

BEYOND TREES NETWORK



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#forestday



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Forests and Innovation: New Solutions for a Better World

In 2012, the United Nations General Assembly proclaimed 21 March as the International Day of Forests (#forestday) to celebrate and raise awareness of the importance of all types of forests and of trees outside forests, including urban areas. On 21 March, the U.S. Forest Service and the Beyond Trees Network honor International Day of Forests with our domestic and international partners.

This year's theme, **forests and innovation**, showcases how innovation can help us restore, protect, manage, and use our forests sustainably. Materials derived from forests and trees are being developed as sustainable substitutes for plastics, building materials, fabrics, medicines, and many other everyday items. At the same time, rapidly evolving drone and satellite technology is helping us to monitor and manage our forests, detect, and fight fires and safeguard ecosystems.

On 21 March, we also reinforce the importance of sustainable forest management to support jobs and human well-being, mitigate climate change, and safeguard biodiversity. Within the UN System, forests provide important contributions to the implementation of the UN Strategic Plan for Forests, the Sustainable Development Goals, and the UN Decade on Ecosystem Restoration.

The UN created international days in the aftermath of World War II as a powerful annual advocacy tool to educate the public and mobilize political will and resources. On 21 March, we celebrate all who dedicate their time and efforts, professionally or on a voluntary basis, to promote the sustainability of global forests.

By Cristina Spear, U.S. Forest Service

[Click here to watch the IDF 2024 Video](#)

Front page photo: A student in Bangladesh hugs a tree that she and her classmates tagged using i-Tree. The tag identifies the tree species and its value over the next 20 years. Photo courtesy of the USAID Bangladesh Compass program.



Forest bathing activity that was conducted as part of the National Forest Week in November 2023.

Photo credit: Ciudad Viva

Boskea.pe: An Innovative Digital Platform that Articulates Urban Forestry Projects in Peru

By Asociación Periferia Ciudad Viva and the U.S. Forest Service International Programs (Peru)

The U.S. Agency for International Development (USAID) and the U.S. Forest Service Office of International Programs are working with youth and women-led non-governmental organizations (NGOs) in Peru to improve community resilience through urban forestry initiatives. One such NGO is **Ciudad Viva**, whose objective is to create greener, more resilient cities through nature-based solutions.

In 2023, the project *Pulmoncitos Verdes para ciudades saludables*, or *Green lungs (microforests) for healthy cities*, was implemented to create and maintain green spaces in the country's urban areas through a digital platform called **Boskea.pe**. The platform was developed in collaboration with Peru's National Forestry and Wildlife Service, the Ministry of Environment, and the Association of Municipalities of Peru. The platform connects different stakeholders such as neighborhood communities, schools, civil society organizations, municipalities, universities, and companies.

Earthquake Relief During Ramadan in Morocco

By Kiran Johnson, High Atlas Foundation

For over twenty years, the High Atlas Foundation (HAF) was a non-profit that distributed native fruit tree saplings to schools, farmer cooperatives, and associations of rural Moroccan communities. Around seven months ago, HAF became an organization that also distributes earthquake relief packages.

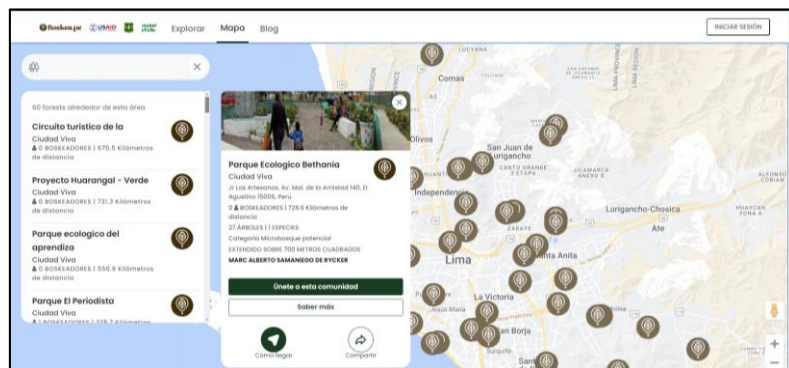
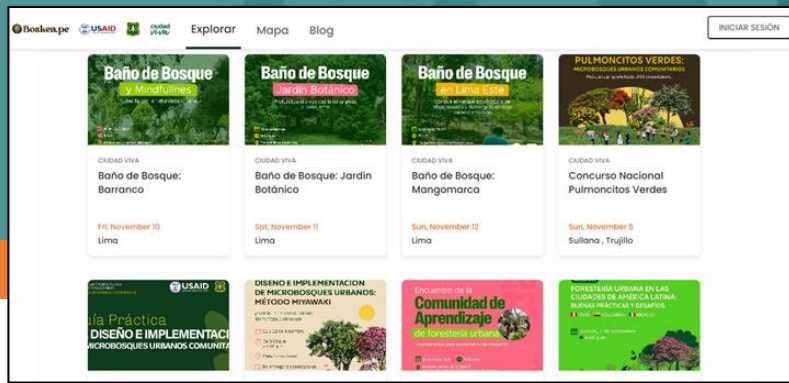
The effects of the September 8th earthquake in Morocco are still being felt and will be for years to come. When the disaster struck, HAF snapped into action, transforming their network and infrastructure created for their sustainable agriculture initiative into something that could distribute relief packages — not just trees.

“One of the communities came to the office last week just to say hi to us. Just to say happy Ramadan,” says Hassan Ahmatay, HAF program assistant and data manager, who has been deeply involved in relief package distribution. Members of this community had traveled nearly four hours from their village, Aghbar. Before the earthquake, HAF had worked with them to construct terraces for farming and plant fruit trees, like pomegranates and olives. Last month, HAF worked with Aghbar leaders to distribute a host of living necessities throughout the community, from stoves and sleeping bags to water filters.

Now, HAF is delivering Ramadan packages. During Ramadan, Muslims fast from dawn to dusk, breaking their fast with a meal called Iftar in the evening. These Ramadan food distribution packages help to complete this aspect of the 30-day period, bringing people together to fast, pray, and reflect with their community.

“We recognize communities as our partners, friends, and families,” says Ahmatay. Before the earthquake, HAF had already worked with many of these communities, like Aghbar, on sustainable development projects, like building canals for water access, women’s empowerment, and tree planting.

HAF is grateful to have been able to innovate on and adapt its vast network—initially built for sustainable agriculture—to provide earthquake relief and Iftar during this year’s Ramadan.



Map of urban forests and microforests on Boskea.pe. Photo credit: Ciudad Viva

Today, the platform visualizes 51 success stories of urban forests and micro forests throughout the country through an interactive map. It strengthens capacities in urban forest management through webinars, guides, courses, and learning materials freely available to the urban forestry community of learning. This group is comprised of more than 500 people, including national and local public officials, companies, professionals, students, and local community members from 19 regions of Peru.

