CFA Newsletter

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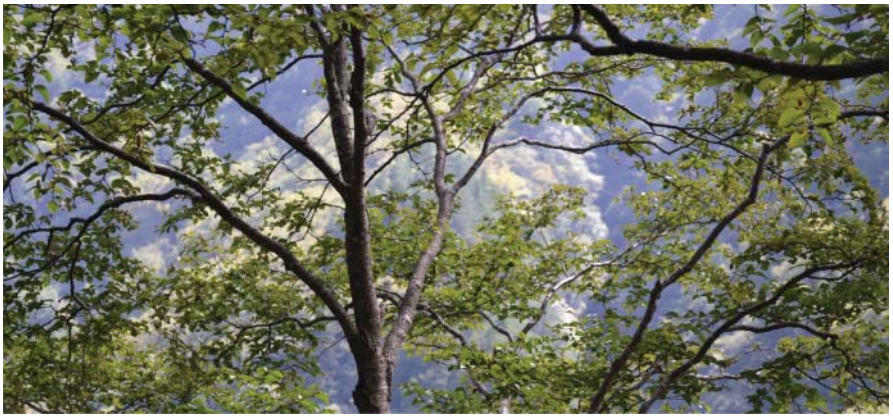
Counting the world's tree species for the first time



The Global Trees Campaign recently collected seeds from populations of Japanese critically endangered, Betula chichibuensis

Botanic Gardens Conservation International (BGCI) has the answer to a question that has long baffled botanists: How many tree species are there in the world? The answer is 60,065.

A recent paper, published in the Journal of Sustainable Forestry in April 2017 introduces the GlobalTreeSearch database, the first comprehensive list of tree species with country level distributions.

GlobalTreeSearch reveals some fascinating facts about the world's tree diversity. The Neotropics, or South and Central America (including the Caribbean), has the most tree species at over 23,000. After Antarctica which has no tree species, the next least diverse region is the North America with fewer than 1,400 species.

Brazil is unsurprisingly the most tree diverse nation with 8,715 tree species, followed by Colombia (5,776 tree species) and Indonesia (5,142 tree species). Nearly 58% of the world's tree species are found only in a single country. Brazil has the largest number of endemic trees, with 4,333 species found exclusively in Brazil. Madagascar, Australia and China all have over 2,000 endemic trees each.

Nearly half of all tree species (45%) are found in 10 families, with the legumes (Leguminosae) the most diverse family (5,405 tree species), followed by the coffee family (Rubiaceae, 4,827 tree species) and the myrtle family (Myrtaceae, 4,330 tree species). All three most diverse genera are in the Myrtaceae (*Syzygium*, *Eugenia* and *Eucalyptus*).

But why has it taken until 2017 to create the list of the world's tree species? The sheer volume of data collected by the GlobalTreeSearch projects hints at the reason why. In creating the database, over 500 sources were consulted and 375,500 lines of data were created. As BGCI's Secretary General, Paul Smith explains "GlobalTreeSearch represents a huge scientific effort encompassing the discovery, collection and describing of tens of thousands of plant species. This is 'big science' involving the work of thousands of botanists over a period of

centuries." BGCI's network of botanic gardens also provided invaluable expertise to review the list.

However, work is not over yet. Even in 2016, there were over 200 new tree species described. BGCI will continue to update and amend GlobalTreeSearch as our knowledge and understanding of tree diversity develops.

Having a comprehensive list of tree species will allow us to measure progress towards the Global Tree Assessment, an initiative led by BGCI and the IUCN/SCC Global Tree Specialist Group (GTSG) to assess the world's tree species for their conservation status by 2020. With threats such as land use change and deforestation on the increase, it is vital prioritisation work occurs to insure that no tree species is lost forever. Preliminary comparisons between GlobalTreeSearch and BGCI's database ThreatSearch, a comprehensive list of all known plant conservation assessments, indicate that 40,000 tree species are left to assess. This target is unachievable without building on the already extensive network of the GTSG and partners in botanic gardens worldwide.

GlobalTreeSearch also has other applications. Anyone in need of a list of trees or a tree inventory for a specific country will be able to use this resource. GlobalTreeSearch will provide restoration practitioners with a baseline list of native species from a country that can then be refined with local knowledge. The database contributes to the Global Strategy for Plant Conservation and the broader Aichi Targets of the Convention on Biological Diversity. GlobalTreeSearch supports initiatives to improve sustainable forest management and will aid the implementation of the Global Action Plan for the Conservation and Sustainable Use of Forest genetic Resources and for supporting the United Nations Framework Convention on Climate Change.

Red Listing allows us to target our conservation action to those tree species most in need. BGCI works in partnership with Fauna & Flora International on the Global Trees Campaign (GTC), the only tree species specific conservation organisation. As well as assessing the conservation status of trees, the GTC runs practical conservation projects to prevent the extinction of tree species, with active programs across the world, including East Africa, China and Cuba. The GTC also provides training to inspire the next cohort of tree conservationists, giving the skills to prioritise, propagate and plant tree species.

GlobalTreeSearch is not just a resource that has counted the world's tree species and collated their country level distributions for the first time; GlobalTreeSearch will inform and underpin the necessary conservation action to protect tree species worldwide for years to come.

GlobalTreeSearch can be found on the BGCI website. More information about the work of the Global Trees Campaign at globaltrees.org. If you would like to contribute to the Global Tree Assessment, please get in touch at redlist@bgci.org.

Emily Beech
Conservation Assistant,
Botanic Gardens Conservation International (BGCI)

BGCI
Plants for the Planet

GLOBAL TREE SEARCH

Association news

XIX Commonwealth Forestry Conference – Dehradun, India

The opening ceremony at the Commonwealth Forestry Conference

Official Conference Report

On behest of the Commonwealth Forestry Association (CFA), the Forest Research Institute at Dehradun (Uttarakhand), India has hosted the XIX Commonwealth Forestry Conference (CFC) under the auspices of the Government of India, Ministry of Environment, Forests, and Climate Change (MoEF&CC) and the Indian Council of Forestry Research and Education (ICFRE), Dehradun from 3 April to 7 April, 2017. This four yearly event was hosted by India second time. First time, India hosted CFC in 1968 at New Delhi.

Nearly 700 participants from many Commonwealth countries including India attended the XIX CFC. The XIX CFC chose the theme "Forests for Prosperity and Posterity" and aimed to specifically deliberate on emerging 'broader' and 'new' perspective in view of magnified global expectations from world's forests towards the sustainable development goals. The Conference was inaugurated by Dr. K.K. Paul, Hon'ble Governor of Uttarakhand State, India while the Valedictory Function was presided over by Dr. John Innes, Chair, Standing Committee of Commonwealth Forestry Association and Dean, Faculty of Forestry, University of British Columbia, Canada. The Conference invited scientific contributions for oral and poster presentations under six sub-themes viz., (i) Biodiversity Conservation and Management, (ii) Diversification, Multiple Use and Sustainable Harvest, (iii) Forest and Climate Change, (iv) Good Governance in Forestry, (v) Livelihood and Economic Security from Forests, and (vi) Forest and Water. These were covered in 19 Technical sessions spread over 5-day Conference. 12 Key Note Addresses in four Plenary Sessions, 19 Technical Sessions covering 95 Oral presentations, 216 Posters presentations, four Special Sessions, seven Side Events, Field Excursion, Exhibition, and Cultural Events were held during the conference. The Conference included a High Level Panel named as the 'Global Forestry Conclave' wherein nine distinguished luminaries in the field of forestry representing different continents discussed 'the role of forestry in implementing international agreements in Commonwealth member nations and beyond – moving from "agreed texts" to action on ground.' Thus, five days Conference at the magnificent campus of famous Forest Research Institute, Dehradun was full of activities, scientific parleys, excitement, expectations, allied events, and lot of stimulation as the Conference provided learned delegates a great opportunity to share knowledge, best practices, and experiences on forestry; deliberate on linkages between forests and sustainable development goals; discussions on how to resolve global environmental issues; and interact with world renowned personalities and experts on forestry.

The Conference also provided glimpses of India in cultural events, facilitated meeting experts from various fields and has been an excellent opportunity for great learning, particularly to young scientists. The Conference allowed looking at potential spheres of collaborations, cooperation and scientific exchange in times to come. Overall, it was a meaningful and productive Conference. Certainly, it was great honor and matter of pride for India and Forest Research Institute, Dehradun to host this conference.

A Conference Newsletter on daily basis was brought out to keep the delegates updated about the sessions. The Conference revolved around the main theme i.e. 'Forests for Prosperity and Posterity'. Accordingly, the XIX Commonwealth Forestry Conference primarily aimed to address emerging environmental concerns that confront the world at large, review real issues affecting forests and people at large besides providing future direction for sustainable management of our forests and related resources for multiple values and enhanced global expectations.

The learned participants while being appreciative of the fact that healthy forests protect watersheds and ensure water security, constitute important wildlife habitats, ameliorate environment, sequester and store carbon, ensure food security, provide aesthetic and recreational values, sustain livelihoods, safeguard humanity from natural calamities and vulnerabilities, and mitigate climate change in addition to the fact that forests continue to provide supply of timber and innovative diversified forest products. They are committed and have really worked hard for conceptualizing a 'big picture' from the emerging 'new perspective' of forest management.

The Conference recognized that the world's forest cover continues to decrease as forest land is being converted to agriculture and other uses. However, concerted efforts by various governments, communities, and non-governmental organizations have definitely slowed down the rate of net global deforestation by more than 50 per cent in the past 25 years. However, growing world population and ever-increasing societal demands put enormous pressure on scarce forest resources for agriculture production, forest use, water utilization, and various environmental services. Thus, the world forests, particularly in the tropics and developing countries continue to experience decline of forests and depletion of goods and services that they used to offer.

