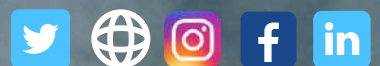


# EARTH ROOT

Volume **36**  
MAY, 2024

“Progress is impossible without change, and those who cannot change their minds cannot change anything.”

-George Bernard Shaw



# 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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<b>Email ID -</b>	<a href="mailto:info@earthrootfoundation.org">info@earthrootfoundation.org</a> <a href="mailto:vivekpanwar@earthrootfoundation.org">vivekpanwar@earthrootfoundation.org</a>
<b>Mobile No. -</b>	+91 876631774 +91 99990013202
<b>Website -</b>	<a href="http://www.earthrootfoundation.org">www.earthrootfoundation.org</a>
<b>Address -</b>	456, pocket B, Sector -13 Dwarka, New Delhi -110078





## **DR. VIVEK PANWAR**

### **Editor-in-Chief**

Assistant Professor, Department of Physics, Sri Venkateshwara College, University of Delhi, Benito Juarez Marg, Dhaula Kuan, New Delhi, Delhi 110021, India

Email: [vivek@svc.ac.in](mailto:vivek@svc.ac.in)

Profile Link: [http://www.svc.ac.in/SVC\\_MAIN/Departments/FacultyPhysics/Vivek.php](http://www.svc.ac.in/SVC_MAIN/Departments/FacultyPhysics/Vivek.php)

## **PROF. SURENDRA KUMAR DHAKA**

### **Editor**

Professor, Department of Physics & Electronics,  
Rajdhani College, University of Delhi, Ring Road, Raja Garden, New  
Delhi – 110015, India

Email: [skdhaka@rajdhani.du.ac.in](mailto:skdhaka@rajdhani.du.ac.in)

Profile Link: <https://www.rajdhanicollege.ac.in/Base/faculty/159>



## **DR. NARENDRA SINGH**

### **Editor**

Aryabhata Research Institute of Observational Sciences (ARIES),  
Manora Peak, Nainital – 263001, Uttarakhand, India

Email: [narendra@aries.res.in](mailto:narendra@aries.res.in)

Profile Link: <https://www.aries.res.in/people/user-profile/sci/76>



## **DR. DEEKSHA KATYAL**

### **Editor**

Associate Professor, University School of Environment Management,  
Guru Gobind Singh Indraprastha University, Sec-16C, Dwarka, New  
Delhi – 110078, India

Email: [deekshakatyal@ipu.ac.in](mailto:deekshakatyal@ipu.ac.in)

Profile Link: [http://www.ipu.ac.in/usem/Associate\\_Professors.php](http://www.ipu.ac.in/usem/Associate_Professors.php)



## **DR. PAWAN KUMAR**

### **Editor**

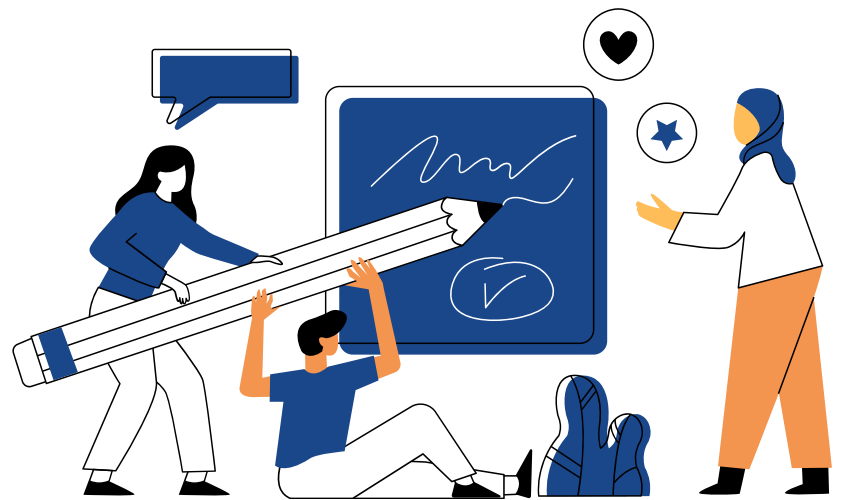
Assistant Professor, Department of Chemistry,  
Rajdhani College, University of Delhi, Ring Road, Raja Garden, New  
Delhi – 110015, India