In the coming years, the platform will expand to include more educational resources and opportunities to participate in initiatives to promote and conserve *pulmoncitos verdes* in Peru.

Learn more about the platform at [Boskea.pe \(ciudadviva.pe\)](https://boskea.pe/ciudadviva.pe).

To watch the recent (February 5, 2024) webinar on this tool, [click here](#).



LRI

8°C

EURASIAN OTTER (*Lutra Lutra*)

2021

04:02:51

Photo credit: Lebanon Reforestation Initiative

Bridging The Gap Between Science And People

By Karma Bouazza and Samara P. El-Haddad
Lebanon Reforestation Initiative


With ecological restoration efforts scaling up globally and a need for efforts to be standardized to maximize impact on the ground, the [Lebanon Reforestation Initiative](#) (LRI) has focused on 1) improving research on the ground and 2) building a community-based research approach where efforts are made to bridge the gap between science and people. Planning ecological restoration projects is a crucial step where objectives are set, and the right restorative measures are identified for each objective. With efforts in Lebanon previously focusing on flora research, LRI's Research and Development (R&D) Program is working on identifying gaps that would improve ecological restoration planning, implementation, and monitoring, thus ensuring a sustainable and long-term impact on the restoration of Lebanon's ecosystems and their ecological functions.

Engaging local communities in research has enabled community members to address the environmental challenges they face daily and to evaluate and select restorative measures suitable to improve local ecological conditions, aiding in the scaling up of national ecological restoration efforts and their

sustainable impact on nature and people's livelihoods.

Case Study 1: Conserving The Critically Endangered Eurasian Otter

Since 2020, and through funding from the Disney Conservation Fund and U.S. Forest Service, LRI's R&D has worked on improving the conservation of the critically endangered Eurasian otter in Lebanon through 1) identification of the species distribution in Lebanon, 2) identification of sub-population presence and 3) assessing current riparian habitat quality and connectivity. Local community members were engaged in field research, having a crucial role in collecting field data accurately and in larger numbers, especially considering the large surface of the project study area. Members of the community were trained in related research activities and tasks, such as the collection and storage of otter spraint samples to be analyzed. Mazen Chbeeb, a member of the local community of Aawaynat village in Akkar Governorate, Lebanon, has supported the collection of over 10 spraint samples from multiple locations along the Naher El Kabir River that crosses through Lebanon and Syria and has contributed to crucial results that will aid in the improvement of conservation of Eurasian Otters in Lebanon. Mazen has highlighted that studying the habitat of Eurasian otters is a primary parameter for water quality and that our role in conserving its habitat is crucial to ensure the sustainability of natural resources, such as clean water from rivers.



Mazen also stated that through this project, he is able to identify the location of otters in a non-invasive way and assess their distribution along riparian habitats. He has highlighted the importance of raising awareness about conserving Eurasian otters and their habitat for healthier ecosystems and improved livelihoods.

Case Study 2: Bridging The Gaps In Accurate Diversity Assessment

One of LRI's objectives has been to bridge gaps in accurate and quantitative fauna diversity assessments. During a water environmental DNA (eDNA) pilot study conducted in 2020 (yet to be published), the presence of the forest dormouse (*Dryomys nitedula*) was identified. This species was detected in a sample collected in the vicinity of the Abou Ali River source, located a few kilometers downhill from the Horsh Ehden Nature Reserve (HENR) in Ehden, known for the unique biodiversity it hosts. Although not yet detected in HENR, LRI worked closely with the HENR staff to introduce non-invasive techniques to assess the presence of the forest dormouse in the reserve. Using camera traps and footprint identification techniques, dormice specimens were actually identified for the first time ever in the reserve, adding to the already broad and diverse list of wildlife species present in the reserve. This project enabled the nature reserve staff to acquire further knowledge and capacity in accurately identifying the presence of wildlife species and raising awareness among the local community and visitors from all over Lebanon on the unique wildlife the reserve hosts. LRI is continuing its research with academic and local community partners on the status of the forest dormouse in Lebanon.

Youth Conservation Corps in Lebanon

Furthermore, LRI aims to build a diversified citizen science community by including youth. The U.S. Forest Service's Youth Conservation Corps (YCC) was established in Lebanon in 2021 and implemented by LRI. The program seeks to build the capacity of youth from diverse local communities in

Lebanon in the fields of biodiversity, conservation, forest management, ecological restoration, and others. LRI has focused on developing the participants' skills in research and applied science and technology in the environmental field. One activity focused on developing a wildlife conservation curriculum, which allowed YCC participants to learn about Lebanon's wildlife and its status, conservation needs, and its role in ecosystem functioning and improved livelihoods. The youth can become global ambassadors for conservation and restoration. Through the YCC program, LRI is building the capacity of the Lebanese youth and is helping them become global practitioners and ambassadors. YCC participants in Lebanon have not only acquired that knowledge and capacity, but contributed to different achievements, such as improving educational material, joining reforestation projects, and leading by example within their communities by introducing projects to improve livelihoods, such as eco-tourism and beekeeping.

The overall LRI vision is to build communities that acknowledge and integrate science in their daily activities, especially science that contributes to wildlife conservation, ecological restoration, and overall conservation of Lebanon's biodiversity while supporting their livelihoods: People and science in the center of biodiversity conservation.



Forest dormouse. Photo credit: iNaturalist



Women who collect seeds. Photo credit: Rwanda Wildlife Conservation Association

A Spotlight on Cecile Kayitanirwa and the Women-Led, Innovative Indigenous Tree Nursery in Rwanda

By Cecile Kayitanirwa, Rwanda Wildlife Conservation Association

Cecile Kayitanirwa, a Botanist from Rwanda, is currently working at the [Rwanda Wildlife Conservation Association](#) (RWCA), a key partner of the U.S. Forest Service International Programs. She is the Habitat Restoration Manager and oversees all restoration activities and manages the organization's indigenous tree nursery.

After graduating from the University of Rwanda, Cecile embarked on a special journey of initiating RWCA's innovative indigenous tree nursery. What makes this nursery unique is that it grows trees that are only native to Rwanda. The initiative began by growing native trees to serve as roost sites for the Grey Crowned Cranes, an endangered species. Over time, RWCA expanded its tree production to benefit both wildlife and people.

"This project transformed my life and shaped my career," says Cecile. "It introduced me to the world of restoration projects, fulfilling my dream of making a positive impact on our motherland."

RWCA's tree nursery has become a leading example for other nurseries within the country by providing indigenous trees for restoration projects throughout Rwanda. It also serves as an income-generating initiative, creating jobs for the local community members, especially women. These women represent innovation in that they collect native seeds around the country, care for seedlings in the nursery, and monitor some of the RWCA restoration sites.

"Historically, women have been responsible for selecting quality seeds for agriculture," shared one of the women who collect native seeds. "I'm happy to utilize this local knowledge for selecting and harvesting native seeds for restoration purposes. It allows me to contribute to the preservation of our homeland while learning valuable skills."