Keeping in view the growing environmental challenges and expanding global expectations from forests in the context of seventeen sustainable development goals, the forestry fraternity at the XIX CFC reaffirmed for adoption of holistic and cross-sectoral approaches. The Conference recommends for integrated forestry seeking cohesive solutions across sectors, regions, and boundaries while applying the ecosystem and landscape based management approaches and implementing adaptive

CFA Chair, John Innes

management. New approaches require linking forest policy with other sectors, enhanced investment in participatory approaches, meaningful engagement of stakeholders, effective coordination, consensus building, addressing mainstream biodiversity concerns, developing adequate governance mechanisms, direct research and practices to strengthen the resilience of ecosystems and societies.

The Conference was able to threadbare deliberate upon various challenges (e.g. forest fire, invasive species, livestock grazing), issues (traditional resource dependence, poverty) and barriers (e.g policy, legal, institutional and governance concerns, inadequate forest investments, gap between science and practice) that, constrain integrated, sustainable forest management and at the same time devoted considerable time on future pathways and innovative approaches to succeed in accomplishing global developmental goals from forests.

The broad recommendations that emerged from various sessions, events and wide ranging deliberations were:

1: Redefine forest management priorities

Considering magnified expectations from forests, Commonwealth nations need to adopt a vision of multiple values and integrated use, reassess the current status of forests as well as public perceptions of forests and forestry.

2: Revisit forest policy, law, and forest planning strategy for preparation of forest plans

Consider and adopt new science based approaches to forest planning for evolving 'big picture' and the 'new perspective'. Forest Working/Management Plans must consider the cumulative effects of actions at a landscape scale and:

- Reintroduce the strong 'population viability' clause within wildlife management
- Adopt adaptive management based on effective monitoring, and
- Develop an administrative 'Code of Ethics' that will avoid political interference and preserve the integrity of scientific research and monitoring efforts.

3: Maintain wilderness and protected areas

Wilderness and protected areas provide a unique opportunity due to their size, relatively untrammeled state, and possessing relatively viable populations of wildlife (broadly defined) and have capacity to sustain important ecosystem services and serve as breeding grounds for numerous rare and threatened species. Such areas thus, serve as 'source' habitats or 'inviolate space' and also provide an opportunity for researching ecological processes hence they need greater protection efforts that involve local communities.

4: Protection of forests and eco-restoration of degraded forests

Widely distributed, smaller and fragmented patches of managed forests often face enormous challenges of degradation.

- Ecological restoration of such degraded forests, which have been functioning as 'sink habitats', is urgently required.
- Crucial corridors and connectivity amongst 'source' and sink' forests need to be prioritized.
- Enhanced forest investments towards afforestation and restoration of functional corridors are required as a priority.

5: Investment for stakeholder engagement, community participation, coordination, and consensus building for integrated approach

Forest conservation and sound stewardship depend on integrated, landscape –scale perspectives to drive appropriate policy. The management of forest and other public lands can no longer proceed in a piecemeal manner with different states, communities, agencies acting independently, limiting their focus to particular resources or jurisdictional boundaries. New partnerships among the forest, agriculture, finance, energy, water, and other sectors, and engagement of indigenous people and communities are critical to accomplish the 'big picture' of forests. This will require:

- Coordination among different sectors, various policies and relevant laws, regulations, and development of required institutions and appropriate mechanisms for governance.
- Mainstreaming biodiversity concerns in various production sectors, which is of utmost priority. There is an urgent need to establish strong linkages between forestry and agriculture, and other priority production sectors.
- Search for and development of innovative financial investment mechanisms for the forestry sector including 'public private partnership'.

6: Capacity building

The evolving perspective of forest management requires:

- Greater awareness and a resolute support for capacity building through rigorous trans-disciplinary approaches;
- Long term and experimental research;
- Effective monitoring;
- The empowerment of women working in the sector; and
- Adequate and up-to-date training of all concerned.

CFA Technical Director, Alan Pottinger

We need to move boldly in addressing the emerging requirements of 'big and new perspective' of forests for prosperity and posterity.

Participants gratefully acknowledged the hospitality received from the organizers and the Indian people while the organizers are thankful to the Commonwealth Forestry Association and the Faculty of Forestry, University of British Columbia for whole hearted technical support and the generous financial support received from various international and national sponsors for successful conduct of XIX CFC.

XIX Commonwealth Forestry Conference Messages

The roles of forests and forestry in supporting countries to achieve "Forests for Prosperity and Posterity", well-enshrined in the goals and objectives of the global development and climate change agendas, have been reiterated during the XIX CFC. Sustainable Forest Management (SFM) in its broadest sense underlines such efforts through an appropriate balance between economic, environmental, social and cultural values of the forests.

The contribution of Forestry to national and international agendas is best realized through a strategic transformational change in the way Commonwealth governments; research and education; civil society organizations-including the private sector – and development assistance agencies operate. Integrating and coordinating national policies for natural resources management, especially among the forestry, agriculture, water, energy and recreation sectors, is the way forward.

Further to the CFC report and recommendations, Forest Research Institute the organizer of XIX CFC and participants have developed the following messages:

- More active participation of Commonwealth countries in the work of the 'Standing Committee on Commonwealth Forestry (SCCF)'is crucial for its effectiveness.
- The results of the XIX CFC should be communicated through competent channels, including the SCCF, to the Commonwealth Heads of Government Meeting in London in 2018.
- Identifying mechanisms for the better coordination of education, research and professional forestry amongst Commonwealth countries is an important function of the Standing Committee.
- The Queen's Commonwealth Canopy is an important project that all Commonwealth countries are urged to participate in.
- Organizing the XX conference in 2121 and seeking to identify a host country at the earliest possible opportunity is entrusted to the Standing Committee on Commonwealth Forestry.
- A follow up on these messages should be reported at the XX Commonwealth Forestry Conference.

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The Queen's Commonwealth Canopy

Together our forests will thrive

The Queen's Commonwealth Canopy is a pan-Commonwealth initiative to create a network of forest conservation projects that will highlight the value of trees and forests to the Commonwealth's citizens. The CFA is a partner, along with the Royal Commonwealth Society and the NGO Cool Earth, and we would like to inform our members of the project's progress by highlighting two QCC projects in each issue of the CFA Newsletter.

Antigua and Barbuda

Victoria Park Botanical Gardens

Established in 1893, the Victoria Park Botanical Gardens (VPBG) has maintained a long history and cultural significance as an open space within the capital city of St. John's. Today, the VPBG covers approximately 6 acres and is directly managed by the Department of Environment (DoE).

The aims and objectives of VPBG are to:

1. establish a family friendly green space for public use
2. create a hub for the display of environmental projects
3. establish a secure and aesthetically pleasing environment able to accommodate educational and recreational activities
4. provide an alternative tourist destination for visitors

In support of environmental awareness through community engagement, the DoE has implemented various outreach activities within VPBG such as: 'Movies in the Park', 'Yoga in the Park' and 'Art in the Park'. Additionally, during Arbour Month, nursery staff exchange with the general public 4,000 - 5,000 fruit-bearing trees for plant bags, which are used the following year for propagation.

The forty-foot-high and fifty-foot-wide African Cloth Bark Tree or Zulu Tree (Ficus nekbuda) is one of the more notable species located within the VPBG; others include the Cuban Royal Palm (Roystonia regia), Lignum Vitae (Guiacum officinale), Yellow Poui (Tabebuia glomerata), Devil's Ear (Enterolobium cyclocarpum), and Hazel Sterculea (Sterculea foetida).

Arbour Day Plant Fair

Arbour Day

PROJECT LOCATION

Yoga in the Park

Partners

Australia

20 Million Trees Programme

The 20 Million Trees Programme is an Australian Government commitment under the National Landcare Programme to deliver 20 million trees by 2020 to re-establish green corridors and urban forests, providing habitat to support threatened species and sequestering carbon from the atmosphere.

Established with a funding commitment of $70 million, the programme has worked cooperatively with local communities since 2014 to undertake projects throughout urban and regional Australia. Native trees and other native plants are being planted on both public and private land, providing community and environmental benefit at the local level. To date over 21,597 participants have volunteered in project activities and 42 participants have completed formal training courses.

At present, projects are in place to re-vegetate over 13,825 hectares and plant over 10 million trees. This is being delivered through a combination of competitive grants for individuals and organisations, and service providers who deliver larger-scale tree planting projects. The programme does not protect existing forests; rather it seeks to revegetate previously cleared areas and to enhance existing vegetation.

PROJECT LOCATIONS

Partners

Australian Government

National Landcare Programme

Forest Scenes

The participatory development of C&I in southeastern Mexico

*Seasoning Mahogany (*Swietenia macrophylla*) and Tzalam (*Lisiloma latisiliquum*) at a sawmill at Ejido Caoba, Quintana Roo (Photo: Fabiola Reygadas)*

Sustainable forest development is the guiding tenet of Mexico's forest policy, with the aim of both improving the quality of life of Mexican men and women living in forest ecosystems and ensuring the conservation of the country's forest resources.

Forests in Mexico are strongly characterized by the community nature of their tenure. The country has 31 518 *ejidos*[1] and farming communities[2], which collectively own 105 million hectares of land. It is estimated that forest production—the harvesting of timber, ornamental plants, medicinal plants, seeds and resin—constitutes the main source of income for 2994 forest-owning *ejidos* and communities.

Mexico's southeastern region which comprises three states in the Yucatan Peninsula and two in the Gulf of Mexico, is home to one of the most important tropical forest resource bases in Latin America. The permanent forest estate (PFE) registered for this region is 9.9 million hectares. The PFE is the land area belonging to the social sector through the *ejidos* system; it is earmarked for forest production.

