis and Canis Major. In the same manner, the Egyptians depicted goddess Sopdet drawing an arrow at Sirius. These imaginative depictions found its way into Tir Yasht 6:6 ‘We sacrifice unto Tishtrya, the bright and glorious star; who flies, towards the sea Vouru-Kasha, as swiftly as the arrow darted through the heavenly space, which Erekhsha (Arash), the swift archer, the Arya amongst the Aryas whose arrow was the swiftest, shot from Mount Khshaotha to Mount Hvanvant.’”

Originally, according to the



Chinese Emperor Zang (75-88 CE) drawing a bow and arrow towards Sirius. <https://www.starmythworld.com/>



Egyptian goddess Sopdet representing Sirius who brought new soil and fertility to the land by flooding the Nile. Wikipedia.

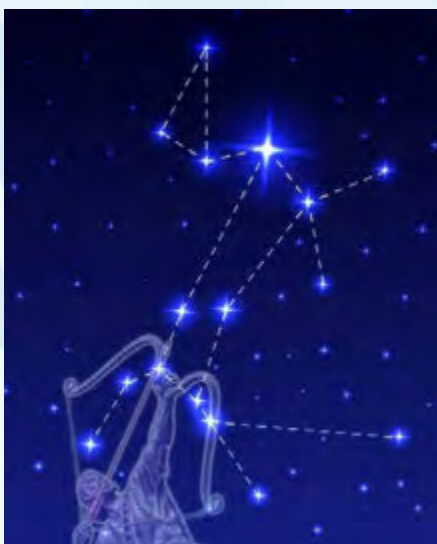
MazdaYasni Calendar, the blueprint of nature, the days of the year were meticulously divided between the unequal seasons marked by the natural phenomenon of Equinoxes and Solstices and the start of each season was celebrated as a festival. Thus, the first day of summer, the longest day, the Summer Solstice was celebrated as Tirgan.

Similarly, the Vernal Equinox was celebrated as Now Rooz and Autumnal Equinox as Mehregan while Winter Solstice was celebrated as Yalda.

The MazdaYasni Calendar the only calendar that is mentioned in the scriptures namely Bundahishn

(25:25) has been replaced by 4 calendars that go against the scriptures. ‘Haptan Yasht’ (Ha-3), “the coming of the season at the proper time of the solar year.”

As a result, followers of the Shenshai calendar do not celebrate most of the festivals and even started calling NovRoj the Pateti. While



The constellation depicting Arash the archer. Created by author. Tir Yasht 6:6.



the followers of the Kadmi calendar in Iran remembered the festivals but since their calendar was no longer seasonal, they looked for a reason for celebration and envisaged a logical reason, that of the coinciding of the name of the day and month. So, they sacrificed the wisdom and science of their ancestors to superstition.

Around 1960 the laity in Iran gradually adopted the Fasli calendar. Although they started the year on the Vernal Equinox, because of the 30-day month the seasons did not come “at the proper time of the solar year.” So, they carried the superstition to the Iranian Fasli calendar but only in the case of Tirgan and Mehregan. Now Rooz and Yalda are celebrated correctly because they have been preserved and celebrated Nationally by the Iranians who had been converted to Islam by force.

All other festivals including Gahanbars whose names pinpoint the exact day of celebration are celebrated on wrong dates. May Wisdom Prevail, and the knowledge and wisdom of the ancestors be given due recognition and respect.

<sup>i</sup> 1-Kadmi, 2-Shenshai, 3-Iranian Fasli, 4-Indian Fasli (Nov Roj fixed on 21 March not Equinox)

Fariborz Rahnamoon says “the Zarathushti history that has come down to us has been written by its adversaries over the last 2000 years and the Avesta has been deciphered and translated by western scholars with preconceived Roman ideology thereby leading us astray.” His findings and views are available on his website: [www.ancientiran.com](http://www.ancientiran.com)



He is in the process of translating the Gathas and it is available on his website [www.gathas.ca](http://www.gathas.ca) Since 2015 Fariborz has compiled and published the Mazdayasni Calendar based on the Bundahishn and it is available at [www.zarathushticalendar.com](http://www.zarathushticalendar.com) He says that the Gathas wants us to be Seekers not Believers.



FEDERATION OF ZOROASTRIAN ASSOCIATIONS OF NORTH AMERICA

NGO CSM FORUM66

Federation of Zoroastrian Associations of North America  
Presents:

**Cross Cultural Connections:  
Environmental Concerns and  
Female Empowerment**

A parallel event at the Commission on the Status of Women at the United Nations

Friday, March 18, 2022 at 4 PM EST  
1 PM PST/ 9 PM UK

Saturday, March 19, 2022 at  
1:30 AM IST/ 4 PM Hong Kong

Please Register to Attend:  
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## HOW TO REDUCE OUR WATER FOOTPRINT

By: ERVAD KAIVAN ANTIA

“If the wars of this century were fought over oil, the wars of the next century will be fought over water.” Dr. Ismail Serageldin (1995, Vice President, World Bank)

### Water facts

The UN estimates that two-thirds of the world’s population will live in water scarce regions by 2025. Approximately 97% of all water is salt water with most of the remaining 3% freshwater being frozen, leaving a small amount available for human consumption. 17 countries are currently under severe water stress. Climate change has exacerbated the water issue with less rainfall and more hotter days resulting in higher demand for water.

### It takes:

- 3500 litres of water to grow crops per person per day (the current population is  $\approx 7.9$  billion people)
- 15,400 litres of water per kg of beef (equates to  $\approx 50$  - 100 bathtubs full of water)
- water footprint of a cup of coffee is around 140 litres, a cup of tea only around 34 litres

Some of the most likely cross border conflicts over water wars:<sup>i</sup> Egypt (Nile), Pakistan (Indus), India (Ganges – Brahmaputra), US (Colorado), Iraq (Tigris-Euphrates).

Water scarcity will result in food insecurity which in turn will lead to a collapse in social structure and increase in violence.

The World Bank estimates that people generally require 100 to 200 litres of water daily to meet basic needs (36.5–73.0 m<sup>3</sup> of water per person annually). If one includes other uses of water, such as agriculture, industry, and energy production, the total annual average requirement of water per person is 1,000 cubic meters. Bluntly put, there simply is not enough water available for everyone due to increasing population growth.

One billion people do not have access to safe water—a problem that will likely increase as the world population grows from 7.9 billion people now to about 9.0 billion by 2050. This problem likely will become especially severe in countries with high population growth rates that share a major source of freshwater with other countries.

In September 2020, the UN reported that despite some

progress the world failed to fully meet any of the 20 targets to protect biodiversity which countries had agreed to in 2010 under the Convention on Biological Diversity (CBD). That lack of progress undermines efforts to address climate change, and increases the risk of diseases spreading from animals to humans. We all have experienced COVID-19.

In 2018, Cape Town nearly ran out of water and narrowly avoided a water crisis. The 2019 Australian bush fires burnt 18.6 million hectares (46 million acres), with over one billion mammals, birds and reptiles combined killed. This excludes insects, the loss of which was reported to be in the hundreds of billions.

All of us will be affected by the projected decline in biodiversity, including our children, their children and future generations.

Earth cannot continue to sustain such events. A short window of time remains for the transformative changes needed across many areas including ecosystem restoration, water conservation, food, agriculture, climate action as well as an integrated “One Health” approach to healthy people and healthy ecosystems.

### The Zoroastrian Perspective:

I want to connect the birth of Zarathushtra with today’s topic. Mother Earth implored Ahura Mazda to send a saviour as she was being mistreated. This plea set off a chain of events which resulted in Zarathushtra being born. Mother earth being ravaged by humans was occurring then and sadly occurs today too.

### Yasna 29.1 and 34.14 translated in poetry<sup>ii</sup> follow:

#### Yasna 29.1

*Unto you bewailed the soul of Mother Earth,  
Who didst fashion me – wherefore given birth?  
Torn apart am I by anger and aggression,  
Violated am I by rapine and oppression!  
Other than you, I have no protector,  
So, for my salvation, send me a strong saviour.*

#### Yasna 34.14<sup>iii</sup>

*Thou verily, O Mazda, doth grant this reward,  
To those who, in their earthly life, O Lord,*



*Do deeds inspired by Vohu Mano,  
And thus, truly help thy creation to grow,  
Thy holy plan they shall thus accomplish  
And through the path of Asha, fulfill thy wish.*

Our religion through these texts teach us to live a sustainable life in harmony with Ahura Mazda's 7 creations (sky, water, earth, plant, animal, human and fire). Zarathushtra taught his followers to tread an ethical and righteous path to bring about a state of perfection in this world.

This is only possible if one shows responsibility toward Ahura Mazda's creations. Those who perpetrate pollution and cause the defilement of all that is natural and good in the world are opposing to the creations and to Ahura Mazda himself. The collective righteous thoughts, words and actions of all of us are vital to strengthen Ahura Mazda's power and diminish Ahriman's power.

We must figure out how to live sustainably, together. When you look at Indigenous people (for example the Aborigines in Australia), they live sustainably, in harmony with nature. In fact, even our parents, grandparents and their ancestors lived very sustainably.

We have a shared responsibility for each other. What you and what I do TODAY matters, for us and everyone else too.

Our religion requires us to act, for ultimately it is deeds which speak louder than thoughts and words.

Zoroastrianism requires the caring of all Seven Creations as part of a mutual relationship. Indeed, it is a sin to defile (or waste) water. The requirement of non-pollution of these elements forms a major part of our duties for which we will be judged.

How?

This requires a lifestyle change, not only from us but from our families too. From a religious viewpoint some of the things we can do to preserve water and reduce our water footprint<sup>iv</sup> are:

1. Install dual flush toilets (a dual flush cistern uses 3 litres for a half flush, 6 for a full flush. A single flush cistern uses 9-11 litres of water per flush).
2. Use water saving showerheads (these use 9L/min compared to old showerheads which use 19L/min).
3. Installing rainwater tanks to capture rain which can then be used for watering the garden, flushing toilets etc. Not only is this environmentally friendly but will reduce your water bills too.

4. Limit showers to 4 - 6 minutes (a timer helps).
5. Eat less meat (difficult for some of us).
6. Drink tea rather than coffee.
7. Place a bucket under the showerhead to capture excess water that normally would go down the drain while we wait for the water to heat up.
8. Use washing machines and dish washers only when there is a full load.
9. Fix leaks (a dripping tap can waste ≈200L of water per day).

Think what our parents and grandparents did and try to follow them as they did live sustainably, had simple lives yet were very healthy.

My main purpose is to write about our religious requirements and I hope this will help you to think about how you can live in harmony with nature and conserve water.

Every small step counts.

*Atha Zamiyat Yatha Afrinami (May it be so as we wish)*

<sup>i</sup> U.N.: Chance of cross border conflicts may rise by 95% over the next century

<sup>ii</sup> The Gathas of Asho Zarathushtra by Jimmy Nadershaw Sidhwa

<sup>iii</sup> The Gathas of Asho Zarathushtra by Jimmy Nadershaw Sidhwa

<sup>iv</sup> Some of the usage figures are from <https://www.gwmwater.org.au/conserving-water/saving-water/how-much-water-you-use>

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## INTERFAITH PERSPECTIVE ON IMPORTANCE OF WATER

MANECK BHUJWALA

### Common Topic for Interfaith Discussion

At meetings of interfaith organizations, we discuss beliefs that are common to different faiths, to develop relationships among members and public, leading to trust, mutual respect and harmony. Water is one such common topic that draws people of different religious and ethnic backgrounds to come together, in interfaith organizations as well as in community and individual meetings.

### Interfaith Events held to Honor Water

The Greater Huntington Beach Interfaith Council (GHBIC) of California has a program “Blessing of the Waves” held at Pier Plaza of the city, attended by dignitaries and public. This annual event attracts people of all faiths to attend and to express their faith’s connection to the great element of water.

Representing Zarathushtis, I recite a few lines from the Aredvisur Nyaish with English translation at this event, and talk about the importance of God’s great creation of Water. I point out how our life depends on water, and our duty to keep it clean. Representatives of other faiths also express their reverence for Water and the need to keep it pure. At our latest event in September, as president of GHBIC I again pointed out the many uses of water in our daily lives to drive home the need to keep it away from pollutants.

The Parliament of World’s Religions (PoWR) also holds events to highlight the importance of Water that all people of the world hold in common. At the PoWR in Toronto, Canada, in 2017, interfaith activists were invited to join in a synchronous water blessing and universal prayer from their homes or at important venues around the world, in a spirit of partnership.

The Great Lakes Water Walk at which all people from the PoWR were invited, was led by the indigenous Anishinaabe people to honor Water. Following their tribal protocols, Grandmothers and Elders planned to make water offering, sing songs, and make petitions for the water to be clean and pure.

At a Zoom meeting of the South Coast Interfaith Council on Meditation from the Native American people, Chief Damiel Ramos connected to the Havapai nation (<https://www.facebook.com/tony.cerda1>) led a silent meditation on 9/23/21 with water as one of the sacred elements. He asked participants to hold a small amount of water under the tongue during the meditation and at the end share our experiences. He experienced seeing dolphins in the ocean. The Buddhist person experienced stillness. I shared my thoughts on how in Zarathushti prayer we have a vessel with water besides flowers, etc. and that I used some water from my previous night’s daily prayer during meditation.

### Observing Reverence for Water in Informal Venues

Once walking at the Huntington Beach Pier I met a Muslim family and saw the women offering something to the ocean waters. I asked them about it to confirm that Muslims also hold reverence for the Water.

I have also observed the inclusion of water in Hindu prayer ceremonies in temples and at river sites.



*Mobedyar Maneck Bhujwala is the co-founder of Zoroastrian Association of California, Los Angeles and Zarthushti Anjuman of Northern California, current President of Greater Huntington Beach Interfaith Council, Board member of North American Interfaith Network and Orange County Interfaith Network, Advisory Council Member of the Guibord Center, Los Angeles, Administrative Committee Member of the Center for Religion, Loma Linda University, Director of the World Zoroastrian Organization, U.K. and a volunteer priest in the Zarathushti community.*



## KING DARIUS' RED SEA CANAL

HENRY P. COLBURN

The Persian King Darius I (reigned 522-486 BCE) constructed a canal connecting the Nile to the Red Sea – an ancient precursor to the Suez Canal that made it possible to sail from Egypt to Persia, and to places in between.

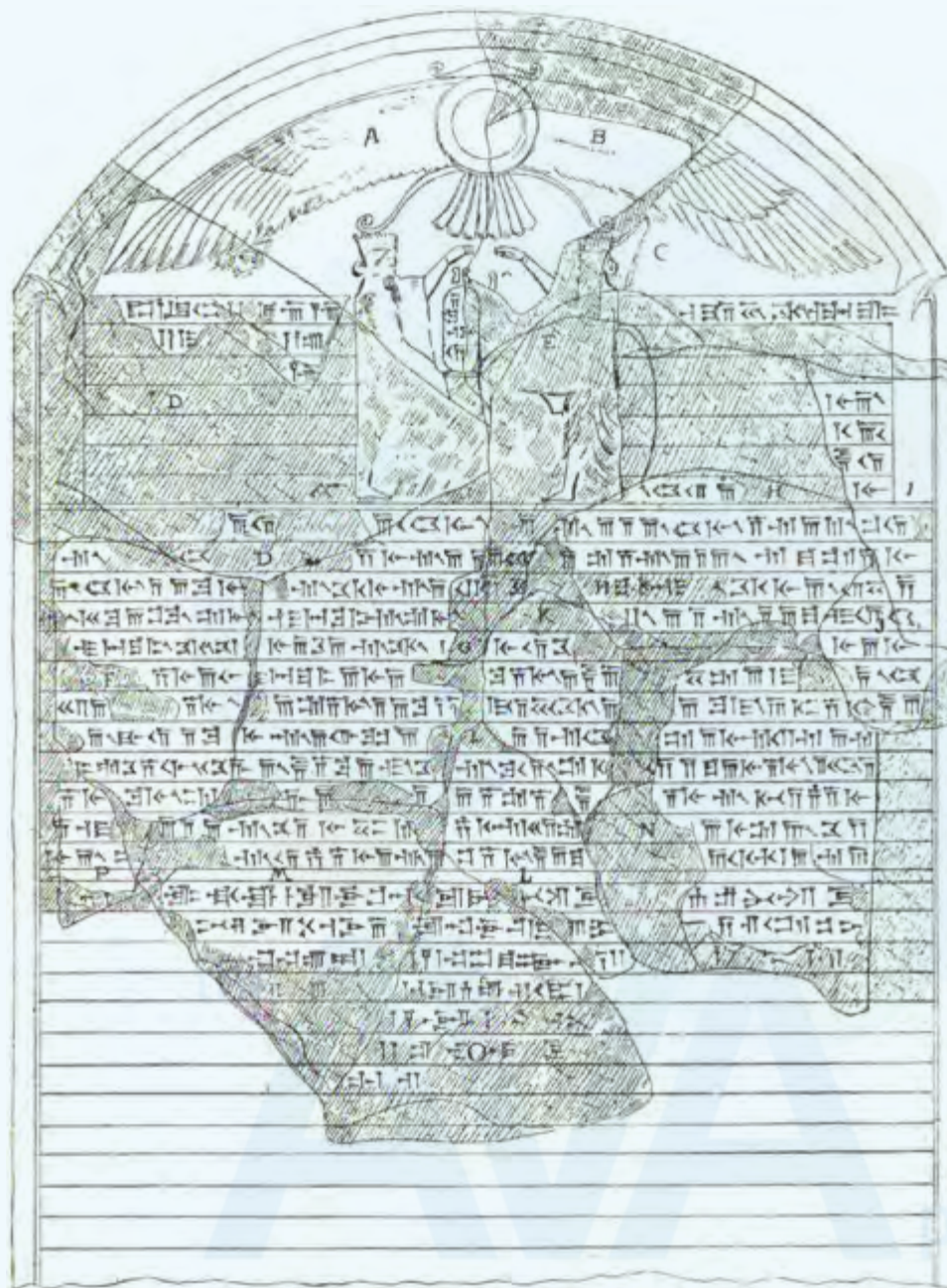
The Achaemenid Persian Empire was the largest land empire of its day, stretching from Egypt to Afghanistan. Yet it was also a sea power, fielding great fleets of warships and sponsoring maritime exploration. The Greek historian Herodotus, for example, says that King Darius I (reigned 522-486 BCE) dispatched Scylax of Caryanda from the mouth of the Indus River (in what is today Pakistan) to explore the Arabian Sea and the Red Sea, a voyage which lasted thirty months.<sup>1</sup> Darius' son and successor Xerxes I (reigned 486-465 BCE) likewise sent Sataspes through the Strait of Gibraltar to circumnavigate Africa. Although the expedition failed in its objective, judging from his report Sataspes may have made it as far as the Cape Verde Peninsula in modern Senegal.<sup>2</sup> Darius and Xerxes both also dug canals. Xerxes' canal, built between 483 and 480 BCE in preparation for his invasion of Greece, bisected the Mount Athos Peninsula in northern Greece, near the modern town of Nea Roda. The purpose of the canal was to avoid the treacherous Mount Athos headland, where a Persian fleet had been wrecked in 492. According to *The route of Darius' Red Sea canal*. Image from Wikimedia Commons, with additions by the author, reproduced under a Creative Commons license (CC-BY-SA-2.5).

Herodotus, the canal was wide enough that two triremes could traverse it side by side, a claim which archaeologists have been able to verify using seismic survey and bore holes.<sup>3</sup> But the canal of Darius, which linked the Nile to the Red Sea, was by far the greater achievement.

Herodotus tells us that the Egyptian pharaoh Necho II (reigned 610-595 BCE) first attempted to dig a Red Sea canal, but was unsuccessful.<sup>4</sup> Evidently Darius succeeded where Necho failed and dug a canal connecting the Nile to the Red Sea through the Wadi Tumilat, northeast of Cairo. The location of the canal can be established with some certainty on the basis of satellite imagery and the stone stelae that were erected along its course. The western end of the canal met the Nile near Zagazig (ancient Bubastis) in the eastern Nile Delta. It continued 70 km to the east through the Wadi Tumilat. Just before reaching Ismailia it turned southward and then followed the route of the modern Suez Canal through Great Bitter Lake and Little Bitter Lake, reaching the Red Sea near Suez.<sup>5</sup>



Four fragmentary stone stelae have been discovered along the canal's course, featuring images of the Persian king along with an Egyptian motif depicting two human figures – representing Upper and Lower Egypt respectively – tying a lotus and a papyrus plant together. This motif, called 'The Binding of the Two Lands,' was a symbol of unity used by Egyptian kings for millennia and adopted by the Persians to represent their rule of Egypt.



The stelae also have inscriptions in Egyptian hieroglyphics and in Old Persian, Elamite and Akkadian cuneiform, naming Darius as the canal's builder. The best preserved of these inscriptions is the cuneiform on the stela from Kabret. The text reads:

King Darius proclaims: I am a Persian; from Persia, I seized Egypt. I ordered this canal to be dug, from a river called Nile, which flows in Egypt, to the sea which goes to Persia. So this canal was dug as I had ordered, and ships went from Egypt through this canal to Persia, as was my desire.<sup>6</sup>

This inscription makes the canal's purpose clear: it created a sea route from the Nile to the Persian Gulf. The hieroglyphic texts on the stelae are very poorly preserved, but they contain references to the Achaemenid capitals Persepolis and Pasargadae, suggesting that these inscriptions also referred to a maritime link to Persia.<sup>7</sup> Despite these inscriptions, scholars have doubted the usefulness of the canal, and indeed it had its limitations. It would only have been navigable during the fall and

*Drawing of the Kabret stela. Public domain image from Recueil de travaux relatifs a la philologie et a l'archéologie égyptiennes et assyriennes 9 (1887), 145.*

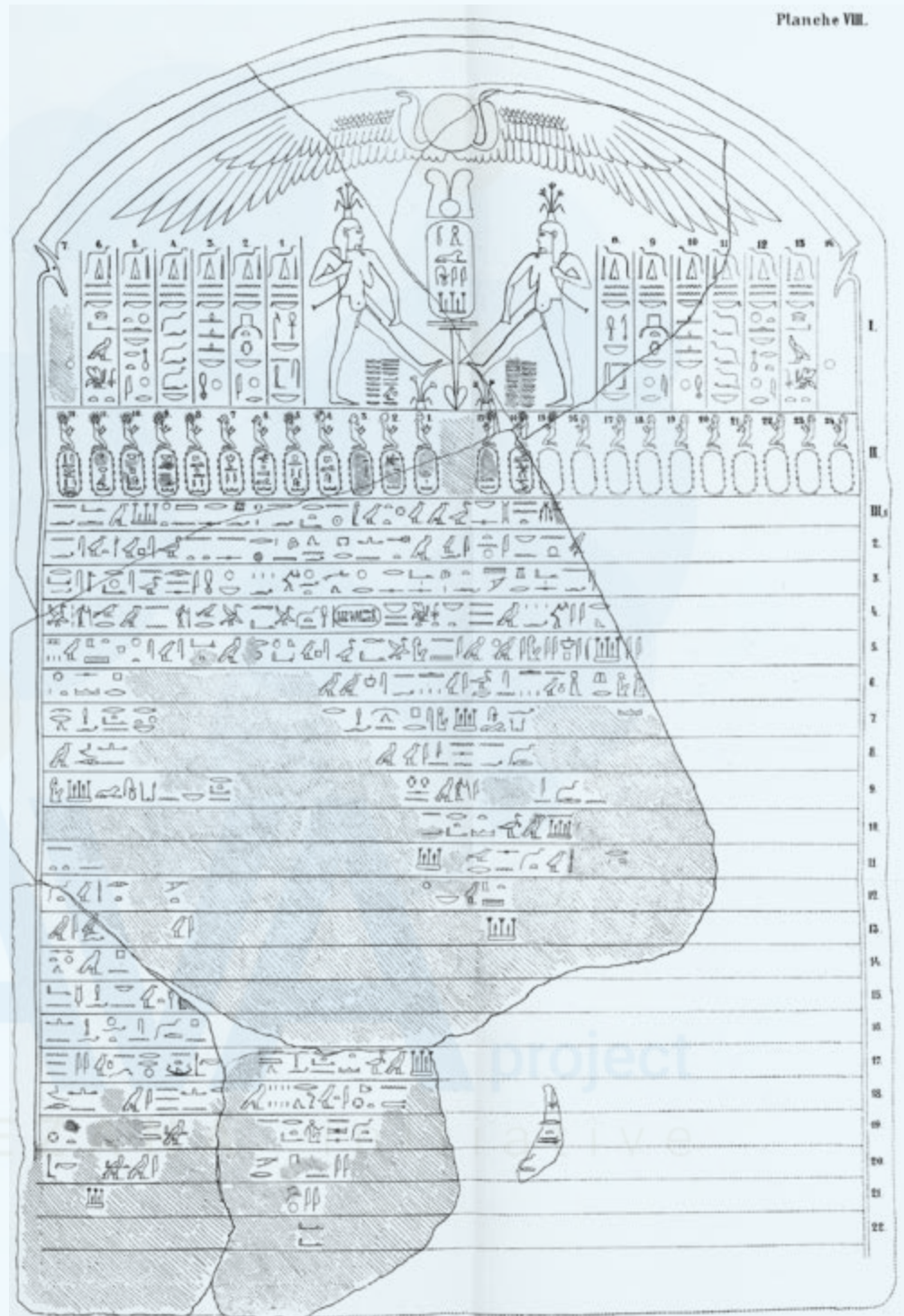
early winter when the Nile flooded, and even then it would have been best suited to barges and small boats rather than large seagoing vessels. Moreover, sailing around the Arabian Peninsula was difficult and time-consuming, especially given the prevailing winds in the northern Red Sea. Furthermore, to make use of the easterly monsoon winds in the Indian Ocean it was necessary to sail in the summer months – the opposite time of year from when the canal was operational. Finally, the canal required frequent dredging in order to remain navigable.



At the same time, the alternative routes to the canal had their own shortcomings. It was certainly possible to travel overland from Egypt to Persia using the empire's road network, which linked its major cities. But overland travel was slow, not to mention expensive if one was transporting bulky cargo. Another alternative was to sail up the Nile and then cross Egypt's Eastern Desert to the Red Sea. This was also difficult, however. As with the canal, Nile navigation was seasonal, with fall being the best time to sail because the annual flood made the river deeper and allowed for larger vessels. Currents and wind speed (sails were necessary for sailing upstream) were also highly variable, and towing was frequently required. Crossing the desert was treacherous and time-consuming as well.

The canal not only created a sea route between Egypt and Persia but also facilitated access to the places in between. This purpose is suggested by the hieroglyphic inscription on the stela from Tell el-Maskhuta.

The inscription is quite fragmentary, but it includes the name Saba'.<sup>8</sup> Saba' was a kingdom in what is today western Yemen, famed in antiquity for the export of spices. In the Hebrew Bible, for example, the queen of Sheba (the Hebrew name for Saba') "came to Jerusalem with a very great retinue, with camels bearing spices, and very much gold, and precious stones...never again did spices come in such quantity as that which the queen of Sheba gave to King Solomon."<sup>9</sup> The canal gave Persia access to this spice trade by sea. It also connected Egypt to Maka, an Achaemenid province usually identified as being in the Oman Peninsula. Indeed, it is not clear what other territories on the Arabian Peninsula were part of the empire and



*Drawing of the Tell el-Maskhuta stela. Cairo JE 48855. Public domain image from Recueil de travaux relatifs a la philologie et a l'archéologie égyptiennes et assyriennes 13 (1890), pl. 8.*



accessible from Egypt by sea by way of the canal. Finally, the canal supplied water for irrigation to the Wadi Tumilat, where Pithom (located at the site of Tell el-Maskhuta) grew into a major town as a result.

Darius' canal had a long history even after the fall of the Achaemenid Empire in 330 BCE. It was dredged and re-dug many times by later Ptolemaic, Roman and Islamic rulers of Egypt.<sup>10</sup> According to the Greek historian Diodorus Siculus, King Ptolemy II (reigned 282-246 BCE) even fitted the canal with a lock.<sup>11</sup> It was finally closed in 747 CE in order to prevent grain shipments to the Hejaz, which was revolting against the newly established Abbasid caliphate. The remains of Darius' canal were rediscovered in 1799 by Napoleon Bonaparte during his invasion of Egypt, and between 1858 and 1863 a

new canal was dug along its course to supply water for the construction of the Suez Canal. This modern canal, known as the Sweet Water Canal or Ismailia Canal, is still in use today.