RWCA restoration sites have been restored using indigenous trees produced from their own tree nursery; that's a total of 86 hectares of land brought back to life using more than 80,000 indigenous trees!

"Our work extends far beyond just trees," Cecile explains. "It's about empowering the community, particularly women. Together, we nurture the nursery's seedlings with dedication. We never imagined the impact our efforts would have."

"On both International Day of Women and the UN International Day of Forests, I am incredibly proud," Cecile exclaims. "The trees produced in RWCA's indigenous tree nursery are making a positive environmental impact by providing habitat for biodiversity while also empowering women in conservation."

To view the women's day celebration, visit <https://youtu.be/KgMOhtUaDY0>.



Photo credit: Rwanda Wildlife Conservation Association



A Rural Mozambique Village Rediscovered the Value of Trees

By Katie Moulton, U.S. Forest Service

Smoking fields and bare soil betray a common practice in this rural Mozambique district: slash and burn agriculture. The rural population here barely subsists on low-yield rice, cassava, and vegetables, and by cutting trees for charcoal and building materials.

Thatched-roof huts and abrupt hills, from termite mounds to rocky outcroppings, dot the rural landscape. But there are signs of environmental progress: strategically placed trees at schools and health centers provide shade and a buffer from the wind and rain that can quickly destroy small villages.

The community can thank **Esperança Para Novo Rebento (ESPANOR)** for the new trees. ESPANOR is a small NGO that supports early education and local sustainability in Mozambique's Milange District. Six years ago, it formed a partnership with the International Programs Office of the U.S. Forest Service and the U.S. Agency for International Development. The goal was to produce and plant

robust seedlings and to show community members the value of trees. The project is ongoing, and 5-year-old, 3-meter-tall trees demonstrate its success.

*"We now get calls from people: schoolteachers, health administrators, individuals. They want to know how they can get trees," said **Paulo Raiva Chiconza**, the Community Development Manager for ESPANOR.*

The Milange District sits on the border with Malawi, 300 kilometers (185 miles) inland from the Indian Ocean coastline that dominates much of the southern African country.



School children used to play in the red dust surrounding their classrooms. Now they are told to mind the newer trees in their football matches. Family members that used to wait in the hot sun for their loved ones seeking treatment now find some comfort in the shade.

As of January 2024, ESPANOR has brought the value of trees to 22 local schools and four health centers. The planting activities serve many purposes. They provide shade-giving, wind-breaking, fruit-yielding trees, and they teach kids about conservation.

Modesta Antoni Escrivão is a midwife with one of the health centers where ESPANOR first outplanted their seedlings. A table and chairs sit under one of the now 5-year-old trees as a bike leans against another. Ms. Escrivão has become an advocate for tree planting since she joined ESPANOR at the health center in 2018. She planted a few of the seedlings around her nearby house. When a cyclone ripped through the village a year ago, her house remained intact. "My neighbors now ask me for trees," said Ms. Escrivão, who has since created her own small nursery operation.

The ESPANOR nursery project is small. It is currently growing 7,000 seedlings and aims to increase that number by 50 percent.

Top left photo: Modesta Antoni Escrivão leans against the health center where she works in Milange. ESPANOR-planted trees are in the background. Photo by Katie Moulton, U.S Forest Service

Top right photo: Nursery manager Benito Vanoeia stands in front of tree seedlings that will soon be planted alongside schools and nurseries in the Milange District. Photo credit: USDA Forest Service Katie Moulton



Reverberations: An Innovative Exploration of Nature Through Sound

With contributions from RL Martens, U.S. Forest Service and Reverberations Exhibit Curator, and Erik Johnson, U.S. Forest Service

A collaboration between the U.S. Forest Service and The Nature of Cities (TNOC) has brought to life a one-of-a-kind online art exhibit titled **Reverberations**. The exhibit, now live [online](#), allows visitors to experience and learn about nature through sound. Both scientists and artists are increasingly using sound to engage with the more-than-human world and human impacts upon it. This exhibition brings together projects and perspectives from across the arts and sciences. Instead of strengthening the divide between these categories, it explores rich and surprising perspectives on sound and invites synergies in knowledge and expression between approaches.

Contributors to the exhibit include several members of the Forest Service. Dr. Kasey Maria Yturalde is a National Program Specialist with the Urban & Community Forestry Program. Dr. Yturalde's graduate research is featured in the 'earth' section with a project focused on documenting the types of sounds bark beetles make and how they vary across beetle species. Dr. Lindsey Rustad, acting director of the U.S.'s Northeast Climate hub and a research ecologist, has a project which can be found in the 'water' section of the exhibit. Dr. Rustad, in conjunction with Xavier Cortada, Marty Quinn and a team of scientists, information managers, and educators, created music out of water and weather data gathered from the Hubbard Brook Experimental Forest in White Mountain National Forest. These projects by Dr. Yturalde and Dr. Rustad exemplify the innovative and diverse offerings within the Reverberations exhibit.

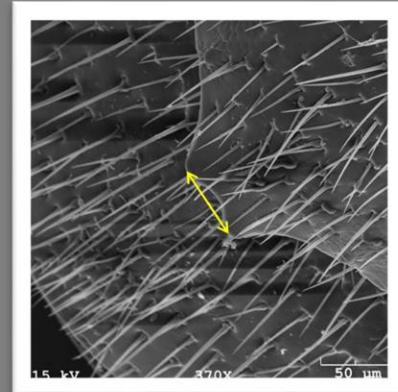
According to the philosophy of deep listening, an embodied sonic practice created by composer Pauline Oliveros, engaged listening experiences are not only important because of what is heard, but because they are precursors to thoughtful stewardship action. She once said that listening is "directing attention to what is heard, gathering meaning, interpreting and deciding on action." Through the transdisciplinary sonic perspectives featured in the exhibit, the intention of Reverberations is to inspire both contemplation and action.



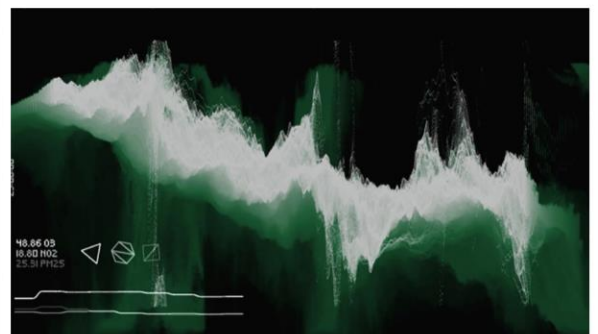
Recording the sound of the water and ice for Water Rhythms, the story of climate change as told by the ice and water. Credit: Susie Ibarra and Michele Koppes