A total of 621 954 m^3 of timber was harvested in the temperate and tropical forests of the southeastern region in 2011; this volume includes commodity tropical timber species, and high-value timber species (*Swietenia macrophylla*, *Cedrela odorata* and *Cedrela mexicana*) which are exported to countries such as Japan, Germany and the United States of America.

Under current law, harvesting permits are awarded to landowners, which in the case of tropical forests are mostly *ejidos*. In *ejidos* with commercial timber stocks, forest operations make important contributions to local income and employment.

Forest management in southeastern Mexico requires knowledge of the rules that regulate forests as well as awareness of the cultural value of these resources for those living in or near them. Participation in the process to develop criteria and indicators (C&I) for the sustainable management of forest resources can enable stakeholders in *ejidos* and communities to become fully aware of the conservation value of their forests and, with the support of specialized technicians, to become working partners in ensuring the conservation of tropical forests and to benefit fully from their economic use.

The National Institute for Forest, Agricultural and Animal Research (*Instituto Nacional de Investigaciones Forestales, Agrícolas y Pecuarias*—INIFAP) implemented an ITTO-financed project to develop criteria and indicators for Mexico's tropical forests (Project PD 351/05 Rev.1 (F)), which was completed in 2016, covered five states of the southeastern region: Yucatán, Campeche, Quintana Roo, Chiapas and Oaxaca. Its development objective was to strengthen, encourage and evaluate sustainable tropical forest management in Mexico with a view to boosting sustainable forest development through criteria and indicators (C&I).

[1] An *ejido* is a land area given to a rural settlement. The allocated area includes three types of land—urban plots, farming plots and community lands—and it is governed through an *ejido* hierarchical system, with general assemblies the highest decision-making authority.

[2] A farming community is a land area given to a rural settlement. It is administratively and socially governed through a customary self-government system (mainly based on a hierarchical structure), with inalienable land tenure and use rights and duties.

A peer-to-peer learning excercise between Ejido members at Ejido 20 de Noviembre, Campeche (Photo: Carlos Franco)

The project implemented and validated C&I in nine forest management units (FMUs) in humid and subhumid tropical forests. The aim was to evaluate and monitor economic, social and ecological aspects of forest management in those ecosystems and thereby to establish a scientific basis for sustainable forest management.

Local people were strongly involved in the project. In total, the collaborating *ejidos* and communities accounted for more than 150 000 hectares of forest and encompassed various forest types and levels of organization. C&I for tropical forests in southeastern Mexico were developed in workshops with the participation of stakeholders involved in the management and harvesting of tropical forests. Efforts were made to obtain the participation of producers from different ethnic groups, as well as bilingual professionals with ethnic backgrounds, thereby ensuring that diverse voices were heard during the process.

By the end of the process, C&I had been identified, developed and disseminated. The number of agreed and applied C&I for tropical forests in southeastern Mexico are 10 principles, 25 criteria, 40 indicators and 69 verifiers.

The C&I were applied to evaluate sustainable forest management in a total of 150 337 hectares of forests subject to harvesting. The concept and use of C&I was disseminated among 1333 *ejido* and community members who were the owners of these forest areas.

As information owners, collaborating *ejidos* and communities received the results of the sustainable management evaluation, which are also contained in a document known as the "specific C&I kit". This kit sets out a systematic approach to the economic, social and ecological aspects of forest resource harvesting and conservation, incorporating all the necessary support elements. It is intended that the kit will be updated over time as each FMU strives to achieve sustainability.

The project had a positive and immediate impact on *ejido* and community members as well as on participating technicians. It has had increased understanding and acceptance of C&I as a tool for the evaluation, monitoring and management of their forests. They have used the results of the C&I evaluation to plan silvicultural activities, improve forest harvesting practices, identify priority research issues in their forests, and request funding for the implementation of various activities; as well as for supporting FSC indicators for those *ejidos* involved in certification processes.

The implementation of the project has created a new enabling condition for those *ejidos* and communities involved in the development of the C&I: it has provided a reference and practical tool for producers for evaluating their forest management.

It is considered, therefore, that mainstreaming the project-developed C&I into Mexico's forest regulations would have a

*Loading logs of Mahogany (*Swietenia macrophylla*), Pukte (*Bucida buceras*) and Zapote (*Manilkara zapota*) in Ejido San agustín, Yucatán (Photo: Claudio Franco)*

positive impact on certification at the forest management unit level in *ejidos* and communities in tropical forests since the process has already been learned, implemented and monitored it would increase the availability of up-to-date information and improve the reporting required to comply with forest regulations.

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Ladies of the forest

Reforesting by DAMCFUG, the Dumrithumka Adarsh Mahila Community Forest Users' Group, in Nepal

In Nepal, many of the men left long ago in search of a salary. But in their absence, the forest has found a new, powerful ally against poachers and illegal loggers: women. This is how Urmila, Kumari and her friends have become heroines of nature conservation. These women understood that the forest is a generous friend, if you treat it right.

They say that if you get your priorities right, you will go far in life. Urmila Khadka has no doubt of hers: "My family and my forest." Like most women in her community, and indeed

Nepal, hers is a long, busy day. She has to fetch food, gather the wood to heat her home and cook the family's meals. She will also collect fodder for her animals, take care of her children and clean the house. A similar life to most women in Rauta, a village in the district of Udayapur, eastern Nepal, consisting of some 5,000 souls, last time they counted. You've probably never heard of the municipality (here they call them Village Development Committees) of Rauta. And there is not much a quick internet search can add,

for most articles containing the word will be wrong; Rauta being also a person's name. Rauta Tamang was, for example, a poor Nepalese migrant working at the security of the Canadian Embassy in Kabul, Afghanistan. He died with eleven fellow Nepalese co-workers in a carbomb attack last June. One that scared many, and created a micro-wave of counter-migration back to Nepal, according to the Kathmandu Post. A rather unusual phenomenon in a country where men have to leave their villages and migrate from, in this case, a lush sub-tropical forest to some smelly city, to make a living and send something back home.

This is one of the reasons, but not the main one, that have turned Urmila and women like her into conservation heroines. Women, with kids to raise, animals to feed, food to fetch and fires to light, understood that the forest is a generous friend, if you treat it right. And so they took matters in their own hands and in the last two years they have had Bird Conservation Nepal (BCN; BirdLife in Nepal) on their side. BCN has provided knowledge and supported them in a number of activities: reforestation, domestic cultivation and controls to avoid overgrazing.

To foreign eyes their association's name is a something in between a mouthful and a swearword: DAMCFUG. It stands for Dumrithumka Adarsh Mahila Community Forest Users' Group, and it has been led for the last 20 years by another heroine, Kumari Ale Magar. Kumari has more stories than you can record. She holds the vivid memories of her forest ravaged by wildfires, overgrazing and over-logging. The soil was impoverished and eroded by predatory practices. That's until DAM became a Community Forest. Now grazing, logging and, in general, the extraction of resources from the forest, is closely monitored.

They've also engaged in some reforestation projects and, through HIMALICA, an international project to provide "Support to Rural livelihood and Climate Change Adaptation in the Himalayas", they've replaced old, inefficient, cooking stoves with new, efficient ones, saving tonnes of wood in the process.

Unfortunately, the forest is not safe just yet. Last September the Himalayan Times reported more than a dozen illegal saw mills in the District of Udayapur, all churning out precious timber from the protected Sal tree *Shorea robusta*. The Times reports that the cherished trees, Vishnu's favourite in the Hindu tradition, and home to a wealth of species, are logged and sold illegally under the eyes of complacent local authorities. Which is probably due to the fact that, according to a UN survey, only 16% of participants in local council meetings are women, and only 9% of key informant respondents said that women actively participated in local planning and decision-making.

Law enforcement is, indeed, a challenge for Kumari's team of heroines. But the growing unity and determination of this community is slowly changing things. Urmila, Kumari and her friends have become a true force for conservation. And in the ultimate sign that times are changing, DAMCFUG has received official praise and recognition from Nepal's Minister for Forest and Soil Conservation, Agni Prasad Sapkota. Not bad going indeed, for a small group of conservationists from a remote Nepalese village.

Kriti Nepal and Luca Bonaccorsi
Bird Conservation Nepal *birdlifenepal.org*

Reconciling conservation and trade in high value timber species: The ITTO–CITES Programme in Latin America

*Measuring stem diameter growth of cedrorana (*Cedrelinga catenaeformis*) (3,61 cm DBH) at Marajoara, Pará, Brazil (Photo: Sofia R. Hirakuri)*

Since 2007, ITTO and CITES have been implementing a collaborative initiative, the ITTO–CITES Programme for Implementing CITES Listings of Tropical Tree Species with the aim of ensuring that international trade in CITES-listed tree species is consistent with their sustainable management and conservation and to increase the quality of information on listed tree species in order to facilitate better forest policy and planning. Maintaining a sustainable trade is important, both for the economies of range states in Latin America and as a way of promoting sustainable forest management (SFM) and conservation.

This article examines the impacts of projects implemented under the ITTO–CITES Programme in improving the implementation of CITES for listed tree species in Latin America and ensuring the sustainability of those species.

