

EARTH ROOT

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"OFTEN WHEN YOU THINK YOU'RE AT THE
END OF SOMETHING, YOU'RE AT THE
BEGINNING OF SOMETHING ELSE."

- FRED ROGERS, TELEVISION PERSONALITY



About E-magazine

“Earth Root” is an open access e-magazine in the discipline of Environmental sciences published by Earth Root Foundation. The aim of the e-magazine is to provide information and upgradation of knowledge about environmental issues on wider scale and to share ideas and resources to the readers. Using essential knowledge people can lead a healthy life, which is more sustainable and can connect with ongoing efforts for stopping catastrophically the climate change. E-magazine caters to all related environmental aspects ranging from big issues like climate change, renewable energy and pollutants in the atmosphere to the health of human and living beings on Earth. We also take topics of water resources and efforts and measurement to provide optimum use of it; including large scale atmospheric circulation linked with oceans and ecology.

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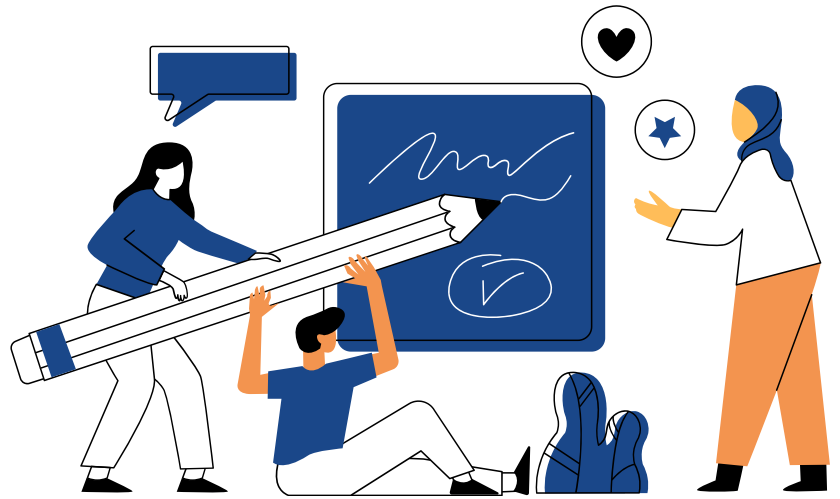
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HARMONIZING NATURE: SONIC SEEDING RESHAPES AGRICULTURE AND RESTORATION

- GEETANJALI, USEM

GURU GOBIND SINGH INDRAPRASTHA UNIVERSITY

Introduction-

In the ever-evolving landscape of agriculture and environmental conservation, a groundbreaking innovation has emerged, one that resonates with the very essence of life itself: sonic seeding. This pioneering technique harnesses the power of sound waves to orchestrate a symphony of growth and restoration, offering a harmonious solution to some of the most pressing challenges facing humanity and the planet.

At its core, sonic seeding is founded on the principle that sound waves possess the remarkable ability to influence biological processes within plants. Delving deep into the intricate melodies of plant physiology, researchers are uncovering the precise frequencies and patterns of sound that resonate most harmoniously with seeds and vegetation. This journey into the realm of sonic biology reveals a symphony of cellular interactions and biochemical responses, where the gentle vibrations of sound become the catalyst for accelerated germination, robust growth, and enhanced resilience.



Applications in agriculture-

1. In agriculture, sonic seeding has the potential to revolutionize farming practices by improving crop yields, enhancing nutrient uptake, and promoting overall plant health.
2. By exposing seeds to specific sound frequencies before planting, farmers can potentially stimulate faster and more uniform germination, leading to earlier and more productive harvests.

3. Sound waves can also influence the structure and health of plant roots, promoting stronger root systems that are better equipped to absorb water and nutrients from the soil. This can result in healthier plants with increased resilience to environmental stressors such as drought.

Applications in ecological restoration-

1. Sonic seeding shows promise in restoring damaged ecosystems by encouraging the growth of native vegetation and enhancing biodiversity.
2. In degraded habitats, such as deforested areas or degraded wetlands, sonic seeding can be used to disperse seeds of native plant species more effectively. This helps to jumpstart the natural regeneration process and accelerates the recovery of ecosystems.
3. By promoting the establishment of native vegetation, sonic seeding contributes to the restoration of ecosystem functions, such as soil stabilization, water filtration, and habitat provision for wildlife.