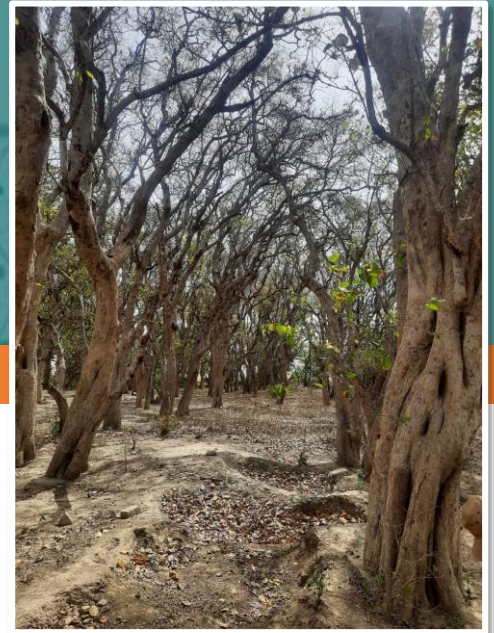
Capturing the sounds of drought stressed trees in fire-prone areas. Credit: Kara M Yedinak



Scanning electron micro graph of a bark beetle (Dendroctonus) abdomen, 120x magnification. The arrows point to the body part referred to as the plectrum, which is scraped down the underside of the beetle wing to produce sound. Credit: Kasey Yturalde



Aire v.3 is an audiovisual album generated with machine learning tools that analyze patterns of the pollution from different cities around the world: Mexico City, Bogotá and Sao Paulo. Credit: Interspecifics



Photos taken from Braj Sacred Groves. Photos credits: Sacred Earth Trust

Sacred Forests & Sacred Ecology: Addressing the root cause of environmental destruction through spiritual ecology

By Radhika Bhagat, Sacred Earth Trust (India)

Chinese explorer Hieun-Tsang, in his travel writings, mentions the vast and dense forests of India, which made travel not only difficult but also dangerous. Historical literature extensively gives a taste of what ancient India's forests and wildlife were like.

History of Sacred Forest and Ecology through Indian Epics

In the ancient Indian philosophical traditions, a harmonious relationship with the environment was advocated. The environment was believed to be a living, biological entity. Ancient Indian scriptures including the Arthashastra, SathapathaBhramanas, Vedas, Manusmrti, Brhat Samhita, Ramayana, and Rajtarangini all represented the sustainable ideas of forest ecology and conservation. Numerous facets of the Indus Valley civilization's social structure and urban layout demonstrated an awareness of the environment.

Consequences of Modern Practices

The primary shortcoming of the modern(ist) approach to environmental protection is its inability to prevent the sixth mass extinction, the emergency caused by a changing climate, and the numerous proximate human actions that are causing these impending tragedies.


Some thoughtful approach

However, several indigenous societies have continued to maintain a dynamic harmony and balance with nature through certain special belief systems and practices. Compared to industrial and urban societies, the ecological footprint of traditional indigenous societies has remained relatively moderate across hundreds or even thousands of years. Their spiritual ecology is the key to the dynamic, sustainable development of the economy and society.

Sacred Groves

Sacred groves or Sacred forests act as a connecting link between humans, nature, sociocultural heritage, and religious and ethnic beliefs (Khan et al. 2008; Rao and Sunitha 2011; Basha et al. 2012). India is home to nearly 100,000-150,000 sacred groves, of which approximately 14,000 have been identified. No comprehensive survey of sacred groves has been conducted in India, and therefore, exact numbers are unknown. Ever-increasing urbanization and modernization coupled with population growth is a threat to our sacred groves. Sacred Earth Trust has compiled the most comprehensive and updated database of Sacred Groves in India. Sacred groves are important refuges for endemic and endangered plants and animals. They are also treasure troves of medicinal plants. They act as integral reservoirs for biodiversity. Many studies have shown that the religious and cultural significance attached to sacred sites drive the sustainable utilization and conservation of native genetic resources (plant and animal) within sacred landscapes.

Sacred forests are also part of the history of conquest and acquisition, which make up the



framework of a rich, ongoing, and often troubling history of tribal, precolonial, imperial, colonial, and post-colonial influence.

The personhood of ecosystems, watersheds, landscapes, and more is currently being given significant consideration in international legal forums, joining global social movements and action networks. The way we think about the legal definition of our natural environment is changing globally in terms of norms. As of right now, Bolivia, Brazil, Colombia, Ecuador, India, Mexico, New Zealand, and the United States (U.S.) have laws pertaining to Rights of Nature (RON).

Lawful Recognition

In 2011, the Vilcabamba River in Ecuador became the first ecosystem to have its rights defended and recognized by a court. In 2017, the Uttarakhand High Court (UHC) in India granted juristic personhood to the Ganga and Yamuna Rivers, stating that the Rivers Ganga and Yamuna, all their tributaries, streams, every natural water flowing with continuously or intermittently of these rivers, are declared as juristic/legal persons/living entities having the status of a legal person with all corresponding rights, duties and liabilities of a living person in order to preserve and conserve [the] river[s] Ganga and Yamuna. (Kaufman and Martin 280–281)

Expert Advice on Cultural and Spiritual Transformation

U.S. advisor on climate change, James Gustave Speth said, “I used to think that top environmental problems were biodiversity loss, ecosystem collapse, and climate change. I thought that thirty years of good science could address these problems. I was wrong. The top environmental problems are selfishness, greed, and apathy, and to deal with these we need a cultural and spiritual transformation.”

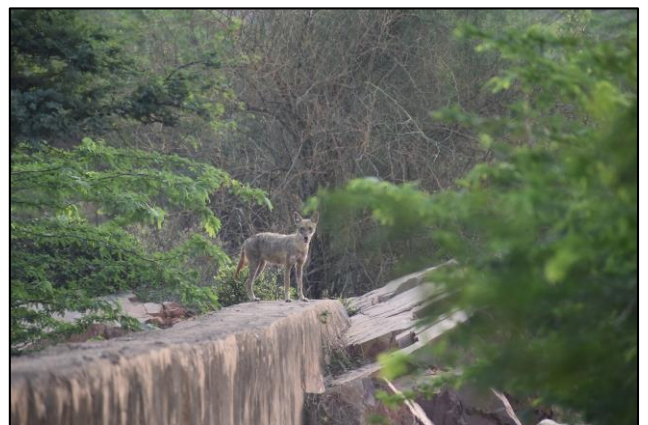
About the Organization

Sacred Earth Trust is a nonprofit charitable organization working to protect key species and habitats while working towards reviving and upholding the values of eco-spirituality and

interconnectedness with nature. We believe there is a spiritual dimension to our present ecological crisis. Therefore, our work is rooted in the principles of spiritual ecology, which acknowledges the spiritual facet of all issues related to conservation, environmentalism, and earth stewardship. We aim to bring eco-spirituality to the forefront through the work we do and by creating a community of individuals who are aware of their connection with nature. This connection is essential to encourage people to come together and take action to save our planet.

Organization's Vision and Mission

Sacred Earth Trust aims to record and research undocumented groves across India and works actively to safeguard some of the last vestiges of traditional conservation practices via these sacred groves. The trust looks forward to actively contributing towards providing mainstream recognition and long-term protection for these groves to ensure their survival. We hope our research and conservation action on the ground will help validate the appeal for the same.