*The Ismailia Canal, ca. 1860. Albumen print by Frank Mason Good. Public domain image from the Library of Congress.*

<sup>1</sup> Herodotus 4.44

<sup>2</sup> Herodotus 4.43; M. Cary & E.H. Warmington, *The Ancient Explorers* (Harmondsworth: Penguin Books, 1963), 120-1

<sup>3</sup> Herodotus 7.22-4; B.S.J. Isserlin et al., "The Canal of Xerxes: Summary of Investigations 1991-2001," *Annual of the British School at Athens* 98 (2003), 369-85.

<sup>5</sup> J. P. Cooper, "Egypt's Nile-Red Sea Canals: Chronology, Location, Seasonality and Function," in L. Blue, J. Cooper, R. Thomas and J. Whitewright (eds.), *Connected Hinterlands: Proceedings of the Red Sea Project IV Held at the University of Southampton, September 2008* (Oxford: Archaeopress, 2009), 195-209.

<sup>6</sup> Trans. A. Kuhrt, *The Persian Empire: A Corpus of Sources from the Achaemenid Period* (London: Routledge, 2007), 485-6.

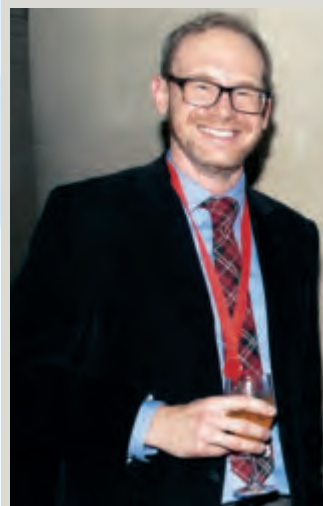
<sup>7</sup> E. Mahlich, "Zwei achämenidische Toponyme auf den Kanalstelen von Dareios I.," *Arta* 2020.001, available at [http://www.achemenet.com/pdf/arta/ARTA\\_2020\\_001\\_Mahlich.pdf](http://www.achemenet.com/pdf/arta/ARTA_2020_001_Mahlich.pdf) (accessed 7/17/21).

<sup>8</sup> D. Klotz, "Darius I and the Sabaeans: Ancient Partners in Red Sea Navigation," *Journal of Near Eastern Studies* 74 (2015), 267-80.

<sup>9</sup> 1 Kings 10: 2, 10.

<sup>10</sup> J.-J. Aubert, "Aux origines du canal de Suez? Le canal du Nil à la mer Rouge revisité," in M. Clavel-Lévêque and E. Hermon (eds.), *Espaces intégrés et ressources naturelles dans l'empire romain: actes du colloque de l'Université de Laval-Québec, 5-8 mars 2003* (Besançon: Presses universitaires de Franche-Comté, 2004), 219-52; Cooper (n. 5).

<sup>11</sup> Diodorus Siculus 1.33.11.



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book is *Archaeology of Empire in Achaemenid Egypt* (Edinburgh University Press, 2020).



## THE WATERS OF LIFE: THE ZOROASTRIAN QANAT & TANKA

DR. SHERNAZ CAMA

*“Water is probably the only natural resource to touch all aspects of civilization from agricultural and industrial development to the cultural and religious values embedded in society..... The need and demand for water.....has been a driving force of social, economic and cultural development throughout human society”.* (Koichiro Matsuura, Former Director General of UNESCO)<sup>1</sup>

While Zoroastrianism is normally related to the symbol of fire, water or Ava Yazad brings life, fertility and purity. Symbolism and action go together in Zoroastrian history and culture, while geography too plays an important role. The Iranian plateau, was essentially a cold desert, however wherever water was available, this dry region would yield abundantly. Therefore, from pre-historic times there was a realization of the importance of water and a creation of a wide network of artificial irrigation through canals and the systems of the *Qanat* or *Karez*. This Persian method of making arid salt deserts fertile and green is recorded by Polybius (*Historia X. 28*) and later spread with their Empire across the Middle East and into greater India in the mountains of Baluchistan.<sup>2</sup>

Snow melting in the mountain ranges was brought to the town and villages by an ingenious system of underground tunnels called *Qanat*. With cleaning and ventilation protrusions, they were a familiar feature in the landscape. Skilled workmen would dig the underground *Qanat*, at a slight gradient to permit the water to flow long distances. The storage areas called *Ab Anbars* or water tanks were interspersed at regular intervals along the path. Those who dug the canals and water storage areas were regarded as the true heroes of the community. The High Priest of Iran, Mobed -e- Mobedyan Firouzgary, recalled in an interview that one of his earliest memories was helping the family in fetching water from an 80 stepped, deep underground neighborhood *Qanat*.<sup>3</sup>

In Central Asia, the earliest evidence of irrigation goes back to the beginning of the third millennium B.C. when farming communities in Baluchistan collected rainwater to use in their fields in structures known even today as *gabarbands* and *gobrikarez*, underground water channels both ascribed to the Zoroastrians. Anil Agarwal has recorded the *gabarbands* in *Dying Wisdom*, his seminal book on traditional water harvesting.<sup>4</sup> These *gabarbands* were probably created by Zoroastrians after Darius annexed Sind and Punjab in 526 BCE.<sup>5</sup>

Today the world is facing a water shortage of global magnitude and attempts are being made to literally “Turn the Tide”. Since 2012, the IUCN (International Union for Conservation of Nature), has been working in Baluchistan to revive the traditional *Karez* system of Iranian water harvesting. Till a hundred years ago, fruit trees and crops covered this region. This had been made possible by the ancient water technology of Iran. Replaced by modern means such as diesel or electric tube wells, the *Karez*es



*Digging a Qanat.*



were being abandoned by rural communities. With the abandonment of the *Karez*, local knowledge was rapidly being lost. The IUCN realized that *Karez* was not just an engineering wonder but a remarkable social phenomenon which improved community life enormously.

All the arid regions conquered physically or culturally by ancient Persia adopted the technology of the *Qanat* using the generic name “Persian works”. This allowed settlements to grow in arid regions by tapping deep groundwater. In Baluchistan, until 1970 about 3000 such systems were in use and the agricultural economy was totally dependent upon the supply of *Karez* water. Vitruvius, the first systematic historian of technology gave an account of the *Qanat* system in technical detail in his work *De Architectura* (about 80 BCE.). Later, in the ninth century CE, at the request of a Persian Governor Abdullah Ibne Tahir, a group of writers compiled a treatise on the subject *Kitab -e- Quniy*.<sup>6</sup> The importance of the *Karez* can be seen from this Balochi proverb “A mosque should be demolished if it obstructs the course of karez”.<sup>7</sup>



Restoring a Karez

After the 1980’s tube wells put an end to communal management of water resources - *Karez* went dry due to depletion of water and the system was on the verge of collapse. This was accompanied by a terrible drought, which affected 74% of the population, and as desertification increased, pasture and agricultural lands were degraded. From 2007 onwards a concerted effort to bring back the *Karez* was begun. The water yield increased the farmland from 60 acres to 300 acres at one trial site and a number of communities began working with IUCN for the revival of their *Karezes*. By 2012 these had resulted in new orchards and tremendous communal benefit.<sup>8</sup>

In India, water harvesting can be found in ancient texts and treatises on agriculture and architecture. Kautilya’s *Arthashastra* tells us that a Head “should build irrigation systems with natural water sources or with water to be brought in from elsewhere.”<sup>9</sup> In India water is a very ephemeral resource; when the monsoon comes there is water and life. The Iranians and the Indians therefore already shared a level of devotion and care for water conservation and management when the Zoroastrians landed in Gujarat. However, unlike the *Qanat* or *Karez* underground systems, the Parsis of South Gujarat, particularly Bharuch, adapted to the Indian climate and learnt of the potential of rain water harvesting after the monsoons.

The Tankas of Bharuch are found across social strata. In the Parsi *Vad*, or smaller homes, these were constructed within the kitchen area, while in larger homes there was a separate space for the Tanka.

The ‘Tanka’ is an underground tank, accommodated inside the house, usually under the kitchen or dining room, made of chiseled blocks of stone, in lime mortar, unlined but made waterproof by an indigenous herbal mix. The ingredients of this mix or *Khari* was not only to render the inside surface waterproof and seal minor cracks, but also to prevent bacteriological growth inside the tanka.

When the rains begin at the start of the monsoon, the first rains clean the rooftops. During the start of the monsoon season, several glasses of water, kept outdoors, are examined regularly for their purity. The day for collecting rainwater can be recognized through the smell and taste of the water in these glasses. At this exact point of time,



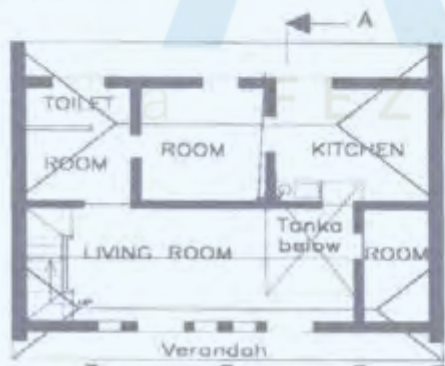
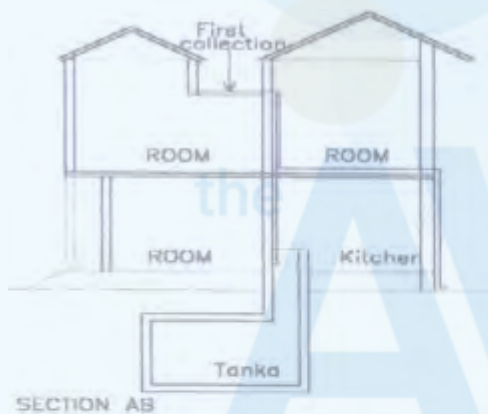
the water is deemed suitable for collection. The sluices are then opened; the water passes through several types of filters, before it is allowed into the Tanka below the house. Pipes lead from all parts of the roof to the final *boiya* a copper colander. This *boiya*, is covered when the water is being collected, with layers of the same white muslin cloth used for making the *sudreh* or sacred shirt of the Zoroastrians.<sup>10</sup>

The size of a tanka is large enough to store sufficient drinking water for a family for a period of six to eight months. An average storing capacity of a tanka is around 25,000 litres. Some tankas are virtually like independent cellars with 8 to 10 feet of water over them. With sizes reaching nearly 20 feet by 60 feet and heights of 12 feet, arches and vaults were needed to support the earthwork and the superstructure on top of the tanka. Architecturally, the Tanka withstands this huge volume of water because it is built using arches, recalling the fact that thousands of years ago the Persians invented the arch and squinch.

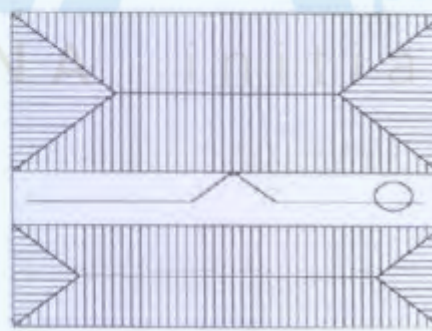


*Cama house Bharuch Vad.*

Since the bottom of the tanka is well below the lowest level of the house, there is no outlet for water provided; when required to be cleaned it must be emptied manually. Almost all tankas are large enough for people to enter and walk about inside. The tanka floor slopes into a sump right under the point from where the water is drawn out.



*Cama house Bharuch Vad Plan*



The water retention capacity of these tankas is measured in the form of a particular 'danger level', indicated inside the tanka by the depiction of a sculptured 'fish' along the inlet neck of the Tanka. Filling the tank above this mark is considered dangerous, as the hydraulic pressure inside may well exceed the retaining capacity of the tank wall.

The tanka is filled gradually till the 'fish' mark and the water stored away to be used long after the rains have stopped. The clean conditions of collection, storage and ventilation as well as ensuring that direct sunlight never enters the tanka or permits bacterial growth makes the system a precious resource.



Most owners clean the tanka only once in 5 to 10 years. When totally emptied, as stated earlier, a crystalline disinfectant and sealing agent, *khari*, is used to seal up any cracks in the structure. The Tankas, as part of the cultural heritage of the Zoroastrians living in an area which has scanty rainfall, are an ecologically valuable system of water harvesting from which there is much to learn.<sup>11</sup>

The last Tanka to be built in Bharuch was over eighty years ago. Women of the community sang songs, danced and performed ceremonies, while a priest prayed over it in blessing. If ever an intervention was required to bring man and nature together again in our world, it is now. The message is very clear that issues of common concerns – issues such as water supply- will need to be tackled jointly by governments and the people together at a global level.

As we have seen with the *Karez* of Baluchistan, there are a few systems of water storage that can be rejuvenated. The efforts of Parzor, the project initiated by UNESCO to document and conserve the traditional practices and customs of Parsi Zoroastrians in India is important in this context. If traditional water harvesting systems can meet even part of domestic and agricultural requirements, they will promote a judicious use of water, a concern once again for Ava - The Living Goddess, who makes this world fertile, green and clean.



**Gulshan Tanka, Bharuch.**

<sup>1</sup> Matsuura, Koichiro. D.G. UNESCO, *Message for World Water Day, 2002. Water and Cultural Diversity: Papers for the Kyoto International Conference*, 15-17 March 2003. UNESCO Pub. p.1

<sup>2</sup> Cama, Shernaz. *Threads of Continuity: Zoroastrian Life and Culture*, Delhi: Parzor, 2016, pp. 19, 21

<sup>3</sup> Singh, Vanshika. *Interview with Mobed Mehraban Firouzgary*, Cama ed. *Threads of Continuity*. p.242-243.

<sup>4</sup> Agarwal, Anil and Narain, Sunita eds. *Dying Wisdom: Rise, Fall and potential of India's Traditional Water Harvesting Systems*. New Delhi: CSE, 1997. p 20-21

<sup>5</sup> *Ibid* p. 21

<sup>6</sup> *Turning the Tide*: IUCN, pp 5-6

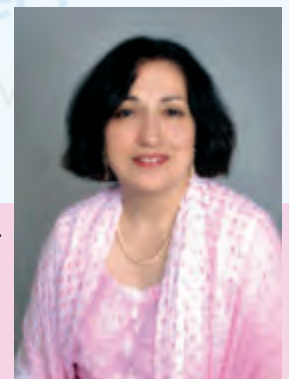
<sup>7</sup> *Ibid*, pp 5 to 12

<sup>8</sup> *Turning the Tide*: IUCN, pp 14 to 18

<sup>9</sup> Agarwal, Anil and Narain, Sunita. *Dying Wisdom*. p. 11

<sup>10</sup> Interview with Mr. Rohinton Jambusarwala, UNESCO Parzor Field Recordings, Bharuch, Gujarat, 1999- 2000.

<sup>11</sup> Interview with Mr. Rohinton Jambusarwala, UNESCO Parzor Field Recordings, Bharuch, October 2001.



*Dr. Shernaz Cama teaches at Lady Shri Ram College, Delhi University. She is Founder and Honorary Director of the UNESCO Parzor Project for the preservation and promotion of Parsi Zoroastrian Culture and Heritage since 1999. Besides academic publications, she guides researchers in their work in the fields of literature, culture studies and Zoroastrianism.*

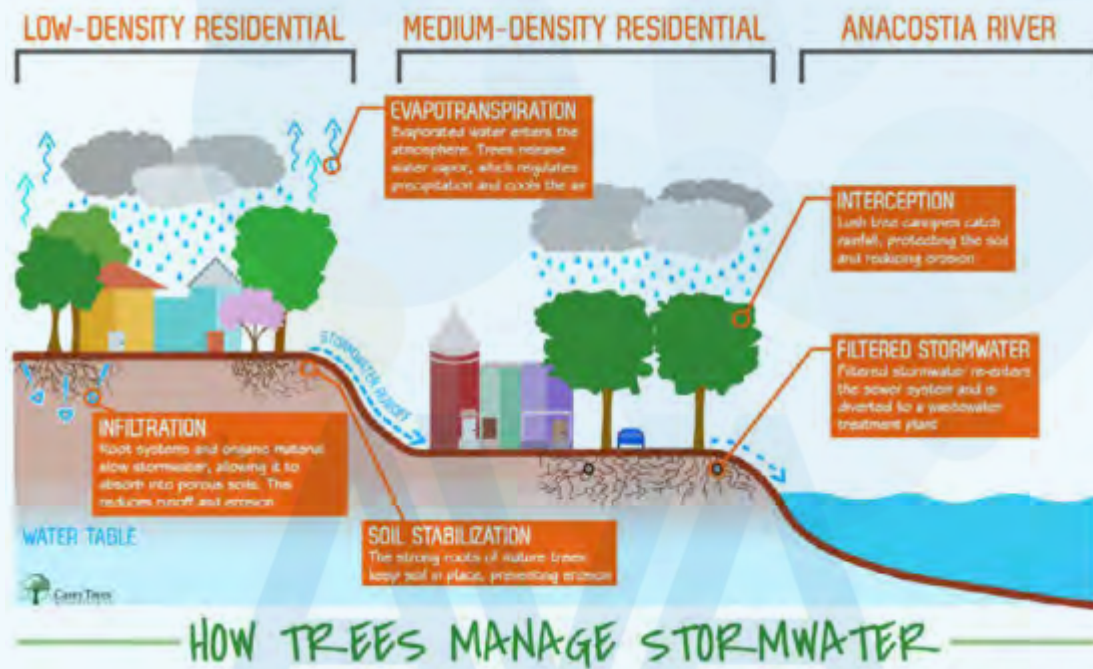


# RAIN GARDENS

JONA ELWELL

It's no secret that the climate is changing. Air and ocean temperatures are increasing, sea levels are rising, and significant weather events like floods and storms are becoming stronger, more intense, and more frequent, among many other things. These changes have far-reaching impacts on communities from concerns like national security, food production, health human safety, and ecosystem resilience.

In cities, one of the more pressing effects of climate change is flooding and the associated stormwater runoff. In fact, polluted stormwater runoff is one of the largest growing environmental concerns in urban areas. As reported by WAMU, folks at the Anacostia Watershed Society explained, "When it rains a lot, whatever happens on land ends up in the water." Paved roads are one of the largest contributors to this runoff. Stormwater runoff is a major issue because water flowing from impervious surfaces (e.g., roads, parking lots, driveways, roofs) brings numerous pollutants to streams and generates torrential stream flow, which causes streambank erosion and makes the water cloudy and inundates the river with sediment. The runoff also carries fecal matter, trash, and other pollutants to the river, the effects of which can clearly be seen in Washington DC's Anacostia River and nearby in the Chesapeake Bay. Unfortunately this issue is not DC-specific - practically every community with storm drains and rain experiences the negative effects of stormwater runoff.



While we cannot directly control the record amount of rainfall, we can impact the amount of stormwater runoff heading into our local waterways. Enter one of the most comprehensive green infrastructure solutions: trees!

As stewards of DC's urban forest, Casey Trees has served as a community resource for educational programs and volunteer opportunities

since 2002. We pursue our mission to restore, enhance and protect the tree canopy through a variety of programs including tree planting, tree care, inventories, adult and youth education, and conservation easements. While the activities vary, all our programs work together to provide greater shade, cooler air, cleaner water, citizen engagement and sustainable growth to the neighborhoods where we live and work.

Trees are a compact, comprehensive way to intercept rain before it flows untreated into waterways. Trees are a powerful green infrastructure tool due to their ability to capture water on leaves, direct it to the ground on stems, absorb it through root systems, and transpire it as water vapor directly back into the atmosphere. Trees, along with permeable pavement, green roofs, and rain gardens, reduce the stormwater runoff that flows into sewer systems and triggers sewage overflows. All these practices reduce the growing amount of impervious surfaces in cities and help capture rainwater where it falls, filtering out pollutants and reducing large volumes of runoff. By intercepting





water on their leaves, stabilizing soil with their roots, and absorbing stormwater into their roots, trees are an all-in-one stormwater mitigation machine.

Plus, green infrastructure like trees also decreases pollutants rushing into waters, improves air quality, and alleviates urban heat island effect to lower heat stress-related fatalities. Not to mention they can mitigate localized flooding.

But trees don't exist in a vacuum. They are surrounded by plants, streets, buildings, and more. This is why when we design stormwater management solutions for property owners looking to manage rainfall, we often turn to another kind of trusted green infrastructure: Bioretention planters. They are basically stormwater infiltration cells.

What does that mean? It's a landscape system that filters pollutants and sediment from runoff. Rain gardens are strategically placed and connected to a downspout to collect and absorb stormwater from your rooftop.

Connecting the downspout to the rain garden directs stormwater away from your home's foundation and holds it there until it can naturally infiltrate into the ground. In addition to improving drainage, rain gardens also help keep polluted runoff out of local streams. The layers of plant material, mulch, planting media (a mix of soil, sand, and compost), and stone capture metals, nutrients, and bacteria that flow into the surrounding rivers. Planters can be quite large or they can fit into small spaces. In fact, Rain gardens are designed to be site-specific. This makes them adaptable to curb extensions, tree spaces along the road, medians, terraced slopes, and planter boxes – perfect for the smaller yards and property spaces that dominate urban spaces. They are customized to meet individual site characteristics, factoring in topography, soils, drainage patterns, and sun exposure.



Another benefit of rain gardens to property owners? Rain gardens require little maintenance once the plants are well established, and they are a beautiful addition to any property. They also minimize the need for mowing, pesticides, pruning, irrigation, fertilization, require minimal watering once they are fully established, and cost less to maintain than conventional landscapes, stabilize soils and prevent erosion.





By simply planting a tree or installing a small rain garden, you're greatly influencing the surrounding area. You not only beautify your property and benefit the environment, but green infrastructure also helps by treating and infiltrating stormwater on-site helping to recharge groundwater levels, diminishing the impact on aquatic life from polluted stormwater rushing to local streams during storm events, stabilizing soils, helping to prevent erosion, minimizing the use of herbicides, pesticides, and fertilizers used in conventional landscaping, providing increased habitat for native wildlife, and reducing air pollution and the urban heat island effect. There is truly a benefit for everyone.

So, what are you waiting for? Plant a tree or rain garden! We plant trees and install rain gardens in Washington, DC but you can see what options exist nearest you. You too can outfit your space – no matter the size – with any number of the green infrastructure features including Bioretention planters, permeable pavers, green roofs, solar panels, and more. Then you can sit back, relax, and watch it absorb stormwater knowing you're helping your yard, city, watershed, and planet. To grow a greater, greener city and future, we must work together, not just today or tomorrow, but day after day and year after year.

*Jona Elwell is the Communications Specialist at Casey Trees, contributing to their online presence by working on their weekly newsletter, social media platforms, and assorted marketing needs. Interested in the intersection of cities, greenspace, and sustainability, she is proud to help restore, enhance, and protect the tree canopy of the nation's capital.*



# MAKE WATER FROM AIR

MEHER BHANDARA

Providing a Localized, Sustainable Source of Water



It's not unusual to see women and girls in rural areas of India and in other parts of the world walking miles to collect water from the nearest source and carrying back huge pots on their heads. This repetitive task leads to a waste of time and energy, limits the girl child from attending school regularly and prevents women from being more productive.

Water is a human right. And yet in many parts of the world we see thousands of people without access to safe and clean water, due to water scarcity, salinity, stress or water contamination.

Much of the world is covered with water in the form of oceans, seas, lakes and rivers. 97% of the earth's water is saltwater and of the remaining 3% freshwater only 1% is available for drinking, the rest being frozen in polar ice caps. In many countries, ground water withdrawal is 25% higher than its replenishment rate. In addition, surface and ground water pollution has become a major issue resulting in serious concerns about the future availability and quality of fresh water sources

\*Today, 1 in 4 people – 2 billion people around the world lack safe drinking water.

\*\*207 million people spend over 30 minutes per round trip to collect water from an improved source.

According to the United Nations, in some areas of the world, a child under 16 dies every eight seconds from drinking contaminated water and shockingly, three million people die each year from water related diseases.

We take water for granted. It comes out from the tap when we need it, but what about the millions who do not? Or those who do not have access to safe water?





*Jalimudi - the first village in the world to provide water from air.*

### **Bringing New Technology to the World - Water from Air**

One possible solution that is contributing towards solving the problem is extracting water from the atmosphere, so that no local water source is required.

In 2004, my family came across this unique technology and realising its many benefits, established WaterMaker (India) Pvt Ltd in Mumbai to design and manufacture atmospheric water generators (AWGs) which could be used in several parts of the world where safe and clean drinking water was unavailable or in short supply. WaterMaker India is a part of the 121-year-old Jeena & Company, owned by the well-known Katgara Group.



In 2009, we zeroed in on Jalimudi village in Andhra Pradesh, India to provide 1000 litres of clean drinking water from air to over 600 villagers as our first social responsibility project. Jalimudi had 3 tap connections, one polluted well and the river Godavari far away. This was their main source of water. “When I first visited the village, I saw women and children spending hours collecting water from the sand bank in little cups and filling huge pots. This is when we decided to make Jalimudi the world’s first village to provide water from air to its inhabitants”, says Meher Bhandara, Director.

In cooperation with the local government, land was allocated, infrastructure built, power connection given and the Air Water Station was set up in record time. At the inauguration, an old woman came up to thank me saying “You have given us water from the Gods!”

In 2015, our second Air Water Station was set up in Gandhigram village, Gujarat in cooperation with the local water board to provide 2000 litres of drinking water to around 800 villagers.

Besides the rural areas, WaterMakers have been installed all over India, at ports, schools, factories, individual homes, communal centres, health clinics, naval hospitals and more, over the years. They are being exported worldwide too.

### **How does the WaterMaker work?**

The atmosphere contains an estimated three million trillion gallons of moisture. This is now being tapped to produce water from air with the use of atmospheric water generators (AWG) which produce healthy, safe, purified drinking water from atmospheric air. They capture water vapour from air by optimising dehumidification techniques to extract and condense moisture to produce water which is then filtered, purified and dispensed.

This localized and sustainable source of clean drinking water without any connection to municipal taps, surface or underground water source is scalable and ideal for decentralised uses. It is an environment-friendly technology as it does not put stress on existing resources. There is no wastage of water as in the case of reverse osmosis where 70% of water is wasted and re-contaminates the ground water; there are no non-biodegradable water bottles to get rid of, no transportation and fuel costs, no costs in laying of pipelines etc. All it requires is a power source. It can also be run on alternate energy. Water quality conforms to WHO standards and contain no harmful chemicals or minerals.

WaterMakers work most efficiently in warm areas with high humidity. They are ideally suited for areas where 70% of the world’s population resides and where safe clean drinking water is most needed. The volume of water production varies with temperature and humidity levels. Optimal output will be achieved in locations where the average temperature ranges from 25 to 32 degrees C and the average relative humidity level ranges from 65% - 80%. In lower humidity conditions, it will produce less water than its rated capacity and vice versa.

WaterMaker models are available in several capacities ranging from 25L to 1000L (and multiples thereof) of clean, safe drinking water per day. Models of the same capacities were recently developed for general water use, without filtration and purification.

“We are creating history, drop by drop!” says Meher, “and further innovations and development are on the anvil to help create a better world.”

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\* WHO/UNICEF 2021  
\*\* WHO/UNICEF 2019

*Meher Bhandara is one of the Directors of WaterMaker (India) Pvt. Ltd along with her siblings Pallan Katgara, Homi Katgara and Hilla Mazda. She has had an interesting and challenging career, starting from exports, to travel and tourism with TCI – Travel*





## JUMPING IN FEET FIRST!

FARAH WADIA

Using the Inquiry Approach and the Outdoor Classroom to Dive Deep into Learning



*We conducted a stream study with EcoSpark in the Highland Creek at Morningside Park in Toronto.*

“How does water impact your life?” Ask this question in a room full of teenagers and you’ll likely hear that all living things need water to survive; we drink it, cook with it, and use it for sanitation purposes. A few will share that most of the world is made up of water, but how much of this valuable resource is actually available? Living in Toronto, Ontario, Canada, we often take for granted how easily accessible freshwater is to us. It’s true that water is a renewable resource, but only if we take care of it. So how do you convince a class of thirty-something eighth graders that they are part of the solution? Easy! Put aside the textbook and use the outdoors as your classroom.