Environmental benefits-

1. One of the key advantages of sonic seeding is its potential to reduce the need for chemical inputs in agriculture, such as fertilizers and pesticides. By enhancing the natural processes of plant growth and development, sonic seeding may contribute to more sustainable farming practices with lower environmental impacts.
2. In ecological restoration efforts, sonic seeding can help restore ecosystems more quickly and efficiently, thereby mitigating the loss of biodiversity and ecosystem services associated with habitat degradation and destruction.

Challenges and future directions-

While sonic seeding shows great promise, there are still challenges to overcome, such as optimizing the specific parameters of

sound waves for different plant species and environmental conditions.

Continued research and development are needed to refine sonic seeding techniques and scale up their application in agriculture and ecological restoration. Collaboration between scientists, farmers, conservationists, and policymakers will be essential to realize the full potential of this innovative approach.

As we stand on the threshold of a new era in agriculture and environmental stewardship, let us heed the call of sonic seeding—a symphony of hope, possibility, and harmony with the natural world. From the gentle whispers of seeds stirring to life to the triumphant crescendo of ecosystems reborn, let us embrace this harmonious journey towards a greener, more sustainable future. In the melody of sonic seeding, we find not only the promise of abundance but also the timeless rhythm of renewal that echoes throughout the ages. Let us join together in composing a symphony of sustainability, where the melody of sonic seeding resounds with the beauty and resilience of life itself.

Mechanism of sonic seeding-

1. Low-frequency sound waves are directed towards the plants.
2. The sound waves create vibrations and oscillations within the plant tissues.
3. These vibrations are believed to stimulate certain physiological processes in the plants, such as:
 - Improving nutrient uptake and transport
 - Enhancing photosynthesis and metabolism
 - Increasing cell division and growth
4. The sound waves may also potentially:
 - Improve seed germination rates
 - Increase resistance to environmental stresses
 - Enhance blooming and fruit/vegetable production



WILL WORLD WAR III BE FOUGHT OVER WATER?

- NANCY YADAV, USEM

GURU GOBIND SINGH INDRAPRASTHA UNIVERSITY

Introduction-

Water is one of the introductory requirements and is needed by all life on earth. It dominates a maturity of the space on our earth, covering about 71 of the total face area of Earth. Hydrology is the study of the distribution, vacuity, consumption, and movement of ground water. Water exists in all three of its countries, videlicet, solid(ice), liquid, and gas(sluice) - explaining the significance of understanding the wisdom and structure of water. It's a transparent tintless chemical substance with one oxygen snippet covalently clicked to two hydrogen tittles. Water is cycled continuously on Earth through evaporation, transpiration, condensation, rush, and other means. Water consumption and use is defined as the water that's drawn continuously from face or ground and that's employed in such a way that it's no longer available for farther use. numerous artificial processes, similar as power generation, irrigation, mining, bleaching, paper and pulp product, cloth manufacturing, and food processing, bear water as one of the main ingredients of the process.

Scarcity of water resources-

Water failure, inadequate brackish coffers to meet the mortal and environmental demands of given area. Water failure is inextricably linked to mortal rights, and adequate access to safe drinking water is precedence for global development. Still, given the challenges of population growth, spendthrift use, growing pollution, and changes in rainfall patterns due to global warming, numerous countries, and major metropolises worldwide, both fat and poor, faced adding water failure in the 21st century. Even in countries with acceptable water coffers, water failure isn't uncommon. Although this may be due to a number of factors - collapsed structure and distribution systems, impurity, conflict, or poor operation of water coffers it's clear that climate change, as well as mortal factors, are decreasingly denying children their right to safe water and sanitation. Water failure limits access to safe water for drinking and for exercising introductory hygiene at home, in seminaries and in healthcare installations. When water is scarce, sewage systems can fail and the trouble of constricting conditions like cholera surges. Scarce water also becomes more precious.