Beyond Carbon: Reframing Sustainability for a Thriving Ecosystem

By Manish Khurana, We Mean To Clean (India)

In the urgent conversation surrounding sustainability, it's paramount that we broaden our perspective beyond the dominant lens of carbon emissions reduction. While mitigating carbon emissions is undoubtedly crucial, fixating solely on this aspect limits our capacity to develop comprehensive solutions that address the intricacies of our interconnected ecosystem. Our approach to sustainability must transcend the reductionist view of carbon as the primary metric of environmental health.

It's imperative to recognize that our planet's vitality hinges not only on carbon levels but also on the diversity and vitality of its flora and fauna. By centering our focus solely on carbon, we risk neglecting the myriad of other species and ecosystems that coexist alongside us. As inhabitants of this shared biosphere, it's our responsibility to champion the conservation and preservation of the entire ecological web.

Trees, often hailed as stalwart carbon sequestration tools, are far more than mere offsets. They serve as the backbone of ecosystems, providing habitats and sustenance for countless other life forms. From the microscopic organisms in the soil to the majestic creatures that dwell within their branches, trees support a rich tapestry of biodiversity. And that's the reason why in our plantation drives at [We Mean To Clean](#), we focus a lot on biodiversity. We believe that to truly understand and address sustainability, we must adopt a holistic perspective that encompasses the intricate interconnectedness of all living beings.

In our quest for sustainability, let us remember that the health of our planet relies not on isolated measures but on the collective well-being of every organism within it. By embracing a broader understanding of ecology—one that transcends carbon-centric approaches—we can forge a path towards a truly sustainable future for all.

Innovative Pollution Solutions with Specialized Trees

Dr. Ronald S. Zalesny Jr., Elizabeth R. Rogers, Ryan A. Vinhal (U.S. Forest Service, Northern Research Station, Rhinelander, Wisconsin, USA)

Increased production of residential and municipal waste has substantially impacted water, soil, and air quality in rural and urban communities throughout the world at rates never seen before. In addition to the frequency and severity of these impacts, we live in a time where traditional inorganic and organic contaminants such as heavy metals and chlorinated solvents, respectively, have given way to emerging contaminants such as per- and poly-fluorinated substances (PFAS). These PFAS are commonly referred to as *forever chemicals*, meaning they will not degrade within the next thousand years and will remain persistent on the landscape. All three groups of contaminants have resulted in degraded ecosystem services, reduced livelihoods, and damaged human health. Therefore, there is a global need for innovative pollution solutions.

One such nature-based solution is [phytoremediation](#), the use of specialized trees to clean and green the environment. Phytoremediation takes advantage of the ability of certain tree species and varieties to stabilize, absorb, utilize, and/or break down contaminants, thereby lessening the impact toward [human health and the environment](#). Common applications of phytoremediation include [landfills](#), military installations, brownfields, and mining areas. Given the broad variability in the types and levels of pollutants at these liability sites, coupled with varying climate- and soil-related factors, the effectiveness and overall success of phytoremediation depends on matching specialized trees with specific contaminants and the particular tree tissues (i.e., roots, wood, leaves) where the phytoremediation is taking place.

Top photo: Participants of the first International Phytoremediation Training Academy. Photo by Fadi al-Nahri.



To address the need for optimizing such phytoremediation effectiveness through tree selection, Dr. Ron Zalesny, Liz Rogers, Ryan Vinhal, and other U.S. Forest Service researchers have spent decades developing **phyto-recurrent selection** as a methodology to choose favorable tree varieties for phytoremediation and other environmental applications. Throughout this time period, Zalesny, Rogers, Vinhal, and their partners have conducted extensive greenhouse, nursery, and field testing to refine and validate the method. As a result of these efforts, phyto-recurrent selection was endorsed as a “Good Practice” by the [UN Decade on Ecosystem Restoration Task Force on Best Practices](#) in 2023. Good Practices are evaluated by the Task Force according to their adaptability, scalability, and broad applicability for implementation in restoration efforts worldwide. Phyto-recurrent selection was determined to meet these criteria, and is now available online within the [UN FERM Registry](#) (Framework for Ecosystem Restoration Monitoring). Building on the momentum of the UN endorsement of phyto-recurrent selection as well as their global application of phytoremediation, Zalesny, Rogers, and Vinhal partnered with Liza Paqueo of the U.S. Forest Service, International Programs and Beyond Trees Network to establish the first annual [International Phytoremediation Training Academy](#) during August 2023. Under Paqueo’s leadership, participants were selected from Bangladesh, Lebanon, India, and the Democratic Republic of the Congo. The academy lasted a week and had four primary goals: 1) provide an overview of the science, design, and application of phytoremediation for pollution mitigation, 2) engage participants with field tours of working phytoremediation systems to deepen their knowledge and understanding of phytotechnologies, 3) provide hands-on opportunities for participants to practice standard data collection techniques, and 4) foster open

communication to support the development of knowledge networks among colleagues from around the world.

An overarching goal, and main product of the academy, was the creation of individual phytoremediation action plans to promote home country implementation of knowledge gained during the program. The first flagship success story took place just months after the academy when Fadi al-Nahri, under the Lebanon Reforestation Initiative (LRI), established thousands of trees belonging to wide-ranging species and genera for the restoration of a landfill in Sidon, Lebanon, a city located 35 km south of Beirut. Historically, Sidon has been known for citrus orchards but has experienced phenomenal growth and urbanization in recent decades resulting in rapid ecological impacts. When asked what he hoped to learn from the academy and how he would apply that knowledge in his community, al-Nahri stated, “We are implementing a planting project on the old landfill in order to reuse contaminated and polluted space and to create a garden of more than 2,800 native species. Our plans are to make 13,000 m³ of this location accessible and attractive to citizens who will give it more importance by appreciating it, taking care of it, and visiting it as a new public space.”

(Top left photo) Agroforestry phytoremediation buffer system utilizing specialized poplar and willow trees as an innovative pollution solution at a landfill in Michigan, USA. Photo by Ryan Vinhal, U.S. Forest Service.

(Top right photo) Specialized poplar and willow trees being tested in phyto-recurrent selection to choose which varieties to plant for ecological restoration at landfills in eastern Wisconsin, USA. Photo by Ron Zalesny, U.S. Forest Service.



Facilitators of Love Tree Day in Vietnam give a demonstration on collecting tree measurements. Photo credit: U.S. Forest Service International Programs.

Showing the Value of Trees

Innovative i-Tree software opens doors for urban planning and reforestation initiatives.

By Katie Moulton, U.S. Forest Service

How much is a tree worth? How much air pollution can it clean? What is the value of shade? These are key questions that city planners and natural resource managers can now determine the answers to thanks to i-Tree, a free suite of software from the U.S. Forest Service and partners.