### The Environmental Inquiry Process

Providing students with authentic learning experiences will encourage them to love nature and promote a greater sense of stewardship. Using an inquiry approach where students explore the natural world, ask questions and make discoveries will make the learning experience even more powerful and engaging!

My Water Systems unit begins with a formative assessment in a Knowledge Building Circle where students have the chance to share what they already know about the topic. They use sticky notes to record any questions they may have and as they read their questions out loud, we group them together by smaller topics or themes. Using my knowledge of the curriculum content, I am able to fill in any gaps by adding my own questions to theirs. For example, do any of my students know what a watershed is? Do they know that humans are a part of the water system, and that they can

*Farah Wadia is a grade 7/8 teacher in the Toronto District School Board with 23 years of experience. She is passionate about ecoliteracy, place-based learning, and mindfulness in nature. Farah values student voice and enjoys providing her students with opportunities to create change as advocates and stewards for our Earth. Farah is part of the Educating the Children group of the FEZANA Ava Project.*



have a negative and/or positive impact on it? Questions like these allow us to dive deep beyond the surface, exposing students to bigger ideas like water scarcity, conservation and sustainability.

### Setting the Stage!

Most students know that about 70% of the Earth's surface is covered in water, but ask them how much of that water is potable (i.e., drinkable), and the answers will vary. I use a model to demonstrate the answer. I begin by filling a graduated cylinder with 1L (i.e., 1000 mL) of water. This represents all of the water on Earth. Next, I ask a student to pour 3% (i.e., 30 mL) of that water into another cylinder. The two cylinders show that 97% of water on Earth is salt water and the remaining 3% is freshwater, respectively. What most students don't realize is that not all of that freshwater is accessible; most of it is frozen or underground. I now ask another student to use a pipette to remove 1% (i.e., 0.3 mL) of the 'freshwater' and place it into another cylinder. This represents the amount of freshwater that is accessible on Earth. The problem is that most of this freshwater is found in North America's Great Lakes. We take water for granted. It is obvious that if we want to avoid a water crisis and sustain our water supply for generations to come, we need to act now!



***Graduated cylinders can be used to analogize the distribution of water on Earth. This is an effective visual that encourages students to think more critically about population growth and access to freshwater.***

### Think Globally, Act Locally!

The Water for the World workshop presented by Engineers Without Borders introduces students to local and global water issues, including equity and access to freshwater around the world. As part of the workshop, students work in small groups to build a model of a water filter. Each group is assigned a country. Depending on the country's wealth and literacy rate, students are given an envelope with varying amounts of play money and instructions to build their filter with. This promotes a rich discussion about a country's literacy rate, living standard and life expectancy and how that relates to freshwater access.



***Students use a variety of materials to build and test their water filtration systems during STEM class.***

### Making Ripples

At this point in the unit, my students have a lot of questions about their local water systems. Enter EcoSpark, an environmental organization that will provide my students with everything they need to participate in a local stream study in the Highland Creek River at Morningside Park. What an authentic experience it was to be able to perform both chemical and physical tests on water samples from the river. Testing for dissolved oxygen levels, turbidity, temperature and acidity became more meaningful as we discussed the plant and animal life supported by the watershed. My students couldn't wait to put on their waders, step into the water and shuffle the earth below their feet to collect benthic macroinvertebrates (BMIs).

They collected and identified over one hundred BMIs and then uploaded the data to The Ontario Benthic Biomonitoring Network to determine the health of the stream. What an exciting experience as a citizen scientist!





*Students use D-nets to gather benthic macroinvertebrates from the Highland Creek riverbed before sorting and counting the types of aquatic bugs they collected. The data is then added to the Ontario Benthic Biomonitoring Network database and is used to determine the health of the stream.*

Based on the data submitted, we learned that the stream wasn't in bad shape. We were happy to hear this, but surprised to learn that another class further downstream, barely collected any BMIs. By applying the inquiry process and conducting some research, my students determined that this was likely the result of some venues being constructed in an area close to the river.

This experience got my students thinking more about local water issues. We discussed the importance of initiatives like the Yellow Fish Road Program, which raises awareness about pollutants entering local water bodies through storm drains. Experiential and place-based learning gave my students a thorough understanding of watersheds. Analyzing the positive and negative impacts of humans on water systems generated even more questions. So, what more could we do to make a difference?

### **Integrated Learning - It All Flows Together**

#### **Language Arts**

Each year, my students create Public Service Announcements (PSAs) to raise awareness about local and global water issues, including the eco-justice issues faced by Indigenous Peoples. Students explore topics like the chemical contamination of water systems like that in Grassy Narrows as well as the boiled water advisories. Some investigate the impact various industries (i.e., bottled water, mining, and fracking) have on our water systems. Students produce short video clips to voice their concerns as well as to share some practical ways in which we can help to conserve and sustain our precious supply of water.

#### **Math**

Students conduct a variety of tests using different samples of water. They have to record, graph and compare their findings and draw conclusions from them. Students used the blackline masters provided by EcoSpark to record their BMI data. There was even an online database that helped them determine the health of the river based on the BMIs collected during the stream study.

#### **Visual Arts**

Freshwater fish play an important role in stream ecosystems. Extend the inquiry process by learning about the impact of native and invasive species of fish in an ecosystem. Students can apply their artistic skills to sketch or paint a native species of fish, or create a wanted poster for an invasive species.

#### **Stewardship Opportunities**

My students wanted to do more than just raise awareness about various issues and so we found ways to take



action! We learned about wetlands and how water-loving plants filter and purify water and decided to participate in the Native Plants Program offered by the Toronto and Region Conservation Authority (TRCA). If you were to step into my classroom, you would see my students monitoring the growth of native aquatic plants from seed. We then visit a local wetland in the late spring to transplant what we grew.

My students also learned that planting trees improve water quality and help create a clean watershed. Over the years, we have had the honour of planting hundreds of trees in the Rouge National Urban Park with Friends of the Rouge Watershed, a non-governmental organization. Experiences like these promote a genuine love for nature and a desire to create positive change within our own communities. My students have learned that you can never be too young to make a difference!

### Salmon Hatchery

Participating in the Toronto Zoo's Aqua-Links Program was an incredible experience! My students and I had the unique opportunity to host a Lake Ontario Atlantic Salmon hatchery in the classroom. Students loved monitoring the temperature of the water and observing the life cycle of the salmon from eggs to alevins and then fry. We conducted a large inquiry on the salmon and shared our learning with the rest of the school. My class held several Open House events where they taught other students about the salmon as well as the threats they face in nature. They even learned how to use coding to create video games that mimicked a salmon's life cycle. The kids loved the entire experience although the highlight was being able to visit Duffin's Creek in Pickering, Ontario to release the fry back into nature and wish them well.

### It All Comes Together

Applying the inquiry process and place-based learning to important topics like water has transformed the teaching and learning process. Giving students the 'driver's seat' and using their curiosity to facilitate the curriculum content makes the learning journey a more powerful, engaging and rewarding one!



*We planted hundreds of trees in the Rouge National Urban Park with the environmental protection organization, Friends of the Rouge Watershed.*



*Students monitored and raised the Lake Ontario Atlantic Salmon in our classroom hatchery. The eggs were kept in an incubation tray before hatching into alevin and then becoming fry. Releasing the fry in Duffins Creek in Pickering was an impactful and rewarding experience.*



## THE POLITICS OF WATER ACCESS AND SCARCITY

LYLA MEHTA

### Global challenges around accessing water

**For** most of us accessing water is as simple as turning the taps on in our homes. But for a large number of the world's population access to clean and safe water remains a major challenge.

With a pandemic response that has highlighted water's critical health value for all, and eleven years since the UN recognised access to safe drinking-water and sanitation as a human right, 2.5 billion people globally still lack access to basic rights to water that are routinely violated around the globe daily.. When water is not available at home, the burden of collecting, storing, and managing it usually falls on women and girls in most families around the world.

In rapidly urbanising contexts in the global South, water provision is a major challenge, especially in slums and informal settlements which lack reliable access to water. For the short time water is available during the day, there is a rush to acquire it, and the quality of this water is also deeply problematic leading to communities susceptible to gastrointestinal and other diseases. Shared toilets in slums and informal settlements can also increase the spread of diseases.

Climate change and unsustainable water management practices are dramatically affecting water resources and water availability, though their local level impacts are uncertain and difficult to predict. The recent IPCC report has highlighted the devastating impacts of human-induced climate change and global warming. The increase of global mean temperature by over one degree has led to increasingly unpredictable rainfall and temperature patterns and extreme weather events such as cyclones, heatwaves, floods etc..

These are affecting not just poor countries but also the global North, and it is mostly vulnerable and marginalised people that are adversely affected by these changes to the water cycle. There is also growing awareness of the compounded nature of climate change impacts. For example, in many parts of India, in recent years droughts are followed by floods. These extreme weather events cause a lot of difficulties and vulnerabilities for local people who, along with policy makers are trying to make sense of these new trends and patterns and their impacts on access to water for survival, food security and the economy.



*Islanders look helpless as their dwelling is getting engulfed by the rampaging river in the Indian Sundarbans*

Unpacking the global water crisis  
Much has been made of the global

water 'crisis'. However, most often than not, this has little to do with the physical availability of water. As I have argued with colleagues in a recent book, there is enough water and food to go around the globe,<sup>1</sup> the problem is more an issue of distribution and allocation. I have been researching water scarcity since the mid 1990s when I spent a year in a remote village in Kutch studying diverse experiences and perceptions of water scarcity and have since gone back regularly for many projects. My research highlighted how water scarcity is part of life in this region and farmers and pastoralists have found ways to adapt and deal with it. By contrast, policy makers and





politicians have tended to politicise scarcity and focus on massive infrastructure projects that do not tend to benefit the poor and those who need water the most. They have also often undermined ways of life and livelihoods that are best suited to deal with water scarcity (e.g. agro pastoral and pastoralist systems). Furthermore, aggressive industrialisation along the coast has also exacerbated environmental & water scarcity problems.

Thus, access to water is usually linked with unequal social, gender and power relations as well as to distortions in policies, planning and management structures. While there are biophysical limits to water resources, mostly there is nothing natural about water scarcity. Instead, it is linked to power, politics, social exclusions (around gender, caste, class) and flawed water management policies & practices. Technology is never neutral & has unequal impacts. Thus, the water crisis is a socially mediated one, with water often flowing uphill to money and power.

### **Gender impacts**

Water scarcity has serious implications on women's and girl's health and life changes. Globally, women spend up to 200 million hours every day collecting water. All over South Asia and Africa, women and girls walk an average of 6 kilometers each day to collect water. Even in urban settings, women queuing up at taps to fill their buckets is a common sight. It is alarming that a source which can be accessed within 30 minutes (round-trip collection time) is considered an "improved water source" according to Sustainable Development Goal #6 on water and sanitation.

The massive number of hours and the labour that many girls and women spend in simply collecting, providing, and managing water for their households/communities distorts their lives, and the labour spent is unaccounted for and unremunerated. If these millions of hours could be taken off from their hands, pathways and opportunities would open up, helping them lead more productive lives, either through time spent in education or in paid work.

The lack of access to water is a violation of poor women and men's human rights. Pictures of women carrying pots maybe beautiful and widespread in popular culture, but it is a crime and outrage in the 21st century that women and girls are still carrying 20 litres on their heads for kilometres every day and also often wait for hours on end because the water operator (usually a man) has failed to turn on the tap (see Photo by Jonathan Demenge and Lyla Mehta, Tigray). Men and women from all walks of life need to be included in decision making processes around water and, more importantly, governments and political leaders should be held to account for this unacceptable situation.

### **Contestations around valuing water**

While farmers and pastoralists struggle to know when the next rainfall will come, and millions are without water around the globe, in the name of water scarcity it is now possible to trade in 'water futures' on Wall







Street with traders hedging against future water availability. It is truly perverse that while global policies are focused on achieving the Sustainable Development Goal 6 on water, the global financial world is seeking investment gains from this life-giving resource.

Different values are attached to water. Take a river. For some, river dwellers it is 'Mother' and sustains their lives through fish, water and the vegetables that grown on the riverbank. For others, the river is a resource to be mined and dammed. Dam-builders often focus on the latter and on engineering and economic principles that override environmentalists' concerns as well as displaced people's values around land, river and forests. The controversies of the large dams in India's Narmada River, for example, illustrate the huge environmental, human and social costs that



*Women waiting for water in Tigray Credit: Jon Demenge and Lyla Mehta*





have been ignored by dam-builders and the State in the name of 'development' despite much research disputing these claims.

Despite general recognition that water has multiple values, since the landmark Dublin conference of 1992 the water sector has tended to prioritize economic and financial values over values embedded in culture and society.

These have led to policies embracing privatization, full cost recovery and "efficient" uses of water, often leading to prepaid meters and controversial cut-offs especially in poor urban localities. At the heart of all such contestations is a politics of value determination in which, very often, the least powerful and most marginalised lose out. This essentially governance problem remains a global challenge – and not just in the Global South. For example, the concerns and complaints around water access and contamination of poor black residents in Flint, USA, were routinely ignored, leading to a major water crisis in the city, linked to systemic biases around race and class.

It is thus important to focus on water's multiple values, and these must include the social and cultural, not just the economic and financial. A hierarchy of water values needs a process of deliberative governance with which to encapsulate human wellbeing, dignity and ecological sustainability priorities, especially of those who are vulnerable and marginalised. This also means recognising how consumption patterns and values of the rich and powerful can undermine poor people's values and basic rights to water.

Why the pandemic forces us to prioritise rights to water and sanitation?

The pandemic has laid bare inequalities in water and sanitation, and also highlighted the inability of so many communities around the world to wash their hands and have safe water and sanitation in order to be free of disease.

For too long have the water and sanitation struggles of poor people been ignored and naturalised by governments, donors and elites.

After the Ebola crisis in West Africa, several countries in Africa such as Sierra Leone, Liberia and Rwanda instituted public hand washing stations with soap and prioritised access to water and sanitation. Can the pandemic encourage similar global attention to issues concerning access to water and sanitation?

If some good can come of this terrible Covid-19 global pandemic, it would be for governments and agencies to prioritise basic water and sanitation rights for all, especially the most poor and vulnerable. Covid-19 has clearly demonstrated that safe water and sanitation are crucial to human wellbeing and to saving lives.

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<sup>1</sup> Mehta, L, T. Oweis, C. Ringler, B. Schreiner and S. Varghese, 2020. Water for Food Security, Nutrition and Social Justice. Routledge: London



*Lyla Mehta is a Professor at the Institute of Development Studies, UK and a Visiting Professor at Noragric, Norwegian University of Life Sciences. She trained as a sociologist (University of Vienna) and has a Ph.D. in Development Studies (University of Sussex). She uses the case of water and sanitation to focus on the politics of scarcity, gender, human rights and access to resources, resource grabbing, power and policy processes in rural, peri urban and urban contexts. Her work also focusses on climate change and uncertainty, forced displacement, transformation and more recently on the COVID-19 pandemic. She has extensive fieldwork experience in South Asia and southern Africa. Professor Mehta has engaged in advisory work with various UN agencies and has also been active in advocacy and activist work on gender, environment and social justice issues with NGOs and social, and anti-fascist movements in Europe and India. She was leader of the project team of the UN High Level Panel of Experts on Food Security and Nutrition's (HLPE) report on Water for Food Security and Nutrition and is co-editor of the journal Environment and Planning E. She has authored, co-authored or edited eight books, the latest one being The Politics of Climate Change and Uncertainty in India. (Forthcoming). She tweets at @Lylamehta*



# HIGHWAY H2O

FREDDY MIRZA

The ten longest road highways in the world are:

1. The Pan American Highway (48,000km) connects more than 20 countries in the Americas, except for a 100km gap halfway, located between Panama and Colombia, known as the Darién Gap.
2. Highway 1 in Australia (14,500) km, comprising of interconnected highways.
3. Trans-Siberian Highway (11,000km) long from St. Petersburg to Vladivostok in Russia.
4. The Trans-Canada Highway (7,821km).
5. The Golden Quadrilateral Highway in India 5,846km, connecting the four major Indian cities of Delhi, Mumbai, Chennai and Kolkata.
6. China National Highway 010, also known as Tongsan Expressway, (5,700km).
7. US Route 20 (5,415km) in an east-west direction from Boston, Massachusetts, to Newport, Oregon.
8. US Route 6 (5,158km) also known as Grand Army of the Republic Highway, stretches from Bishop, California, to Provincetown, Massachusetts.
9. Interstate 90 (I-90) (4,860.2km) runs from Boston, Massachusetts, to Seattle, Washington.
10. Interstate 80 (I-80) (4,666km) also known as Christopher Columbus Highway in certain parts along its route.

You will notice that the “Highway H2O is not on the list and you might ask “Then what is this “Highway H2O” and where is it”? It is not on the list because this “Highway” is on water and not on the road. Hence the term “H2O” since the formula for water is H2O because it has 2 parts of Hydrogen (H2) and 1 of Oxygen (O).

Hwy H2O is a 3,700-kilometre (2,400 mile) marine corridor between Canada and the United States. It is comprised of the St. Lawrence River, St. Lawrence Seaway and the Great Lakes. Hwy H2O is a vital transportation artery that enables domestic and international trade, and offers unique access directly into North America’s commercial, industrial and agricultural heartland.<sup>2</sup>

### What Is The Saint Lawrence Seaway?<sup>3</sup>

The Saint Lawrence Seaway is a system of channels, canals, and locks that allow ships from the Atlantic Ocean to access the Great Lakes as far as the western parts of Lake Superior. The seaway is named after the Saint Lawrence River which originates from Lake Ontario and drains into the Atlantic Ocean. It extends from Montreal through Quebec and Lake Erie including the Welland Canal. The St. Lawrence Seaway Management Corporation in Canada and the Lawrence



Seaway Development Corporation in the US both manage the seaway and officially refer to it as “Highway H2O”. The seaway is about 2,500 miles long including the lengths of the lakes. Its construction began in 1954 and ended in 1959.

### Construction Of The Seaway

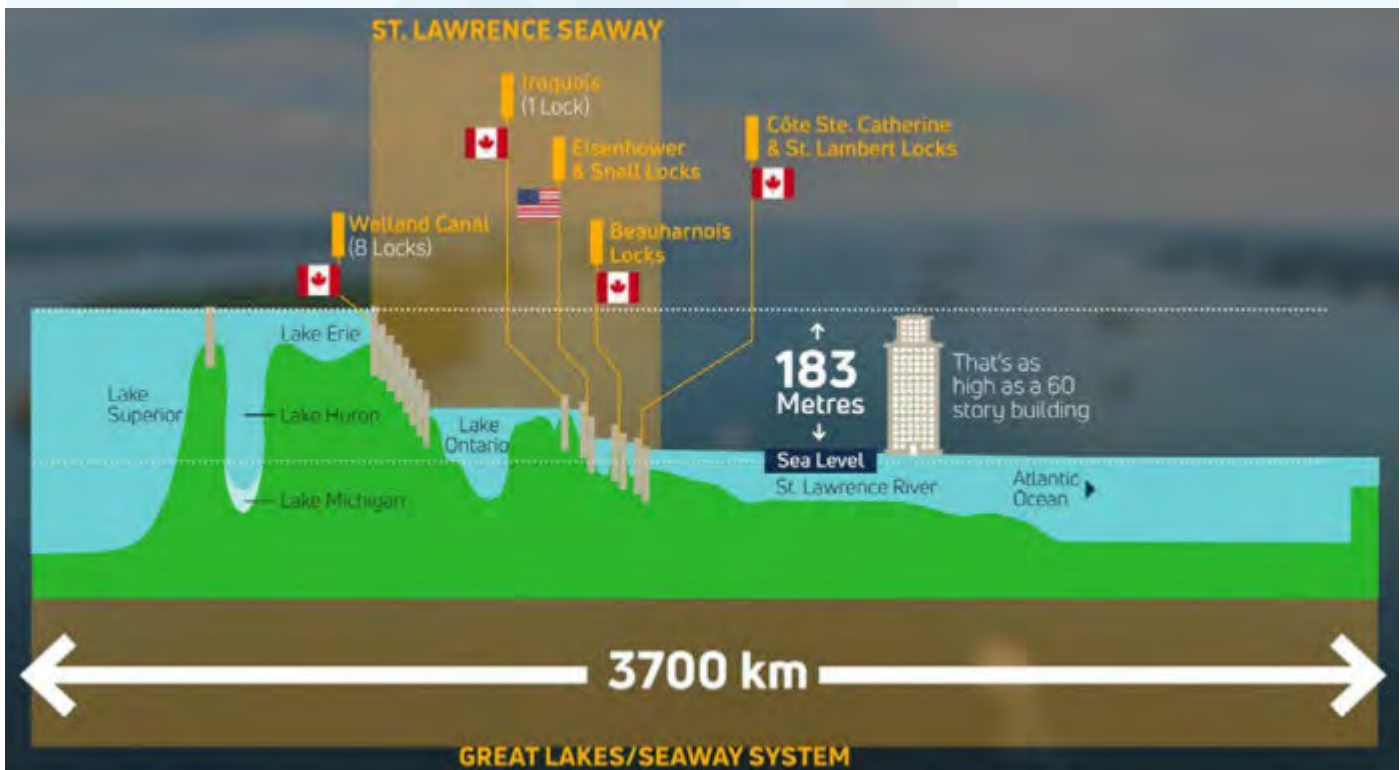
The seaway was constructed between 1954 and 1959. It is considered one of the largest civil engineering feats in



modern history. Fifteen locks had to be built along the seaway to lower and raise ships a total of 557ft. The lock system is considered the world's greatest and takes about seven minutes to fill or empty a single lock. The total project amounted to C\$470 million, \$336.2 million of which was paid by the Canadians who also earn three-quarters of the revenue generated from the seaway.

#### How A Canal Lock Works<sup>4</sup>

The Welland Canal locks allow large ships over 183 metres (200 yards) in length that may weigh approximately 30,000 kilograms (30000 tons) to travel between Lake Ontario and Lake Erie in spite of the 99.5 meter (326.5 feet) difference in elevation. The Welland Canal locks lift and lower these ships with the help of gravity and large quantities of water. The force of gravity is used to fill or drain a lock moving about 76 million liters (20 million gallons) of water in about 11 minutes. It is this movement of water that actually lifts or lowers a ship in a lock. The



**Great Lakes System Profile**





force of gravity is so strong that it draws this water a distance of 43.4 kilometers (27 miles) from lake Erie to Lake Ontario filling and draining the 8 locks in between.



The above illustration shows a ship in the reach section (the area before or after a lock) of the canal preparing to enter a canal lock. The open gate is black in color. This gate is at the lower water level end of the lock and therefore is labeled the downbound gate.

On the other end of the lock is the upbound gate which is at a higher water level. The upbound gate is closed, holding back the water that the force of gravity is attracting downstream.

In the following illustration, the ship is in the lock and both gates are closed making a somewhat water tight concrete lock chamber. At this point in time, the ship is secured in the lock chamber by ropes tied to concrete bollards located along the sides of the lock so that the ship remains stable during the lifting or lowering process. Once the ship is secured, water from the higher source of elevation or reach fills the lock chamber by way of a filling valve shown in the bottom right corner of the picture. When the water level in the lock reaches the same water level as that on the outside of the lock, the ship is untied from the bollards and the gate is opened to allow the ship to leave the lock. Before the ship leaves the lock it signals its departure with a loud blast from the ship's whistle.



### Great Lakes were formed from Great Glaciers

The formation and location of the Great Lakes is a direct result of ancient glaciation and geology, yet the precise age of the lakes is not known. Scientists estimate that they are anywhere between 7,000 to 32,000 years old, with the lakes changing in shape and size throughout the millennia. But all agree the process began millions of years before that with the movement of continents and a series of enormous glaciers that cut across the landscape. Although glaciation occurred numerous times during the Earth's history, it is only the process that took place in the last two to three million years that scientists are the most certain about. During that time, nearly 30% of the Earth was beneath glaciers, during what is referred to as the Pleistocene Ice Age. These massive ice sheets formed in mountainous regions along the northern latitudes and expanded down across continents digging out deep valleys and slopes. These ice age glaciers were so large that approximately 97% of Canada, the second largest country in the world, was covered in thick ice.



### The Great Lakes Today

One of the most recognizable features on a modern map of North America are the five unique shapes of the Great Lakes. While the movement of glacial ice caused the lakes to form, it is the geology beneath them that gives each its unique shape. The largest, Lake Superior, was shaped by buckles and junctures in its precambrian geology, while the deep trough of the Appalachian geosyncline not only gave Lake Erie its shape but also the vast drop-off and resulting torrent of water known as Niagara Falls. Today, over 30 million people totalling 30% of Canada's population and 10% of the United States, live close to the Great Lakes and rely on them for drinking water, transportation, and their livelihoods.

### Hwy H2O by the numbers<sup>2</sup>

375 Billion - the value of the more than 3 billion tonnes of cargo carried along the St. Lawrence Seaway since its opening.

3.6 Billion- saved by cargo shippers in transportation costs each year.

329,000- the number of direct and indirect jobs related to the waterway.

298 days-the longest navigation season\* on record, set in 2017. A navigation season is from the middle of March to around the Christmas time each year when the seaway is open to international shipping. Between middle of December to the following mid-March, it is closed to international ships and the local "laker ships" which are specially constructed, operate on the lakes depending on the ice and weather conditions.

1 litre of fuel - required to move one tonne of freight 240 kms by ship.

### Environmental benefits of Highway H2O

Transporting goods by water delivers substantial environmental benefits, including:

- Energy efficiency – On a single litre (about a 1/4 U.S. gallon) of fuel, one tonne of freight can travel 240 km by ship, compared with less than 100 km by train and less than 30 km by truck
- Reduced emissions – Ships only emit one tenth the greenhouse gas emissions that trucks produce and half that of trains
- Increased safety – The marine mode is the safest mode of domestic and international freight transportation, thus reducing the likelihood of environmental harm caused by accidents and spills
- Minimal noise – Marine transportation generates very little noise, when compared to other forms of transport
- Mitigated need for future highway and rail line infrastructure investment – Utilizing Hwy H2O decreases the need for new roadways and rail lines, the creation of which negatively impact quality of life, communities and the ecosystem

Every mode of transportation creates an environmental footprint, and it's important to note that the elimination of one maximum size Seaway vessel would require the addition of 963 truckloads on our highways, or the addition of 301 railcars to the rail system. Any addition of trucks or rail cars to our roads and railways would only serve to exacerbate current issues of congestion faced by those modes of transport and associated environmental effects.

For more information relating to sustainable environmental projects, please visit the FEZANA's website: <https://www.fezana.org/theavaproject>

<sup>1</sup> <https://www.roadtraffic-technology.com/features/feature-the-worlds-longest-highways/>

<sup>2</sup> [www.hwyh2o.com/faq](http://www.hwyh2o.com/faq)

<sup>3</sup> <https://www.worldatlas.com/articles/how-were-the-great-lakes-formed.html>

<sup>4</sup> <https://www.worldatlas.com/articles/what-is-the-saint-lawrence-seaway.html>

<sup>5</sup> <https://www.wellandcanal.com/operation.htm>

<sup>6</sup> [www.hwyh2o.com/faq](http://www.hwyh2o.com/faq)

<sup>7</sup> <https://www.britannica.com/place/Great-Lakes/Physiography>

*Freddy Mirza has been involved with various committees of the Zoroastrian Society of Ontario (ZSO) ever since coming to Canada in 1975 from Mumbai. He has been a teacher in the Religious Education Committee of the ZSO since 1980, and one of the founding members of the 100<sup>th</sup> Toronto-First Zoroastrian Scout Group. Freddy has received several awards from Scouts Canada and the Ontario Ministry of Citizenship and Multiculturalism for his voluntary service. He is the current Chair of the Interfaith Committee of the ZSO. Freddy was a Senior Marine Inspector and Engineer Examiner with the Canadian Federal Department of Transport for 35 years. He is presently enjoying his retirement in Toronto with his wife Kety and visiting their children and grandchildren.*





## THE ISLAND OF TRASH

FARAH KAVARANA

**Meet the Great Pacific Garbage patch, a 1.6 square kilometer floating mass of garbage. Some of the waste in it could be yours.**

Imagine you are on a boat in the middle of the Pacific Ocean. You have been rowing for almost a whole day, searching desperately for land. Parched and starving, your stomach lurches with relief as you spot what looks like land in the distance. From far away, it looks a strange shade of white and a little bit spotty. At first you think it might be a sandy beach, but as you row closer, you realize that it's not quite what it seems.