ITTO-CITES Programme

The Programme has been implemented globally through activities proposed by or developed in collaboration with range states. In Latin America, work has focussed on significant exporters of forest products from listed species (Bolivia, Brazil, Guatemala, Guyana and Peru). The Programme complements the work of the CITES Plants Committee[1] and the CITES Secretariat

[1] Some activities of the Committee are linked with the activities of the Programme, including the Committee's work on CITES decisions: Decision 14.135 (Timber species and medicinal plants: non-detriment findings); Decision 14.145 (An action plan for the control of international trade in bigleaf mahogany (*Swietenia macrophylla*)); Decision 14.146 (Action Plan for *Cedrela odorata, Dalbergia retusa, Dalbergia granadillo and Dalbergia stevensonii*).

also oversees the Programme's activities to avoid duplication of effort and to maximize opportunities for integrating the results of the Programme into the work of the Committee.

The main species covered by the Programme in Latin America are *Swietenia macrophylla* (bigleaf mahogany), *Cedrela odorata* and other *Cedrela* species (cedar), *Bulnesia sarmientoi* (lignum vitae, palo santo), *Aniba rosaeodora* (Brazilian rosewood) and *Dalbergia* species (rosewood). The majority of species covered by the Programme are listed in CITES Appendix II, i.e. legal trade requires a scientific and technical opinion (known as a non-detriment finding or NDF) that trade is not detrimental to the conservation of the species.[2]

In general, an NDF is made using the best available knowledge of a species. It is made at the discretion of the CITES Scientific Authority in each country, taking into account the following elements: population status and trend; geographical distribution; harvest level, including volumes; other biological and ecological factors; and trade information.

Nevertheless, there is often a lack of information on the extent of listed species and their distribution in the region, as well as on their regeneration and ecology. In addition, there may be insufficient capacity and resources in CITES Management Authorities with respect to monitoring, control, transparency, and communication and information systems. To fill such gaps, the ITTO–CITES Programme has been helping to build capacity and conduct studies where information is lacking.

Dalbergia Stevensonii *adult tree in Ruta del Mono, Petén, Guatemala (Photo: Sofia R. Hirakuri)*

[2] CITES, Article IV, Paragraph (2), Regulation of Trade in Specimens of Species Included in Appendix II.

Key accomplishments

The key accomplishments of the ITTO–CITES Programme in Latin America can be summarized as follows.

(i) Technical guidance for management plans and NDFs

- A biological foundation has been established for the sustainable management of mahogany in much of the Amazon (Bolivia, Brazil and Peru) based on long-term studies of growth, reproduction and regeneration in natural populations in primary and logged forests.
- An approach has been developed for controlling mahogany shoot borer (*Hypsipyla grandella*) in Brazil, which increases the feasibility of bigleaf mahogany plantations.
- A computer-based "Big-Leaf Mahogany Growth & Yield Model" was developed, which is capable of simulating response by local mahogany populations to a wide range and intensity of harvest practices.
- Scientific and technical understanding of bigleaf mahogany population and regeneration dynamics in Bolivia, Brazil and Peru has increased.
- In Peru, implementing agencies have partnered with conservation non-governmental organizations and timber concessionaires and companies to develop and implement biodiversity conservation and sustainable use objectives.
- Governmental **f**orestry plans have been developed for the recovery of bigleaf mahogany and cedar populations in Peru, through a participatory planning process.
- Guatemala in partnership with Spain's University of Cordoba implemented a project to develop simple, clear and comprehensive guidance for CITES exporting parties on the preparation of NDFs.
- An assessment of Guyana´s commercial forests was undertaken to determine the status of red cedar. This resource assessment was used to develop a management plan for the sustainable harvesting of red cedar and to increase the capacity of the industry to harvest, develop and market the species domestically and internationally, consistent with the objectives of a possible CITES Appendix III listing.

ii) Harvest quotas[3]

- Establishment of sustainable harvest quotas for mahogany and cedar based on population estimates and the demographic characteristics of populations; annual export quotas have been established in Bolivia and Peru, based on population surveys.
- National sawn timber yield tables were developed for bigleaf mahogany standing volume and export-grade sawnwood in Guatemala and Peru. These allow the estimation of sawn timber volumes (to determine or compare to annual export quotas) from tree data registered in annual operating plans.

[3] CITES considers that an export quota system is a management tool for ensuring that exports of specimens of a given species are maintained at a level that has no detrimental effect on the population of the species.

- The resumption of exports of mahogany products from Brazil[4] took place from an area covered by a project implemented under the Programme, which helped put in place the required procedures to allow exports to resume after many years.

iii) Tracking, traceability and wood identification

- In Peru, the speed at which valuable species such as cedar and bigleaf mahogany can be tracked for the issuance of CITES export permits has increased.
- A pilot study has been completed on the use of near infrared spectroscopy for monitoring the bigleaf mahogany trade in Brazil.
- In Guatemala, a forensic laboratory has been established for identifying and describing wood as a way of assisting in legal processes and traceability systems for products included in CITES.

iv) Knowledge sharing and capacity building

- Lessons learned have been communicated to the private sector and governmental policy and regulatory institutions in all range states in Latin America.
- A website (www.swietking.org) has been established dedicated to disseminating information on bigleaf mahogany to general and specialized public audiences, based on an activity implemented in Brazil.
- The "Bigleaf mahogany growth and yield model" referred to above has been made freely available.
- Scientific and technical findings have been broadly disseminated, including in scientific journals, manuals and presentations in academic conferences at the local, national and international levels.
- Peru has strengthened its capacity to make NDFs for trade in bigleaf mahogany. It was able to provide relevant information to the CITES Plants Committee at its 17th meeting, with the Committee determining that it was unnecessary to continue including Peru in its "review of significant trade" for this species.
- The Peruvian government has widely used a manual for evaluating seed trees and regeneration for bigleaf mahogany and cedar produced by an ITTO–CITES Programme activity.

All information generated by the ITTO–CITES Programme in Latin America is available on the Programme website (http://www.itto.int/cites_programme/) and will help underpin future NDFs for CITES-listed timber species in range states.

[4] Mahogany was included in CITES Appendix II in 2002 and Brazil banned exports shortly thereafter.

Final remarks

While significant progress has been made by the ITTO-CITES Program in Latin America, there is a need to carry out additional work under each of the above four headings for the species already listed and new ones to be considered for listing in future. Dissemination and communication are important tools to exchange experiences on management and governance of all CITES-listed species in the countries concerned. Actions recommended for the long-term sustainability of high value timber species, based on the findings of the Programme to date, include: (i) collaboration between countries for sharing information and expertise; (ii) improve communication between government agencies involved in forest management and CITES issues; (iii) extension of cost effective timber tracking and identification technologies (like the NIRS technology developed in Brazil) to other countries; (iv) establishing synergies between the work of the Programme and that of other species conservation/forest governance initiatives such as EU FLEGT, IUCN Red Listing process, timber procurement policies, etc.

The Programme has engaged with all stakeholders, including the private sector, which previously had frequently been left out of the CITES dialogue regarding timber species. Timber species listings in CITES are sometimes seen as the key to conservation success. The conservation of high-value timber species, however, will be more successful when their sustainable trade produces returns for forest owners and managers and thereby provides them with an incentive to maintain their forests and to manage them sustainably. Integrating conservation and sustainable timber production is a key contribution of the ITTO–CITES Programme, both in Latin America and globally.

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Publications

Harnessing the Potential of Private Sector Engagement in Productive Forests for Green Growth

PROFOR

The forest sector has great potential for contributing to inclusive green growth through job creation, export opportunities, and climate change mitigation. Promoting harvested wood products (HWP) (such as wood for construction or furniture, or biomass for energy) is an important strategy for maximizing the economic, social, and environmental potential of the forest sector. When trees are harvested and turned into HWP, the woody biomass of the HWP continues to store carbon until the product is burned or decomposes. Depending on the use of the HWP, carbon storage can range from immediate release (fuelwood) to release centuries later (construction). By delaying the release of carbon back into the atmosphere, HWP can help to mitigate climate change. In addition, HWP can reduce carbon emissions by acting as a substitute for fossil fuel–intensive materials, such as concrete or metal for construction.

Download at www.profor.info/content/harnessing-potential-private-sector-engagement-productive-forests-green-growth

New field-level technique available for identifying timber species

Near infrared spectroscopy (NIRS) has been applied successfully to wood identification and verification of origin by the Forest Products Laboratory (LPF) of the Brazilian Forest Service, thanks to support from the ITTO–CITES Programme for Implementing CITES Listings of Tropical Tree Species.

NIRS wood identification is now available for 16 endangered tropical tree species, and wood identification and origin verification have been applied to mahogany (Swietenia macrophylla). NIRS is an accurate, practical and rapid method for identifying timber in the field and at checkpoints along the timber supply chain, thus facilitating the enforcement of CITES regulations and improving market transparency. Watch this new video from the LPF to learn more by visiting https://www.youtube.com/watch?v=W_0NG7r54mU

PEFC and Certified Furniture

PEFC and Certified Furniture explains how furniture manufacturers can benefit from PEFC Chain of Custody certification.

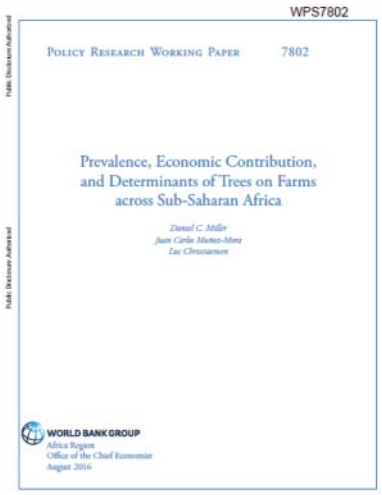
The PDF of this publication can be downloaded at: **http://bit.ly/2mSplAf**.