The U.S. Forest Service has introduced the i-Tree tool around the world, often in partnership and with funding from other U.S. government agencies.

“The i-Tree tool has been incredible for enabling researchers and community members to show the real value of trees. Our partners are using it for community engagement and greenspace advocacy,”

said Liza Paqueo, the Urban Outreach and Partnerships Specialist with U.S. Forest Service International Programs, “and they are finding success in getting people to act on the information i-Tree provides.”

Securing funds for the cooling effect of trees in a warming Vietnam

Other Forest Service seminar alumni, Hoang Van Chuong, Huynh Van Thuong, and Ho Le Tuan, coordinated a 4-week i-Tree training of trainers for university staff at the Vietnam National University of Forestry through the three organizations for which they work: the non-profit conservation organization GreenViet, the Nong Lam University, and the International Programs Office of the Forest Service. The U.S. Agency for International Development funded the training.

“Carbon sequestration is a hot topic in Vietnam, and i-Tree is attracting users who want to work in carbon measurement,” said Forest Service International Programs Vietnam Coordinator Huynh Van Thuong. “i-Tree is perfectly aligned with our Prime Minister’s “One Billion Trees” program to combat climate change.”

i-Tree is now part of the curriculum at the Vietnam National University of Forestry, and the Vietnam Ministry of Construction has given the university a \$75,000 grant to pilot an urban forestry initiative that makes detailed maps of urban forests. The tool uses i-Tree to demonstrate the valuable environmental services that trees offer to communities, such as carbon sequestration, heat reduction, and stormwater runoff retention. It also inventories the diversity and health of tree species in an area.

The Ministry of Construction seems poised to continue its support of this pilot throughout Hanoi and in other urban areas in Vietnam. Community members have expressed excitement about the opportunity to learn about tree planting and using trees to combat environmental pollution in their own backyard.

Finding the best tree species for tackling air pollution in India

In India, another participant from the 2019 International Seminar on Urban Forestry and Community Engagement, Akshat Tyagi, used i-Tree to discover the best trees for removing air pollution. Tyagi is from Delhi, where the Air Quality Index (AQI) often reaches 300, the threshold for when air quality is hazardous to one's health. Forest Service International Programs helped him find two people to help him sample plots across Delhi. He and his small team have done a full-scale city assessment of trees in the Delhi area, a study spanning close to two years and 400 sample locations, and they have trained others to use i-Tree, including local school children.

Tyagi is in touch with pulmonologists so that they can see the effects of air pollution on health and advocate for the planting of trees. i-Tree can be used to support community equity by determining if there are enough trees in a neighborhood and if they are being maintained properly for human health. With i-Tree, Tyagi determined that the peepal tree (in the Ficus family) is a standout air cleaner. Its large canopy also provides fantastic shade and surface cooling. Perhaps not coincidentally, it's a sacred tree in Hinduism and Buddhism and an often-used gathering place for barbers and vendors looking for a cool place to set up shop.

"i-Tree is the best (and perhaps the only) software available internationally to understand the benefits of trees. In Delhi, this tool has helped us understand different species from an ecosystem services point of view – carbon sequestration, air pollution absorption, oxygen production, evapotranspiration and many others - something that is becoming more and more important in the current climate change scenario," said Tyagi.

Young researchers inform policy makers and citizens with i-Tree inventories in Bangladesh

Tahrima Jui Era is a researcher at Bangladesh University of Professionals. She's using i-Tree to take a census of the botanical gardens in Dhaka. The



Tahrima Jui Era takes measurements of a tree in the Bangladesh's National Botanical Garden, one of the few green areas of Dhaka. Photo by Saiful Islam Shakil

census serves as an inventory of Bangladesh's most precious plants and it assigns a value to each tree, allowing policy makers and citizens to better understand the ecosystem services forests provide.

"I want to create awareness with my research. To show them the results of their actions. How it affects their climate. And get them to prioritize nature," said Era.

The Bangladesh government is supporting tree planting programs, community awareness programs, and investments in reforestation based on inventory results and forest cover goals.

i-Tree brings hope in Ukraine

Forest Service partner and Urban Ecology Seminar alumni Alexandra Khalaim of the NGO Green Wave had planned an i-Tree measurement activity on the same day that Russia invaded Ukraine. Almost everyone still showed up. "i-Tree made us feel alive. It gave us hope," said Khalaim.

To learn more about i-Tree visit <https://www.itreetools.org/>.

During the workshops, participants had the opportunity to learn the scientific and common names for trees, measure tree diameters, evaluate health, and estimate their benefits. They also shared information about their favorite trees.



Citizen Science For Knowledge And Protecting Urban Forests (Colombia)

By: Maria Arroyave, Cristina Romero and Yeny Velez
U.S Forest Service International Programs/
Colombia

The **Citizen Science Program for Knowledge and Protecting Urban Forests**, implemented in Colombia by the International Programs Office of the U.S. Forest Service, aims to generate knowledge about urban forests and their benefits through direct citizen engagement. Acknowledging the importance of urban forests reinforces the sense of belonging to such spaces and the desire to care for and protect them. This is how people can partner with the bodies directly tasked with maintaining green spaces.

From March to September 2023, the U.S. Forest Service International Programs conducted seven Citizen Science workshops in Medellín, Colombia. Various sites in the city were visited: the Medellín Botanical Garden, La Floresta Park, Parques del Río, as well as the INEM José Félix Restrepo, UPB, and San José de las Vegas schools. Workshop participants consisted of natural science teachers from schools, high school students from public and private schools, and urban park neighbors. In total, 166 people (84 women and 82 men) were sensitized and trained, 109 of them youths. There were representatives from 32 different types of organizations: public and private education institutions, governmental and non-governmental entities, Community Action Boards, and Environmental Working Groups.

To quantify the benefits that trees provide, **MyTree** was used; one of the tools in the i-Tree suite developed by the U.S. Forest Service, the Davey Tree Expert Company, and other partners. MyTree is an application that is very easy to use. The location of a tree is entered into the

web-based tool along with the species name, the trunk diameter, the health status, and the sun exposure. After a short amount of time, the values for carbon storage and capture, the removal of different pollutants from the air, and the reduction in surface water runoff are obtained. This allows for determining how each tree contributes to mitigating climate change, improving air quality, and regulating the hydrological cycle. Each participant was given a booklet containing the basic concepts of tree morphology, photos of the most common species, and the step-by-step procedure for using MyTree. This tool can be accessed via the following link:

<https://mytree.itreetools.org>

An essential aspect of the program involves learning the participants' opinions. It was particularly gratifying to witness the project's positive impacts and observe a shift in citizens' attitudes towards trees. Here are some of their testimonies:

"There were many lessons from the workshop. Among the most significant I can highlight were the importance of urban forests to the city, and caring for trees and their beauty and the benefits they provide us."

"I liked learning about the MyTree tool and how it can be used to understand and quantify the benefits that a tree provides to the ecosystem."