Instead, you are right in front of a humongous floating mass of trash.

If you look closely, you can make out each of the individual pieces, all locked together into a giant, buoyant island.

And one common theme amongst them? They're all made of plastic.

But why plastic? Why not metal or glass or paper?

Well, that's because plastic takes thousands of years to decompose, and some pieces of plastic may even last forever.

Think about it. Those plastic spoons that you ate from at your birthday party? The ones that you used for only a matter of minutes? They'll still be here when your great-grandchildren are, and likely even thousands of years after that. Those spoons might even last until the end of time!

You might ask, how did this plastic end up in the ocean? After all, most trash goes to the landfill, doesn't it?

Well, that's not exactly the case.

### You Could Be Eating Plastic

When you initially dispose of any plastic product, it is taken from your home by the garbage truck to the landfill. But somewhere in between your trashcan and the landfill, the light piece of plastic waste could easily blow away onto the street. Once it gets there, if it rains, water currents will lead it into the gutter, where it will enter the sewage. From there, it is only a matter of time before it ends up in a body of water. In fact, *10 percent* of all plastic on Earth ends up in the ocean. To date, there are over 8 million tons of plastic in our oceans. The pieces

that sink end up on the seabed, harming precious ocean life. The rest of it floats, which may be even worse.

When a piece of plastic floats in the water, it is exposed to the harsh rays of the sun. Over time, the intense heat breaks the plastic down into thousands of tiny microscopic pieces known as *microplastics*. These microplastics are so small you cannot see them with the naked eye. And these microplastics are even more harmful to the wildlife than when they are fully intact. Because of their tiny size, they are very commonly and easily ingested by marine life.

And that's what makes it even worse. We as humans commonly eat fish. Hence, we are indirectly ingesting the microplastics through the fish. Some scientists even suggest that we could be taking in enough plastic to make a *credit card* every week!

### The Great Pacific Garbage Patch

All plastic that ends up in the ocean follows the sea's currents. And due to the pattern of these currents, all waste in the sea is lead to one common spot in the Pacific Ocean. At this spot, the trash accumulates, making what appears to be one gigantic island of trash.

It is over 1.6 square kilometers in size, located in what is known as the North Pacific Subtropical Convergence Zone, in the area where the currents from the north and the south clash, forming a gyre, or a giant swirling system of currents.



Above: The Great Pacific Garbage Patch, stretching for 1.6 million square kilometers.



This gyre harbors the huge trash island known as the Great Pacific Garbage Patch.

Ninety-four percent of waste in the Garbage Patch is plastic, which as mentioned before, is not a surprise. With trash from all over the world, any of the waste in it could easily be yours.

As discussed before, the damage that plastic pollution causes to sea life is devastatingly large. Over 800 marine species have been drastically reduced in number due to this problem. Whether the animals ingest it or get caught in it and starve, plastic is very harmful to all wildlife!



Above: A map of ocean currents, outlining the Convergence Zone in which the Pacific Garbage Patch is located.

### What You Can Do

The effects of the plastic pollution problem are truly devastating, especially when it comes to the ocean. As this problem continues to worsen, the size of the Pacific Garbage Patch continues to increase, and this will remain to be true unless drastic measures are taken.

A lot of the power to fix this issue lies in the hands of the governments around the world. Perhaps they could place an extra tax on all single-use plastic products in order to discourage their widespread use, or even more harshly (and effectively) ban them altogether.

However, that doesn't mean you are completely powerless in fighting this issue. In fact, there are plenty of things you can do in even your own home to help. While recycling may have been all the rage a couple of years ago, that is no longer the case. In fact, some of the waste you may throw in the *recycle* ends up in the *landfill* due to one of many causes such as contamination

or lack of storage area. And while throwing something in the *recycle* is always better than dumping it, make



Above: A seal with a plastic ring stuck around its neck. It was almost killed, but thankfully was saved by rescue workers before it was too late.

sure that whatever you recycle is actually recyclable! Otherwise, one piece of trash in a batch full of recyclables could contaminate the entire load.

Meanwhile, the main thing you can do is *reduce*. Unless the usage of single-use plastics are absolutely necessary, such as in medical facilities, refuse them. If you can afford to make the switch to biodegradable garbage bags, do that too! There are plenty of eco-friendly alternatives to everyday single-use plastic items you may use.

As Zoroastrians, we worship the Amesha Spentas, the guardians of each of the Seven Creations of Ahura Mazda. And Haurvatat (also known as Ava Yazad), the Amesha Spenta of Water, needs your help to protect her creation. Please help Haurvatat and all of Mother Earth to keep her land. She will thank you later!

**Farah Kavarana** is a 14-year-old tenth grader who lives with her parents and sister in Novi, Michigan. Strongly passionate about the environment, she started a Styrofoam recycling program for her community and schools and maintains it till date. In her free time, she enjoys reading, writing, and playing the guitar.





## LIVING MORE SUSTAINABLY

KARL DESAI

*Learn about the impact buildings have on climate change and the small changes we can all make at home to live more sustainably.*

A fundamental tenet of our religion is to “tread lightly” on the earth – to never take more than we can afford and to live within our means (and the planet’s). Then why are we facing such wicked environmental problems today, including climate change and the collapse of natural biodiversity? (If only more would listen to the words of our prophet! I jest.) We all have a role to play in bringing humanity back from the brink of destruction and the buildings we inhabit have a critical role too.

As humans, we on average, spend 90% of our time in buildings. For example, think about how much time you’ve spent inside today, either at home, in an office, in a shopping centre etc. We typically spend time indoors gobbling up the earth’s resources, however being blissfully unaware of just how impactful it can be on our planet. In fact, the structural environment – all the buildings, roads, infrastructure that make up our towns and cities – is responsible for around 40% of global greenhouse gas emissions that worsen the effects of climate change.

A ‘sustainable’ building is essentially one that ‘treads lightly’ on the earth – it consumes minimal resources and any of its outputs can ideally be reused in another process. The three main types of resources flowing through buildings are: energy, water and waste. I could preach for days about the merits of sustainable buildings, but I’m going to try and keep it short in this article.



*Karl Desai is trained as an architect and has a master’s degree in sustainability. He has been working for over 10 years to advocate for more sustainable buildings and currently works for the UK Green Building Council. Karl was born and raised in Sydney, Australia.*

### Energy

The energy used to operate buildings is responsible for around 28% of global greenhouse gas emissions, no small figure. The majority of this energy use is from homes – think about the number of lights you’ve switched on today, whether you’ve run the dishwasher or washing machine, the amount of time you’ve had the TV or heating on... it all adds up. We’ve come to take these modern luxuries for granted, but the impact this has on exacerbating climate change is huge.

To turn this tide, we need to be more mindful of our energy use and aim to use less. A prime

example I can think of is an agiary in Bombay. It uses next to no electricity with a strong reliance on ‘passive design’ measures to keep occupants comfortable, such as large openings to help cool the building in the evening whilst also using shutters to keep the daytime heat out. Nothing fancy, but incredibly smart and efficient. Turning to commercial buildings, they are also starting to employ these low-tech, passive design measures. Some examples include:

- Careful building orientation to help maximise natural daylight, minimising the need for artificial lighting, and also help keep out unwanted heat gain or glare from the sun.
- Introducing windows that can open to help with ventilation when outdoor conditions are right, reducing the reliance on air conditioning systems running non-stop throughout the year.
- Installing smart building systems that moderate the building to run more efficiently, such as automatically turning off lights or adjusting internal temperatures based on the occupancy of the building.

But it’s not only the energy used in buildings that create greenhouse gas emissions. All the products and materials used to construct and maintain a building across its entire lifecycle also have an impact. Steel and cement are the two main culprits, as their production requires vast amounts of resources, not to mention emissions



from extraction and transportation. Shifting away from these carbon intensive materials to low carbon options is vital. This includes tall timber construction, made from compressed or laminated wood to create high strength, aesthetically pleasing and carbon negative buildings – they actually lock up carbon! Scandinavia is leading the world on tall timber buildings, and it'll take some time for North America to catch up.

When we talk about climate change, 'net zero' is a term that is being thrown around a lot by politicians. It simply means a state when all greenhouse gas emissions are brought to zero (with some offsetting) to end humanity's contribution to climate change. So, effectively, we need to drastically cut emissions – including energy use at homes – and switch to 100% renewable energy. To do this at home, you should always aim to cut your energy use in the first instance, for example, running the dishwasher only when it has a full load or adjusting your heating so that it doesn't have to work so hard. There are loads of resources online if you simply Google "home energy saving tips".

## Water

The amount of water we use in our homes can also be immense. Think about all that water coming into your home – used in the bathroom, kitchen, laundry – and the water that is expelled – from toilets, basins, washing machines. It all has to be sourced from somewhere and treated at the other end, all requiring growing amounts of infrastructure and energy to process these water loads.

Not like the old days in Bombay which my parents would tell me about, when water was pumped into

a tank on the roof and supplied for only a few hours a day, leaving no room for wastage. However, today if you turn on the tap in any American home, it's not only a limitless supply but also incredibly cheap. Once again, we need to be mindful of our water usage to live within the planet's capacity to provide it.

In my home country, Australia, which is the driest continent in the world, we have always been taught to be very resourceful in our water usage. Here are a few water saving features you might find in a water-conscious home:

- Low flow taps and shower heads – to improve efficiency and reduce the amount of freshwater used.
- Half and full flush toilets – to ensure we are not flushing fresh water (literally) down the drain.
- Rainwater tanks – to collect rainwater falling onto our roofs, to later be used for watering the garden.
- Greywater tanks – to collect used water from washing machines and dishwashers that, once treated, can be reused in the garden.
- Instant hot water boilers – heating only the water that is needed, rather than a full tank.

Turning back to commercial buildings, recent innovations include installing a 'blackwater' system which treats wastewater on-site for it to be re-used within the building. Combining rainwater collection and grey/blackwater treatment systems, some of these buildings can be water positive – producing more fresh water than they consume!

I encourage anyone who is interested in saving water at home

to check out and engage with the FEZANA-led Ava project. I for one am inspired by the initiative shown by this group and looking forward to seeing what can be achieved! Link: <https://fezana.org/theavaproject/>

## Waste

Finally, as if buildings weren't bad enough, they are also responsible for about a third of global waste sent to landfill. A lot of this can be related to the construction of new buildings and demolition of older buildings. Therein lies an opportunity to reducing waste; if we make better use of existing buildings, increasing their longevity, we can significantly reduce the amount of waste being produced. In turn, this will reduce the amount of virgin materials being used in new construction which can have significant environmental impacts, including land degradation, toxic pollution and greenhouse gas emissions. Placing a greater value on building materials is vital. The construction industry is coming to grips with the term 'circular economy' where waste is no longer a thing – any material outputs from a process are repurposed, reused, or recycled. But there's still a long way to go before this becomes mainstream...

## Conclusion

Zoroastrians are staunch environmentalists, and the teachings of our religion are pertinent today in tackling some of humanity's most pressing environmental problems. The buildings we inhabit have a massive impact on the environment, including worsening the effects of climate change. We can all be more mindful of this and the resources we consume at home – including energy, water, and waste – to help reduce our impact on the planet and live more sustainably.



## PROTECTING MARINE TURTLES IN CENTRAL AMERICA

HOMI BYRAMJI AND STEFAN BYRAMJI

Turtles have been around for 100 million years and are now endangered.  
They can survive all natural predators, except man.  
Can mankind take steps to ensure their survival?

**The** Rio Escalante-Chacocente Wildlife Refuge (“Chacocente”) is a magical place that is home to a very important sea turtle nesting beach. Located on the Pacific Coast of Nicaragua, Chacocente can receive up to 80,000 nesting females who give birth to up to 1,750,000 baby turtles each year. This land was privately owned before it was declared to be a refuge and it continues to be in private hands. A group of entrepreneurs (many of them members of the Zoroastrian Association of Greater New York) formed LCI Partnership (“LCI”) to use eco-tourism as a way of generating the resources to protect this refuge and the turtles nesting there. LCI collaborates with the Nicaraguan Ministry of the Environment and Natural Resources (“MARENA”), the Nicaraguan army and local communities to maximize our collective impact.

Sea turtles can be found in every ocean in the world except in the arctic regions. They have been roaming the seas since the times of the dinosaurs. Nature equipped them to survive through major changes in the environment like the ice age, and to be able to protect themselves against all natural predators...except man. And now, it is up to us humans to work towards ensuring their survival.

In this article we will introduce you to sea turtles, explain the challenges that they face, and share what we and others are doing in Chacocente to protect them as best we can.

### **Marine or Sea Turtles**

There are seven species of marine turtles, the green turtle, loggerhead turtle, Kemp’s ridley turtle, olive ridley turtle, hawksbill turtle, flatback turtle, and leatherback turtle. All except the flatback turtle are listed as endangered or threatened under the Endangered Species Act.

Sea turtles are migratory and often travel thousands of miles. They live to about 50 years old and take decades to get to adult egg laying maturity. When they are ready to nest, they use their incredible navigational capabilities to return to the same beach where they were born to lay their eggs.



*A turtle Coming Ashore to Nest*



Only the females come ashore to nest. Ironically, these marine creatures lay their eggs on land where they are out of their element, and therefore most vulnerable. No longer are they the sleek underwater creatures gliding gracefully and effortlessly through the water. Now they are lumbering, slow, and completely defenseless. This is when they need the most protection. The mother, heavy with eggs, must go through a short but arduous process of slowly moving up the beach past the high-water mark, stopping every few feet to rest, then dig a hole 18”-24” deep to house the 90 to 110 eggs she would lay. Next, she covers the nest and disguises it for protection against marauders. Only then will the mother make her way back to the sea. Olive ridley turtles are unique in that they come ashore in large numbers to ensure the survival of a sufficient number of the babies.

### Why are sea turtles going extinct?

There are many factors contributing to the rapid decline in sea turtle populations and they can all be traced to one source – mankind.

Turtles are slaughtered for their eggs, meat, skin, and shells. In some countries turtle meat is part of a regular diet and turtle-based foods are served at religious festivals.

Turtle egg poaching is widespread, and these eggs command a premium price because they are credited with aphrodisiac properties. Turtles face habitat destruction from over-development of coastal locations, especially those close to their nesting areas. Lights, noise, and people scare away mother turtles. Baby turtles are attracted to any light, mistaking it for moonlight reflecting off the ocean, and are drawn inland to the light source instead of out to the ocean.

Accidental capture—known as bycatch—in fishing gear. Turtles must surface periodically to breathe and often drown if caught in nets, long line fishing apparatus, or if they get entangled in abandoned fishing nets.

Climate change has an impact on turtle nesting sites; it alters sand temperatures, which then affects the sex of hatchlings. The warmer the sand the greater proportion of the hatchlings will be female and vice-versa. Marine debris, especially plastic bags, are a serious danger to sea turtles. Turtles mistake plastic bags for their favorite food, jellyfish, and then choke on the plastic.

- The laboratory of Exeter and Plymouth Marine tested 102 turtles and found plastic in every one of their stomachs. The researchers found more than 800 pieces of plastic in those 102 turtles.

*Marine turtle populations are declining rapidly around the world. According to the Las Baulas National Park in Costa Rica, over just the last 30 years the population of sea turtles in the Eastern Pacific has declined by 90 percent!! The threat of extinction is very real and the need for preservation is most urgent!*



*A Mother Turtle Lays 90 to 110 eggs at a time*



*A Mass Nesting Event - Safety in Numbers*

### Protecting the Turtles in Chacocente

The main turtle nesting season is from July to January. Even before the turtles arrive, we have an extensive beach cleanup effort to make the beach as hospitable as possible. School children volunteer to pick up plastic bottles and



other debris brought ashore by the ocean, and LCI's staff clear the beach of large driftwood that could impede a turtle's ability to get far enough up the beach to where their eggs have the best chance of hatching.

The single biggest threat to the turtles is the poaching of turtle eggs. Every egg poached is a turtle killed. In Nicaragua a single turtle nest can be sold for the equivalent of 3 days' wages, so in a poor country with high unemployment this is an irresistible temptation. When LCI first started operations, turtle egg poaching was rampant. We helped the totally overwhelmed environmental agency (MARENA) park ranger staff control the poaching with some success, but it was not



*Driftwood to be Cleared Before the Turtles Arrive*

*Larger Driftwood Pieces Require a Lot of Muscle*



*School Children Volunteering for the Beach Cleanup*

until the Nicaraguan Army sent in a platoon of soldiers to provide muscle power to back us up, that together we were able to make a major impact on reducing poaching. Even today, at every arribada (mass nesting event) LCI, the local community volunteers, the Army, and MARENA organize to stop poachers on the main Chacocente nesting beach, but poaching stills continues unabated throughout Nicaragua and many other countries.

The leatherback is the largest of the sea turtles and can grow to nine feet in length and weigh up to 1,500 pounds. Twenty years ago, we used to get 200 leatherback turtle nests on the adjacent beach named Veracruz. Now we barely get seven. LCI supports Flora and Fauna International's program to protect these turtles. Since the turtles can arrive anywhere along a large section of the coast, FFI pays the poachers above market rates to bring the leather back eggs to their hatchery where they bury them to ensure their survival.

**Caring for the Hatchlings**

Baby turtles hatch mostly at night and make their way unaided to the ocean. However, many hatch during daylight hours. These baby turtles are extremely vulnerable, being attacked by birds from the air, crabs and dogs on the land, and fish in the ocean. To increase their chances of survival, we collect the turtles born during the day and release them at sundown when they have the best chance of avoiding predators.

**A Win-Win Solution**

We have spoken of the threat to turtles from plastic bags. A German NGO has a very interesting and successful program in the neighboring community to combat plastic bag waste



*Hauling away material cleaned up from the beach*





and empower women at the same time. They showed the women how to collect and clean plastic bags, then cut them into long strips and use those strips to crochet a variety of bags from beach bags to purses. The tourists love these bags, and before COVID struck the women would sell all that they could produce.

In summary, there is no single magic bullet to solve issues such as turtle conservation, and on the other hand, there are many things that can be done. Our activities are only a small sample of ways in which to help. Every little bit makes a difference.

If you would like to make a difference, even if you live far from any ocean, here are a few simple things you can do in your daily life to help:

1. Please don't use single use plastic shopping bags. Use reusable bags instead.
2. Pick up garbage when you see it, especially plastic bags. Remember, anything you see on the ground WILL eventually find its way into the ocean.
3. Do not eat turtle eggs or buy jewelry made from turtle shells.
4. Minimize the use of plastic bottles. Reusable metal or glass bottles for water are healthier, cheaper, and far more ecological.

We live on a beautiful planet and with a bit of thought and work on our part we can not only enjoy it ourselves but preserve it for posterity.

*A Leatherback Turtle next to a full grown person*



*Baby Turtles collected to be released at sunset.*



*Frigate Birds feasting on Baby Turtles when they are released.*



*Weaving beach bags from used plastic bags*



*Homi Byramji experienced in building profitable, industry leading companies. He has been the CEO and board member of several public and private companies and charitable organizations including ZAGNY. Homi is presently engaged in using eco-tourism and sustainable development to preserve a wildlife refuge in Nicaragua and to improve the lives of the people in the area.*



*Stefan Byramji spent 13 years helping manage the family's environmental and business interests in Nicaragua. Presently he works at New York Life helping families and businesses plan for and invest in their financial future. Stefan is a New York Life Agent for life and long-term care insurance, and a Registered Representative offering investments through NYLIFE Securities LLC, and is fluent in Spanish.*



## RAISING THE UNDERGROUND WATER LEVELS - TREES AND WATER

NECKLIN ASPI PITHAWALA



*Necklin Aspi Pithawala is pursuing his Ph.D. in Botanical sciences from Department of Botany, Gujarat University, Ahmedabad. He has about 6 refereed research publications including International and National research papers, communications and also participated and presented in many international conferences, Workshops and Seminars. Necklin rendered his services to many of the Institutes at college and university level as visiting and guest faculty and delivered many invited plenary lecturers in his field of expertise. He has also guided many of the M.Sc. Dissertations in applied to interdisciplinary research topics. His area of interests includes Plant Taxonomy, Green Chemistry, Pharmaceutics and Pharmacognosy. Necklin has an Academic/Teaching experience of about 9 years at undergraduate level. Necklin is part of the Water & Trees group of the FEZANA Ava Project.*

One of the numerous ways that trees produce shelter cover is by connecting with water to create a solid biological system for us to live in. While the planet is comprised of 66% water, and the human body contains about a similar sum, trees hold somewhat less as they are comprised of roughly 50% water. They are planted to hold and clean water, whether it is in a metropolitan or provincial region. (Enderlin 1997). Older trees assist in decreasing overflow in metropolitan settings, keeping water from winding up in storm channels. This decreases reliance on water treatment plants. The advantages accumulate over time since gallons of precipitation are redirected from treatment plants, saving time and energy.

Trees not only save downpour water from winding up in the tempest channels, but they also additionally assume a huge part in our biological systems watershed. A watershed is a space of land that collects the water which then advances into streams, waterways, lakes, and at last to the ocean (*Watershed Planning Guidebook for Kentucky Communities*. 1st ed. 2010). On the off chance that a region is hit with substantial precipitation or intense flooding, trees will assist with moderating the harm caused, as they can collect an enormous amount of the precipitation. Trees will then discharge the retained water once more into the earth and atmosphere after some time instead of at the same time. This special ability that permits trees to take in water through their leaves, sending it into the air as oxygen and water fumes, additionally pushes the water down through its underlying foundations, sifting through unsafe substances as it streams into our groundwater. The overhang of leaves of a 50-foot-tall tree can catch up to 700 gallons of water over a year. A tree's root framework holds soil set up. Thus, a portion of the caught water is sent back in the soil to refresh the ground water supply. Also, a lot of run-off water in urban communities contains synthetic compounds like vehicle oil and other pollutants, the dirt you find in road channels during a deluge. When that water travels through the dirt, it sifts through a portion of the flotsam and jetsam. The tree fibers and the soil act as a sieve, sifting out the pollutants.

The earth's surface is not uniform in quality of the soil, which directly influences the quality of the water. Our drinking water is not chemically pure H<sub>2</sub>O but contains a wide range of micro-organic and inorganic dissolve materials. Root anatomy plays a vital part in water absorption. Root hairs are the accessory organs of roots which hold soil particles and water molecules. The surface of root hairs is sensitive in absorbing toxins from the soil (Neff, J., Lee, K., and Deblois, E. M. 2011). Even the micro flora associated with root hairs play a vital role in the detoxification process. They indirectly absorb the organic and inorganic toxins dissolved in ground water. Sometimes they produce byproducts which are released in the soil. These byproducts convert toxic material by breaking them down into nontoxic simple organic molecules which are easily separated from water molecules. The salinity of ground water depends on the natural salts present in the clay particles (Padmavathiamma, P. K., and Li, L. Y. 2012). If the salinity is the right concentration and free from



toxic micronutrients, the water will taste good. At the same time such water is healthy as it contains micronutrients for sustaining life.

Even on the earth's surface, there are many levels: fields, valleys, hills, mountains, slopes, hillocks, deserts and so forth. Due to this, the ground water is at various levels. Even the seas, streams, lakes, etc are on different levels. The earth's surface is not uniform in quality of soil, which directly influences the quality of water. Our water assets impact the quality and amount of ground water.

Trees have variety in root framework. The geo-directional stretching of extended roots can reach 15 to 60 meters (50 to 200 feet). Examples of extended roots include the banyan, mahogany, pine, and Asoka trees. The Banyan tree, (*Ficus benghalensis*), is the most recognizable tree native to India, and the biggest shade-giving tree in the country. The Eucalyptus is an interesting tree when contrasted with other enduring trees, with respect to its flexibility in relation to water. Most eucalyptus species have a root profundity of 1.5-2.0 meters and their root framework is explicitly adjusted to utilizing precipitation. It takes dampness from the upper soil instead of from the groundwater table. It can change with the availability of water using as much as 90 liters for each plant, each day, to as little as 40-50 liters for every plant each day. (Tong, Y.-P et.al. 2004). In contrast to other species, it can attract water from a huge region due to the area of its root framework. Under pressure, its root system can grow upto 6-9 meters to reach more water. Eucalyptus alongside Dalbergia are useful species to grow in drought affected regions due to its extraordinary probability of water intake (Van der Ent et.al 2013).

Sea-growing plants, duckweed, water hyacinth and green growth (*Chlorella vulgaris*), improves the elimination of contaminants by working as plant supplements (Teixeira, S. et. al. 2014). Substantial metals, microscopic organisms, oil and different toxins can be eliminated from water with the assistance of wetland plants. Cattails can eliminate metals like zinc, cadmium, lead and nitrate from water. Water mint, or *Mentha aquatica*, grows up to 6 inches high with light purple blossoms and ought to be first planted in a compartment prior to being moved to the water. It can assist with cleaning water by eliminating microorganisms like *E. coli* and *Salmonella*. Plants that develop under water are truly adept at retaining poisons. They will likewise oxygenate the water and keep fish healthy. Cabomba and hornwort are two acceptable under water species to plant.

Succulent plants e.g. *Borassus flaberifer*, *Coccoloba nucifera*, *Aloe vera*, Cactus, Opuntia, Watermelon etc. are best to plant in dry conditions.

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## HOW TATA COMPANIES NURTURE NATURE – A BRIEF STUDY

DR. HOMI DHALLA

Over the years, many Tata companies have been involved in various environmental activities. But as the theme is ‘Water’ the scope of my presentation has been extremely limited and shall cover the activities of only a few companies very briefly.

The founder, Jamsetji Tata, who, writing to his son Dorab Tata in 1902, five years before a site for his proposed steel plant had been decided, stated, “Be sure to lay wide streets planted with shady trees, every other of a quick growing variety. Be sure that there is plenty of space for lawns and gardens. Reserve large areas for football, hockey and parks. Earmark areas for Hindu temples, Mohammedan mosques and Christian churches”.

These words are pregnant with meaning. Being a visionary, he showed his deep concern for the environment. Moreover, his empathy towards the religious susceptibilities of other communities speaks volumes, when today we are engulfed by so much intolerance, hatred and discrimination in the name of religion.

Ratan Tata, Chairman Emeritus, Tata Sons, had stated that, “The Philosophy of corporate social responsibility as practised by Tata companies is a legacy of this organisation’s founders, most prominently Jamsetji Tata...Social responsibilities come under a holistic canopy. There is no single element of it that is more important than any other. The environment is important and we must be responsive to it. Businesses are under greater pressure than ever to generate profits, but this should never be at the expense of the environment...A business cannot prosper for long by contaminating the waters of a community, polluting its air or degrading its soil”.

The kinship that Tata companies have for the protection of the environment has led to a slew of activities that place the good earth above bottom lines.

Jamsetji Tata had passed away by the time Jamshedpur came into being, but his spirit of caring and giving has come to represent the nature of the city which bears his name. It was once a cluster of tribal settlements before it was morphed into an industrial hub and a model for modern India’s urban landscape. Tata Steel maintains Jamshedpur’s public utilities water and electricity supply, streetlights, healthcare, sanitation and more. The water is of such high quality that Jamshedpur is one of the very few cities in India where you can drink directly from the tap. The company runs a number of primary and high schools as well as an AIDS awareness and drug abuse program.

But the real jewel of Jamshedpur is the Jubilee Park. This was inaugurated by Pandit Nehru, the first Prime Minister of India, on March 3, Founders Day (the Birthday of Jamsedjee). This was a gift to the citizens of Jamshedpur. It is designed on the pattern of the Mughal Garden, and the park overlooks a man-made lake which is home to migratory birds during winter. It has a beautiful rose garden, musical dancing fountains, a zoo, as well as a park for children.