To request a hard copy send an email to **info@pefc.co.uk**

Prevalence, Economic Contribution, and Determinants of Trees on Farms across Sub-Saharan Africa

PROFOR

Trees on farms are often overlooked in agricultural and natural resource research and policy in Sub-Saharan Africa. This paper addresses this gap using data from the Living Standards Measurement Study–Integrated Surveys on Agriculture in five countries: Ethiopia, Malawi, Nigeria, Tanzania, and Uganda. Trees on farms are widespread. On average, one third of rural smallholders grow trees. They account for an average of 17 percent of total annual gross income for tree-growing households and 6 percent for all rural households. Gender, land and labor endowments, and



especially forest proximity and national context are key determinants of on-farm tree adoption and management. These new, national-scale insights on the prevalence, economic contribution and determinants of trees on farms in Africa lay the basis for exploring the interaction of agriculture, on-farm tree cultivation, and forestry. This will improve our understanding of rural livelihood dynamics.

Download at www.profor.info/content/prevalence-economic-contribution-and-determinants-trees-farms-across-sub-saharan-africa

Around the World

Canada steps up efforts to diversify markets for Canadian wood and wood products

Canada's forest industry has transformed itself into one of the most innovative sectors of our economy, investing in research, developing new products and expanding its markets as it also sets the pace on environmental performance.

Hundreds of thousands of Canadian workers and their local communities depend upon this industry's continued success to support good middle-class jobs, create new opportunities and ensure sustainable prosperity for generations to come.

Federal cabinet ministers are targeting new markets around the globe in a concerted effort to enhance trade and market diversification for Canadian wood and wood products as part of the clean-growth economy.

International Trade Minister Francois-Philippe Champagne is in China to promote the use of Canadian wood in home construction while Pamela Goldsmith-Jones, Parliamentary Secretary to the Minister of International Trade, is in Vietnam, Singapore and Brunei Darussalam to explore further opportunities for Canadian wood exporters in the Asia-Pacific region.

Canada's Minister of Natural Resources, the Honourable Jim Carr, will also lead a delegation of Canadian forestry leaders to China in early June to maintain momentum from Minister Champagne's efforts this week.

These trade missions build on the $6 million in funding provided this year by Natural Resources Canada's Expanding Market Opportunities program to eight Canadian forest product associations to promote Canadian wood products in overseas markets, and $18 million to FPInnovations for research and development. In addition, Budget 2017 announced measures to continue investing in Canada's forest sector, including $40 million over four years to support projects and activities that increase the use of wood in construction. This helps create new markets for sustainable Canadian products.

These initiatives are part of the Government of Canada's continuing effort to maintain and increase access to global markets for Canadian wood and wood products.

"Canada's forest industry is uniquely positioned to help address some of the biggest challenges facing our country: combating climate change, driving innovation, creating jobs for Indigenous and rural communities and advancing trade. Our government will vigorously defend its interests as a way to strengthen the industry and support the people and communities that rely upon it."
Jim CarrCanada's Minister of Natural Resources

"Canada will not be deterred and will vigorously defend our industry. We will also seek new opportunities and provide greater access to the burgeoning economies of the world for Canada's high-quality products, notably softwood, where my mission to China has been met with eagerness to explore the sustainable, eco-friendly and safe softwood products where our industry excels. We will leave no stone unturned. Canada's softwood will help build the economies of tomorrow, especially

in Asia, and together we will ensure the future prosperity of our producers and the good jobs they sustain."
Francois-Philippe ChampagneCanada's Minister of International Trade

"Thousands of middle-class Canadian jobs depend on our wood and wood products. Our government is firmly committed to promoting and defending the interests of workers and producers from across Canada. My colleagues and I will continue to work very closely with the industry, its workers, the provinces and territories to ensure continued success at home and abroad."
Chrystia FreelandCanada's Minister of Foreign Affairs

"Our government stands ready to take action to protect and support the workers, families and communities who may be affected by the softwood lumber trade dispute. The softwood lumber industry is a priority for our government, as this industry provides employment in communities across the country and is a source of economic prosperity."
Jean-Yves DuclosCanada's Minister of Families, Children and Social Development

marketwatch.com

Global: To save forests, cut some trees down, scientists say

Forests are feeling the heat. In places like the American West, rising temperatures and drought mean less water for trees, sometimes shriveling swaths of woodland. Now, scientists have found that thinning early in forest growth creates tougher trees that can endure climate change. What's more, these thinned forests can suck carbon out of the air just as fast as dense forests.

"When it comes to carbon sequestration and climate change adaptation, we can have our cake and eat it too," says Andrew Larson, forest ecologist at the University of Montana in Missoula and author of the new study. "It's a win-win."

As trees grow, they convert carbon dioxide to food and store it in their leaves, trunks, and roots. U.S. forests capture between 10% to 20% of U.S. emissions each year. But if trees get too crowded, they compete for light and water—and stressed trees are more susceptible to drought and insect attacks. Removing some trees can ease the competition, letting the remaining trees grow big and healthy. But scientists worry that removing trees can reduce forest carbon storage. These worries, however, are based mostly on models and short-term studies.

To see if the climate trade-off truly exists, scientists tapped into a long-term experiment in northwestern Montana. In 1961, U.S. Forest Service officials started the experiment in a young forest of western larch—a conifer common in the Inland Northwest. The forest was broken up into plots. In some plots, the 8-year-old trees were thinned from tens of thousands per hectare down to 494 per hectare (2.5 acres). These trees grew thick trunks and broad canopies. Other plots were left alone, and the teeming trees grew tall and skinny as they competed for sunlight. The original study was rooted in an interest in growing timber rapidly. But the scientists at the University of Montana sprouted a new question: How did tree density affect carbon storage?

To find out, they measured tree height, diameter, and width of branches to estimate the amount of carbon stored. They also calculated the carbon contained in other plants, dead wood, and forest floor debris.

Total carbon was nearly the same in both forests. The un-thinned forest had more trees, but the thinned forest compensated with bigger trees, the team reports this month in *Forest Ecology and Management*. Larson was surprised by how quickly the thinned trees had caught up.

"There are very few experiments that have ever been set up to test [carbon storage] directly," says Mark Harmon, forest ecologist at Oregon State University in Corvallis, who was not involved in the research. Long-term studies like this are useful to validate climate models, he says. "I think we need more examples like this."

The key is early thinning, before trees start to fight over water and light. The remaining trees grow rapidly. Thinning treatments on mature trees haven't had such success, because the leftover trees were already weakened by competition. "The later you wait, the more impact you're going to have on carbon storage," Harmon says.

Climate change may bring more severe droughts to the West. Big trees are more drought-resilient, and their thick bark can resist fire better than can young trees. Also, they are healthier and can fight off disease and insects. When the large larches do die, they become homes for woodpeckers and lynx.

The results can be applied to forests that have been clear cut, boosting the recovery of trees, says forest ecologist Michael Schaedel, lead author of the study. As a forester for the Nature Conservancy in Missoula, he's thinned similar young larch forests. But, until now, he hasn't fully understood how the practice will affect them in the long run. "Having an opportunity to travel through time to the present day—54 years later—and see what the effect of those treatments is invaluable."

There are still concerns over how thinning impacts other species. In Montana, snowshoe hares—preyed on by the threatened Canada lynx—inhabit young western larch forests. Thinning in these forests could reduce hare habitat and in turn food for lynx. Still, Larson thinks thinning could become a useful tool for addressing climate change. "I think there's no more pressing issue in natural resource management."

sciencemag.org

Costa Rica's Return to Forest in the Midst of Latin America's Deforestation

While Latin America as a whole has experienced marked deforestation, Costa Rica has proved the notable exception, and has sustained and even increased its forest cover, said a climate investigation published in the University of Costa Rica's weekly Semanario Universidad.

What has led to Costa Rica's success? The United Nations Organization for Agriculture (FAO) says state support and incentives to preserve forests have played a key role.

Costa Rica's environmental services payment program (PSA, its initials in Spanish) is one of the most successful environmental public policies in the country's history, and has been used as a model for other countries.

The country went from having 75 percent forest cover in 1940 to an all time low of 21 percent in 1987, as shown in the infographic included above by Revista Vacío.

Today, more than half of the country is forested and, about 50 percent of forested lands are classified as protected.

The environmental service payment program was formalized in 1997, having morphed out of some similar previous programs. Between 1996 and 2015, investments in forest-related PSA projects in Costa Rica reached US$318 million, according to the FAO.

The program pays for four types of "environmental services" on forested lands. These include carbon capture; water protection for rural, urban or hydroelectric use; protection of biodiversity; and natural scenic beauty or value for tourism and/or scientific purposes. In essence, the program is simple: if you keep the forest on your property, Costa Rica will pay you.

The report in Semanario Universidad found that the environmental service payment program tends to be more effective in areas far from national parks. This appears to be related to the fact that owners of lands near national parks can often find more lucrative uses for their land due to the presence of tourism, and so conserving forest for government payments is not as attractive as in more remote areas.

An important finding for the FAO was that while other Latin American countries cleared forests to make room for agricultural production, Costa Rica was able to increase conservation and sustainable management of forests without jeopardizing their food security. In fact, the FAO found that 70 percent of deforestation in Latin America between 2000 and 2010 occurred to make way for commercial agriculture.

Costa Rica has increased its food security since the 1990s by increasing agricultural productivity and importing food from countries with lower production costs, according to the recent FAO report.

While there continue to be poor, landless and vulnerable rural families suffering from food insecurity, Costa Rica appears to be heading the right way and has found a way to preserve its forest cover while maintaining good levels of food security, said the report.

news.co.cr

Global: Cities need 'hedges rather than trees' for environment

Hedges are often better than trees at soaking up air pollution among tall buildings, research has suggested.

A paper in the journal Atmospheric Environment says tall trees are good at absorbing pollution in more open areas.

But hedges can trap toxins at exhaust pipe level, so reduce people's direct exposure to harmful pollutants.