"I really liked sharing what I learned with my classmates. I like activities where we socialize."

Participants showed great enthusiasm for learning about the characteristics and names of urban trees. They expressed gratitude for the opportunity to identify trees and quantify their benefits using the MyTree tool. The participants enjoyed the activity and requested additional time to continue learning and spending time in the urban forest. Additionally, environmental organizations and civic groups were interested in using i-Tree in other parks and throughout the city to estimate the benefits of urban forests.

An Initiative Towards Better Urban Forest Management in Indonesia: A Story of Field Research Involving Active Stakeholder Participation

By Indria Zhafirah Akbar, Chairunnisa Afrianti, Risdayatry Aulia, Amarizni Mosyafitiani, Dr. Kaswanto, Harityas Wiyoga (IPB University & US Forest Service International Programs/Indonesia)

As part of green open spaces, urban forests play an important role in providing vital landscape services in cities. These spaces not only generate oxygen but also help to conserve biodiversity by providing habitat, absorbing carbon emissions and pollutants, and providing a variety of other benefits to communities, such as environmental, social, and economic advantages. Despite their inherent potential, urban forests are facing management challenges, including those across Indonesia. One of the factors contributing to this situation is a lack of scientifically-based management planning to ensure and improve the landscape services provided by urban forests. In light of this, the U.S. Forest Service International Programs has been working with IPB University on sustainable forest management topics. Experts, university students, and recent graduates collaborated and participated in various research activities. Moreover, stakeholder engagement was carried out in Jakarta's capital, partnering with the Jakarta Parks and Urban Forestry Office (Dinas Pertamanan dan Hutan Kota (Distamhut) DKI Jakarta), and in West Java, partnering with the West Java Forestry Office (Dinas Kehutanan (Dishut) Jawa Barat) and Bandung's Housing and Settlement Area Office (Dinas Perumahan dan Kawasan Permukiman (DPKP) Kota Bandung).



Installing the interpretive signage for translating the result of i-Tree Eco research to the public in Taman Hutan Ra Djuanda, Bandung, Indonesia.

In Jakarta, the collaborative project (2021 – 2023) kicked-off with a vegetation inventory in five urban forests: Srengseng UF, Rawa Malang UF, Cipayung UF, Munjul UF, and Pondok Labu UF. Following the insights gathered from the landscape services assessment conducted using [i-Tree Eco](#), the results of field research were disseminated. Developed by the US Forest Service, Davey Tree Expert Company, and other partners, this free, online suite of peer-reviewed tools is a platform and suite of tools that can estimate the certain ecosystem benefits of trees.

A year later, the next phase began, and it entailed hosting a focus group discussion to gather valuable insights and exchange ideas with key stakeholders. From these discussions emerged a comprehensive management plan titled "Management of Urban Forest Landscape Services" that underwent a thorough refinement process.

Meanwhile, in West Java, the project (mid-2022 – 2023), started with a vegetation assessment through field inventory and data analyses of the landscape services in the three identified green spaces in the Bandung area: Djuanda Grand Forest Park, Babakan

The students from schools read the result of i-Tree research in one of the urban forests in Bandung.

Siliwangi Urban Forest, and Maluku Park. These served as part of a pilot research model to demonstrate the application of i-Tree Eco and its survey methods in forest monitoring. Additionally, the implementation of this project also produced output in the form of interpretative signage installed in each of the spaces. These signs serve to raise public awareness about the significance of trees and green spaces in delivering landscape services for urban areas and their residents. Furthermore, both of the projects' scopes go beyond these activities. They included a dissemination event and a series of training sessions. These were designed to engage various stakeholders and interested parties and transform them into credible research papers and publications. The primary objective of these trainings was to increase awareness regarding the significance of trees in our environment and to introduce i-Tree Eco as a valuable and impactful tool for assessing the landscape services provided by trees.

The project results from both Jakarta and West Java initiatives show the significant impact and far-reaching scope of this project, from introducing i-Tree Eco as a tool for understanding ecosystem valuation to collaboration between the scientific community and city managers in assessing the ecological and economic benefits of green spaces and urban forests. The results prove that an in-depth study could provide data-driven insights and support stakeholders in decision-making and effectively managing future urban forests.

The analysis results from i-Tree Eco have the potential to enhance public awareness regarding their importance, thereby encouraging public involvement in the preservation and conservation of these areas. Additionally, the participation of students and recent graduates may improve their critical thinking and research skills while increasing exposure to real multi-stakeholder engagement,