*Mughal Gardens at Jubilee Park in Jamshedpur. Source: Wikimedia.org*



Mithapur in coastal Gujarat is privately owned by Tata Chemicals, which is part of the 5398 acres of freehold land obtained in the 1930s from the Government of the erstwhile princely state of Baroda. A department within Tata Chemicals takes care of Mithapur's administration. It is responsible for developing and maintaining residential houses, schools, medical facilities, welfare and sports activities. Two lakes at its outskirts attract a variety of migratory birds in winter months. Water is quite a precious commodity in Mithapur, which comes under the drought-prone Jamnagar District. Because of this, water is recycled back to a flush-pumping station & used to nourish plants and maintain gardens.

Fourteen hundred kilometers to the north of Mithapur is Babrala, developed in 1991 when Tata Chemicals fertilizer plant was constructed. This is an urban settlement in a rural layout. Nearly 70% of the land was converted into a green cover with a quarter million trees. Great importance is given to environmental matters in Babrala and Mithapur, both of which are ISO-14001 certified. The emphasis is on water management, waste reduction and proper garbage disposal. Both towns have a strict 'no plastics' policy.

In the late 1980s, Titan, India's top watchmaker zeroed in on Hosur in Tamil Nadu's impoverished Dharmapuri district for its manufacturing operation. In 1991 Titan set up a township spread over 110 acres at Mathigiri with the help of the eminent architect Charles Correa. In order to overcome the problem of water shortage, the company had invested in more than 50 rainwater harvesting pits to raise the water table level. Digging bore wells arbitrarily is not allowed while recycled water is used for gardening & landscaping.

Tata Tea has been in the forefront of safeguarding the incredibly rich flora and fauna in and around Munnar, Kerala, which is a region that has been classified as one of the world's bio-diversity hotspots. The company has assumed responsibility for conservation and maintenance of 1100 hectares of swamps and streams in South India. This plays a crucial role in the availability of water for water harvesting.

The centerpiece of this breathtakingly beautiful spread is the Eravikulam National Park which admeasures 97 sq. kms. and consists of shola grasslands. This Park borders three of Tata Tea's Estates. The Park is jointly managed by High Range Wildlife & Environment Preservation Association (HRWEPA) and Kerala's Department of Forests and Wildlife. Since its formation, HRWEPA has received full support of Tata Tea.

Tata Power, Lonavala, which is about 100 kms. from Mumbai is the source of the beating pulse of the metropolis. Tata Power's three hydroelectric power stations supply the city with electricity. It has been involved in the conservation of the habitat for the last 40 years. It has developed stretches of forests and wetlands that have attracted over 100 species of migratory birds. Between 1979 and 2005 Tata Power planted over ten million



*Tata Chemicals launched the 'Save the Whale Shark Campaign' in 2004 in collaboration with the Wildlife Trust of India and the Gujarat State Forest Department, with support from the fishing communities of Gujarat's Veraval, Sutrapada, and Dhamlej regions. To date, 585 whale sharks have been rescued and released after becoming entangled in the fishing nets of locals.*

*Source: <https://sustainability.tatachemicals.com>*





*The 150-acre botanical reserve of Tata Chemicals is home to 31 species of native plants and over 114 species of other vegetation. It is home to 90 bird species, as well as monitor lizards, hedgehogs, mongooses, civets, the rare star tortoise, hare, jackals, wild boar, striped hyenas, and the Neelgai.*

*Source: <https://www.tata.com>*

are converted into compost. Taj Hotels use CFL lights, which consume 78% less energy; Taj Coromandel, Chennai, generates energy from windmills; Solar water heating systems at the Taj West End, Bangalore. Lake Palace, Udaipur, which is located in the middle of the famous Pichola Lake, uses battery -operated boats instead of those powered by gasoline and wastewater is recycled and used of for irrigation.

Tata Motors plant which is in Pimpri, on the outskirts of Pune city has a sprawling campus. Trees in the thick forests that surround the lake stretch across nearly 800 acres. It was JRD Tata, the visionary chairman of Tata Sons who wanted the barren land to be greened before production commenced.

Since there was little groundwater and scanty rainfall, two lakes were created to meet the water requirements of the plant. Water is also harvested from the roof of factory buildings and its use is strictly monitored.

The water management and conservation techniques practised at the plant have also been extended to the surrounding villages. Several types of bunds have been built and wherever villagers show a willingness to learn, meetings are held to disseminate information about water management, conservation of water, conservation of energy and other resources have to meet strict standards. Solar and wind power account for one-third of the energy used.



*Tata Motors has converted 245 acres of scrubby, barren land within its Pune plant into a natural wetland habitat, with 150,000 trees planted. More than 150 bird species and 60 butterfly species visit the wetland.*  
*Source: <https://www.tata.com/newsroom/gardens-of-green#//newsroom/environmental-conservation-by-tata-companies>*



There are about 150 species of birds in the lake area. In the 1970s several different kinds of fish were introduced in the lakes.

Tata Sponge Iron has been doing constructive work with communities living in Belpahar, Orissa. The areas of focus include drinking water, education, health and sanitation, agriculture and farming, sports and recreation in 35 villages in the vicinity. Over the years the company has planted more than 200,000 trees turning the landscape lush green with fast – growing species.

Tata Metaliks is in the businesses of Pig iron making. A corporate sustainability committee consisting of employee volunteers undertakes initiatives that deal with energy, water conservation and greenery, air emissions, health, safety, community development and resource conservation. Communities and areas surrounding its plants in Kharagpur in West Bengal and Redi in Maharashtra have benefited from its programs.

The environment is a key area of Tata Sky's corporate sustainability activity. It seeks to make its employees more aware of global warming and climate change. It has launched a green initiative to save trees by reducing the use of paper at its plant in Mumbai.

Tayo Rolls is actively involved in promoting community initiatives and social development in villages around Jamshedpur. It has been distributing free medicines to patients and handing over smokeless ovens in villages in the Gamharia block. The company also creates ecological awareness by celebrating World Environment Day by organizing a poster campaign and awareness about climate change.

The Tinsplate Company of India, Jamshedpur, has shifted its perspective from the community to sustainability with a major thrust on affirmative action (AA), inclusiveness and environment. Under AA, the focus is on employability, entrepreneurship, education and equity of youngsters from scheduled castes and scheduled tribes who are provided financial assistance and free training in the company plant and hospital. Solar water heating and rainwater recharge systems have been installed in its hospital and works canteen. Eco Clubs in 20 schools sensitize children towards the environment.

The IWMI–Tata Program is a collaborative effort between the International Water Management Institute (IWMI) and the Sir Ratan Tata Trust. The program generates policy research in support of the effective management of land and water resources across India. The program focuses on generating knowledge on water use, efficiency of crops and better crop and water management.

The Tata Water Mission is an initiative of Tata Trusts which was launched in 2015 to address the critical need of water, sanitation and hygiene (WASH). Its objective is to create a healthy future for India's rural population through easy access to safe, assured, and adequate drinking water as well as to improve sanitation. Over the next three years, this project should reach 12,000 villages across India.



*Dr. Homi Dhalla was awarded the MA degree from Harvard University and a PhD from Bombay University. He was appointed Assistant Professor by Shiraz University, Iran. He has been involved in the interfaith movement since 1986 and has been invited to about 70 international conferences globally as the Zoroastrian representative. He has been lecturing on Human Rights, Peace, Ecology and Interfaith Dialogue.*

*He has worked closely with the Dalai Lama and has met the late John Paul II, Pope Benedict XVI and Pope Francis as the Zoroastrian representative. He was invited by the former President of India Dr. Abdul Kalam to join FUREC (Foundation for Unity of Religions & Enlightened Citizenship) to represent the Zoroastrian faith. He was also appointed as an advisor to the Parliament of World Religions.*

*As Founder President of the World Zarathushti Cultural Foundation, he has been prompting and preserving the Zarathushti culture. He has crafted two museums in Udwada and Navsari and set up three libraries of Zoroastrian literature in Pune, Baroda and Bangalore.*

*He has initiated the preservation of Bahrot caves and also the excavations at Sanjan. After the disappearance of vultures at Doongarwadi, he introduced the solar panels to desiccate thew bodies.*



## NATURE AND BIODIVERSITY AT TATA MOTORS

CO-AUTHORED BY:

SJR KUTTY, CHIEF SUSTAINABILITY OFFICER, TATA MOTORS & PETER D'SOUZA, HEAD, ENVIRONMENT AND SUSTAINABILITY, TATA MOTORS

This is a story of a powerful vision, much ahead of its time, that guided the thinking of several managers over decades of our close interconnection with Nature and Biodiversity and how the principles of being sustainable got ingrained into the DNA of Tata Motors from its early years.

Tata Motors (then Tata Engineering & Locomotive Company Ltd - TELCO) began construction of the Pimpri

Plant near Pune in 1964. Shri Sumant Moolgaonkar, our Chairman at the time envisioned and conceptualised a natural environment alongside the Plant, though not located near any identified or notified biodiversity hotspot or protected water body, even before the truck manufacturing facilities were set up.

As detailed plans got laid out, replete with enabling conversations with experts and conservationists the execution started with construction of a weir to hold back the seasonal monsoon stream, which drains into the Pavana, a tributary of the Mula-Mutha and eventually the Krishna river. Subsequently, the weir was upgraded to a dam of 10 meters height and the lake thus created was deepened, increasing its storage capacity. With a perennial water source, these water bodies served as a nucleus for transforming the landscape. Drum nurseries

were set up (using the empty metal barrels from the Plant). These saplings have now grown into a massive

green belt around the water bodies and hold the key to the vibrant biodiversity ecosystem thus created. This was a challenge as the substrata was hard rocky basalt, and it required excavation of pits by cutting into the rock and filling it with good quality topsoil.

The pictures tell the story of the transformation of the entire landscape. Today, this wetland system comprising of four ponds, two lakes and 245 acres of tree plantation, receives



*Sumant Sarovar*



**TATA MOTORS**  
Connecting Aspirations

*Stork Flock*







Grey Heron

seasonal monsoon flows from the surrounding catchment, but thanks to the unique and thoughtful design of two overflow weirs, the water level of the lakes are rarely altered. What this means in wetland terms is that the margins of the lakes remain constant, and the reed beds rooted in the shallows provide a stable ecological habitat for waders like storks, cranes, herons, egrets, and moor hens.

The inspiration for creating this biodiversity hotspot at Pune, which was the second Tata Motors Plant after Jamshedpur, would find echo in these quotes of Mr J N Tata: “In a free enterprise, the community is not just another stakeholder in business, but is in fact the very purpose of its

existence.”

Far from being a business driver, the effort – financial, logistical and human - taken for development of this green island next to a factory was completely without precedent for its time. Dr. Erach Bharucha, a renowned medical doctor surgeon and wild-life conservation expert (Director, Bharati Vidyapeeth Institute of Environment Education and Research, Pune), in his 2017 book “Changing Landscapes – The Cultural Ecology of India”, makes a telling statement, “The lake and the marshland pre-date wetland eco-restoration and waterfowl management by several decades”.

One of the most awaited events of the year was the visit of our Chairman Emeritus, Mr Ratan Tata, to the lake house. His guidance to preserve and enhance the wetland coupled with his love for the ecosystem and the migratory birds that frequented the lake annually was always inspiring. These conversations helped defining the character of this man-made wetland and surrounding areas attracting aquatic and other birds, through systematically planned habitat development programmes over the years.

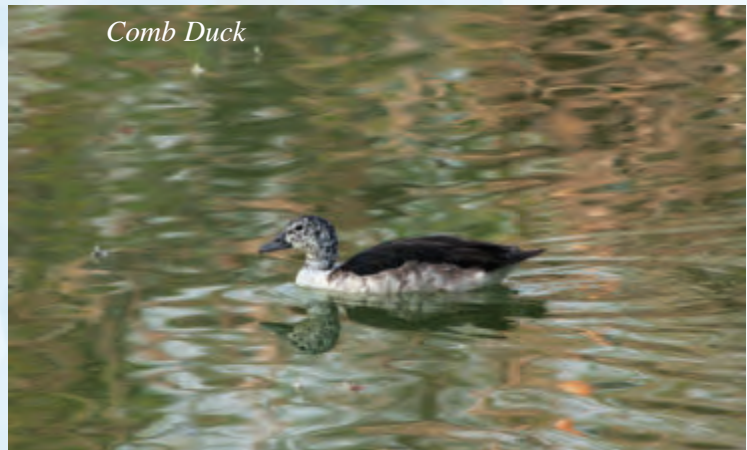
In an attempt to quantify the impact of conservation efforts and measure it in terms of Biodiversity Index, a



Cormorant

Biodiversity Assessment Study was conducted for three of our oldest and largest plants, namely Pune, Lucknow and Jamshedpur in 2016-17. The study carried out by an external agency has also provided Biodiversity Management Plans, for enhancement of biodiversity, enriching species diversity and habitat conservation of endemic species.

The Tata Sustainability Policy at the Group level articulates the commitment by Tata Companies to undertake Natural Capital valuation by all businesses. Tata Motors believes that the value of Natural Capital it has created including ecosystem services, biodiversity conservation and climate change mitigation is significant across its



Comb Duck



manufacturing locations. We are committed to avoid and mitigate the negative and enhance positive impacts on biodiversity through our biodiversity management plan and social responsibility initiatives. This wetland conservation site at Pimpri has received the Bombay Natural History Society's (BNHS) "Green Governance Award" in 2006. The genius of this wetland development lies in the vision of the Tata enterprise of caring for the environment and the ecosystem in a very futuristic and responsible manner and laying the foundations of the principles on which the company built its persona. Over the years as new plants came up creating wetlands, caring for the environment became an overarching theme in all of Tata Motors actions. Several decades of leaders and managers continue to pay homage to the vision of great leaders that guided the company in earlier years, through abiding actions consistent with the vision laid out decades ago. Today as the world speaks about these principles, we are glad that they are already rooted in the psyche of the employees and the leaders of Tata Motors and serve as a benchmark for many an industry and enterprise to follow.

**Mr. S J R Kutty** is the Chief Sustainability Officer (CSO) at Tata Motors and heads the CSR & Sustainability verticals. Having been associated with Tata Motors since 1983, Kutty has worked in leadership roles across various functions including Manufacturing, the Engineering Research Centre (ERC), Strategy and Business Planning. In his immediate previous role, he was the Head of Vehicle Attributes & Technical Services (VATS), and successfully led the migration to BS 6 emission norms, NVH (Noise, Vibration & Harshness), IPR, Innovation, and the development of India's first 5-star GNCAP safety rated car. In an earlier role as Head of Strategic Projects, he delivered an efficient cost management exercise across the company.



Kutty's rich qualifications include an Engineering degree in Metallurgy from the reputed College of Engineering (COE) Pune and a Bachelors in Law (LLB) from ILS Law College, Pune. Awarded the Tata – BP scholarship, he completed his MBA from the Imperial College London.

An acclaimed teacher of Business Ethics, Business Strategy and Employee Engagement, Kutty lectures at several business schools in India. He is also actively involved in leadership development and has mentored a number of students and professionals, enabling them to excel in their areas of competence.

**Peter D'souza** is Head of Environment and Sustainability at Tata Motors. He is a post-graduate in Environmental Science from Pune University with 25+ years' experience in Environmental Management and Sustainability.



He reports to the Chief Sustainability Officer in the area of Environment and Sustainability and is responsible for the function across manufacturing and non-manufacturing operations across India.

Peter has experience of environmental issues in automobile sector, its Value Chain and associated Sectors. Functional areas of responsibility include environmental facility management, landscape and biodiversity management, legal compliance, environmental management systems, green value chain, and cross-functional sustainability initiatives involving process and product. Peter has developed monitoring and measurement systems, performance dashboards, standardized operational procedures and incident management for our facilities along with driving environmental improvement projects and upgrades. During 2007-2012 he was part of the Core Team that set up 5 new Greenfield Plants, which included 2 dedicated Vendor Parks with Common ETPs. This included a range of activities from initial environmental impact studies, legal permissions, environmental infrastructure planning and execution and setting up of EMS prior to handover to Operations Team.

His professional qualifications include – EMS Lead Auditor, CII Sustainability Assessor, Carbon and Water Footprint Champion. He was a Chevening Scholar (the erstwhile Young Indian Environmental Managers Program) at the University of Manchester in 2000.



## TREES FOR HEALING: HONORING HEALTHCARE HEROES

STEPHEN PETERSON

What better way is there to honor health care workers who served in the pandemic than to plant trees? Trees symbolize life. They are a central path to heal mother earth. Trees planted for every member of the healthcare team acknowledge the enormous effort and compassionate care given for those who suffered and often died alone in the year of Covid-19. Trees are a palpable recognition of the grief healthcare providers experienced, some of whom made the ultimate sacrifice. Planting trees commemorates the bravery of all in healthcare and puts our gratitude into action.

Tree Planting Initiative by Activist Leader, Philanthropy Support, and Implementation Partner

At Medstar Health, our major healthcare system in the Washington, DC area, our group developed a straightforward method to plant trees for every member of our healthcare team numbering 30,000 associates. With an activist leader, philanthropy support and a partner for implementation, this program can be done anywhere.

My activism was sparked by the news of our first grandchild on the way. Suddenly I began thinking about the world for her and all children being born. What world would we leaving them?



We now are blessed with two nature loving toddlers.

This picture from early one morning in April 2020 captures our one year old pointing in astounded delight at seeing the brilliant blue sky. Almost everyone had stayed in from the pandemic for weeks, no traffic was moving. Voila, the air and streams near the US capitol cleared of pollution. Here was a poignant reminder of our impact on the world and the pandemic's impact on us. Even a one year old could see the difference.

### My Story

One day, in fall 2019 I needed a ride to the hospital where I work as my car broke down. I called for a Lyft. Up drove Hank. He was driving part time. He was cordial and told me of his work during the ride. He had started a company planting trees to help thank persons for attending conferences or buying products. Wow, here was a man planting trees to help save the world... as I got out of the car I wondered to myself, how would that work at my hospital or in healthcare?

Some months later, the pandemic began. MedStar Washington Hospital Center, the largest hospital in Washington DC, morphed into a giant covid hospital in

a matter of weeks. We took care of the majority of very sick Covid-19 patients in our city. Sadly, some caregivers fell ill, some paid the ultimate sacrifice. Yet our staff was very brave. They truly gave honor to the name, MedStar Health. I developed deep appreciation and respect for the dedication and compassionate care our team gave, even in the face of grave risk. One day I realized, we could plant a tree for each associate in our system.

Next, I rang a good friend Gabe at our philanthropy office and ran this by him. He loved the idea. He spoke of the special meaning it would have for team members and morale. He helped repurposed some funds that I had contributed to a building fund. We found a fellow contributor. I checked with Hank who gave two thumbs up. I





looked for agreement across my corporation and everywhere I turned the idea was embraced. I contacted our hospital and corporate sustainability committee. Everyone liked the idea.

With philanthropic support, we planted 30,000 trees in areas of need in Tanzania and Madagascar. Our public affairs office put out the word. As expected, morale was boosted greatly. And this was truly helpful to provide work for those in Africa at low cost, just 15 cents a tree making this an affordable way to improve the environment.

Mangroves are ideal trees to sequester carbon. According to an UN assessment, we have lost 1/2 of the world's mangroves in the past 40 years. These trees thrive on the coasts bordering land and sea... they clean the salt water, provide a habitat for fish and crustaceans, and prevent ocean surges from flooding the land. They grow fast, trap a lot of carbon, and make oxygen.

The IPCC recently warned, humanity is in Code Red Condition. We have delayed much too long to address the world's number one health threat, climate change. We know that atmospheric carbon dioxide is the driver, up to 417 ppm as of May of this year. We really should go back down to 350 ppm to keep ourselves in a safer range for temperature rise. At current levels, unprecedented weather including severe storms, heavier rains, seas rising, reef die offs, terrible heat waves, raging wildfires, long droughts and permafrost melt are the result: indeed, they are the new normal...and these things are happening now much faster than any scientist imagined.

Shakespeare once wrote, "Present fears are less than horrible imaginings", but now we might say, "present fears are worse than horrible imaginings".

We will make a huge difference. As we all make efforts to address our fossil fuel overuse, planting trees will be of great help to draw down CO<sub>2</sub>. What we horribly imagine in the future is largely preventable. We can markedly lessen the future impacts. Reforestation is a key way. Back to my story...

Then one morning, our moderator, Dr Behram Pastakia who works at the VAH next door walked by. We were having a group picture and he saw me with a tree on my lap and stopped and said, "What's happening here?" We told this friendly colleague that we were members of our sustainability committee having a group photo.



Dr Pastakia told me about the PoWR conference and about the FEZANA Journal. All this valuable connection came





unexpectedly, by sheer happenstance. To me, this seemed providential.

Dr. Pastakia also spoke of a tree planting at the VAH hospital next door. 77 trees were planted by a celebration of staff and volunteers during a wonderful tree planting event sponsored by Casey Trees. Subsequently he has helped us start a similar plan to plant 88 trees on our property. Doing so will help lessen the pronounced heat island effect in Washington DC and will help absorb excess water runoff from the heavier rains we are experiencing in the eastern US. In this aerial view, the yellow dots are proposed tree planting sites.



And so, we hope others will take up tree planting as a way of honoring first responders. Every caregiver in the world might be honored by planting a tree. Our religious leaders, who in our view are also first responders, could be honored in this way.



Let us leave our children and their children a sustainable and beautiful earth. They need this, deserve this, and will love us for this. And what more fitting way to give honor to our caregivers and religious leaders could there be than planting trees?

*Dr. Stephen Peterson is a practicing psychiatrist in Washington DC who works in the hospital setting. He has had an avid interest in climate change as it impacts mental health and general health. Five years ago, as his grandchildren were coming along, he became very concerned about climate change and the world impacts this has had on our health and all living creatures. He is especially interested in trying to change policies through education and practical efforts to improve our atmosphere for the better. He is married and has 3 children and 2 grandchildren and has practiced psychiatry for more than 40 years. He also enjoys running and working with a likeminded group of dedicated psychiatrists in the Climate Psychiatry Alliance.*



## THE ROLE OF CONSECRATED WATER IN THE YASNA CEREMONY

ALMUT HINTZE

The pivotal role water plays in nature in general and in our daily lives in particular is reflected in many Zoroastrian rituals. This is also the case in the core ritual of Zoroastrian high liturgies, the Yasna, whose name is an Avestan word meaning ‘sacrifice, worship’. During the performance of the ritual a strictly defined set of actions is accompanied by the recitation of text in the ancient Iranian Avestan language. The ritual is preceded by a preparatory rite called Paragna, during which the ritual implements are consecrated, the ingredients needed for the preparation of the Haoma-drink procured and the Haoma-drink prepared. The main ceremony is divided into 73 chapters (including a chapter 0), or Hāitis. Its middle part consists of the seventeen hymns of the Gathas in Yasna 28–34 and 43–53. The Gathas in turn enclose the ‘Liturgy in Seven Chapters’, or Yasna Haptanghaiti, in chapters 35–41 of the Yasna.

The Yasna ceremony begins and ends at the well of a Zoroastrian fire temple. In the earlier days this would probably have been a stream of running water.



*At the well, fetching water*

The first act of the preparatory, of Paragna, ceremony is that the chief priest (Persian zōt) and the assistant priest (rāspīg in Persian, rāthvī in Gujarati), each of them carrying an empty high-necked metal pot, repeatedly go to the well to fetch water and take it to the ritual precinct. There they fill it into a large metal basin (kundi in Gujarati), which sits on a stone base next to the priest’s seat within the ritual precinct. The water container is filled to the brim with water and the ritual implements which are going to be used during the performance, are submerged in the water basin. All ritual implements are already pure, but they become consecrated in contact with consecrated water and under the recitation of the Avestan mantras, including xshnaothra ahurahe mazdā ‘for the gratification of Ahura Mazda’ and the Ashem-vohū-prayer, accompanied by ritual actions.

Throughout the ceremony, the consecrated water is present and is used in almost every ritual action. At the beginning of a new chapter of the Yasna, the chief priest takes some water from the water container with his right hand and moistens the date-palm cord tied around the bundle of barsom sticks, which sit on the crescent-shaped stands.

Consecrated water is mixed to the milk which the priest has taken from an animal, today usually a goat, in the preparatory rite. Using the libation wire, the chief priest moistens the date-balm cord with milk-water at specific ritual moments. Milk-water is also added to the Haoma mixture when is prepared twice more during the main Yasna ceremony, but, in contrast to the first preparation in the Paragna, not consumed by the priest. Instead, at the end of the ceremony, part of this Haoma-mixture is poured back into the well while the other part is given to the person who commissioned the ritual.

The praise of the water forms a high point of the entire ceremony. This happens during the recitation of the Yasna Haptanghaiti. In Yasna 38.3–5, the waters are praised as a divine gift for the spiritual and material worlds, and so is the water flowing in rivers and providing pleasant bathing spots, and the worshippers address them as ‘living mothers’:

Yasna 38.3. We worship the tasty and sap-providing waters, the lordly ones who move swiftly by the Lord’s skill.

(We worship) you, who are easy to cross, smoothly flowing and with good places for bathing, (you who are) a gift for both existences.

Yasna 38.4. Thus, with these names which the Wise Lord assigned to you, O good ones, when he was making you into providers of good (things), with these (names) we worship you, with these (names) we please (you), with these (names) we pay homage (to you), with these (names) we bring (you) refreshment.

Yasna 38.5. We call upon you as the waters,

(we call upon) you as milch cows,

(we call upon) you as mother-cows,

O prized cows, who care for the destitute, provide drink for everyone, O best, most beautiful ones!

Enjoying far-reaching achievements because of your generosity, O good ones,

I want to facilitate your pleasant distributions, O living mothers!

The last third of the Yasna ceremony includes an entire ritual dedicated to the waters in Yasna 62–69. It consists of



*Libating the date palm leaf with water*





*Y 65 Ab Zohr Pouring water from one cup into another*



*Y 65 Praise of the waters*

the Āb Zōhr in Y 62.11 followed by the “Praise of the Waters”, or Ābān Niyāyišn, in Yasna 65–70. The latter starts with the words yazāi āpəm ‘I shall worship the water’, which are distinctively and audibly uttered by the priest. The ritual action involves that the chief priest pours a little of the contents of the cup containing the Hōm mixture, of the milk saucer and of the libation cup into the mortar while distinctively reciting the name and attributes of Aredvī Sūrā Anāhitā, and then pours the contents of one cup into the other and back.

The assistant priest then walks to the side of the chief priest, who stands up and both priests, standing, recite more praises to the waters, facing the water container.

After the chief priest has sat down again on the priest’s seat, more praises follow and ritual actions involving the two cups containing the libation water and the Hōm-mixture until the praise of the waters concludes in Yasna 70.

The ritual comes to an end when the two priests walk to the well and pour part of the Hōm-mixture into the well.

Thus, the ceremony begins and ends at the well. The difference is that at the beginning of the ritual, water is taken out of the well, while at the end, the Haoma-mixture prepared during the ritual is poured into the well.



*Y 72 At the well*

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## THE SACRED QUALITY OF WATER IN RELIGIOUS BELIEFS AND PRACTICES

AUDREY E. KITAGAWA

Water, in its many forms, the gentle, flowing brook, the rushing, sweeping river, the roaring waterfall, the soft, dropping rain, the endless ebb and flow of ocean tides, all are essential to sustain life. In many faith traditions around the world, water plays an important role in ceremonies and rituals of purification, cleanliness, and important rites of passage. Many faith traditions honor water as sacred and integral to their worship.

Indigenous Peoples have long believed that water is sacred, and the home of divine beings and animals. The Blackfeet believed that there are three realms of existence: the sky, earth, and water. Sacred beings living in the water were “Soyiitapi.”<sup>1</sup> Water was a distinct, sacred place to the Blackfeet, and all of the beings and animals that lived in the water could not be killed or eaten because they were divine teachers of the moral restrictions on human behavior.<sup>2</sup> The divine beaver that spoke to humans taught the Blackfeet their most important religious ceremony that helped to support their connection to the three realms of existence.<sup>3</sup> The Blackfeet were tasked with protecting the water world from pollution and disturbances.