Email: [drpkumar@rajdhani.du.ac.in](mailto:drpkumar@rajdhani.du.ac.in)

Profile Link: <https://www.rajdhanicollege.ac.in/Base/faculty/248>



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# THE SUSTAINABLE REVOLUTION OF COCONUT HUSKS

- VARNA SREE KUMAR

MS, CELLULAR AND MOLECULAR MEDICINE  
UNIVERSITY OF ARIZONA

Sustainability, in essence, is the effort to meet the needs of the present without compromising the ability of future generations to meet their own needs. It fosters harmony between environmental, social, and economic dimensions to ensure a balanced and thriving existence for all life on our planet. Embracing sustainability requires a shift in mindset and practices towards more responsible consumption and production patterns. One such remarkable example unfolds in the Philippines, where transforming coconut waste into natural insulation mitigates plastic pollution and fosters community empowerment.

In the Philippines, coconut farming is a vital industry contributing significantly to the economy. However, the production of coconut oil generates substantial waste in the form of coconut husks, which are often burned, contributing to air pollution and environmental degradation. Recognizing this issue, Tamara Mekler and David Cutler devised a solution to repurpose this waste into valuable resources.

The process of coconut waste transformation is a fascinating journey. It begins with collecting waste husks from coconut farms, diverting them from the harmful practice of burning. These husks are then transported to a factory, where they undergo processing to extract fibers. Subsequently, these fibers are stitched and fused, creating insulation panels. These panels are utilized to produce eco-friendly coolers, replacing traditional plastic styrofoam. This step-by-step process showcases the practicality of sustainable innovation.

Each innovative nutshell cooler utilizes 37 coconut husks and incorporates shells from 50 recycled plastics, further reducing environmental impact. Notably, this initiative has saved 2,43,708 coconut husks, demonstrating the potential for scalable impact. Moreover, beyond environmental benefits, this initiative provides additional income opportunities for local farmers, fostering economic sustainability within communities. This dual benefit of environmental and economic sustainability is a hallmark of successful sustainable innovation.



The coconut waste transformation case is not just a local success story but a global inspiration. It exemplifies the power of sustainable innovation in addressing environmental challenges while promoting economic and social well-being. By repurposing waste materials and embracing natural alternatives, we can significantly reduce pollution and mitigate the adverse effects of unsustainable practices. Initiatives like the nutshell coolers offer practical solutions and inspire a shift towards more responsible consumption habits.

But this is not just about the Philippines. Considering this strategy, it becomes clear that these practices should not remain confined to a single region. Instead, they should serve as a beacon for global adoption. Other countries dealing with similar environmental issues can learn from this example and implement initiatives tailored to their unique issues. We can collectively work towards a more resilient future by fostering collaboration and knowledge exchange on sustainable practices.

## THE COCONUT

### Coir

Fibers of the brown and green coconut can be processed into:

- Carpets, rugs & mats
- Plant soil enrichment
- Brushes
- Fishing nets
- Mattress filling
- Flower pots

### Husk

Can serve as:

- Fuel
- Charcoal
- Handicraft
- Ropes and strings
- Mosquito repellent
- Aquarium filter

### Flower

Before it grows into a coconut:

- Coconut syrup
- Coconut sugar
- Coconut candy
- Coconut wine

### Shell

Material for:

- Bowls
- Utencils
- Charcoal
- Musical instruments
- Pet houses
- Handicraft

### Meat

Produces:

- Coconut milk
- Coconut oil
- Coconut flour
- Coconut candy
- Coconut jelly
- Shredded coconut
- Coconut butter

### Water

From green coconuts:

- Natural energy drink full with electrolytes
- Emergency hydration fluid
- Coconut vinegar





# INDIA'S THREE-STAGE NUCLEAR PROGRAM: A STRATEGIC JOURNEY UNVEILED

- KAMALDEEP KUMAR

DEPARTMENT OF PHYSICS AND ASTROPHYSICS,  
UNIVERSITY OF DELHI.