Lead author Prof Prashant Kumar said councils should try to plant low hedges between pedestrians and the street if pavements are wide enough.

- Air pollution: 'Heart disease link found'
- Pollution particles 'get into brain'
- Ministers will not appeal pollution ruling

He and his partners in the EU and US are still researching the best pollution-busting plants, and the optimum height for the hedge.

But any gardener in a major city who has trimmed a privet hedge, for instance, will attest that it is full of dust and pollutants that the tight-knit foliage has filtered from the air.

The authors of the report are not anti-trees – far from it.

They say trees help clean the air, and many more should be planted as people worldwide flood into cities.

But they say the role of the hedge has been neglected, especially in city "canyons" where tall trees can in some circumstances trap pollution at street level.

There is, they insist, no hard and fast rule about the best planting for any given area – it will depend upon local conditions.

Dr Kumar, of Surrey University, told BBC News: "The big thing about hedges is that they are right down at tailpipe level.

"The emissions from vehicles starts to dilute very quickly as you move away from the road – so any hedge that acts as a barrier slowing down the airflow and catching pollutants on the leaves is going to offer people in homes better protection."

The paper comes as cash-strapped councils round the UK are starting to charge households for collecting green waste.

If this policy prompts people to remove their hedges to avoid the charges, it seems that the neighbourhood may suffer.

bbc.co.uk

Global: Larger swaths of tropical forest being lost to commercial agriculture

Larger patches of tropical forest are being lost worldwide as governments and corporations clear more land to make way for industrial-scale agriculture, a Duke University study shows.

The newly published analysis reveals that clearings for large-scale agricultural expansion were responsible for an increasing proportion – in some places, more than half – of all observed forest loss across the tropics between 2000 and 2012. The trend was most pronounced in Southeast Asia and South America.

"In South America, more than 60 percent of the increase in deforestation was due to a growing number of medium- and large-sized forest clearings typical of what you see with industrial-scale commercial agricultural activities," said Jennifer J. Swenson, associate professor of the practice of geospatial analysis at Duke's Nicholas School of the Environment.

"Brazil, which had stricter policies limiting agricultural expansion until 2012, was the only country showing a reverse trend – its average forest clearing size actually got smaller," she said. "This unique trend may be short-lived, however, given Brazil's relaxed forest policies of the last few years."

The new findings underscore the growing need for policy interventions that target industrial-scale agricultural commodity producers in the tropics, the researchers say.

A small family farm that produces sustenance crops or food for local consumption typically causes less than 10 hectares – or just under 25 acres – of land to be cleared per year, said Ph.D. student Kemen G. Austin, who co-authored the report. These small clearings can have relatively modest impacts on biodiversity, habitat connectivity, carbon storage, water quality, erosion control and other vital ecosystem services the forest provides. By comparison, an industrial-scale plantation – such as one that grows and processes palm oil or soybeans for the global market – can cause nearly 2,500 acres of land to be cleared annually.

"As the size of the cleared land increases, so do the scale and scope of the potential ecological impacts," explained Ph.D. student Danica Schaffer-Smith.

The Duke team conducted their analysis using high-resolution, satellite-derived maps of forest cover produced by researchers at the University of Maryland. "Using these invaluable maps, we were able to design a new computational approach that allowed us to analyze trends in clearing sizes across the globe," said Schwantes, who programmed the computational analysis with González-Roglich.

eurekalert.org

Global: Status of forests is 'dire' as world marks 2017 Earth Day

They cover a third of the world's landmass, help to regulate the atmosphere, and offer shelter, sustenance and survival to millions of people, plants and animals. But despite some progress, the planet's woodlands continue to disappear on a dramatic scale.

Since 1990 the world has lost the equivalent of 1,000 football fields of forests every hour, according to World Bank development indicators from last year. That's 1.3 million square kilometers of forest, an area larger than South Africa, according to the international financial institution.

With the observance of Earth Day conservationists seek to drive home the message that protection of forests is more critical than ever. "The situation is dire," said Orion Cruz, deputy director of forest and climate policy for Earth Day Network, an organization that grew out of the first Earth Day in 1970. "Forests are being eliminated at a very rapid rate and collectively we need to address this problem as quickly as possible. There's still time to do this, but that time is quickly running out."

Tropical regions are seeing the fastest loss of forests.

Indonesia, with its thriving paper and palm oil industries, is losing more forest than any other country. Despite a forest development moratorium, the Southeast Asian nation has lost at least 39 million acres since the last century, according to research from the University of Maryland and the World Resources Institute.

Brazil, Thailand, Congo and parts of Eastern Europe also have significant deforestation, according to United Nations data.

Brazil managed to reduce deforestation in the Amazon by at least 70% between 2004 and 2014 and was widely considered a success story in forest conservation, according to the World Resources Institute's Global Forest Watch initiative.

But last year, a report by Brazil's National Institute for Space Research, which monitors deforestation, found that between July 2015 and August 2016 aboout 2 million acres of rain forest was depleted. Experts attributed the destruction to the Brazilian government's relaxation of environmental laws, among other reasons.

"Many people around the world are concerned about whether Brazil is going to remain dedicated to protecting its forests," said Cruz. "I think what we're seeing now is a backsliding."

Meanwhile, forest loss is accelerating in other regions. The greatest loss between 1990 and 2015 occurred in South America, the Caribbean and sub-Saharan Africa, according to the World Bank. A significant uptick in tree loss has been recorded in countries such as Bolivia, Paraguay and Argentina, where the depletion is offsetting any gains, according to Global Forest Watch.

The organization pointed to Paraguay as "a notable hot spot" because of expanding cattle ranching and soybean farming.

Meanwhile, of the 10 countries with the fastest acceleration of tree cover loss, almost half can be found in West Africa, according to Global Forest Watch data, which cited expansion of palm oil development as a cause of the accelerated clearing of forests.

Human needs are killing forests

Aside from the increased demand for food, energy and minerals, the clearing of forestland for agriculture "accounts for the lion's share of the conversion of forests," according to the U.N. Food and Agriculture Organization.

Rod Taylor, global director of the World Resources Institute's Forests Program, underscored the role of the "death of a thousand cuts" syndrome, in which numerous small, bad things accumulate to cause the demise of forests. For example, a flourishing forest is hit by illegal logging, animals are pushed out, humans move in and this eventually leads to degradation.

New infrastructure, including roads and rail that suddenly make very remote areas much more accessible for mining, farming or settlement, is also "often the precursor to deforestation," Taylor said.

When forests die, humans and animals feel the pain

According to the Earth Day Network, among the 1.3 billion people worldwide who live in extreme poverty (on less than $1.25 a day), forests directly contribute to 90% of their livelihoods.

"People who are most vulnerable tend to be indigenous groups and people who live in and around the forest," said Taylor. "Often they have weak land rights. When land is grabbed or converted, they . . . are the people who bear the brunt of it."

And neither is wildlife spared. Outright forest clearance could result in the loss of species, while degradation — where a forest's quality is compromised — could reduce species' ability to find food and reproduce and cause potentially dangerous exposure to humans, said Amy Smith, a forestry expert with the World Wildlife Fund.

For example, while tigers, elephants, rhinos and orangutans are feeling the effect of deforestation in Indonesia, the habitat of Amur tigers is being destroyed by the logging industry in Russia's Far East, and alluvial gold mining in Peru's Amazon region is threatening the environment that species such as jaguars and howler monkeys need to survive, Smith said.

Deforestation and forest degradation have caused a surge of greenhouse gases into the atmosphere, according conservationists.

Belize and Bolivia have seen their carbon emissions skyrocket in recent years as a result of increased deforestation, the World Bank reported.

"Protecting forests can give you 30% of the emissions reduction and carbon capture you need in order to keep the planet from overheating," said M. Sanjayan, executive vice president and senior scientist at Conservation International. "The most effective way that we could spend to deal with climate change would be to spend on protecting on forests."

But the international community is failing to step up, conservationists said.

"If you look at the $400 billion that is being spent globally to deal with emissions, only 2% of that goes towards protecting and restoring forests," Sanjayan said. "The science is really clear that we are on a dangerous path and if the world temperature increased by more than 1.5 or 2% it would make life extraordinarily difficult for billions of people around the planet, particularly those who live along the coast. Forests give us the most efficient way we know for mitigating that."

So what do environmentalists suggest?

"There really needs to be a multi-tiered, multi-pronged approach to this, because these are complex issues," said Smith of WWF.

Suggested solutions from conservationists include:

— Using a system of certification to hold companies accountable for better forest management, and combating illegal logging.
— Putting pressure on global corporations to reduce and eventually eliminate deforestation from their supply chain.
— Protecting the rights of indigenous people who live in forests, because they are often viewed as being the best stewards of the land.

"If you don't empower indigenous and local communities, financially and legally, to take care of their home, then all is lost," said Sanjayan.

— Promoting soil restoration and reforestation efforts, while working with governments and nongovernmental organizations to establish protective zones and employ more balanced land-use practices.

LAtimes.com

Vietnam: Protective forest destroyed for Phu Yen golf course

Phu Yen Province approved the destruction of nearly 116 hectares of forest to build a golf course despite having no legal documents to go ahead. On April 21, the trees were felled near Tuy Hoa city at the location of the New City Vietnam tourism complex project. Mai Kim Loc, vice director of the provincial Department of Natural Resources and Environment confirmed that the local authorities had destroyed protective forest.

In 2003, all coastal land in Tuy Hoa City was included in the tourism development plan. However, new regulations were issued after that. Projects that affecting more than 20 hectares of protection forest must be approved by the Ministry of Natural

Resources and Environment and the ministry had not approved the environmental impact report of New City Vietnam project.