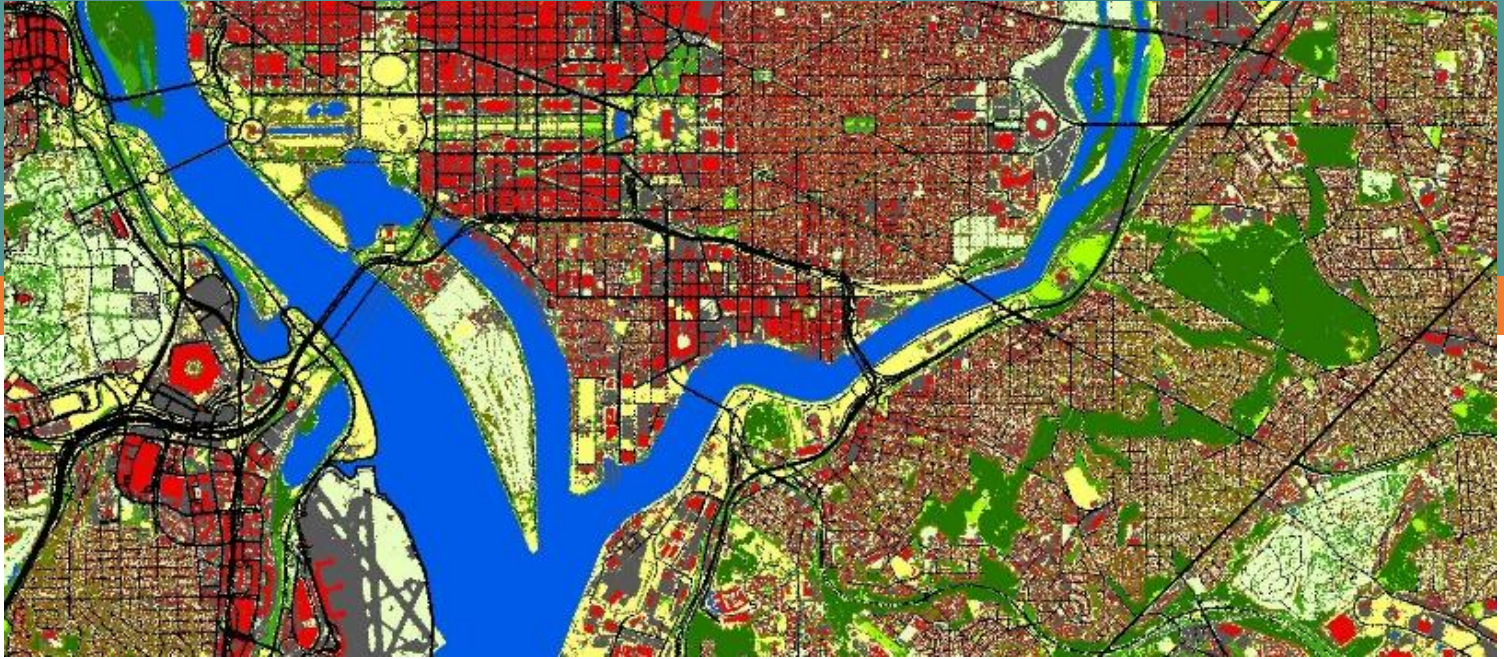


thereby opening up new perspectives for their future. Thus, there is optimism across Indonesia for further collaborative efforts to introduce i-Tree Eco as a valuable tool. Moreover, involving multi-stakeholder participation in other areas could also empower communities to assess the value of their own public/private forests, both urban and rural, and raise awareness about better green open space management across a broader spectrum of the public and society in Indonesia to tackle our current environmental challenge.

A NOTE FROM THE i-TREE TEAM

Working with the U.S. Forest Service and the Davey Tree Expert Company, i-Tree continues the collaborative effort to expand the availability of i-Tree tools around the globe. With the help of in-country partners i-Tree is now fully adapted in 43 countries with an additional 300 global cities supported through local user submitted information. In 2022, i-Tree's entry-level MyTree tool was expanded worldwide. In 2023, MyTree was the fastest growing i-Tree tool with 30,000 new users, a 300% increase over the previous year.

The i-Tree team is also incorporating new science through its Research Suite, adding new assessment and reporting capabilities to its tools. This work has included the development of the HydroPlus and CoolAir models that perform localized evaluations of urban trees in reducing stormwater runoff and lowering the impact of urban heat islands. i-Tree continues its commitment to understand and share all the benefits of our urban forests to improve the livability and resilience of our communities, and the health of the people who live there.



Screenshot of the Chesapeake Bay's high-resolution land use dataset.

Engaging Partners with New Tree Cover Data in the Chesapeake Bay Watershed

By Katherine Brownson, U.S. Forest Service Liaison to the Chesapeake Bay Program

The Chesapeake Bay watershed is the largest estuary in North America, encompassing 166,000 square kilometers (64,000 square miles), six States, and the District of Columbia. Forests are the predominant natural land cover in the watershed, but there are also abundant rural agricultural lands and dense urban areas, all of which drain into the Chesapeake Bay. For the past 40 years, the [Chesapeake Bay Program](#) partnership has been working to restore water quality and fisheries in the Bay. The U.S. Forest Service is the lead coordinating agency for the partnership's Forestry Workgroup, which facilitates efforts to restore and conserve forests throughout the diversity of landscapes and communities found in the watershed.

A recently released [1-meter resolution land use dataset](#), produced using remotely-sensed imagery, has given the partnership an incredible opportunity to learn about Chesapeake forests at a finer scale than ever before. Although remote sensing data can provide powerful information to inform restoration and conservation efforts, it is essential to provide the data in a form that is engaging and accessible to practitioners and decision-makers. To this end, the

U.S. Forest Service worked with partners to develop innovative products to better communicate and translate this rich dataset. On the local scale, [county fact sheets](#) were developed for all counties in the watershed, sharing tree cover status and change as well as estimates of the benefits local trees are providing. Understanding how tree cover is changing over time at a fine scale can help inform the sustainable management of forests and community trees.

The new [State of Chesapeake Forests Storymap](#) provides a broader perspective on forests and trees in the watershed and how they are changing at the county, state, and watershed scale. The Storymap also highlights the numerous benefits trees provide in the watershed, which go beyond water quality alone. According to estimates from i-Tree, across the Chesapeake Bay Watershed, trees are providing over \$6 billion of benefits annually from air pollution removal, reduced stormwater runoff, and carbon sequestration. However, this watershed-wide analysis has revealed that forests in the watershed are being lost or fragmented due to rapid development. Between 2013-2014 and 2017-2018, there has been a net loss of over 106,000 acres of tree cover to development. It is therefore critical to focus additional attention on conserving and maintaining mature trees and forests. This new dataset provides an innovative and powerful tool to better target efforts to restore, maintain, and conserve forests and tree canopy throughout the watershed.

PEOPLE | CITIES | FORESTS

HIGHLIGHTS & SPOTLIGHTS



CELEBRATE INNOVATION!

- March 21, 2024: 8 – 9 AM EDT (GMT -4) : **How innovation is driving change in forestry**

Watch the [webcast](#) or join the [Zoom webinar](#). Interpretation will be provided in Arabic, Chinese, English, French, Spanish, and Russian.

- March 21, 2024: 10 – 11 AM EDT (GMT -4) – A webinar for the UN International Day of Forests: Drone, Machine Learning and AI to create Digital Twin for Urban Landscape Planning and Monitoring in Bangladesh (Register at <https://bit.ly/49Z4lLw>)

- Other IDF events happening around the world: <https://www.fao.org/international-day-of-forests/events/en/>

- Key messages: <https://www.fao.org/international-day-of-forests/key-messages/en/>

What is the Beyond Trees Network?

Beyond Trees is a network of urban conservation organizations and practitioners from across the world. It includes members from 90+ countries across the world. Our aim is to share knowledge, best practices, challenges, and solutions with the shared goal of increasing the health of urban populations and ecosystems. The network consists of people working on tree plantation, wildlife conservation, environmental awareness, social justice, gender equality, rooftop farming, waste management, water conservation, and many others.

THE BEYOND TREES NETWORK

NEW WITH THE NETWORK

- [A blogspot by Mpambira Kambewa](#) of U.S. Forest Service International Programs/Malawi

NEW ON THE YOUTUBE CHANNEL

[\(Beyond Trees Network – YouTube\)](#)

- Interview with Dr. Lindsay Campbell, U.S. Forest Service
- Interview with Mpambira Kambewa, U.S. Forest Service International Programs/Malawi

JOIN THE BEYOND TREES NETWORK!!!

- Beyond Trees website: <http://www.beyondtrees.global>
- Beyond Trees Network Facebook (FB) page: <https://www.facebook.com/BeyondTreesNetwork>
- Beyond Trees FB Main Group: Urban Forestry and Community Engagement: <https://www.facebook.com/groups/beyondtrees>
 - Women, Urban, Natural Resources: <https://www.facebook.com/groups/3695340203884039>
 - i-Tree International: https://www.facebook.com/groups/beyondtreesitre?modal=false&should_open_composer=false
 - Schools, Youth, Nature: https://www.facebook.com/groups/376523757120406?modal=false&should_open_composer=false
 - Urban Gardens and Farms: https://www.facebook.com/groups/beyontreesurbangardensfarms?modal=false&should_open_composer=false
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