## Abstract:

India's nuclear program has been a subject of global interest and scrutiny, particularly its three-stage nuclear program formulated in the early years of independence. Established in the backdrop of security concerns and energy demands, this ambitious initiative aimed to utilize the country's vast thorium reserves for sustainable nuclear energy production. This article delves into the inception, objectives, progress, challenges, and future prospects of India's three-stage nuclear program, providing detailed insights into its significance in the global nuclear landscape.

**Introduction:** In the early 1950s, shortly after gaining independence, India embarked on a journey to harness nuclear energy for peaceful purposes. Driven by the vision of achieving energy self-sufficiency and bolstering its strategic capabilities, India's nuclear program underwent significant developments over the decades. Central to this program was the formulation of a three-stage nuclear strategy, which aimed to leverage the country's abundant thorium resources.

**Stage I: Uranium Fueled Reactors** The first stage of India's nuclear program focused on establishing a fleet of pressurized heavy water reactors (PHWRs) fueled by natural uranium. This phase, initiated with the commissioning of the CIRUS reactor in 1960, aimed to generate plutonium as a byproduct. Over the years, India expanded its PHWR capacity, with reactors like Dhruva (100 MW) and Kakrapar Atomic Power Station (KAPS) Units 1 & 2 (220 MW each) contributing significantly to plutonium production.

**Stage II: Fast Breeder Reactors** The second stage involved the development and deployment of fast breeder reactors (FBRs), which play a crucial role in India's nuclear fuel cycle. The Prototype Fast Breeder Reactor (PFBR) at Kalpakkam, with a capacity of 500 MW, represents a milestone in India's fast reactor technology. The PFBR utilizes a mix of plutonium and uranium-238 as fuel, breeding additional fissile material while generating electricity.

**Stage III: Thorium Utilization** The third and final stage of India's nuclear program entails the utilization of thorium as the primary fuel for nuclear energy generation. With one of the world's largest thorium reserves, estimated at around 300,000 tons, India possesses a strategic advantage in thorium-based nuclear technology. The Advanced Heavy Water Reactor (AHWR), currently under development, is designed to utilize thorium-based fuels and breed uranium-233 for sustained energy production.

**Significance and Challenges:** India's three-stage nuclear program holds immense strategic significance, both in terms of energy security and technological advancement. By leveraging indigenous resources, particularly thorium, India aims to establish a sustainable and secure energy infrastructure while reducing dependence on fossil fuels. Furthermore, the program underscores India's commitment to peaceful nuclear cooperation and non-proliferation objectives.

However, the realization of India's nuclear ambitions is not devoid of challenges. Technical hurdles, regulatory complexities, and international scrutiny pose significant obstacles to the program's progress. Additionally, concerns regarding nuclear safety, waste management, and proliferation risks necessitate careful consideration and stringent oversight.

Despite these challenges, India has made remarkable strides in advancing its nuclear capabilities. The successful operation of the PFBR and ongoing research on thorium-based reactors demonstrate India's commitment to technological innovation and sustainable development. Furthermore, collaborations with international partners, such as the Indo-US Civil Nuclear Agreement, have facilitated access to advanced nuclear technologies and expertise.

**Conclusion:** India's three-stage nuclear program epitomizes the nation's quest for energy independence and technological prowess. From the establishment of uranium-fueled reactors to the realization of thorium-based energy generation,

India's nuclear journey has been marked by resilience, innovation, and strategic foresight. As the country continues to navigate the complexities of the global nuclear landscape, the three-stage program remains a cornerstone of its pursuit of sustainable development and strategic autonomy.

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# BATTLING THE BLAZE: RECENT FOREST FIRES IN UTTARAKHAND

**Dr. Vivek Panwar**  
Assistant Professor

Sri Venkateswara College, University of Delhi

Uttarakhand, known for its serene landscapes and lush greenery, has recently been grappling with a raging adversary: forest fires. The state, nestled in the lap of the Himalayas, has been witnessing an alarming surge in forest infernos, posing a grave threat to its biodiversity, environment, and human settlements. In this article, we delve into the recent spate of forest fires in Uttarakhand, their causes, consequences, and the concerted efforts to combat this ecological crisis.