As 116 hectares of forest will be destroyed for the golf course, this project needed to be approved by the prime minister. But the reports and documents weren't completed as it needed an approved environmental impact report.The provincial still allowed New City Vietnam Company, the project's investor, to clear the forest anyway as the Miss Friendship of ASEAN will be held in Phu Yen this July and the authorities hope the tourism complex will be a major attraction for tourists. "It will take a year or two to complete all procedures while the beauty pageant is going to be held in July. So we created favourable conditions for the investor," Loc said.

Loc said his department was responsible for the decision to destroy the forest. They received the decision from the provincial people's committee. Phu Yen Urban Environment JSC, the company hired to destroy the forest since late 2016 said they didn't know anything about the incomplete procedures. "We don't understand, we aren't managers. We are only hired to do what we do. The woods are transferred to the local Department of Finance to sell," said director Huynh Kim Toan.

Vo Ngoc Kha, chairman of Tuy Hoa City, also said they didn't know anything as the decision came from provincial authorities. "I've ordered to halt the project until they have all required papers," he said. Lee Jung Jun, project manager of New City Vietnam Company refused to comment.

Nguyen Le Vu, vice director of the provincial Department of Planning and Investment said they agreed to let New City Vietnam carry out the project despite the permit not being issued to begin work. Nguyen Duyen from the Phu Yen Department of Natural Resources and Environment said the Ministry of Natural Resources and Environment was conducting inspections at all projects that have forest land in the province so they will wait for the result before giving official answers. However, all activities to destroy the forest are still being carried out.

Vietnamnet.vn

Global: New research unlocks forests' potential in climate change mitigation

New insights into the impact forests have on surface temperature will provide a valuable tool in efforts to mitigate climate change, according to a new research paper co-authored by Clemson University scientist Thomas O'Halloran.

For the first time, scientists have created a global map measuring the cooling effect forests generate by regulating the exchange of water and energy between the Earth's surface and the atmosphere. In many locations, this cooling effect works in concert with forests' absorption of carbon dioxide. By coupling information from satellites with local data from sensors mounted to research towers extending high above tree canopies, O'Halloran and his collaborators throughout the world have given a much more complete, diagnostic view of the roles forests play in regulating climate.

Their findings have important implications for how and where different types of land cover can be used to mitigate climate change with forest protection programs and data-driven land-use policies. Results of their study were recently published in the journal *Nature Climate Change*.

"It's our hope that such global maps can be used to optimize biophysics in addition to carbon when planning land-use climate change mitigation projects," said O'Halloran, assistant professor of Forestry and Environmental Conservation at Clemson's Baruch Institute of Coastal Ecology and Forest Science in Georgetown.

Previously, scientists measured vegetation's impact on local land temperatures using satellite imagery, which is limited to only clear-sky days and few measurements per day, or they used local stations, which are limited in their reach. Integrating data from towers extending more than 100 feet in the air with satellite measurements allows for a more advanced view of the variables impacting surface temperature. The research team found that forests' cooling effect was greater than thought and most pronounced in mid- and low-latitude regions.

This new statistical model of analyzing forests' impact on local temperature will allow communities around the world to pinpoint ideal locations for forest protection or reforestation efforts. "We wanted every country in the world to have some estimation of the cooling effects of forests and vegetation," O'Halloran said. "It's about optimizing the benefit of land management for climate change mitigation."

A tower similar to those used for this study is under construction at Baruch in collaboration with the University of South Carolina to help provide greater analysis of local climate, he said. "The towers will really help us understand how ecosystems respond to change," O'Halloran said. "In South Carolina, we've had a lot of extreme weather events, droughts, flood and hurricanes. This will help us understand the resilience of local ecosystems to those types of events."

O'Halloran co-authored the article in *Nature Climate Change* with lead author Ryan Bright of The Norwegian Institute of Bioeconomy Research in Norway and several additional collaborators throughout Europe and the United States.

Unlike local climate changes owed to global emissions of CO2 and other greenhouse gases, local climate changes linked to land-related activities are unique in that they are only influenced by the local land-use policies that are in place, Bright said.

"The results of our study now make it easier for individual nations or regions to begin measuring and enforcing climate policies resulting in tangible mitigation or adaptation benefits at the local scale," says Bright. "This is especially critical moving forward in a world facing increasing competition for land resources."

sciencedaily.com

China: New look at satellite data questions scale of China's afforestation success

China has invested more resources than any other country in reversing deforestation and planting trees. However, given the large scale of these programmes it has been difficult to quantify their impact on forest cover. A new study shows that much of China's new tree cover consists of sparse, low plantations as opposed to large areas of dense, high tree cover. The results of the study could help policymakers track returns from tree-planting investment and identify suitable environments for future afforestation, aiding efforts to sequester carbon, prevent soil degradation and enhance biodiversity.

Since devastating floods in 1998 highlighted the dangers of deforestation, China has enacted strict bans on logging in primary forests, a massive expansion of forest reserves, and multibillion-dollar afforestation programmes. "This approach has undoubtedly had a major impact on reducing loss of trees in China" said Antje Ahrends of the Royal Botanic Garden Edinburgh (RBGE) and Kunming Institute of Botany (KIB), and lead author of the study. "China has spent more than US$ 100 billion on planting trees over the last decade alone. However, despite the many successes of this programme, planting trees is not the same as gaining forests."

In China's fight to halt tree cover loss, Ahrends and her colleagues analysed high-resolution maps derived from satellite data using different definitions of "forest." Under the broadest definition, that used by the UN Food and Agriculture Organisation (FAO), China gained 434 000 km² of forest cover between 2000 and 2010 – larger than the areas of Germany, The Netherlands, Belgium and Luxembourg combined. However, this definition includes scattered, immature or stunted plantations often consisting of a single species or even single clones, which are unlikely to provide the same benefits as large areas of dense and tall forest. The paper, co-authored by a team from organisations including RBGE, KIB and the World Agroforestry Centre (ICRAF), will be published online today in the *Proceedings of the Royal Society B*.

"We wanted to see how this picture would change if we specifically looked for large areas of tall, relatively dense tree cover" said co-author Xu Jianchu of the World Agroforestry Centre and KIB. "Understanding the type of cover established by afforestation programmes is critical to understanding the impacts of these projects on soil health, biodiversity and carbon sequestration." The results were dramatically different: under the stricter definition, China's forests expanded by less than a tenth of the previous estimates – 33 000km², an area smaller than the size of The Netherlands.

The study also notes the practical challenges facing tree planting programmes in China: China has to feed one-fifth of the global population on less than one-tenth of the world's agriculturally suitable land, and its growing economy means land suitable for growing trees is increasingly in demand for food production, construction and industrial use.

"Our analysis illustrates the importance of both definitions and large-scale monitoring for understanding changes in tree cover" said co-author Peter Hollingsworth of RBGE. "It provides enhanced understanding of where tree planting programmes are most successful, and whether those programmes are leading to dense forests or sparsely spaced shrubs."

The report also looks at global trends: the researchers found that roughly half of the world's forest cover has been lost over the past 10,000 years, and that tree cover is being lost in low-income countries at the rate of around 25 000km² per year. However, the researchers also found evidence that many countries which have in the past lost much of their forests may be shifting to protect their remaining tree cover.

sciencedaily.com

Poland EU row over ancient forest heats up

Poland is ready to take a dispute with the European Union over logging in an ancient forest to the bloc's highest court, Environment Minister Jan Szyszko has said. The European Commission last week sent a "final warning" to Warsaw saying it could take legal action to halt large-scale logging in the UNESCO World Heritage forest of Bialowieza on the border with Belarus.

"We are not afraid to take this dispute to the EU Court of Justice," said Szyszko, cited by the Polish PAP news agency. "We are simply defending environmental law based on Natura 2000."

One of the last large ancient forests in Europe, Bialowieza belongs to the EU's Natura 2000 network of protected areas. "I think it would be truly indispensable to put an end to this dispute at the EU Court of Justice... in case the information we have does not manage to convince the (European) Commission," said Szyszko.

Europe's executive branch gave Polish authorities one month rather than the usual two to address its concerns about the forest or face being summoned by the EU's top court, citing the "urgency of the situation". The EU is concerned the logging will cause irreparable loss of biodiversity.

Poland defends the wood-cutting, calling it "protective logging" to stop an insect infestation, preserve road traffic and fight forest fire risks.

"In the forest of Bialowieza, we are defending the law, we are acting to protect habitats. So that they can truly exist. These habitats call for human action, that is, active protection," said Szyszko.

phys.org

Global warming is reshaping the world's forests

In the mountains, trees are racing uphill to escape the heat – and in Canada, invasive insects have already killed massive swaths of forest. Such changes will have significant consequences for communities and ecosystems.

In some regions, the climate is changing so quickly that forests probably won't be able to provide basic functions – such as timber production and protection from landslides and snow avalanches, as well as food, wildlife habitat and recreation – that people take for granted, scientists said at the recent annual assembly of the European Geosciences Union.

"The tree line shift is something that everybody can already see, with young trees growing in new areas," said Matthias Jochner, a forest ecologist with ETH Zürich, describing his new tree-ring study across the Swiss Alps.

The results support previous estimates that vegetation zones will shift upward by 500 to 700 meters (1,600 to 2,300 feet). That change will be especially noticeable at the mid-elevations, exactly where forest-dependent communities in the Alps now thrive on agriculture and tourism.

At lower elevations, oaks and other broadleaf trees will start to dominate the forests, completely changing familiar landscapes. Trees sprouting now will be living in a much-altered climate by the time they reach middle age.