Growing demand for water-

Over the once 100 times, global water use has increased nearly eight times. This is due to a combination of population growth, profitable development, and changing consumption patterns. It's estimated that water demand will continue to rise and this will present important challenges for the future. Freshwater is essential for healthy lives and a healthy terrain. Ecosystems depend on the vacuity and quality of water to thrive. We humans also depend on water for the food we eat, the energy we induce, the goods we produce and, of course, our drinking, cuisine and cleanliness. This makes the security of our water coffers, critical for our well-being and our earth. Only about 0.3 of our freshwaters is set up in fluently accessible lakes, gutters, and wetlands. Of the freshwater that's available, it's estimated that we formerly use further than half of this.

Potential conflicts over water-

Water conflict generally refers to violence or controversies associated with access to, or control of, water coffers, or the use of water or water systems as munitions or casualties of conflicts. The term water war is colloquially used in media for some controversies over water, and frequently is more limited to describing a conflict between countries, countries, or groups over the rights to pierce water resources. Water conflicts can do on the intrastate and interstate situations. There's a growing number of water conflicts that go undetermined, largely at the sub-national position, and these will come more dangerous as water becomes scarcer, climate changes alter original hydrology, and global population increases.

Impacts of a water war-

One billion people don't have access to safe water - a problem that will probably increase as the world population grows from 6.8 billion people now to about 9.0 billion by 2050.

This problem probably will come especially severe in countries with high population growth rates that partake a major source of brackish with other countries. Conflicts over water, both within countries and between countries, are sprucely adding. Still, many of these conflicts have led to violence. Major beginning reasons for these conflicts include low downfall, shy water force, and reliance on one major water source high population growth and rapid-fire urbanization; modernization and industrialization; and a history of fortified combat and poor relations between countries and among groups within countries. Violent conflict over water, like other fortified conflict, can have disastrous health consequences for individualizes and populations, including not only death, injury, illness, and long-term physical and internal impairment, but also destruction of the health-supporting structure of society, including systems that give freshwater; forced migration, which generally decreases access to freshwater; and diversion of mortal and fiscal coffers, including coffers to maintain and ameliorate access to freshwater

Preventing Conflicts Over Water-

Several possible approaches can help conflicts over water. One set of approaches consists of measures to increase the vacuity of water, including reducing use of water, similar as by dwindling extravagant uses and adding effective uses; adding vacuity of clean water, similar as by reducing artificial pollution and sewage impurity of water, perfecting sewage and wastewater treatment, and perfecting watershed operation; establishing and maintaining new groundwater wells; designing and enforcing bettered styles of desalinization; and expanding use of greywater (wastewater from domestic conditioning that can be reclaimed for some uses)

Another set of approaches aims to resolve conflicts over water before they boil over - that is, before they come violent or have other serious consequences.

Similar preventative measures include laws and regulations at the original, state or parochial, public, or transnational position; visionary cooperation among nations or among countries or businesses within nations; and agreement and arbitration. Internationally, there have been further than 3800 unilateral, bilateral, or multinational affirmations or conventions concerning water, including 286 treaties. Visionary cooperation can help resolve conflicts over water and help maintain public health, food security, and social, environmental, and profitable stability. It can also help violent conflict over water and help make sustainable peace.

ADDITION READINGS

Introduction of the first water conservation treaty

The Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water Convention) was adopted in 1992 and entered into force in 1996. It brings together almost all countries sharing transboundary waters in the pan-European region, and is expected to achieve broader participation with its global opening to all United Nations Member States. This Guide constitutes a commentary to the Convention's provisions, providing explanations of the legal, procedural, administrative, technical and practical aspects of the Convention's requirements for appropriate implementation. It aims to strengthen the understanding of the Convention among current and future Parties, international partners, non-governmental organizations and academia.

URI CASTS SHADOW ON INDUS TREATY

The Indus Waters Treaty, 1960, explained

1 What is the treaty?
The Indus Waters Treaty, 1960, is a water sharing pact between India and Pakistan that covers six rivers beginning in India and flowing into Pakistan. The treaty was signed on September 19, 1960.