## **The Blaze Unleashed:**

In recent years, Uttarakhand has become increasingly susceptible to forest fires, especially during the dry season. The year 2024 witnessed a significant escalation in the frequency and intensity of these fires, engulfing vast swathes of forest cover. The fires, exacerbated by factors such as rising temperatures, reduced humidity, and human encroachment, have wreaked havoc on the state's rich biodiversity, including its diverse flora and fauna.

## **Causes of the Inferno:**

Several factors contribute to the ignition and spread of forest fires in Uttarakhand. Human activities such as indiscriminate burning of agricultural waste, unauthorized clearing of land for development, and negligence during recreational activities like camping or cooking are primary catalysts. Additionally, natural causes like lightning strikes and spontaneous combustion of dry vegetation further fuel the flames, amplifying the devastation.

## **Impact on Biodiversity and Environment:**

The repercussions of the forest fires extend far beyond charred trees and scorched earth. Uttarakhand's delicate ecosystem, home to numerous endemic species of flora and fauna, faces irreparable damage. The loss of habitat and biodiversity, disruption of ecological processes, and degradation of soil quality pose long-term challenges for the region's environmental sustainability.

Furthermore, the emission of greenhouse gases during combustion exacerbates climate change, contributing to a vicious cycle of environmental degradation.

**Human Toll and Economic Ramifications:**

Beyond the ecological realm, forest fires in Uttarakhand exact a heavy toll on human life and livelihoods. Rural communities dependent on forests for resources like timber, fuelwood, and medicinal plants suffer significant economic losses. Moreover, the thick blanket of smoke engulfing towns and villages poses serious health risks, particularly respiratory ailments, exacerbating the vulnerability of already marginalized populations.

**Mitigation and Response Efforts:**

Addressing the menace of forest fires demands a multi-faceted approach encompassing prevention, preparedness, and response strategies. Government agencies, NGOs, and local communities collaborate to implement measures such as creating fire lines, conducting controlled burns, and deploying firefighting personnel equipped with specialized equipment. Additionally, public awareness campaigns emphasizing the importance of forest conservation and fire safety practices play a pivotal role in fostering a culture of environmental stewardship.

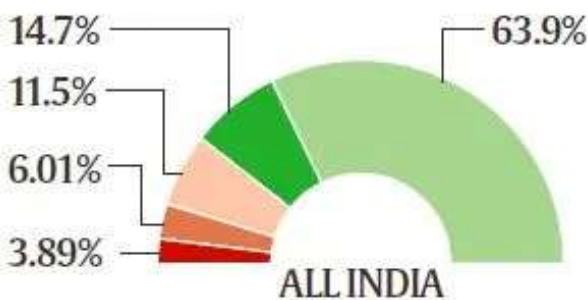
**The Road Ahead:**

As Uttarakhand grapples with the aftermath of yet another wildfire season, the imperative to adopt proactive measures to mitigate future disasters becomes increasingly urgent. Sustainable forest management practices, coupled with robust policies to curb illegal encroachments and promote community participation in conservation efforts, are essential to safeguarding the state's precious natural heritage. Furthermore, investing in research and technology to enhance early warning systems and firefighting capabilities can bolster resilience against the growing threat of forest fires in an era of climate change.

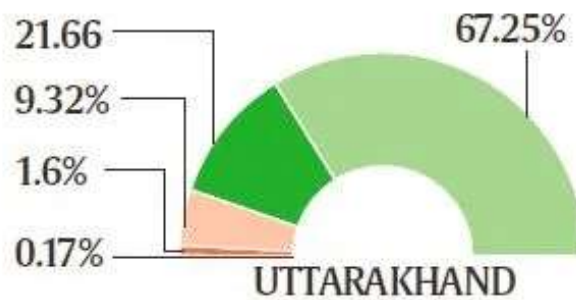
The recent forest fires in Uttarakhand serve as a stark reminder of the fragility of our natural ecosystems and the urgent need for collective action to address environmental challenges. As custodians of the Earth, it is incumbent upon us to adopt a holistic approach towards forest conservation and fire management, lest we risk irreparable harm to the very foundations of life on our planet. Only through concerted efforts and unwavering commitment can we hope to extinguish the flames of destruction and nurture a sustainable future for generations to come.