On March 14, 2017, the New Zealand Parliament passed the Te Awa Tupua (Whanganui River) Claims Settlement Bill which settled the historical claims of the Maori Whanganui Iwi tribe which fought for recognition of its ancestral relationship with the Whanganui River. The Whanganui River is New Zealand’s longest navigable river, and the Whanganui Tribe’s customary norms, relationship, control and management of the river were extinguished by the Crown and subsequent government actions over

decades. The Settlement gave legal recognition of the “personhood” of the river with all of the rights, powers and liabilities of a legal person.<sup>4</sup> The Maoris wanted this recognition of the river’s personhood to acknowledge the importance of the life of water as indistinct from that of human life. There is a Maori saying, “Ko au Te Awa; ko-Te Awa ko au,” which means, “I am the River, and the River is me.”<sup>5</sup>

Shintoism is an indigenous religion of Japan. Water has an important role in Shintoism as a great purifier, and as an integral part of the totality of nature that gives, supports and sustains life. Before entering a Shinto shrine, it is customary to wash one’s hands and mouth at the washbasin provided outside. In the Kojiki, the “Records of Ancient Matters,”<sup>6</sup> ceremonies, customs and divinations, the water god, Sujin,<sup>7</sup> is considered the guardian of fishermen, the patron of fertility, motherhood and painless childbirth. Rice is a major part of the Japanese diet and is grown in wet fields. Water is therefore seen to be a primary element in ensuring a vital food source. Many festivals are celebrated in Japan to honor Sujin, to ensure abundant crops, plentiful hauls of seafood, protection at sea, protection from drowning, and the safety and health of children, and mothers during childbirth.<sup>8</sup>

In Buddhism, water symbolizes life, purity, clarity and calmness.<sup>9</sup> Nature and all life forms are seen as interconnected and interdependent to the wholeness of life, and the parts are inseparably linked together with the totality of life itself. “Not a single drop of water, not a single insect or animal, not a single human being, and of course, not a single country not a single



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*She is the Chair of the Anti-Racism Initiative, and Co-Chair of the Gender Equality Working Group of the G20 Interfaith Forum. She is a United Nations Rep for the United Religions Initiative, an Ambassador of Religions for Peace International, and Chair Emerita of the NGO Committee of Spirituality, Values and Global Concerns, NY.*

*She has been enstooled into the royal family as the Nekoso Hema, (i.e. Queen Mother of Development), of Ajiyamanti in Ghana, West Africa, and has a school which she helped to build named after her in her African name, the Nana Ode Anyankobea Junior Secondary School.*



continent escape this reality: we can live and exist only together.”<sup>10</sup> Our inherent connectivity with all life forms compel us to grow in mindfulness of the suffering of others, and to develop the heart of compassion, caring and loving kindness. This heart of compassion and loving kindness calls upon us to affirmatively act to relieve the suffering of sentient beings and the myriad of life forms which comprise the wholeness of life.

In Hinduism, the attainment of purity and the avoidance of pollution are important to one’s physical and spiritual cleanliness and well being. Water is revered for its power to purify, and cleanse not only the body, but negative karma and sins. Many holy places are situated along sacred rivers, one of the most famous being the Ganges River in India. During the Kumbh Mela festival, the world’s largest religious assemblage, millions of Hindus gather to bathe in the Ganges River to wash their sins away. Mt. Kailash is considered to be one of the holiest, most sacred of mountains to Hindus, Jains, Buddhists and Bons. Hindus consider it to be the abode of Lord Shiva, the Supreme Deity in the Hindu trinity of Brahma, Vishnu and Shiva. Lord Shiva is the creator, protector and transformer of the universe. Near Mt. Kailash is sacred Lake Monsarovar, one of the world’s highest altitude fresh water lakes. It is fed by the Kailash glacier melt, so the waters coming from Mt. Kailash itself is considered very sacred and pure. The Hindus will bathe in the lake to purify themselves and have their sins washed away. The Hindu poet Kalidasa claimed that drinking water from this lake could clean the sins of hundreds of lifetimes.<sup>11</sup>

Christians believe that water represents life. The baptism ritual of immersion into water symbolizes

purification of the soul and an important act of admission into the faith. Water is mentioned 722 times in the Bible,<sup>12</sup> and God created water on the first day of the six days of creating heaven and earth.<sup>13</sup> Holy water is water blessed by a priest, and can be used to provide protection against evil. Holy water is often part of ceremonies of matrimony, the administration of the Holy Eucharist to the sick, and in services for the deceased.<sup>14</sup> There are several sources of water that are considered to be miraculous for its healing qualities and as sites of devotion for pilgrims. One such source is the spring water flowing in a grotto in Lourdes, France, where the Virgin Mary appeared numerous times to Bernadette Soubirous, a peasant girl, who was later canonized as St. Bernadette. Under the directive of the Virgin Mary, Bernadette dug in the dirt of the grotto where this spring started to flow and has been flowing continuously since 1858. Pilgrims can bathe in the water, and many have reported being miraculously cured of their diseases and sicknesses.

Zoroastrians believe that water and fire are integral to ritual purity, and purification ceremonies utilizing both elements recognize their primordial nature in the creation of the universe. Both are considered essential to the sustenance of life, with fire as the source of light through which wisdom is attained. Water is considered the source of that wisdom which is strengthened through the Yasna service which is the principle act of worship which represent the “strengthening of the waters.”<sup>15</sup> Water is considered to have been created after the creation of the sky, and seven important Zoroastrian divinities are associated with water.<sup>16</sup> Several commemorative festivals and days of the Zoroastrian calendar are dedicated to the sanctity of water.

The Sikh, Jain, Muslim, Jewish faiths, and most of the world’s religions honor the sacredness of water. Volumes can be written about the numerous rituals, ceremonies and practices associated with water in the everyday lives of adherents around the world. As with all matters sacred, we must honor and respect it, properly conserve it, and avoid polluting it. May we live the wisdom of our collective practices and rituals which acknowledge the importance of water in our lives. May we always cherish it as if our lives depend upon it, because it does.

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<sup>1</sup> The Conversation, “Why Is Water Sacred To Native Americans?”  
 Rosalyn R. Lapiere, March 21, 2017

<sup>2</sup> Ibid

<sup>3</sup> Ibid

<sup>4</sup> Library of Congress, New Zealand: Bill Establishing River as Having Own Legal Personality Passed, March 22, 2017

<sup>5</sup> RNZ Te Ao Maori/Comment and Analysis <https://www.rnz.co.nz/news/on-the-inside/326756/'ko-au-te-awa,-ko-te-awa-ko-au> Mark Bennet, March 17, 2017

<sup>6</sup> [HTTPS://EN.WIKIPEDIA.ORG/WIKI/KOJIKI](https://en.wikipedia.org/wiki/Kojiki)

<sup>7</sup> Sujin <https://en.wikipedia.org/wiki/Sujin>

<sup>8</sup> Ibid

<sup>9</sup> The Significance of Water in Buddhism, Trudy Fredriksson, September 23,2020 [https://swedishwaterhouse.se/wp-content/uploads/The-significance-of-water-Buddhism\\_-ENG-and-SVE.pdf](https://swedishwaterhouse.se/wp-content/uploads/The-significance-of-water-Buddhism_-ENG-and-SVE.pdf)

<sup>10</sup> Ibid

<sup>11</sup> <https://www.wonderoftibet.com/destinations/western-tibet/mansarovar/>

<sup>12</sup> The Connection, Dwight Tucker, Jr. June 5. 2014

<sup>13</sup> Ibid

<sup>14</sup> [https://en.wikipedia.org/wiki/Holy\\_water](https://en.wikipedia.org/wiki/Holy_water)

<sup>15</sup> <https://en.wikipedia.org/wiki/Aban>

<sup>16</sup> Ibid



## OUR COMMON HERITAGE: NATIVE AMERICAN AND PARSI

FEROZA JUSSAWALLA



With a name like Feroza Jussawalla, I have embraced the land of turquoise and silver smiths. The U.S. southwest, where I have lived for the near forty years, is known for its Native American jewelry, studded with turquoise. I was always told that Jussawalla—was the name for people who worked in “jess,” i.e., silver and plating. As I write this, I am sitting on land that must have been Native lands, and acknowledge this. The tall cottonwood trees, are shamans of the land. My book of poems, *Chiffon Saris* (TSAR, 2003), begins with a poem entitled “Indian,” in which I note my kinship with the native peoples,

Jim Silversmith stands tall over me  
In Taos Pueblo, as I admire filigree, as delicate  
As the ancient work in my Indian home-town,

. . . .  
We talk about how we were  
Carried by even more ancient colonizers,  
into the hearts of continents and subcontinents,

. . . .  
We are all the same people  
Coming overland through the Northwestern passages

. . . .  
Coming to fill this vast  
Diaspora...

from, “Indian,” pg. 1

‘I who have come  
‘from deserts vast and plenty,  
from the land where the lizard and the lion  
keep Jamshyd’s court.’

From “Tierra de la luna,” p.10, and *The Rubaiyyat*

My interest lies in braiding together, our cultures, like braiding, “sweet grass,” with our tamarisk, or barsom, grasses we use in our rituals, like the *haoma*, (ephedra) braided into switches, which have now been replaced with intertwined metal wires.

Our cultures also share the need to preserve our environment.

Zoroastrianism is the original ecological religion, concerned with the purity of the land, fire, water bodies and the proper disposal of that which we consider dead, the body, hair, nails etc. the Native peoples also share these concerns. If new archaeological research is to be believed, we all originated in the Central Asian Plateaus and migrated in all directions, from there.

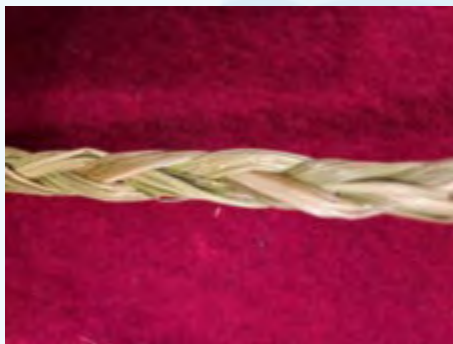


Photo taken by me at the Santa Fe Indian Market, 2021



Like many Native American tribes, we, Zoroastrians, have also been cliff dwellers and have proven ourselves able to survive by hiding in cliffs, both in India, as well as in Persia. The most significant story of such a survival in our tradition is of Nikbanou from Chak-Chak. Here we see the first significance of water. Her tears turn into a miraculous healing spring, from which cliff dwellers were also able to draw water to survive. In the U.S. Southwest, the habitations of the ancient peoples were “Cliff Dwellings,” as in Mesa Verde. The most significant archeological finds among them are those of pots. Pots were needed and created for bringing water to the dwellings from springs dispersed far and wide in the parched desert hills. At Mesa Verde, there is a seep “pond” just under what has been called “The Sun Temple.” They brought water in pots, and stored water in small amounts. Thus, pottery is a significant part of all the North American native cultures.

If we inquire into the origins of these commonalities, we have two theories: that the ancient peoples walked across the Bering straits. This connection is beautifully made in the

China-travel memoir of southwestern writer, Rudolfo Anaya, *A Chicano in China* where he explores the connections between the “Chicano” or Hispanic peoples of the southwest and the Chinese. There is also the notion of the movements and migrations of peoples across “Ten Thousand Plateaus,” or *Mille Plateaux*, as described by Giles Deleuze and Felix Guattari. All tribal peoples, even if we don’t consider ourselves as such, have pantheistic roots, and so we see the similarities in the reverence and worship of the elements, fire, water, earth, the planets, the sun and the moon, those items which nurture the land and give us food. The native calendar revolves around the “Sun Dagger,” a shaft of light that comes through some displaced rocks, much like the light that guides the Hindu calendar and the festival of *Sankaratri*.

Of primary importance in both cultures, is the worship of the sun. As a child, I was taught to say, “*Gorje Khoreh awazaad, Khorshed amarg rayomand aurvadasp be resad*” every morning. I still do this as soon as I see, what John Donne in 1633 called a “Busy old fool, unruly sun.” Basically, this prayer honors “the luster and the glory of the immortal, radiant, swift footed horse, the sun.” All the Native American tribes, begin their day with offerings to the sun, usually, sprinkling ground corn, tossing it into the air, very much like the Hindu practice of offering water to the sun, along with the Gayatri mantra. Water, earth, sun, are the ingredients for growing food (in native cultures the three sisters, corn, beans and squash), and life itself. “Water is life,” the native peoples believe. During the Covid crisis, the Navajo Reservation lacked clean water. Several local charity organizations and individuals had trucks carry large quantities of bottled water to the reservation. This is an ever-present problem in the desert southwest.

Robin Wall Kimmerer’s memoir, *Braiding Sweetgrass* collects



Pottery collected by me, the pots in the back being wedding vases



Renee Allen is Hopi and Choctaw Native, who weaves sun symbols, called (Sun) Dawas.



The Sun Dagger (courtesy Indian Pueblo Cultural Center, Albuquerque)



Native American wisdoms. It is also about the colonialization of the land. It expresses what I call “the cousinship of experience” with our Zoroastrian religion and its practices. Kimmerer begins her book with a dedication to “all the Fire Keepers.” We are, the original “fire keepers,” tending the fire, at all times. Fire, is for us Zoroastrians, is the most sacred and purest element. In his book *Religion, Culture, and Politics in Pre- Islamic Iran*, Bruce Lincoln reproduces an ancient seal from the archival remains found in Persepolis. It depicts a typical scene, familiar to us. It has, “two priests, one of whom holds twigs before a fire altar while the other is oriented towards a mortar and pestle on a table next to the altar.” In his footnotes, quoting from Strabo, Lincoln writes, that in Cappadocia, there were large numbers of “*Pyraithol*” or “Fire kindlers, with fire sanctuaries, sacred enclosures in the middle of which there is an altar with an inextinguishable fire.” (pp.324-325).

Below is a picture of how the fire is essential to Native American existence, even to firing pottery.



Indian Pueblo Cultural Center

In Native American mythology, particularly Navajo, fire is necessary for warmth. Bo Grayson’s children’s book, *How Coyote Stole Fire*, illustrates this.

However, there are many differences between the native tribes of the U.S. Kimmerer is a Plains Indian (*Potawatomi*). New Mexico is best known for its Pueblo Indians and their pottery. Navajos are known for their jewelry. Various other tribes such as the Apache, Mescalillo, Jicarilla, and Laguna have their own ways of being. Laguna Pueblo, is another high desert, high plateau settlement. One of the challenges of these spread-out settlements is getting water to them, especially when they are perched atop very tall mesas, like the Acoma. Water is carried in pots, on top of heads, just like in India.

Robin Wall Kimmerer is a botanist, scientifically concerned with the preservation of the land and the water works. She writes,

Among our Potawatomi people, women are the Keepers of Water. We carry the sacred water to ceremonies and act on its behalf. “Women have a natural bond with water, because we are both life bearers,” my sister said. “We carry our babies in internal ponds and they come forth into the world on a wave of water. It is our responsibility





to safe guard the water for all our relations.” Being a good mother includes the caretaking of water. (pp. 94)

The cleaning and preserving of nearby ponds, of Onondaga Lake and Creek, is part of Kimmerer’s “Mother’s work,” her gratitude work to the elders and ancestors, and her fight against pollution by salt wells around the factories like Allied Chemicals. Ancestor worship, like our *Muktad* is very much part of Native cultures.

We honor Avan Ijad, *Avan ardivisur, banoo beresad*. She is the Yazata entrusted with taking care of our waters, one who is supposed to live in the waters of wells, rivers, lakes, and the oceans. My mother lived in Hawaii for forty years and religiously cast coconuts in the ocean on *Avan roj*. Parsis do so from the steps across the Taj Mahal Hotel, on Apollo Bunder. In my poem, “Crossing the Seven Seas,” I wrote,

I cast three coconuts  
at Anaeho’omalū  
when the tide was down  
at early morning  
in thanksgiving  
in offering.

We Parsis cast coconuts  
thirteen hundred years ago  
in the Arabian sea  
in thanksgiving  
for our safe deliverance  
from the persecuting hordes  
traveling from Arabia to Pars  
Persia.

We give an offering to the sea  
it gives it back to the land  
as a coconut tree...

Fruit for our existence

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## ENGAGING SMALLHOLDER FARMERS IN HAITI

HUGH LOCKE

Smallholder farms are those under 2 hectares, or 5 acres, operated by family members—wife, husband, kids and often grandparents. There are currently around 500 million smallholder farms throughout the developing world. Adding up the people who live and work on those farms, the total comes to 2.5 billion, or one third of the entire global population. Collectively they have been marginalized and ignored for the past half century, but people are gradually awakening to the fact that smallholders can play a key role in addressing issues such as climate change, food security and gender equality.

In this context I would like to share the work of the [Smallholder Farmers Alliance](#) (SFA) in Haiti. Co-founded by myself and Haitian agronomist Timote Georges, the organization has developed a pioneering agroforestry model that engages 6,000 farmers in contributing to mitigating climate change, improving food security and actively working towards gender equality.

Haiti is seriously deforested. At the same time its approximately one million smallholder farms are under-performing, due in large part to the lack of trees that leads to flooding and soil erosion. The resulting low yields puts pressure on farmers to supplement their income by cutting trees to produce charcoal. The result is a self-reinforcing downward spiral.

At the core of the SFA model is the idea of tree currency. Farmers grow, transplant and look after trees in order to earn credits that they can exchange for non-hybrid, open pollinated crop seeds, hand tools like hoes, shovels and machetes, and training in organic agriculture.

What we found when these services became available was that crop yields went up a minimum of 40% and household income between 50 to 100%. And everything, tree nurseries and agriculture, is run entirely on organic principles.

For the farmer members of the SFA, trees are now worth more in the ground than cut for charcoal. We have 30 nurseries around the country and to date the farmers have planted over eight million trees.



Members of the Smallholder Farmers Alliance in Haiti taking part in tree planting.

Tree currency is now used for more than just seeds, tools and training. Farmers use

their credits for participation in seed banks, to obtain livestock, for adult literacy classes and water source upgrades. Tree currency also allows farmers to take part in and benefit from *kombits*, which is a Haitian creole word for neighbors volunteering to help each other for planting and harvest. It's a long tradition in the country



*Hugh Locke is president and co-founder of the Smallholder Farmers Alliance (SFA), a non-profit working to feed and reforest a renewed Haiti using a new agroforestry model in which smallholders plant trees to earn credits that they exchange for seed, tools, training and other agricultural and community services. Hugh is also founder and president of the Impact Farming Foundation, which is using a social business approach to transform smallholder farmers into a global force to combat climate change, improve food security and empower women. He is the author of *The Haiti Experiment* and writes and lectures extensively on smallholder farming.*





*Members of the Smallholder Farmers Alliance harvesting cotton in Haiti.*

but the pressure of extreme poverty has eroded it over time.

Women and men, when they farm together, are equal but separate members of the SFA, which meant definitely going against the norm when we started. Women members, through tree planting, get targeted support in the form of micro-loans exclusively for them, along with specialized business and leadership training. And a cardinal rule is that the farmers involved in implementing any of the SFA services have to include a balance of women and men, so that gender equality is becoming an accepted norm. Part of their cultural DNA.

Our latest venture involves the [Timberland](#) company, the SFA's founding corporate sponsor. Beginning in 2010, they earmarked their financial support for tree planting. Then five years ago they asked if they could also become a client, and this launched a program to reintroduce cotton growing in Haiti after a 30-year absence. Earlier this year Timberland released its first products made with Haiti-grown cotton, and the SFA is embarking on a major expansion to engage thousands more farmers in the tree currency model... now expanded to include both food and cotton crops.

We feel the SFA agroforestry model developed in Haiti is one that may be worthwhile exploring for application in other developing countries.



*One of thirty tree nurseries operated by the members of the Smallholder Farmers Alliance in Haiti.*



# TIPPING POINTS

NERGISH UDWADIA

Where on Earth are we going? Mad max dystopian *hothouse* or a *stabilized* mother Earth? Imagine a world where societies are based not on known established systems of order and stability but function on survival mode where the name of the game is upheaval, chaos and anarchy. How resilient and viable would society be? This perhaps is what might get inherited by future generations if we collectively do not alter the trajectory of global climate change post-haste.

Tipping Points, often a crisis stage in a process, occur when a series of small changes or incidents cascade to significantly larger, more important changes. Global temperatures are rising fast and we are at a *fork in the road*.

There are essentially 2 scenarios – one wherein we manage to slow and hold the rate of rise of global temperatures – Stabilized Earth. The other, crossing a threshold that would prevent a stabilization – Hothouse Earth, causing continued warming, serious disruptions to ecosystems, societies and economies even as emissions are reduced.

Impossible you say?? To understand and acknowledge our predicament let's take a journey through time.

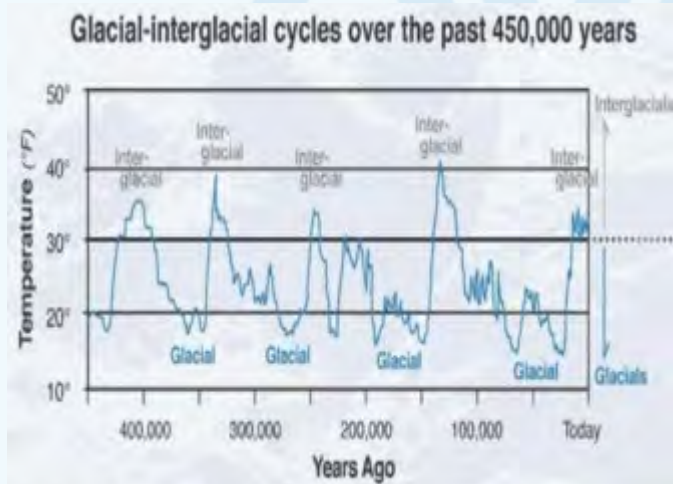
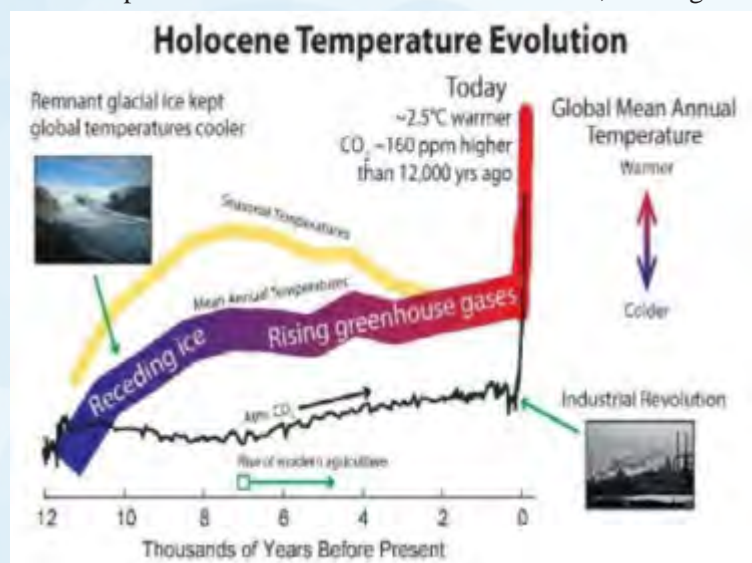
## Glacial-Interglacial

A Glacial cycle is an interval of time within an Ice Age marked by colder temperatures and glacier advances. Interglacial, which is the current cycle, refers to the interval of warmer temperatures. Glacials historically last anywhere from 7 to 9 times longer than Interglacials.

Importantly Glacial-Interglacial cycles, have always been influenced by geology, and largely been predictable, bounded within certain parameters and sufficiently stable allowing humanity to flourish.

## Holocene & Anthropocene

The current Interglacial cycle is called Holocene (*holos* – whole, *cene* – new) and began approximately 11,700 years ago.



Agriculture, sedentary communities, and eventually socially and technologically complex human societies developed during the Holocene.

Anthropocene (*anthropos* – human, *cene* – new) period marks a new and recent beginning, influenced by humankind. The Holocene period is ending abruptly and we are now in uncharted waters of the Anthropocene, a hotter Earth.

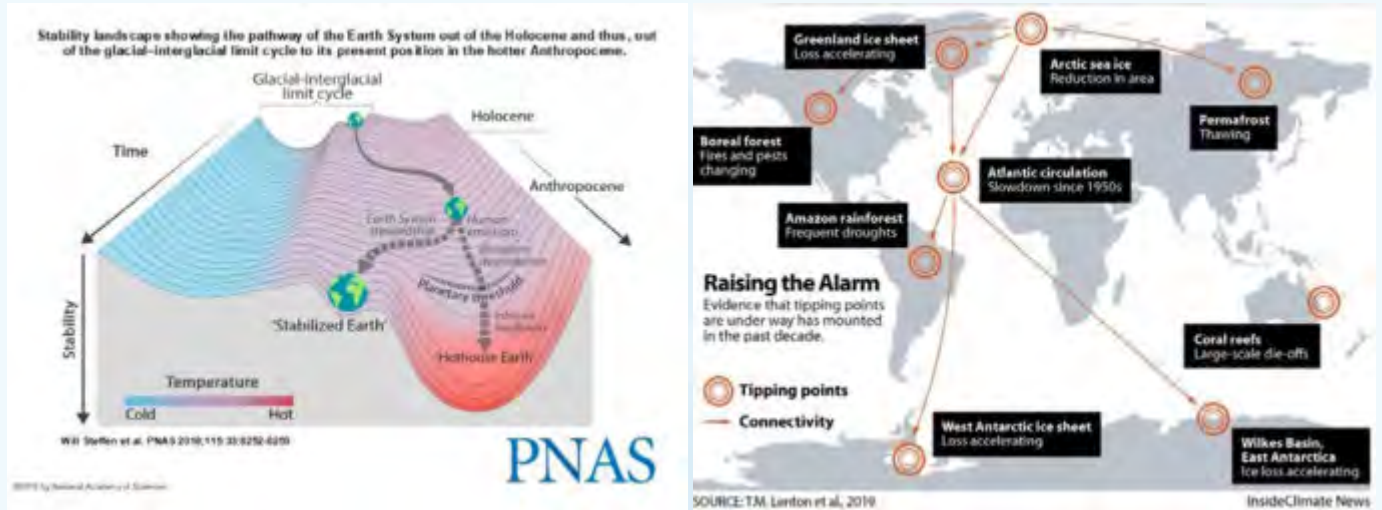
## Hothouse Earth or Stabilized Earth - A fork in the road

The end of the 2<sup>nd</sup> World War marked the Great Acceleration of humankind's dominant influence, causing significant impact on climate and environment. Human



impact now rivals geological forces, unheard of prior to the last few decades. Since 1950 humankind has shown a distinct lack of sensitivity or regard to Earth.

Tipping Points such as the melting of polar ice, permafrost depletion, monsoon weather pattern disruptions, destruction of rainforests, adverse changes in ocean and atmospheric circulation, if allowed to continue at the



current rate will within our lifetime cause a cascading effect towards a Hothouse Earth.

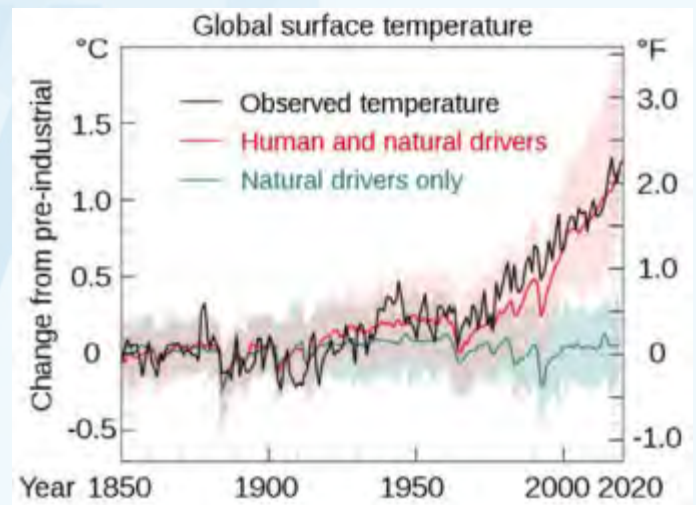
We have to make some hard choices and rapidly within this decade to avert a climate disaster. We can choose to fundamentally restructure core human values and behaviors, government institutions and societies.

We can choose to restore and manage resources for the betterment of all creations. We can choose to develop a more ethical existence. Indigenous cultures are naturally attuned to a sustainable way of life and could chart the way forward.