2 What is the foundation of the treaty?
The preamble to the treaty aims at satisfactory utilisation of the Indus system of rivers (Ravi, Beas, Sutlej, Indus, Jhelum and Chenab) based on the goodwill between the two countries. It was essentially a confidence building measure between the two neighbours.

3 What are the Indian and Pakistani shares in the Indus rivers system?
The treaty divides the Indus system into two segments: Eastern Rivers - Sutlej, Beas and Ravi and Western rivers - Indus, Chenab and Jhelum. India gets right of unrestricted use over the Eastern rivers. Pakistan is entitled to "unrestricted" use of the Western rivers. India is under obligation to let flow the western rivers unrestricted.

4 What are the limits in using the treaty?
Both India and Pakistan have the right to non-consumptive use. However, both sides have the rights of drainage issues and river conservation aspects. Both sides are mandated to prevent pollution of the rivers. As responsible partners, both sides are expected to create permanent Indus Commissions with Commissioners in charge.

5 What is the dispute resolution mechanism mentioned in the treaty?
Any dispute will have to be examined by the Commissioners. Under Article 8 of the treaty, both sides are expected to meet at least once a year to discuss bilateral problems. However, after the Uri attack, Prime Minister Narendra Modi has decided to suspend talks between the Commissioners, and has stopped short of reviewing the treaty.

6 Can India abrogate or withdraw from the treaty?
Experts suggest that India can exercise the sovereign right of a state under Article 64 of the "Vienna Convention" to withdraw from any international treaty. Article 64 provides for sovereign states to withdraw from international treaties.

Why is the treaty vital for Pakistan?
The water of the Indus system flowing into Pakistan helps irrigate about 110,000 square kilometres and supports its agriculture belt in Punjab and Sindh.

SOURCE:- [HTTPS://WWW.CIVILDAILY.COM/NEWS/BACK-IN-NEWS-INDUS-WATER-TREATY-IWT/](https://www.civildaily.com/news/back-in-news-indus-water-treaty-iwt/)



ROARING SUCCESS EVALUATING INDIA'S CONSERVATION EFFORTS

- VARNA SREE KUMAR

MS, CELLULAR AND MOLECULAR MEDICINE
UNIVERSITY OF ARIZONA

India proudly holds the title of having the largest tiger population in the world, a testament to its everlasting dedication to wildlife conservation. In 1973, the government of India launched "Project Tiger", marking the beginning of an innovative approach to preserving tigers. By this initiative, India leads the global charge in protecting these magnificent species with over 70% of the world's tiger population. The National Tiger Conservation Authority (NTCA), established under the Wildlife (Protection) Act of 1972, plays a pivotal role in strengthening tiger conservation efforts in India. Operating under the Ministry of Environment, Forests and Climate Change (MoEFCC), NTCA provides oversight and guidance through advisories and normative guidelines, informed by assessments of tiger population and ongoing conservation initiatives. Initially comprising 9 reserves, this project has grown to include 55 reserves in 18 states that are part of the tiger range. Over ~79,000 square kilometres of pristine forests make up these reserves. The project operates on a core/buffer strategy, with core zones designated as national parks or sanctuaries,

and buffer areas comprising a mix of forest and non-forest land managed for multiple purposes. Project Tiger places emphasis on the protection of tigers only in the core zones, while in the buffer zones, it employs a people-centred strategy to promote inclusion. Ecotourism is welcomed in 36 of these beautiful reserves. Destinations like Ranthambore and Jim Corbett national park provide more than just a peek into tiger's realm.

India's commitment to monitoring tigers, co-predators, prey and their habitats is unparalleled representing the largest biodiversity survey worldwide. Innovations such as M-STrIPES mobile phone application, which digitally records field data with GPS geotagging, significantly enhanced accuracy and reduced human error. Additionally, advancements like the CaTRAT software, employing artificial intelligence for automated segregation of camera trap photographs, and the ExtractCompare program for fingerprinting tigers from their stripe patterns, revolutionized data analysis, ensuring a comprehensive understanding of tiger populations and their ecosystems.