**HOW FIRE-PRONE ARE FORESTS?**

Forest fire-prone class    ■ Extreme    ■ Very high    ■ High    ■ Moderate    ■ Less



Source : ISFR 2019



Source : ISFR 2019/ Uttarakhand





# TURNING THE TIDE: ADDRESSING THE GROWING CRISIS OF OCEAN PLASTIC POLLUTION

**Dr. Aparna Rai**  
Assistant Professor

**Kamla Nehru College, University of Delhi**

The global climate crisis has intensified, manifesting in numerous and varied environmental challenges worldwide. One recent and prominent issue is the escalating problem of plastic pollution in our oceans. Plastic pollution is not a new concern, but the scale and impact of this problem have reached alarming proportions, requiring immediate and sustained global action.

Plastic pollution primarily arises from the production and improper disposal of plastic products. With over 300 million tons of plastic produced annually, a significant portion ends up in the oceans. This waste includes single-use items like straws, bags, and bottles, which are particularly problematic due to their widespread use and short lifecycle. Unlike organic materials, plastic does not decompose; instead, it breaks down into smaller particles known as microplastics. These microplastics persist in the environment for hundreds of years, posing severe threats to marine life and ecosystems.

The extent of plastic pollution in the oceans is staggering. The Great Pacific Garbage Patch, a massive accumulation of plastic debris located between Hawaii and California, is estimated to cover an area twice the size of Texas. This is just one of many such patches across the world's oceans. These floating islands of trash are not only an eyesore but also a deadly trap for marine animals. Sea turtles, seabirds, and marine mammals often mistake plastic debris for food, leading to ingestion that can result in starvation, poisoning, and death. Additionally, entanglement in plastic waste can cause injury, impaired movement, and drowning.

One of the most insidious aspects of plastic pollution is its impact on the food chain. As marine organisms ingest microplastics, these particles accumulate in their bodies. Small fish consume microplastics, and these fish are then eaten by larger predators, including commercially important species such as tuna and salmon. Consequently, microplastics make their way up the food chain, ultimately reaching humans.



In addition to direct health risks, plastic pollution has significant economic repercussions. The fishing and tourism industries, which are vital to many coastal communities, suffer considerable losses due to plastic debris. Fish populations decline as a result of ingestion and entanglement, leading to reduced catches and economic hardship for fishermen. Coastal areas littered with plastic waste become less attractive to tourists, impacting local businesses and economies dependent on tourism revenue.

Addressing the issue of plastic pollution requires a multi-faceted approach involving governments, industries, and individuals. Policy measures such as banning single-use plastics, implementing extended producer responsibility (EPR) programs, and encouraging the development and use of biodegradable alternatives are essential steps. Countries like Canada, Kenya, and the European Union have taken significant strides in this direction by introducing bans on plastic bags and other single-use items. However, enforcement and compliance remain challenging, necessitating continuous monitoring and adaptation of policies.

Industries play a crucial role in mitigating plastic pollution through innovation and sustainable practices. Companies are increasingly exploring alternatives to traditional plastics, such as biodegradable materials made from plant-based sources. Initiatives like the Ellen MacArthur Foundation's New Plastics Economy aim to redesign the future of plastics by promoting recycling and the use of renewable materials. Moreover, businesses can adopt circular economy principles, where products are designed for reuse, repair, and recycling, minimizing waste generation. Individuals also have a significant part to play in combating plastic pollution. Reducing plastic consumption by opting for reusable products, participating in clean-up efforts, and supporting legislation aimed at curbing plastic waste are tangible actions that collectively make a difference. Education and awareness campaigns can empower people to make informed choices and foster a culture of sustainability.

In recent years, technological advancements have provided new tools to tackle plastic pollution. Ocean cleanup projects, such as The Ocean Cleanup, utilize innovative technologies like floating barriers to capture plastic debris in the ocean. These efforts have shown promise in removing large quantities of plastic waste, although challenges related to scalability and funding persist. Additionally, research into plastic-eating bacteria and enzymes offers potential solutions for breaking down plastic waste more efficiently.