*“The social/political tipping points that definitively move the current trajectory away from Hothouse Earth have not yet been crossed, while the door to the Stabilized Earth pathway may be rapidly closing”, Professor Will Steffen, pre-eminent Earth System scientist.*

**Ho hum, why all the fuss over 1° C to 2° C change?**  
The 1.5° C Paris Agreement Goal and the IPCC Special Report on 1.5° C are linked to a requirement that all countries work together to bring greenhouse gas emissions to zero within the second half of the 21st century.

In order to avoid catastrophic consequences, global temperatures need to be slowed and not be allowed to rise by more than 2° C (Celsius) this century. There is consensus we are already at a 1.1° C to 1.2° C increase and if nothing is done within this decade, we will definitely breach 1.5° C by 2035.



It is critical to lower CO2 emissions by 50% globally within this decade, by 2030. The more beyond 50% we can reduce emissions, the more likely we are to get to net Zero by 2050. If we do not reach



this seemingly impossible level due to political short-sightedness, if we cannot keep the global temperature rise preferably below 1.5° C or 2° C, it will be too late to halt further catastrophic climate changes.

### **Tipping Points Afoot?**

#### **Amazon Rainforest:**

- Amazon covering 9 countries, spanning a mind boggling 2.1 million square miles, was largest CO<sub>2</sub> storehouse, fast approaching a reversal to emitter from storehouse.
- 17% forest reduction over last 50 years from human activity, currently emitting as much CO<sub>2</sub> as it stores.
- Brazil, where most of the Amazon is, was a net emitter of CO<sub>2</sub> between 2001 and 2019.



#### **Arctic:**

- Warming roughly 3 times faster, annual Arctic temperatures now 3.5° C higher.
- Shrinking sea-ice in the Arctic causing Earth to warm more quickly as more sunlight gets absorbed.

#### **Australia:**

- Coral bleaching due to rising temperatures, support one of the most bio diverse ocean eco-systems.
- 50% of the Great Barrier Reef Coral currently declared dead. At 1.5° C, 75% and at 2° C, 99% will be dead.

#### **Bangladesh:**

- One of the least greenhouse emitters but highest vulnerability to global warming.
- Monsoon floods of 2020 were the worst, within weeks a quarter of the country was underwater.
- Experiencing ever increasing severity of floods.

#### **Canada:**

- Boreal or snow forest of North America, world's largest land biome, covering 11% of Earth's land mass.
- Higher temperatures are causing a beetle infestation, with millions of acres of dead and decaying trees, the beetle turning snow forests into a CO<sub>2</sub> emitter.
- Interior mountain range temperatures of British Columbia have risen faster than global average.

#### **Finland:**

- Warming faster than ever predicted.
- Warming at nearly twice the rate of any other country.

#### **Greenland:**

- Ice melting faster than at any time in the past 12,000 years.
- During the week ending July 31, 2021 the level of ice melt on one single day would have covered Florida in 2 inches of water.

#### **India:**

- Himalayan Glaciers ice loss between 2000 and 2016 was double the loss from 25 years prior.
- 36% of the Hindu Kush-Himalaya (HKH) range will disappear by 2100, if global warming limited to 1.5° C, loss soars to 66% if we fail.
- Glaciers critical water store for the 250 million people living in the HKH region.
- 1.65 billion people rely on the great rivers that flow from the peaks into India, Pakistan, China and other nations.

#### **Siberia:**

- Rapid Permafrost thawing in Siberia, pent-up methane a potent greenhouse gas.
- Forest fires during the past 3 summers have torched millions of hectares across Siberia.



- On June 20, 2020 Verkhoyansk, one of the coldest inhabited places reached 38° C, the hottest temperature ever recorded in the Arctic.

*“God didn’t do this Anna, we did.”*  
Will Smith, *I Am Legend* Movie (2007)

As there is no precedence in human history, we do not know where the Tipping Point thresholds are. Any of a multitude of adverse climate changes could reach a Tipping Point. Anyone could cause a cascading chain reaction.

We do not know nor completely understand the true impact of climate change. What is clear is that anthropogenic as opposed to ecological impacts are causing instability in climate patterns globally. No longer can one country be held accountable nor can any one country alone mitigate the impending climate crisis.



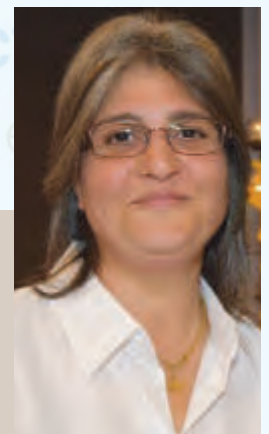
Can individual nation states come together proactively rather than after the event. Are warnings of dire consequences due to abject apathy being heeded, can we bring about systemic change for the betterment of all on Earth?



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*Nergish Udwardia from Melbourne, Australia researched extensively on the health of our Earth for this abridged article. Having been a FEZANA Journal reporter at the 2010 UN-DPI Conference, Nergish is extremely concerned that MDG 7, Ensure Environmental Sustainability has regressed to such an extent that it could become humanity’s greatest existential crisis, if not urgently actioned this decade by all. Nergish is part of the Educating the Children team of the FEZANA Ava Project.*



## A STORY OF AN ABUSED WORLD

### THE IMPACT THAT CORPORATE ENVIRONMENTAL POLLUTION HAS ON US EVERYDAY

KYRA SINGH

This article is dedicated to my loving, dear late mother, Aban. My mom taught my sisters and I from an early age the importance of sustainability. She was so happy to hear I got involved in the Ava project. I miss her dearly and will continue to live by her example in all that I do.

Growing up my mom had a rule that rainy days were reserved for movies. When it rained, my family would cozy up on the couch, switch through the channels, and after much debate, settle on the movie everyone agreed upon as the “best” option on TV. Most times it was hard to select a movie as we are a typical Zoroastrian-Hindu family with many opinions - my sisters love action, my Mom loves mysteries, I love comedies, and my Dad has always been smart enough to squeeze in a power nap and wake up once the movie has been selected. But on one notable rainy day, something strange and amazing happened. We all immediately converged on the desire to watch the *same* movie, “Erin Brockovich,” starring Julia Roberts.

This movie really hit something deep in our souls. “Erin Brockovich,” is both enlightening and heart wrenching, forcing you to think about the world we live in today and how many organizations, groups, and individuals may be abusing our precious Earth. Many either knowingly, trading profits for lives, or unknowingly, living blindly on autopilot, making decisions that abuse our environment which could lead to our ultimate demise.

#### **PG&E Environmental Pollution**

“Erin Brockovich”, released in 2000, is the true story about a woman who discovered that Pacific Gas & Electric knowingly contaminated the groundwater of Hinkley, California in the 1950s. Nearly 50 years later, Erin Brockovich’s research and investigations helped to win a settlement of \$333 million dollars for 650 plaintiffs. At the time, the case was the largest direct-action lawsuit in American history.

For over 10 years, PG&E used a toxic carcinogen, called hexavalent chromium, in its water supply. While hexavalent chromium is commonly used to prevent rust in industrial processes, the company stored its water in unlined ponds which allowed the chemical to seep into the town’s water supply, slowly causing cancers, miscarriages, and other illnesses among the residents. To make matters worse, it wasn’t until 10 years after polluting the water that PG&E alerted the local Hinkley water board of the contamination.

Unfortunately, the story of PG&E and Hinkley isn’t unique or the first of its kind. Chemical contamination in water and soil caused by large corporations is not uncommon. In some instances, such as PG&E, it starts out as negligence, and then continues on as the company chooses ignorance in favor of profits. And in the worst case scenario, it’s intentional from the beginning. Take for instance, a corporate environmental pollution case whose



*Kyra Singh grew up in the Philadelphia area and is a member of the ZAPANJ community. Currently she works at Google as a statistician within the Ads Marketing group in New York, NY. She received her PhD in Statistics from the University of Rochester and her B.S. in Economics and Statistics with a minor in Psychology from Carnegie Mellon University. She has been so inspired to see FEZANA’s support of the UN Sustainable Development Goals. Kyra is passionate about environmental sustainability and is part of the Educating the Community group of the FEZANA Ava Project.*



story is brilliantly captured in the 2019 movie “Dark Waters” which tells the harrowing account of Robert Bilott’s discoveries and fight against DuPont in the 1950s.

### **DuPont Environmental Pollution PFOA**

Robert Bilott is a corporate defense attorney who uncovered, fought, and won a case against DuPont for contaminating a West Virginia town with unregulated chemicals in the 1950s. In the 1950s, DuPont began using the chemical perfluorooctanoic acid, known as PFOA, in its manufacturing of Teflon, which became one of its billion dollar businesses. If “Teflon” rings a bell, that’s because it’s commonly known for its use in non-stick cookware, although it is also used in many other consumer goods. PFOA was not classified by the U.S. government’s Environmental Protection Agency (EPA) as a hazardous substance and hence was *unregulated*, but DuPont quickly learned of the chemical’s toxicity.

PFOA has a strict process for proper disposal and needs to be burned or sent to a chemical waste facility. This alone speaks volumes about the chemical’s potentially harmful effects. Instead of following the guidelines for proper disposal, over decades, DuPont dumped waste engulfed with PFOA into unlined ponds. Similar to PG&E in the movie “Erin Brockovich”, the unlined ponds allowed the toxic chemical to seep into the ground and pollute surrounding communities’ water supplies. From the water pollution alone, over 100,000 innocent people were impacted.

Of the shocking facts that Bilott discovered, DuPont’s disposal process was only a slice of the pie. More alarmingly, Bilott found evidence that DuPont was well-aware that the chemical was dangerous. In 1961, DuPont conducted their own medical studies on animals that revealed that concentrations of PFOA in the body resulted in enlarged organs and birth defects in rats. Around the same time, DuPont found high concentrations of the chemical in the blood of some of its factory workers and multiple birth defects in infants of pregnant employees working on their Teflon line. In the early 90s, the company learned that the PFOA in drinking water in a local area was more than three times their own internal safety limit.

DuPont failed to report these findings to the EPA and refused to transition to an alternative to PFOA. *You may be wondering; how could this happen?*

In the early 2000s, there was limited information available about the impact of PFOA exposure in large populations. The Toxic Substances Control Act of 1976 allows the EPA to regulate new and existing chemicals. However, the law only allows the EPA to test chemicals if there has already been evidence of harm. Because DuPont didn’t share the knowledge of what they knew and denied the harmful effects of PFOA, the EPA was powerless. The Act, although well meaning, essentially enables companies to regulate themselves.

*Companies have manufactured and released more than 60,000 man-made chemicals that have remained unregulated by the government today.*

Bilott spoke out against DuPont and the larger plastics industry and its use of PFOA in 2000. His research and investigations resulted in numerous multi-million dollar settlements and lawsuits against DuPont and several other large chemical corporations. He still continues to fight. It wasn’t until 2013 that DuPont finally stopped its production of PFOA. When DuPont phased out PFOA, they replaced it with another type of chemical that was meant to degrade quicker but was also unregulated by the EPA. Since the potential toxicity of PFOA was only brought to light in 2000, much research has yet to be done to understand the environmental and human health effects of it and other chemicals like it.

### **Forever chemicals**

As the DuPont scandal unfolded, the EPA began to conduct its own investigations into the toxicity of PFOA and its presence throughout the environment. PFOA belongs to a class of chemicals known as PFAS, or polyfluoroalkyl substances, also colloquially called “forever chemicals”. PFAS chemicals are used in numerous industries and



traces of the chemicals live in many products in our homes today - non-stick products, stain and water repellent fabrics, polishes, and cleansing products, to name a few.

The chemical structure of PFAS chemicals allow them to migrate to and persist in soil, water, air, humans, and animals. They do not break down easily under typical environmental conditions and can accumulate over time. Hence their name, “forever” chemicals.

There are a large number of chemicals within the PFAS class and most lack analytical standards, making them difficult to track and regulate. PFOA and another called PFOS are the most widely known and researched. More research is needed to understand the impact of these chemicals but evidence does indicate prolonged PFAS exposure is related to adverse health outcomes. Recently, researchers have been able to correlate long-term exposure of PFOA with some types of cancers. They also believe that other PFAS in the environment are related to endocrine disruption, causing thyroid and nervous system disorders, although it has been difficult to show a direct causal effect. Scientists now recognize that due to their widespread use across industries, varying concentrations of PFOA and PFAS persist in the blood of most people and animals throughout the world.

### Fracking

While DuPont may have been one of the first corporations to use PFAS chemicals, it was not the last.

Chemicals that can degrade into PFAS and the chemicals themselves have also been used in the oil and gas industry through hydraulic fracturing processes, commonly known as fracking. Fracking is the process of drilling into (or “fracturing”) rocks deep within the earth to increase volumes in the flow of natural gas and oil in a cost-effective way. It is a highly controversial process as some believe its negative impacts on the environment (e.g. releases carcinogens, pollutes groundwater, destabilizes the earth causing earthquakes) outweighs the positive.

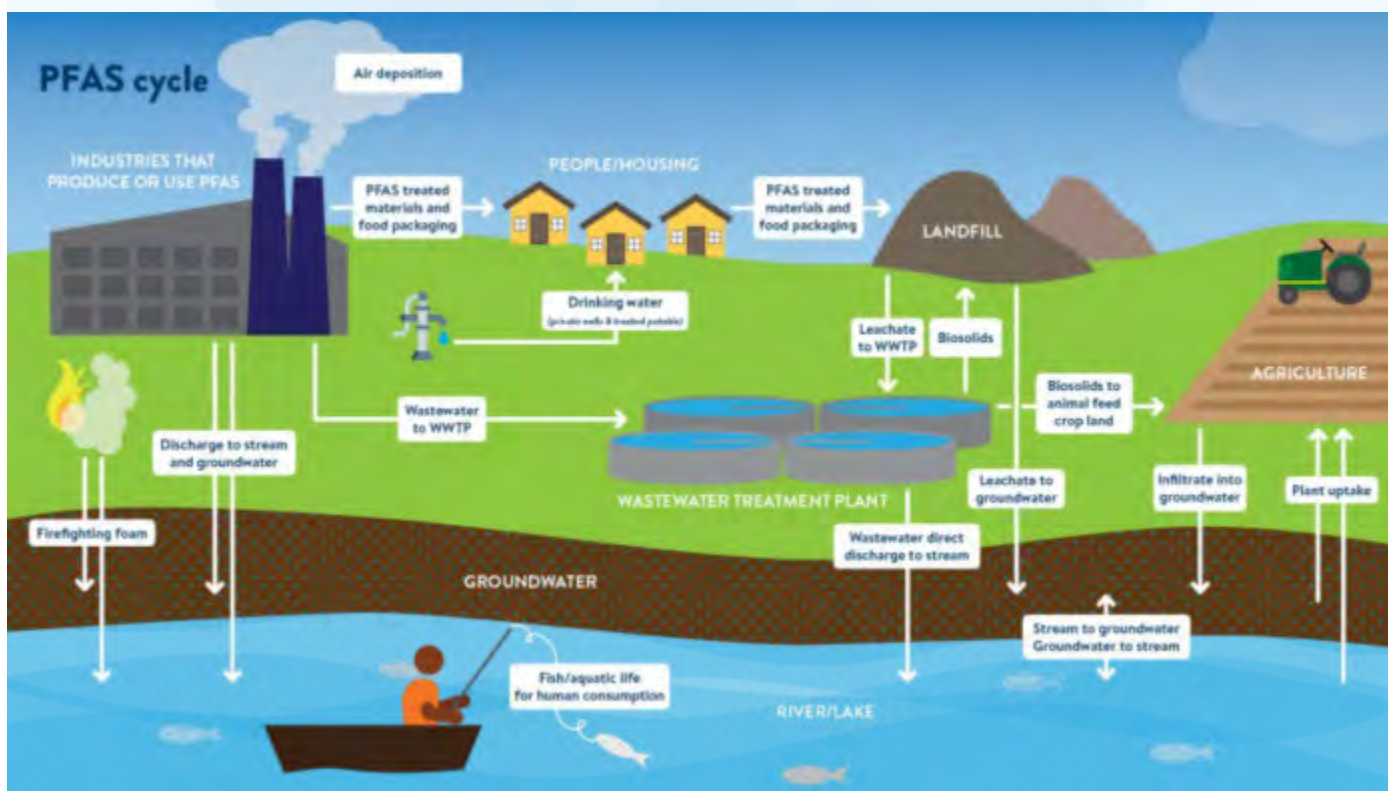


Illustration of how PFAS move through the environment and impact our day to day lives. From *Protecting communities and families from PFAS contamination*, by Minnesota Pollution Control Agency, 2021 (<https://www.pca.state.mn.us/about-mpca/protecting-communities-and-families-pfas-contamination>).



Using PFAS in fracking further pollutes the environment and our water sources. It also exposes the oil-field employees, workers, and community workers to these harmful chemicals. A story that begins to sound eerily familiar to the case of DuPont.

### **Ignorance isn't always bliss.**

So what does this mean for you?

There is no doubt that PFAS are widespread throughout our environments and bodies, and seemingly impossible to avoid entirely. Movements to better regulate PFAS and other toxic synthetic chemicals are underway, but the regulatory bodies have a long way to go. Exposure to these chemicals won't go away in our lifetimes and likely not our children's either, but *with knowledge comes power*.

With the understanding of what PFAS chemicals are, how prolonged exposure to high concentrations can impact our bodies, and how they enter the environment, we are armed with the information we need to think critically about the products we use and the companies we support. It's important to keep in mind that PFAS presence doesn't necessarily equate to disease. The concentration and duration are equally as important. Many consumer product goods (household supplies and beauty products) have trace elements of PFAS that are considered safe for use under most conditions.

So, the takeaway here isn't to throw out any and all of our consumer goods and beauty products. The takeaway here is to be mindful of the environment we live in and the products we use that may affect the environment. Ignorance isn't always bliss. When Erin Brockovich and Robert Bilott uncovered PG&E and DuPont's contaminations, they were curious. Curious enough to uncover stories that still impact us today and will continue to impact us for years to come. We can be conscious, careful, and curious in how we approach the world and our environment. After all, we are the environment we live in.

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# KALESWARAM RIVER LIFT IRRIGATION

MARINA BATLIWALLA

THE KALESWARAM RIVER LIFT IRRIGATION SCHEME IN INDIA'S SOUTHERN STATE OF TELANGANA, IS AS MUCH A TALE OF HUMAN ENDEAVOR AND INSPIRATION AS IT IS A STORY OF INDIA'S ENGINEERING AND LOGISTICAL BRILLIANCE.

This summer, while white-water rafting on the south fork of the American River in northern California, I witnessed firsthand the ravages of drought and the environmental impact of water

The world's largest lift irrigation project. Fittingly, the world's largest lift irrigation project was born to address the frequent droughts that have plagued the Telangana region

conundrum. How do you lift, redirect, and at times even reverse, an entire river 528 meters (1730 feet) uphill each day in order to irrigate 4 million acres of farmland?

The answer came via a combination

## KALESHWARAM, INDIA'S LARGEST MULTI-STAGE LIFT IRRIGATION PROJECT

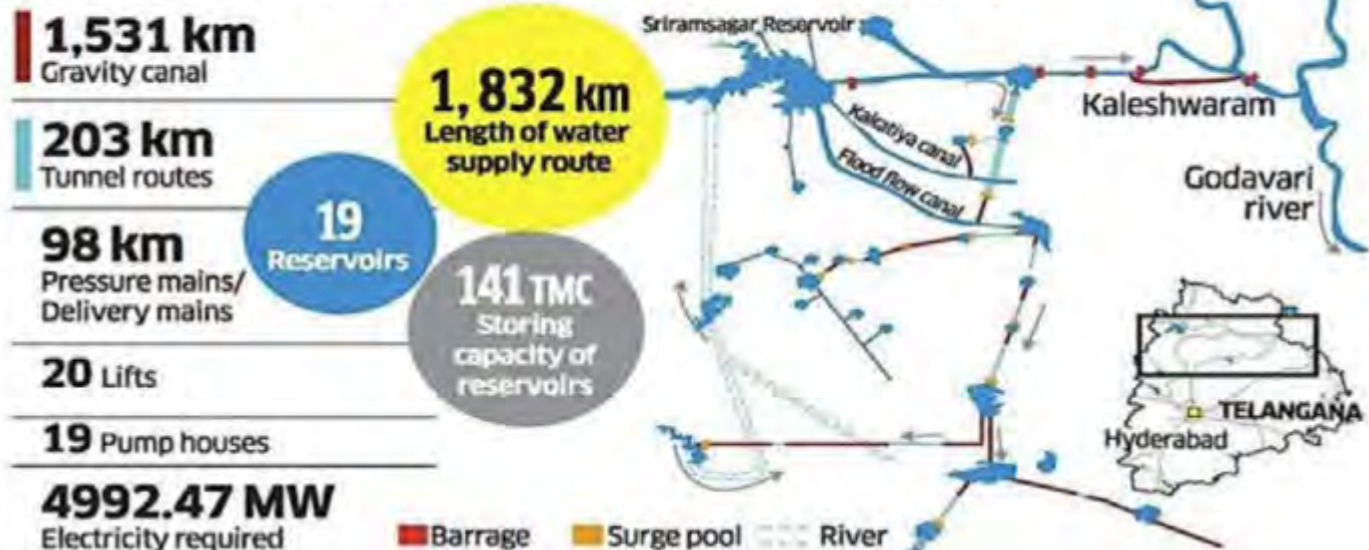


Image Source: <https://blog.studyiq.com/kaleshwaram-lift-irrigation-project-burning-issues-free-pdf/>

management. Racing through rapids punctuated with rocky outcrops, flanked by parched and barren hillsides which had been scarred by the water bombing of California's first gold rush, I was left acutely aware of the delicate balance between climate and ecosystem, and between man and nature.

Consider then, the environmental challenges of a nation as diverse and populous as India, and the devastating impact on farmers of drought and flood, sometimes occurring simultaneously within the same region.

of southern India for decades, and to harness the monsoon flood waters which were otherwise abandoned as wasted overflow.

Championed by the Chief Minister of Telangana, K Chandrashekar Rao whose vision was to bring prosperity to the entire state, the project launched on the banks of the river Godavari, in the town of Kaleshwaram and at the confluence of two major rivers, was officially opened in June 2019.

To understand the scope of the Kaleshwaram Project, is to understand the scale and complexities of a monumental

of Indian engineering and design brilliance, and an international consortium assembled from countries around the globe including China, Japan, and Europe.

A bird's eye view reveals that the scheme is divided into 7 links and 28 packages (construction clusters) spanning a distance of approximately 500 km (310 miles) through 13 districts and utilizes a canal network of more than 1,800 km (1,100 miles).

From blueprint to construction Remarkably the Indian firm, Megha Engineering & Infrastructures Limited, awarded the contract to



build most of the pumphouses, had never previously undertaken such a large project nor under such a tight timeframe. Working within a twenty-four month timeline, later compressed to 18 months, the project became a race against time and natural elements, including monsoon flooding. Despite this condensed timeline, safety and accuracy were never compromised.

Initial review of the project scope and timeline by engineers deemed it practically impossible to execute. However, state of the art technology and the unwavering determination of the key stakeholders proved to be driving forces.

**What is a Lift Irrigation Project?**

*Where a natural river cannot flow, a lift irrigation project uses pumps to carry water away from its source, uphill to the topmost point of a project area and then delivers water to the beneficiary farmers and towns using a suitable and fair distribution system.*

Since a project of this scale had never been attempted before, the journey from blueprint to construction commenced with design drafts which had to be tested in a virtual environment and then finally built with small scale models in hydrology testing labs. LiDAR (Light Detection and Ranging) was used to prepare aerial geological surveys and to design storage capacity based on the availability of water along the Godavari and its tributaries.

*Lifting a River: A Special Documentary* on the Discovery Channel, provides a window into the human challenges and geographical obstacles that were faced in the Project’s construction.

Assembling a workforce of 60,000 skilled workers and technical engineers to supervise them was itself a herculean task.

The world’s largest pumps, built by Bharat Heavy Electricals Ltd (BHEL) in Bhopal, were required to be built within millimetre accuracy. Each of these pumps use an unprecedented 139 Megawatts of power to lift 3 TMC (Thousand Million Cubic feet) of water in total, every day during the monsoon months.

Breaking records for the usage of materials, the construction of Link 1 alone, used enough concrete (15,000 cubic meters) to build seven Burj Khalifas.

Package 8, one of the largest pumphouses in the world, is itself a cavernous 8,000 square meter underground city, residing 470 feet below the earth’s surface.

The human spirit  
Conversations with engineers and skilled workers in the documentary reveal their determination to push limits and make significant personal sacrifices to fulfill the vision of this project.

B. Srinivas Reddy, Director at Megha Engineering, realizing this was a once in a lifetime opportunity to both achieve something great and to challenge and motivate his people, relates his own efforts to overcome claustrophobia with therapy, in order to work in enclosed spaces for extended periods of time.

Others recount the searingly hot climate and relentless hours

demanding by the tight deadlines.

P.V. Krishna Reddy, Managing Director at Megha Engineering recalls, “I tell my team members - for every problem there is a solution... based on that you can achieve anything, not only in projects but anything in life also.”

Ultimately it is the human spirit which prevailed over the many challenges the teams faced and which manifested itself in the successful completion of this extraordinary engineering feat.

A testament to the outstanding leadership of the project, those offering first-hand accounts of their involvement appear to have been driven by a higher purpose, inspired by not only what they have achieved but also the humanity they have served in the process.



*Marina Batliwalla is an actuary and institutional investment consultant residing in Los Angeles with her husband and three children. She is part of the Educating the Community group of the FEZANA Ava Project.*



## IPCC REPORT

PORUS P. COOPER

*“We do not need more science to improve policy making. Instead, we need to tackle head on the social, cultural, technological, or political aspects of climate change both in terms of their impacts and solutions.” -- Lyla Mehta, professor, Institute of Development Studies, University of Sussex.*

**The** latest existential warning from the United Nations’ climate change watchdog – the U.N. secretary-general called it a “code red” on emissions of greenhouse gases – took my mind back to when I was a child in India.

Back then, my family left what experts might now call a small “carbon footprint,” though nobody spoke of footprints that way at the time.

We had no car. We walked or took trains or buses. My father commuted to work on a Lambretta. We needed to travel only as far as our front door to buy food. Vendors came to us, on foot or bicycle. Meats were a luxury. No refrigerator, so leftovers were few. Eggs were preserved in a bowl of cold water. No TV, no air conditioner. Our electricity came in part from a hydroelectric power plant. So, my family contributed little to climate change, except for that scooter and the kerosene stove in the kitchen.

My carbon footprint has enlarged considerably as my family, along with billions of others, has risen to greater prosperity.

Two cars. Two refrigerators. A gas cooking range. Buying food requires driving to the store. Where we live now, in suburban United States, there is scant public transportation. We drive everywhere in cars that burn gasoline. We have central air-conditioning and central heating. We have multiple Internet-linked computers and televisions, some of which are fired up for hours at a time. And meats are taking up a larger portion of our dinner plate. (What does meat have to do with climate change? Thanks for asking. I will get to it).

It is distressing to learn that the lifestyle improvements we enjoy have a dark side, that in just going about our daily lives we might be violating a core tenet of our Zarathushti faith, to respect and protect nature. The Intergovernmental Panel on Climate Change has sounded its alarm in scientific report after report over decades, winning a Nobel Prize along the way. It’s sixth, and latest, report is unusual in that it asserts with nearly complete certitude that human activity is the main culprit.

### Highlights of the Report

The office of U.N. Secretary General Antonio Guterres summarizes the findings this way:

*“The report ... highlights that human influence has warmed the climate at a rate that is unprecedented in at least the last 2,000 years.*

*In 2019, atmospheric CO2 concentrations were higher than at any time in at least 2 million years, and concentrations of methane and nitrous oxide were higher than at any time in the last 800,000 years.*



Global surface temperature has increased faster since 1970 than in any other 50-year period over at least the last 2,000 years ....

Global mean sea level has risen faster since 1900 than over any preceding century in at least the last 3,000 years.

The document shows that emissions of greenhouse gases from human activities are responsible for approximately 1.1°C of warming between 1850-1900, and finds that averaged over the next 20 years, global temperature is expected to reach or exceed 1.5°C of heating. ...