The NTCA has embarked on significant initiatives to strengthen tiger conservation in India, including "active managerial interventions" aimed at reintroducing tigers in areas where they have locally disappeared. Successful collaborations between the MoEFCC, State Governments, and the Wildlife Institute of India have led to the reintroduction of tigers in Sariska (Rajasthan) and Panna (Madhya Pradesh) Tiger Reserves since June 2008. The NTCA's rigorous monitoring efforts, including radio collaring, have provided valuable insights into the behaviour and spatial use of reintroduced tigers, highlighting the success of such endeavours in reinforcing tiger conservation efforts. This pioneering scientific undertaking, the first of its kind globally, underscores the efficacy of collaborative efforts and state-of-the-art technology in safeguarding endangered species.

Assessing tiger reserve management is vital for their survival. After tigers vanished from Sariska Tiger Reserve, India mandated an independent audit by the C&AG and MoEFCC, with the report to be presented in the Parliament.

The Wildlife Institute of India, in collaboration with global experts and NTCA, developed the Management Effectiveness Evaluation (MEE) Framework for evaluating Tiger Reserves, covering design issues, management systems, and conservation efforts. India is among the few countries institutionalizing the MEE Process, starting evaluations in 2006, with four repeat cycles conducted every four years until 2018. This process stands as a significant approach for tiger and landscape connectivity conservation and management.

The journey doesn't end with tiger conservation. It extends to the protection of all species that call these reserves home. By adopting a holistic approach to conservation and implementing targeted strategies tailored to the specific needs of each endangered species, we can replicate the success achieved with India's tiger population and secure a brighter future for biodiversity worldwide.

Name	Established	Area (in km ²)	State
Mudumalai wildlife sanctuary	1940	321.55	Tamil Nadu
Hazaribagh wildlife sanctuary	1954	183.89	Jharkhand
Mount Abu wildlife sanctuary	1960	288.84	Rajasthan
Ghana bird sanctuary	1982	28.73	Rajasthan
Anamalai wildlife sanctuary (Indira Gandhi wildlife sanctuary and National Park)	1989	117.10	Tamil Nadu
Jaldapara wildlife sanctuary	2012	216	West Bengal

SOURCE:-

[HTTPS://WWW.RESEARCHGATE.NET/FIGURE/LIST-OF-SOME-MAJOR-WILDLIFE-SANCTUARIES-IN-INDIA_TBL2_350445788](https://www.researchgate.net/figure/LIST-OF-SOME-MAJOR-WILDLIFE-SANCTUARIES-IN-INDIA_TBL2_350445788)



OUR FRAGILE EARTH: A CALL FOR ENVIRONMENTAL ACTION

- PAWAN KUMAR CHAUDHARY
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The environment, a tapestry woven from air, water, land, and countless living organisms, forms the very foundation of our existence. It sustains us, nourishes us, and provides a breathtaking tapestry of life unlike anything else in the known universe. However, this intricate web is facing unprecedented challenges, demanding immediate attention and collective action.

The Looming Threats:

- Our planet is grappling with a multitude of environmental issues, each posing a significant threat to the delicate balance of our ecosystem. Here are some of the most pressing concerns.
- **Climate Change:** The Earth's climate is undergoing a rapid transformation, primarily driven by the emission of greenhouse gases like carbon dioxide. This warming trend disrupts weather patterns, melts glaciers, and raises sea levels, impacting everything from food security to biodiversity.

- **Pollution:** Our activities pollute the air we breathe, the water we drink, and the land we inhabit. Industrial waste, vehicle emissions, and agricultural practices contribute significantly to this problem, jeopardizing human health and harming ecosystems.
- **Deforestation:** The destruction of forests, often for unsustainable practices like logging and resource extraction, has far-reaching consequences. It disrupts natural habitats, reduces biodiversity, and weakens the Earth's ability to absorb carbon dioxide, further accelerating climate change.
- **Loss of Biodiversity:** The variety of life on Earth is dwindling at an alarming rate. Habitat destruction, climate change, and unsustainable hunting are pushing numerous species towards extinction, disrupting the intricate web of life that sustains us all.