International cooperation is vital to addressing plastic pollution on a global scale. The United Nations has recognized the urgency of the issue, incorporating it into the Sustainable Development Goals (SDGs), specifically Goal 14, which aims to conserve and sustainably use the oceans, seas, and marine resources. Collaborative efforts among countries, non-governmental organizations, and international bodies are essential to developing comprehensive strategies and sharing best practices for reducing plastic pollution.

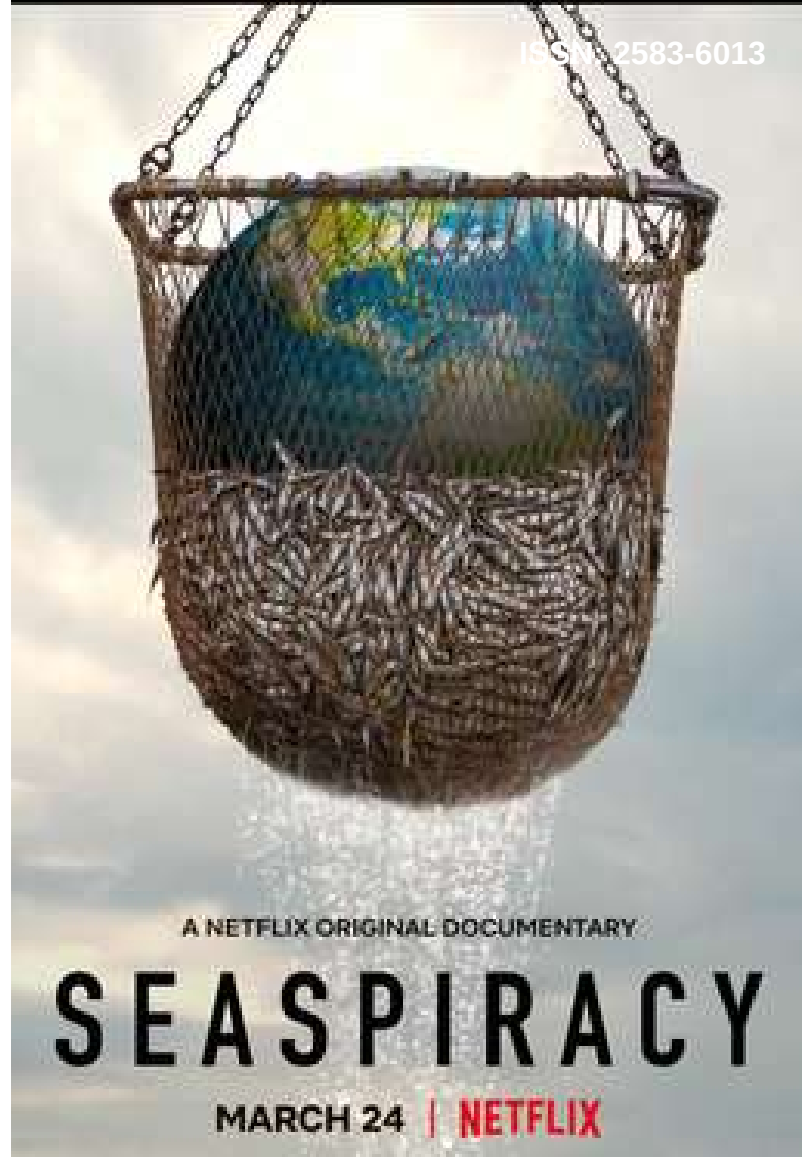
While the challenges posed by plastic pollution are daunting, there is hope in the growing recognition of the problem and the increasing momentum towards finding solutions. Grassroots movements, such as the global #BreakFreeFromPlastic campaign, are gaining traction, advocating for systemic change and holding corporations accountable for their plastic footprints. Environmental organizations continue to push for stronger regulations and innovative solutions, while scientists and researchers work tirelessly to understand the impacts of plastic pollution and develop effective mitigation strategies.