For 1.5°C of global warming, there will be increasing heat waves, longer warm seasons and shorter cold seasons.

At 2°C of global warming, heat extremes are more likely to reach critical tolerance thresholds for agriculture and health.

But it won't be just about temperature. For example, climate change is intensifying the natural production of water – the water cycle. This brings more intense rainfall and associated flooding, as well as more intense drought in many regions. ...

Extreme sea level events that previously occurred once in 100 years could happen every year by the end of this century.”

As for ways to adapt to and mitigate or reverse the effects of climate change, two other working groups at the IPCC are scheduled to weigh in on those politically fraught aspects later.

That is “an unhelpful division of labor,” says Lyla Mehta, who studies the politics of water scarcity, is the author of a seminal study of [water issues in the Kutch region](#) of India and is a professor at the Institute of Development Studies at the University of Sussex in Britain.

“I am not sure that the media will focus as much on the findings of the next two working groups on adaptation/mitigation and solutions,” she says.

“We do not need more science to improve policy making. Instead, we need to tackle head on the social, cultural, technological, or political aspects of climate change both in terms of their impacts and solutions. This is where the IPCC needs to do better and communicate these issues clearly to politicians, scientists and policy makers.”

A dwindling but still significant section of policymakers and citizens continue to cling to the notion that the alarm over human-induced climate change is overblown. Some rely on misinformation peddled by the oil, gas, and coal lobbies. Many other skeptics may just be unwilling yet to make hard choices, since combating climate change will disrupt certain industries and will bring expenses.

Psychologist Mahzarin R. Banaji, Richard Clarke Cabot Professor of Social Ethics at Harvard University, likens at least some of the skeptical reaction to climate change to the “cognitive dissonance” exhibited by smokers who refuse to believe data linking smoking to cancer or convince themselves that somehow their health is exceptional.



### **Nature Pushes Back**

Ardeshir Damania has spent his professional lifetime in agricultural research. He is Associate Research Geneticist, Genetic Resources Conservation Program, University of California, at Davis.

Climate change is nature's way of pushing back, he suggests. "I have been telling my students for the past 10 years that humans have monopolized earth's resources to a very large extent at the expense of other biota, including animals and plant life. And the rule of nature is that when one group multiplies to a very large extent (humans) at the expense of other life, nature always retaliates in its own way and returns the earth to a balance once more."

Soroosh Sorooshian, Director of the Center for Hydrometeorology and Remote Sensing at the University of California, Irvine, served as a reviewer on an early draft of the IPCC report. He vouches for the thoroughness of the agency's work. "Teams of scientists and experts ... sorted through thousands of scientific articles which resulted in the conclusions," Sorooshian notes.

The IPCC's "sixth assessment report," released in early August, is the distillation of the highly technical handiwork of 234 scientists from 66 countries.

For almost a decade, until the mid-2000s, Sorooshian headed the Science Steering Group of the World Climate Research Program's Global Energy and Water Exchanges (GEWEX) project. GEWEX aids research into the earth's water cycle and interactions between the land and the atmosphere.

Sorooshian is especially struck by evidence in the IPCC report that he says backs up early GEWEX hypotheses of "the acceleration of the hydrologic cycle and increase in the magnitude and frequency of hydrologic extremes such as floods and droughts."

### **Adverse Impacts**

The adverse impacts long term of unchecked climate change can hardly be grasped.

Millions may be dislocated or become embroiled in conflicts over water. Repeated blows from nature would make many current human settlements uninhabitable.

Various spots on the globe already have received a foretaste of the misery that might lie ahead: an unusually severe heat wave that baked parts of the United States, followed by a deadly storm, is one example. Some small island nations, which generate almost no greenhouse gas emissions, are facing existential peril as sea levels rise.

Mumbai Municipal Commissioner Iqbal Singh Chahal recently warned that if climate change is unchecked, "80 percent of areas (in South Mumbai) like Cuffe Parade, Nariman Point, and Mantralaya will be underwater, which means they are going to disappear" by 2050.

"Earlier, we used to hear about climate change events like melting glaciers, but it was not directly affecting us. But now it has come to our doorstep," Chahal said as he launched the city's [Climate Action Plan](#) website.

The Holy Grail of climate mitigation is to reach "net zero" emissions of greenhouse gases by 2050, with emissions offset by reductions of similar quantities of emissions, though critics of the strategy say it leaves loopholes for polluters.



A large part of the increase in global greenhouse gas emissions is attributed to an [increase in meat eating](#), another byproduct of rising prosperity. Among the culprits: Methane emitted by beef cattle and the clearing of forests to enable industrial-scale cattle and chicken farming, which reduces the vegetation needed to absorb carbon-dioxide.

Which brings me back to my role, however minuscule, in worsening climate change. How to reconcile my middle-class lifestyle with my sacred obligation to safeguard the environment?

The great scholar of the Zarathushti religion, Mary Boyce, noted that the faith's rituals link the various virtues represented by the Amesha Spentas to natural creations – earth, water, fire, plants, metal, and so on.

While political and business leaders, weighed down by the fiscal and political costs of responding to climate change, stumble toward the mass-scale reforms needed, there is a role still for individuals, Lyla Mehta says.

“Every effort counts, both individual and collective,” she says.

### **FEZANA Ava Project**

She lauds efforts such as the [AVA Project](#) of the Federation of Zoroastrian Associations of North America (FEZANA). The project brings together participants from across the world to generate ideas specifically on sustainable use of water.

“I hope more and more Zoroastrians will be advocates for the transformative changes needed in the economy, business models, and society to the uneven and unequal ecological and social impacts of global environmental change,” Mehta says.

She has a note of caution: Prescriptions for adapting to or reversing climate change must “not be top-down and expert-driven but instead should build on local people’s experiences and knowledge of the water cycle and climate impacts.”

Numerous environmental groups offer guidance to individuals who wish to take action. There is no dearth of recommendations, from the common-sense advice to shift to electric vehicles or take more public transport to the exotic, such as buying carbon offsets for plane trips.

Number One on a to-do list suggested by the Grantham Institute at London’s Imperial College (<https://www.imperial.ac.uk/stories/climate-action/>) is this: “Make your voice heard by those in power.”

***Porus P. Cooper** is a veteran journalist based in the U.S. He got his start in the profession as a trainee at The Times of India in Bombay and recently retired from The Philadelphia Inquirer, leaving there as a senior editor. He is a frequent contributor to community publications Parsiana and the FEZANA Journal.*



## CHILDREN'S SECTION

FEZANA AVA PROJECT

In a time when everything is through a screen, people are bored, and there is a message to be put across... a fun, fact-filled event seems to be the best solution! Led by a precocious 12-year-old, Parinaz Dastur, with

have an international paint event and raise awareness for water.

Much hard work and preparation went into the



*Painting by Parinaz B. Dastur*

the support of her mother, Delnavaz Dastur, and Afreed Mistry, history was made as the first Ava Project Family Paint Event was held on June 5<sup>th</sup>, 2021 - World Environment Day.

After over a year of staying couped up in one's own house, President's Day Weekend did not seem to be too exciting. But wait! Somewhere in Fremont, California, Parinaz Dastur was painting trees and water on a canvas, inspired by her mother's participation in the Water and Trees team of the Ava Project.

Unknowingly, Parinaz had planted a seed – using art to bring awareness to the Ava Project. The Water & Trees team of the Ava Project agreed that the idea of using art to bring awareness to the Ava Project was an excellent one, especially if it was led by an involved youth, Parinaz Dastur. To advance this idea, it was decided to

event. Firstly, Parinaz had used different paint brushes in her original painting, brushes that were not necessarily easily found or available, so she tried new and innovative ways to get the same results with more common paintbrushes, so that everyone could participate. After researching different techniques, trial and error, and infinite patience, she found a way to get the same results with more accessible materials. Next, after finalizing how to make the painting, Parinaz and Afreed worked together on coming up with a list of supplies, so that everyone attending could be prepared in advance. Closer to the date of the event they also created a short video which did the job of enticing and informing recipients of all the information needed for the event. After the main event was finalized, Afreed and Parinaz had to decide how to keep the group occupied while the paint was drying. To get more youth involved it was decided that different youth



would present facts about water during this “drying off ” period. The Youth that presented on the day of were, Natasha Dungor (from Houston, Texas), Mahtab B. Dastur (from Houston, Texas), Toyesha Ganesh (from New Jersey) and Sabrina Warden (from Houston, Texas).

On the day of the event, there were an average of 40 participants from all over the globe. Parinaz walked through the steps of painting the scene above and everyone followed along. As the paint was drying, the youth talked about water.

Natasha Dungor first talked how water plays a vital role in various life and ecological cycles, such as the Water Cycle. She also discussed different water bodies and water vapor.

Next, Mahtab B. Dastur presented on why saving water is important and why action now is vital to save the world we live in. Mahtab went on to explain, that the lack of water around the world is a problem to be solved to ensure the livelihood of future generations, emphasizing that more water means more life.

Afterwards, Toyesha Ganesh gave information on the importance of hydroelectric power and how it is used to create renewable energy. She further explained the positives and negatives of hydroelectric power.

Lastly, Sabrina Warden created a Kahoot, an online educational game, on how to conserve water.

Everyone had a blast playing Kahoot and also learned valuable information! As the game progressed, the attendees learned simple methods on how to conserve water while having competitive fun. When all paintings were finished everyone lifted their final product and the amount of artistic talent among the participants was incredible!

The event was a spectacular success. People from all over the world were connected while painting a scenic image and being informed about water. Members of all the sub-groups of the Ava Project stepped up, creating material and showing up to the event to support and encourage. One parent mentioned that “Teamwork is the dreamwork! ... the painting event was a huge success because each participant used their creativity to produce a unique piece.” Overall, the event served its purpose and helped in spreading the word of the Ava Project, which furthered the motion of the UN Sustainability goals, ultimately making Earth a better home and improving the lives of all its inhabitants.



*Mahtab Dastur is a 15 year-old high schooler from Spring, Texas. Using her mother as inspiration, she has volunteered and participated in the community from a very early age, from writing plays (like the one in the recent, successful ZAH Youth*

*Fundraiser), packing lunches for the less fortunate, to making materials for her Sunday School teachers and a lot more. Along with her younger brother Darius, she has her own non-profit, Books2Smiles, which sends books around the world to children who may not have access to them. Mahtab is an avid reader (she can read for hours and not realize where the time has gone!) and loves to dance. Mahtab’s lifelong goal is to make a lasting difference in the world! She is part of the Bringing Clean Water team of the FEZANA Ava Project.*



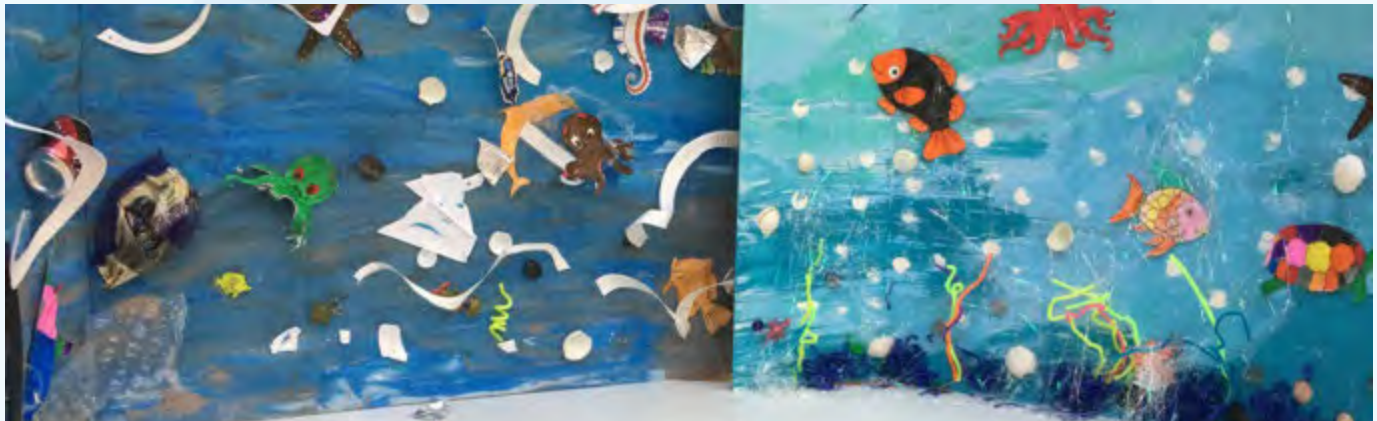
Some Finished Paintings



## Artwork Submitted by Children and Youth



Parmis Jouyban, Age: 9, Los Angeles, CA



### ZAH Z-Camp Painting

Zai Gonda, Jidina Mory, Aanya Kharas, Saloni Pargaonkar, Cyrus Masani, Neville Masani, Darien Vimadalal, Sanaea Warden, Shireen Anklesaria, Mahtaab Mondegarian, Zarius Desai, Josephine Irani, Darius Dastur, Ariana Anklesaria, Cyrus Desai, Ages 5 – 14, Houston, Texas







↑  
Serena Elavia, Age: 10, Lisle, IL



Be conscious of water  
 Water is leaving;  
 We need to make a difference;  
 We need to be green;  
 If we don't, we could vanish;  
 Off the face of earth;  
 That would not be good;  
 New generations can help and  
 conserve;  
 Water's value in life today.

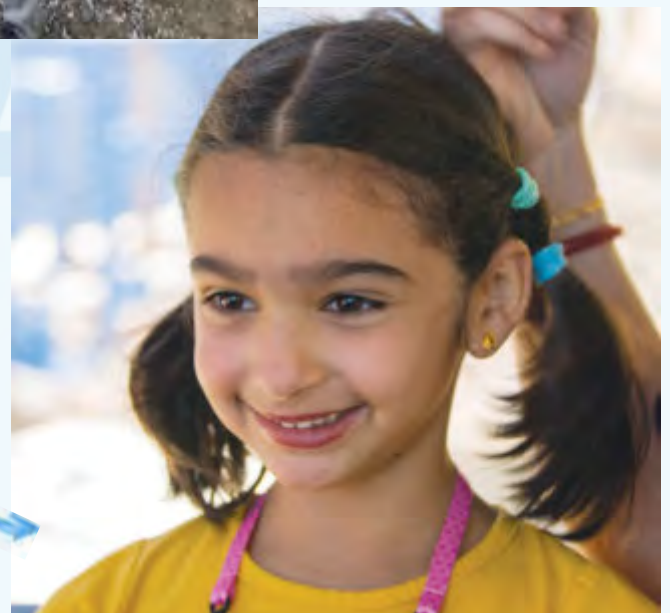
↑  
Daraius Subawalla, Age: 11, Chicago, IL



### A Water Poem

Water water falls from the sky,  
 and when it stops it says goodbye.  
 Water water falls again drip by drop,  
 then it comes to a stop.  
 Water water makes the plants grow  
 it stops when plants know.  
 Water water says hi drip by drop come by.  
 Water water in the sky trickling down as dark clouds go by.  
 Water water flows from rivers to oceans in a specific  
 motion.  
 Water water can be clear just like your reflection in a mirror.  
 Water water thirst quencher  
 gulping gulping from pitcher.

↑  
Aban Mir, Age: 7, Glendale, AZ





Darius Cama, Age: 7, Tenafly, NJ



Shanaya Cama, Age: 5, Tenafly, NJ



Zeus Spenta, Age: 14,  
Vancouver, BC

It is a drawing of a person with multiple arms and legs, reaching out to the environment and encouraging harmony between us and nature. There is also a baby being cradled, representing how we should look after our Earth.







Ava Irani, Age: 16,  
Palo Alto, CA

This painting, that I have made, is my modern depiction of the Amesha Spenta of water, Haurvatat.



Parinaz B. Dastur, Age: 12,  
Fremont, CA

Inspired by the Water  
and Trees group of the  
FEZANA Ava Project.



Hello.

I am Ava and I am a Zoroastrian.

My name means water and I want to do all I can to look after this <sup>VERY IMPORTANT</sup> creation.

AFTER ALL, WE ALL NEED "AVA" (WATER) TO LIVE.

"I can help you Ava.

There are 3 types of water.

- clean or drinking water
- grey water which is used water from washing machines, baths, and taps and
- black water which is waste water from toilets, dishwashers and kitchen sinks.

p.s. My name means water too so I know a lot about this."



wow! Anahita is so clever Must be something in her water?

— THANKYOU Anahita. But I am worried — I know that the clean drinking water, also called SURFACE WATER is unavailable to many different parts of the world. ...and animals too...



"We need rain!"



hee hee..... "what if I do a rainfall dance. Maybe we will get rain for our water needs."

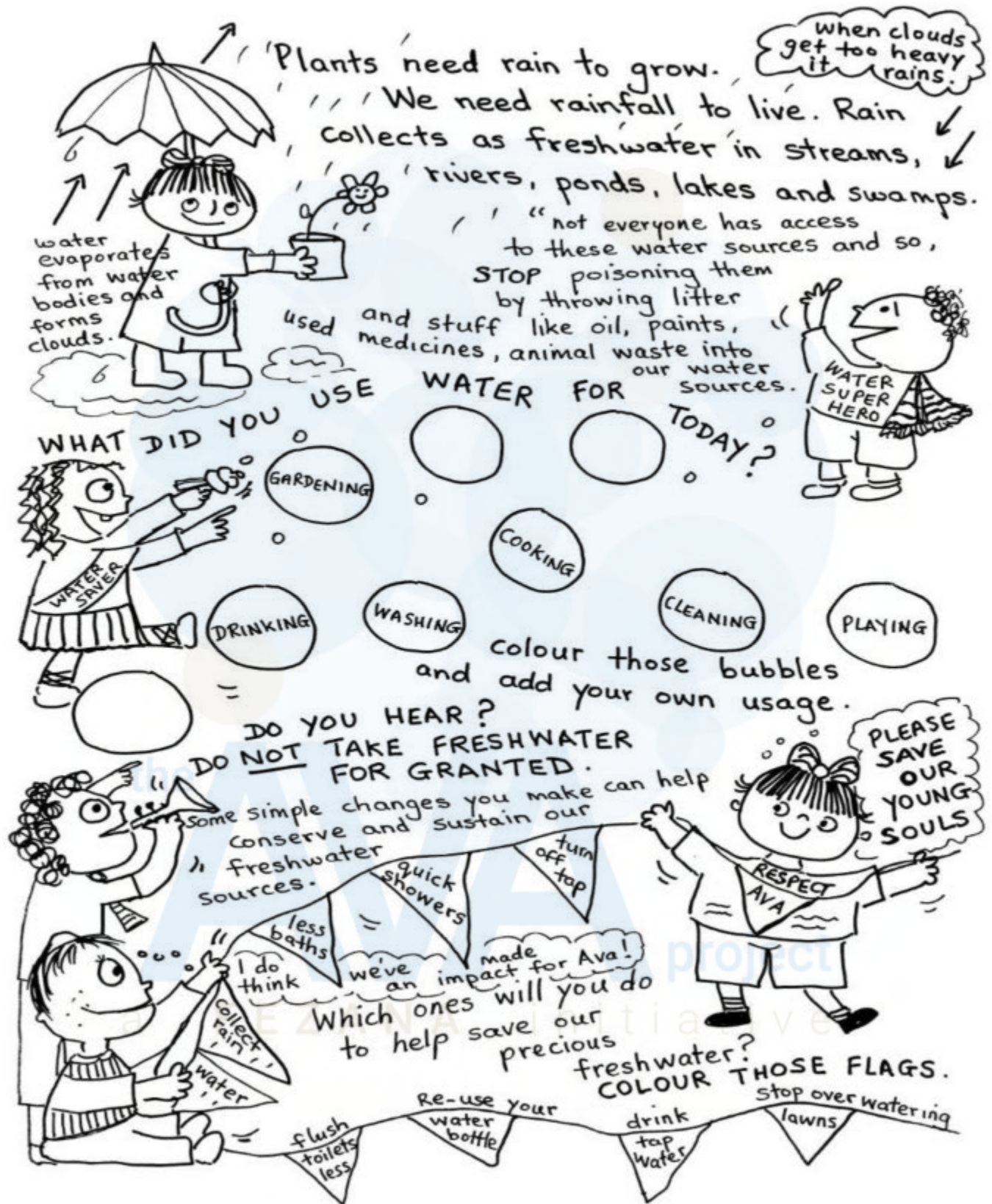
"let's not be silly. We need drinking water from rainfall so we need to plant trees not cut them down."

"if we plant trees from our own lands, they are more hardy and need less water."



"now, they're talking. sigh, humans!"





*Ava Mehta has been very kind to find time in her busy life teaching young children as well as writing and illustrating yet another great book in her style, to put pen to paper and in an instant add her bit for children to educate them in a fun manner and enhance the AVA project in our FEZANA winter issue magazine.*

*Ava is the published author of 'The Story of the Religion, Zoroastrianism' (6<sup>th</sup> Edition) and 'The First Navjote' (now in its 2<sup>nd</sup> Edition).*

*She lives in London and has two charming and very successful daughters who are more in than out of her colourful life and a little dog who sits on her work when she feels Ava her owner, needs a break outdoors.*

*Ava has recently very bravely fought stage 3 cancer and she wrote and illustrated a book of her experiences through her battle with the disease whilst having treatment. Cancer will never define her as she continues bringing light and joy to all she meets in her daily life. She has many exciting projects ahead and we all await her next super book educating our kids and their interfaith friends, to be released soon, in 2022.*

*Hopefully Ava will give us more snippets of her fun and educational illustrations for young children in further FEZANA editions to come! In the meantime, hope children enjoy all she has put together about Ava from a very overflowing talented Ava Mehta!*



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## TRASHED

WRITTEN BY FERZEEN KAVARANA AND ILLUSTRATED BY LEEA CONTRACTOR

Katrina

I am a plastic bag. I have been stuck in a bag rack at Walmart for about 3 hours now, but it has seemed like an *eternity*. Thankfully, I have 2 friends Olive and Lisa who I was manufactured with.

“Can we just be picked up now?” Olive whined for the 20th time in a row.

“Yeah!” I agreed. “Lisa, do you see anything?” Since she was at the front of us all, she could see if we were next up.

“Um, not really but I’m pretty sure there is a human there and — WAIT! Shawn just got picked up!”

“Who’s Shawn?” I asked, puzzled.

“The bag in front of me” Lisa answered. “We’re next!”

“*Finally.*” Olive sighed. All of a sudden, I heard a scream and Lisa was pulled from my side. At that second, I knew I was next. I felt grubby human hands grab my handles. Someone forced my mouth open and stuffed 3 boxes of Wheaties, a jalapeno and a bottle of Italian seasoning into my stomach. I was violently tossed into a cart and was rolled out of the store.

“Ouch!” I yelled.

“Well, now we’re picked up, just like you’ve always wanted Katrina!” Olive snapped.

“I thought it was going to be *fun*, but it turned out to be harsh! The Wheaties box just ripped a hole in my nose!”

“What did you expect?” Olive replied.



We were then picked up once again and shoved into the trunk of the car. After a long trip, we were removed from the car and taken inside. ‘*Hey, maybe the fun is just about to begin*’ I thought to myself. But my theory was to be proved to be wrong as the groceries were wrenched out of my stomach and I was crushed into a small ball and was thrown into a dark can.

“Hello?!” I cried through the darkness. “Olive? Lisa? Are you there?” I heard commotion from outside.

“Sorry! I’ll throw the other one into the recycling!” I heard a human apologize.



Then it struck me. I was in the trash can.

“HELPPPPPP!!!!!!!” I panicked. “GET ME OUTTTT!” but it was no use. Days passed until later that week. The darkness ended. The light was let in. But it was not my bag friends there to save me, it was that human again. The can which I was in was picked up, and I was taken back outside to the brightness. But before I even got to think that I was going to be taken out of the trash, I was dumped into a bigger, more smelly can. ‘*What kind of life is this?!*’

Later that day, the smelly can was dumped into a truck full of trash. I *hated* this. I was just eventually going to get thrown into a bigger can of trash and then a bigger one and so on. Finally, I was dumped into a landfill. Just like I predicted. Inside the landfills were many other plastic bags as well as other trash. It was not fun. I was lonely.

Each morning I woke up to a new day, expecting to have fun. But the new day eventually drifted into night. Days passed in the dump. Then weeks. Then months. Then years. I had given up on life. I had been lying in this dump for years now and still no sign of my friends.



Olive

I watched sadly as I saw Katrina being thrown into the trash can. I was also crushed into a ball, but instead of going into the trash can behind Katrina, I was held in the human’s sweaty hands as the smaller human argued with the bigger one.

“ Callie! How many times have I told you to throw the bags into the recycling bin?! The recycling station started recycling plastic bags a month ago, and its way better for the environment. Go take that one out of the trash!” the bigger human scolded.

“Ew! No!” the smaller one protested.

“Take it out!” the bigger one repeated.

“Sorry! I’ll throw the other ones into the recycling!” the smaller one apologized.

I was taken into another room and thrown into another bin, filled with other plastic bags.

“Katrina?!” I yelled “Where are you!” but I knew what my eyes saw. I didn’t want to believe it. Katrina was in the trash, and I was in the recycling. Before I knew it, Lisa was cannonballing into the recycling bin too and landed









Lisa

I was set onto a table next to a cold plastic cup full of orange juice. My heart was skipping beats. I didn't want to be eaten again. For some reason I still felt as though I was still hoping for a last chance to see my friends. And that's when I heard someone call my name.

"Lisa?" the voice whispered.

"Who is that?" I asked.

"It's me. . . Olive,"

I looked up to where the voice was coming from. And I saw her. She was part of the plastic cup right above my plate.

"Olive?" I said, my breathing fast. I couldn't believe what I was hearing or seeing. The silence was broken as a little girl came and sat behind the plate of sushi, which just so happened to be the plate I was in.

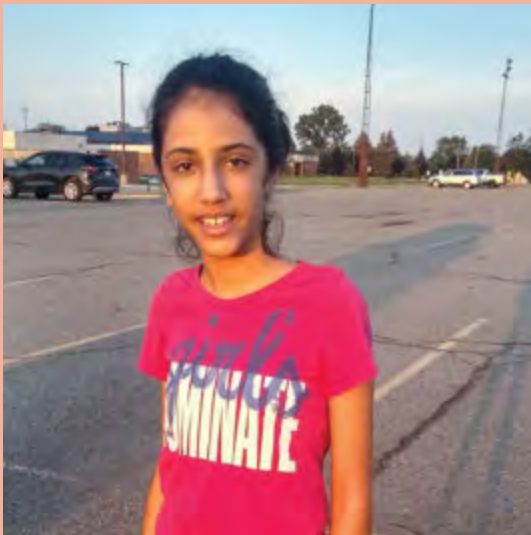
"Lisa?! How did you get there?" Olive asked me.

Instead of answering her question, I said, "Goodbye." as I was shoved into the little girl's mouth.

Olive

"NOOOOOOOOOOOOOOOOOOOOOOOOOOOOO!" I yelled at the top of my lungs. But she was already gone. The girl who I now hated so much picked me up and gulped down all of the orange juice from inside me. Then she passed the cup to her mom who took me from the girl's grasp and thankfully, threw me into the recycle. *It's way better than the trash I thought.*

My life just keeps repeating itself, each time, a new item. Once I was a plastic McDonald's toy, the other time I was a bottle and finally I have found a place to settle. I am a plastic bag. I have been reused about 16 times, but it has seemed like an *eternity*.



**Ferzeen Kavarana** is an 11-year-old who attends Geisler middle school in Novi, Michigan as a seventh grader. She is in charge of the environmental section in the school newspaper club. Originally, a longer version of this story was published there and ended up winning a Superior Distinction award from JEA, the Journalism Education Association. In her free time, she enjoys doing arts and crafts, cooking, and playing her ukulele. Ferzeen is a part of the Educating the Children group of the FEZANA Ava Project.



**Leea Contractor** is a post-graduate student at the Emily Carr University of Art + Design in Vancouver, where she is pursuing her Masters in Design. Prior to this, she graduated from the Indus Valley School of Art and Architecture, following which, she was the Associate Creative Manager for the Dawn Media Group in Pakistan. Leea is passionate about connecting Zoroastrian Youth to their roots and is the first WZO International Youth Representative.



# The Ava Project



[www.fezana.org/theavaproject](http://www.fezana.org/theavaproject)