The Consequences of Inaction:

Ignoring these environmental threats is not an option. The consequences of inaction are dire and far-reaching, impacting not only our generation but also generations to come

Rising sea levels could inundate coastal cities, extreme weather events could become more frequent and destructive, and food security could be jeopardized due to disrupted weather patterns and declining soil fertility. The loss of biodiversity would not only impoverish our natural world but also disrupt vital ecosystem services, impacting everything from pollination to water purification.

A Call to Action-

- The good news is that it's not too late to reverse the course. By taking collective action and embracing sustainable practices, we can still create a healthier planet for ourselves and future generations. Here are some ways we can contribute:
- Reduce our carbon footprint: Utilize public transport, cycle, or walk whenever possible. Invest in energy-efficient appliances and adopt sustainable practices at home.
- Embrace renewable energy: Support the transition to renewable energy sources like solar, wind, and geothermal power. Advocate for policies that promote clean energy solutions.
- Conserve resources: Reduce, reuse, and recycle whenever possible. Be mindful of your consumption habits and avoid unnecessary waste generation.
- Protect our forests: Support organizations working towards forest conservation and reforestation efforts. Choose wood products from sustainable sources and advocate for responsible forestry practices.
- Support sustainable agriculture: Opt for locally grown, organic produce whenever possible. Encourage sustainable farming practices that minimize environmental impact.

- Educate and advocate: Raise awareness about environmental issues and engage in discussions with friends, family, and communities. Support policies and initiatives that promote environmental protection.

Conclusion-

Protecting our environment is not just a responsibility, it's a necessity. By acknowledging the challenges, understanding the consequences, and taking collective action, we can build a more sustainable future for ourselves and generations to come. Remember, every small step counts, and together, we can make a significant difference. Let's work together to ensure that our fragile Earth remains a vibrant and healthy home for all living beings.

Additional Points to Consider:

- Highlight the role of individuals, communities, and governments in addressing environmental challenges.
- Discuss technological advancements and innovations that can contribute to environmental solutions.
- Share inspiring stories of individuals and organizations making a positive impact on the environment.
- Encourage readers to take action and provide resources for further information and engagement.
- By sharing knowledge, fostering collaboration, and taking decisive action, we can create a better future for our planet and all its inhabitants. Let's embrace the responsibility to protect our environment and ensure a thriving future for generations to come.