Ultimately, the fight against plastic pollution is a collective responsibility. Governments must implement and enforce robust policies, industries must innovate and adopt sustainable practices, and individuals must make conscious choices to reduce their plastic consumption. By working together, we can mitigate the devastating effects of plastic pollution on our oceans and ensure a healthier, more sustainable future for generations to come.

# MOVIE RECOMMENDATION

## SEASPIRACY

Directed by	Ali Tabrizi
Produced by	<u>Kip Andersen</u>
Cinematography	Ali Tabrizi Lucy Tabrizi
Edited by	Ali Tabrizi Lucy Tabrizi
Music by	Benjamin Sturley
Production companies	A.U.M. Films Disrupt Studios
Distributed by	<u>Netflix</u>
Release date	March 24, 2021
Running time	89 minutes
Language	English



## Synopsis

Tabrizi acts as both the narrator and protagonist of the film, discovering key pieces of information at the same moment as the viewer. This framing device serves to provide narrative momentum and suspense. The film centers early on the collapse of whale, shark, dolphin and sea turtle populations. The film asserts that the focus of environmental groups on comparatively small consumer plastics like straws has obfuscated the larger problem of plastic waste from fishing gear, or ghost nets, as well as the devastation of bycatch. The film also suggests environmental organizations have been unable to define or effectively implement sustainable fishing, sustainable seafood or dolphin-safe products. These criticisms are particularly focused on the Marine Stewardship Council, the Earth Island Institute and the Plastic Pollution Coalition.

The film's settings are global, including the Taiji dolphin drive hunt in southern Japan, whaling in the Faroe Islands, Thai and Chinese fish markets, coastal West Africa, and salmon aquaculture farms in Scotland. At various moments, Tabrizi and his crew appear to face imminent peril from local authorities or corrupt fishing industry players; some of the action is presented through hidden camera techniques, and animation is used to depict scenes of violence. Activities of the Sea Shepherd Conservation Society—an American conservation group focused on direct action at sea—feature prominently in the film, including an extended section documenting illegal fishing practices and worker exploitation in Liberian waters. The film also includes an investigation into modern slavery conditions on Thai fishing vessels, and interviews several survivors.

That the cessation of fish consumption is the solution to collapsing fish stocks and human exploitation remains a consistent message throughout the film. Statistics repeatedly buttress this point, including various fish species listed at >90% wild population loss, and the claim that global oceans could be essentially devoid of fish by 2048. The possibility of fish farming aquaculture is introduced, only to be dismissed after a trip to Scotland. The film suggests that aquaculture is untenable due to the problem of feed for farmed fish and the prevalence of disease and coastal degradation.

SOURCE|| [HTTPS://EN.WIKIPEDIA.ORG/WIKI/SEASPIRACY](https://en.wikipedia.org/wiki/Seaspiracy)



## "Whispers of the Sylvan Realm"

In the heart of emerald halls, where shadows  
dance, There lies a realm untouched, in verdant  
trance.

A canopy of ancient giants, towering high,  
Whispers tales of earth, reaching for the sky.

Within this haven, secrets softly breathe,  
In every rustling leaf, a story beneath.  
A symphony of life, in every hue,  
Where each creature plays its role, tried and true.

Through winding trails and streams that softly  
flow,  
The forest weaves its magic, a timeless show.  
Mysteries lurk in every shadowed glen,  
As light filters through the leafy den.

In twilight's embrace, the forest sighs,  
Underneath the moon's enchanting eyes.  
A sanctuary where souls find solace deep,  
In the embrace of nature's silent keep.

Beneath the boughs, where time stands still,  
A symphony of silence, a tranquil thrill.  
Here, in the heart of nature's grand design,  
We find our souls entwined with the divine.  
In every rustle, every gentle breeze,  
We're reminded of life's profound mysteries.  
For in this forest, where dreams take flight,  
We find our sanctuary, bathed in nature's light.





Associate Editors: Kamaldeep

Publisher

**Earth Root Foundation**

456, Pocket B, Sector-13, Dwarka, New Delhi-110078

www.earthrootfoundation.org | info@earthrootfoundation.org | +91 8766317774