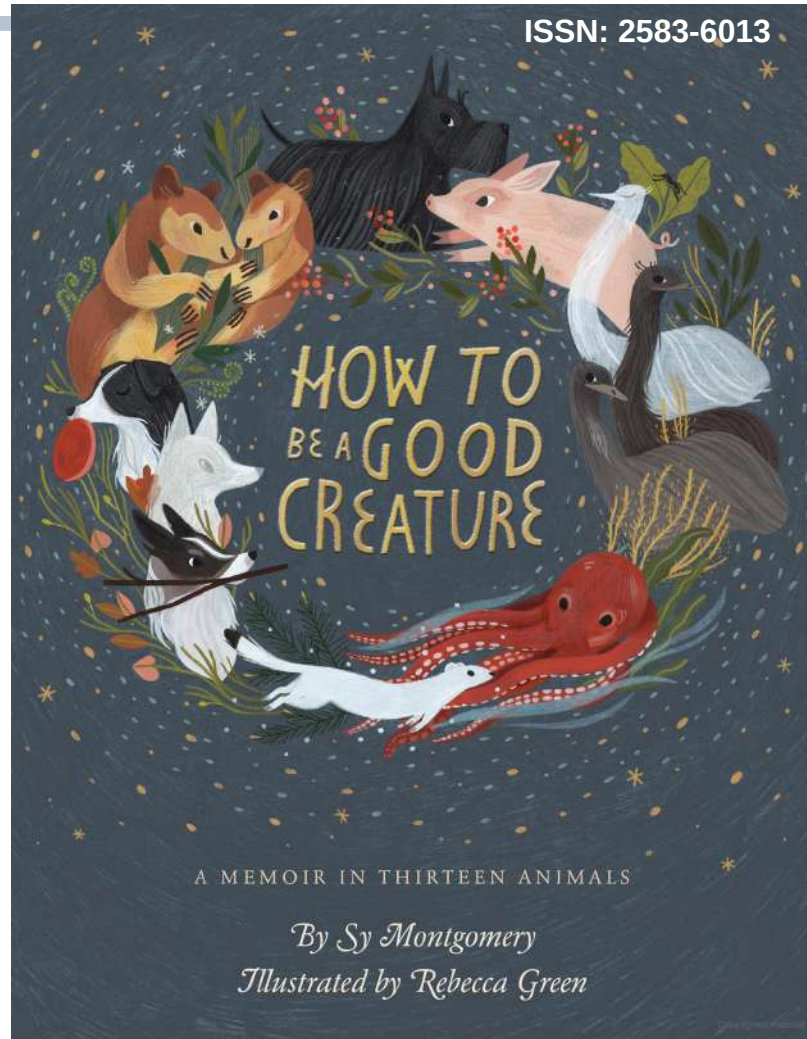
BOOK

RECOMMENDATION

HOW TO BE A GOOD CREATURE: A MEMOIR IN THIRTEEN ANIMALS

Bibliographic information

Title	How To Be A Good Creature: A Memoir in Thirteen Animals
Author	<u>Sy Montgomery</u>
Illustrated by	Rebecca Green
Edition	illustrated
Publisher	HarperCollins, 2018
ISBN	1328528235, 9781328528230
Length	208 pages
Subjects	<u>Nature</u> > <u>Animals</u> > <u>General</u>



About the author (2018)

In addition to researching films, articles, and thirty-six books, National Book Award finalist Sy Montgomery has been honored with a Sibert Medal, two Science Book and Film Prizes from the National Association for the Advancement of Science, three honorary degrees, and many other awards. She lives in Hancock, New Hampshire, with her husband, Howard Mansfield, and their border collie, Thurber.

Rebecca Green is an illustrator of many children's and middle grade books, including *The Unicorn in the Barn*, *Iqbal and His Ingenious Idea*, *Madame Saqui*, and *From Far Away*. She is also the author and illustrator of *How to Make Friends with a Ghost*. This is her second collaboration with Sy Montgomery, their first being *How to Be a Good Creature*. She resides with her husband and their lovely animals, Mori and Junie B.

Summary

National Book Award finalist Sy Montgomery reflects on the personalities and quirks of 13 animals—her friends—who have profoundly affected her in this stunning, poetic, and life-affirming memoir featuring illustrations by Rebecca Green.

Understanding someone who belongs to another species can be transformative. No one knows this better than author, naturalist, and adventurer Sy Montgomery. To research her books, Sy has traveled the world and encountered some of the planet's rarest and most beautiful animals. From tarantulas to tigers, Sy's life continually intersects with and is informed by the creatures she meets.

This restorative memoir reflects on the personalities and quirks of thirteen animals—Sy's friends—and the truths revealed by their grace. It also explores vast themes: the otherness and sameness of people and animals; the various ways we learn to love and become empathetic; how we find our passion; how we create our families; coping with loss and despair; gratitude; forgiveness; and most of all, how to be a good creature in the world.

SOURCE:- GOOGLE BOOKS

The Shiny Treasure

As I soar above the ocean
My wings guiding me gently on the currents
All I see beneath me
Is the of magnificence the sea

Sparkling objects,
catching the sun's beautiful rays.
Shiny treasures,
glistening just beneath the waves.

I sing out to my friends gleefully!
Come join and see what treasures
lie just below the water's surface.

We circle and dive to see who can capture the shiniest prize.
Grabbing the alluring riches
In our beaks and claws
As fast as birdly possible.

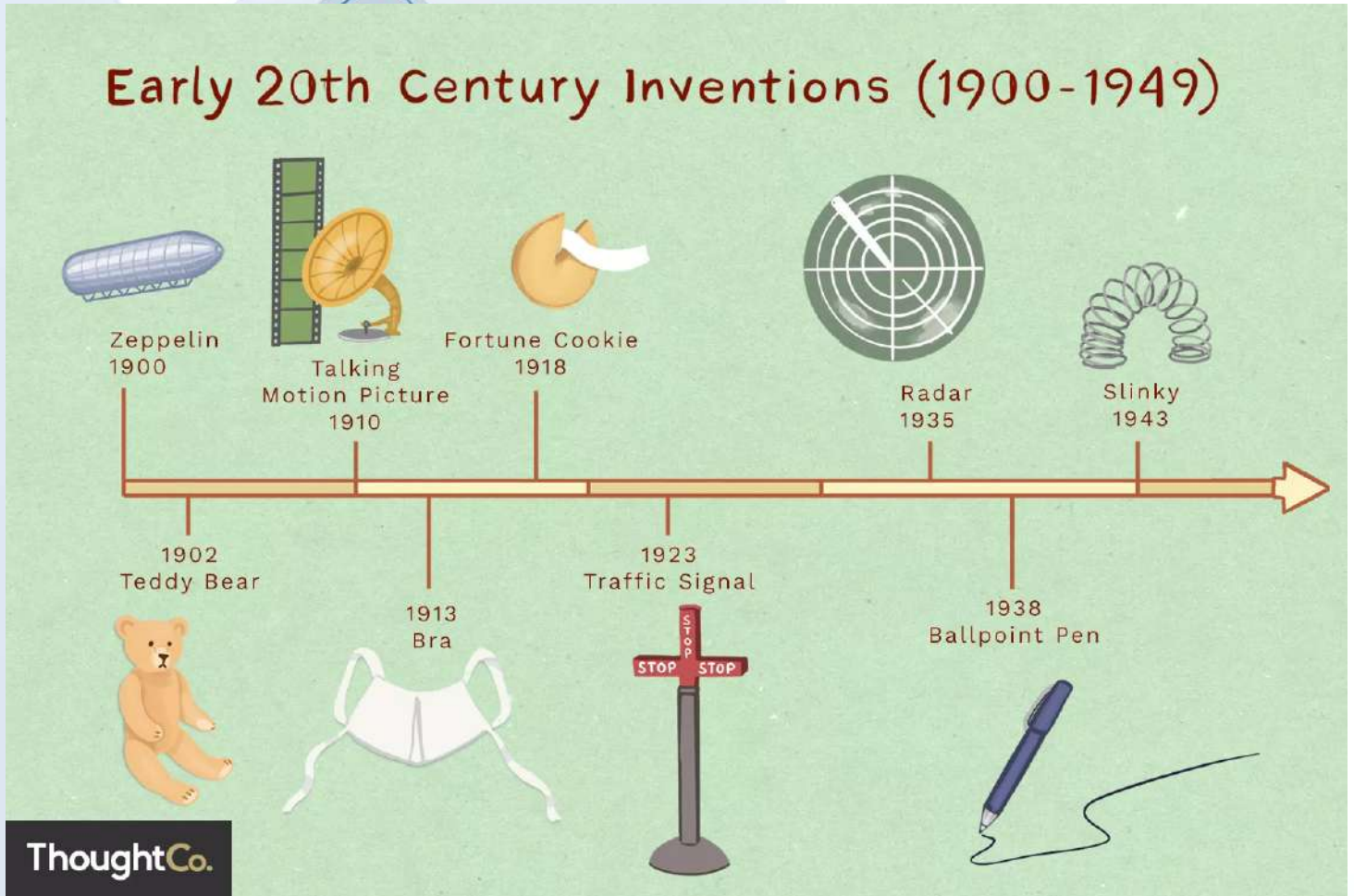
We race to see who can gobble their loot the fastest.
But wait! What did we just eat?
Was it a beautiful treasure
Or a deadly treat.

Our stomachs answer with despair.
Sick, dying, dead.
Birds falling from the sky.

Why must man
Turn our oceans into their trash can?
Harming us without a care.
Those beautiful treasures
The beginning of our demise.

Elijah Davis
Chicago, IL
2015, Junior, Poetry
& Spoken Word

20TH CENTURY INVENTION TIMELINE 1900 TO 1949



source:- <https://www.thoughtco.com/20th-century-timeline-1992486>

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