In Swiss conifer forests, already having seen an average temperature increase of 1.9 degrees Celsius (3.4 degrees Fahrenheit) since the 1800s, and with another 1 to 2 degrees Celsius projected by 2100, trees are becoming ever more susceptible to fires and deadly insect outbreaks – twin forces that will play a key role in reshaping forests around the world over the decades to come.

The width of the tree rings Jochner examined show exactly how different species, and even individual trees, respond to warmer temperatures and changes in moisture.

And that's exactly the kind of information farmers and foresters are increasingly seeking to make decisions about how and where to try and conserve trees, or whether to plant new species more suited to future climate conditions.

North America transformed

Proactive forest management could avert large-scale forest die-offs driven by global warming, like the 1990s outbreak of tree-killing bark beetles in western North America.

That wiped out trees across about 200,000 square kilometers (77,000 square miles) – an area more than twice the size of Austria. In Canada, the outbreak caused a loss of 53 percent of the country's commercial pine production, according to Natural Resources Canada.

In the Rocky Mountains of Colorado and Wyoming, and in California's Sierra Nevada, recent studies have shown that the climate has become too warm for some pine species to re-grow after fires or insect outbreaks. Those forests are quickly changing to brush- and grasslands.

Scientists have researched the same phenomenon in the Four Corners region of the Desert Southwest, where climate change triggered an outbreak of ips beetles that destroyed millennia-old piñon pine forests. These may be gone forever as the region bakes under global warming.

Researchers are also keeping an eye on tropical forests, especially the Amazon – often called the lungs of the Earth – to see how they will be affected. Some studies suggest the Amazon could be fairly resilient in the face of global warming through 2100, although it faces serious deforestation pressures.

Act now to save forests

European forests grow in smaller patches so they're not as susceptible to large-scale impacts. But climate change will still have significant regional impacts.

Climate models for Great Britain project such an extent of warming and drying by 2080, that much of the storied lowland beech forests won't be able to survive, said Jianjun Yu, with the University of Oxford Environmental Change Institute.

"Conservation of beech woodlands should be prioritized in the future," said Yu, warning that England's northern and eastern forests are most susceptible to the extreme droughts and heat waves that global warming will cause.

Some northern forests expanding

One place where forests will benefit from warming is in the far north, where Russian forest researcher Viacheslav Kharuk, of the Sukachev Forest Institute in Krasnoyarsk, Russia shows how taiga forests are racing toward the North Pole.

In the widespread "ribbon" forests of the region, Siberian pines are filling in gaps and surging northward. Thanks to excess carbon dioxide in the atmosphere, the growth rate for 50-year-old trees has doubled since the start of the 20th century, he said.

Yet at the same time, this has been tempered by insect outbreaks, which are surging in tandem with steeply climbing regional temperatures since the 1980s.

Forestry disaster

Overall, global warming is a disaster from a forestry perspective, with environmental services the forests provide under threat for extended periods of time, according to Klaus Katzensteiner, with the University of Natural Resources and Life Sciences in Vienna.

These ongoing changes endanger commercial forest production in the short-term. Over the longer term, they threaten to pinch water supplies, increase erosion and stream pollution, and hinder forests' abilities to remove CO2 from the atmosphere.

"I also see it from a societal perspective. In the 1980s, I started my scientific career when 'Waldsterben' was a serious issue," he said, referring to a widespread forest die-off in Central Europe caused by acid rain.

"[We saw] the widespread areas of dead forests. Society reacted. Enforcement of clean air acts were a solution to the problem.

"Maybe we need more proof of our impact on climate to overcome climate change skepticism and to speed up the Energiewende [transition to renewable fuels]," he concluded.

dw.com

Global: The Earth's 'lost forests': study finds area equivalent to 60% of Australia in previously unreported forest

A new global analysis of the distribution of forests and woodlands has 'found' 467 million hectares of previously unreported forest – an area equivalent to 60% of the size of Australia. The discovery increases the known amount of global forest cover by around 9%, and will significantly boost estimates of how much carbon is stored in plants worldwide. The new forests were found by surveying 'drylands' – so called because they receive much less water in precipitation than they lose through evaporation and plant transpiration.

These drylands contain 45% more forest than has been found in previous surveys. We found new dryland forest on all inhabited continents, but mainly in sub-Saharan Africa, around the Mediterranean, central India, coastal Australia, western South America, northeastern Brazil, northern Colombia and Venezuela, and northern parts of the boreal forests in Canada and Russia. In Africa, the study has doubled the amount of known dryland forest.

With current satellite imagery and mapping techniques, it might seem amazing that these forests have stayed hidden in plain sight for so long. But this type of forest was previously difficult to measure globally, because of the relatively low density of trees. What's more, previous surveys were based on older, low-resolution satellite images that did not include ground validation.

In contrast, the new study used higher-resolution satellite imagery available through Google Earth Engine – including images of more than 210,000 dryland sites – and used a simple visual interpretation of tree number and density. A sample of these sites were compared with field information to assess accuracy.

Given that drylands – which make up about 40% of Earth's land surface – have more capacity to support trees and forest than we previously realised, we have a unique chance to combat climate change by conserving these previously unappreciated forests.

Drylands contain some of the most threatened, yet disregarded, ecosystems, many of which face pressure from climate change and human activity. Climate change will cause many of these regions to become hotter and even drier, while human expansion could degrade these landscapes yet further.

Climate models suggest that dryland biomes could expand by 11-23% by the end of this century, meaning they could cover more than half of Earth's land surface. Considering the potential of dryland forests to stave off desertification and to fight climate change by storing carbon, it will be crucial to keep monitoring the health of these forests, now that we know they are there.

The discovery will dramatically improve the accuracy of models used to calculate how much carbon is stored in Earth's landscapes. This in turn will help calculate the carbon budgets by which countries can measure their progress towards the targets set out in the Kyoto Protocol and its successor, the Paris Agreement.

The study increases the estimates of total global forest carbon stocks by anywhere between 15 gigatonnes and 158 gigatonnes of carbon – an increase of between 2% and 20%. This study provides more accurate baseline information on the current status of carbon sinks, on which future carbon and climate modelling can be based. This will reduce errors for modelling of dryland regions worldwide.

The discovery also highlights the importance of conservation and forest growth in these areas.

dailymail.co.uk

Russia to launch forest fire monitoring satellite

Launch of the Mayak microsatellite together with the Kanopus-V-IK forest fire monitoring spacecraft is scheduled for July 14 from the Baikonur space center, according to the announcement posted on the Mayak project's Facebook page.

«The satellite's launch is planned for 9:30 Moscow time on July 14, 2017,» the Mayak project's announcement said.

The launch of a Soyuz-2.1a carrier rocket with the Kanopus satellite from the Baikonur spaceport was initially planned for 2015 but was delayed several times in 2016. It was earlier reported that the delays were due to the spacecraft's unpreparedness.

The Kanopus is expected to be orbited together with the Zvezda satellite, four satellites made by South Korea's SatByul Co. Ltd, two Corvus-BC satellites, AISSat-3, Lemur+, Tyvark, the Mayak microsatellite, MKA-H developed by Dauria Aerospace and Flock 2k.

The Kanopus-V-IK satellite is designed to monitor man-made and natural disasters, look for hotbeds of forest fires, large emissions of pollutants and monitor agricultural activity and natural resources. It is equipped with an infrared camera, which, as developers expect, will help reveal forest fire hotbeds on an area of 25 square meters.

The Mayak satellite has a sunlight reflector, which will unfold after entering the orbit. The sunlight reflection will make the satellite the brightest star on the sky. The developers say it will shine brighter than Sirius, Vega and Altair and will be seen in all major cities on the Earth.

tass.com

USA: Assessment concludes urban forests in Chicago region face a warmer, wetter future

In a first-ever assessment of urban forest vulnerability to climate change in the Chicago region, a team led by the USDA Forest Service concluded that native tree species in a 7-million-acre area may decline while invasive species may thrive with shifts in habitat suitability.

Seventeen percent of the tree species currently present in the region have either moderate-high or high vulnerability to climate change, and 77 percent of individual trees with low vulnerability are invasive species.

"The value of assessing the region's vulnerability to climate change is that it gives decision-makers, land managers and homeowners an opportunity to plan ahead," said Leslie Brandt, a climate change specialist with the Forest Service and lead author of the Chicago region assessment.

"Communities have invested in their urban forests, and the information that we provide can be used to maintain healthy forests that continue to provide services like removing pollutants from the air, reducing energy costs, and managing stormwater."

Published this week by the USDA Forest Service's Northern Research Station, the assessment evaluates urban forests within a region served by Chicago Wilderness, an alliance of more than 200 organizations working to improve quality of life for people and improve natural resources in portions of Illinois, Indiana, Michigan, and Wisconsin. The vulnerability assessment documents past and current conditions, and synthesizes the potential impacts of climate change on urban forests in the Chicago Wilderness region. The assessment also presents case studies of assessing vulnerability at the scale of municipal forestry and parks departments and describes future management considerations. The assessment also provides a process for municipalities, park districts, and forest preserve districts to assess their vulnerability to climate change based on impacts and adaptive capacity.

"Chicago Wilderness Region Urban Forest Vulnerability Assessment and Synthesis: A Report from the Urban Forestry Climate Change Response Framework Chicago Wilderness Pilot Project" is available online at. https://www.treesearch.fs.fed.us/pubs/54128.

In the past century, the Chicago region has warmed by about 1 degree Fahrenheit and has experienced a significant increase in precipitation, as much as 3 inches during the summer. Climate modeling for the region projects that:

- By the end of the century, temperatures and precipitation will be more erratic.
- The mean annual temperature will increase by 2.3 to 8.2 degrees Fahrenheit, with temperature increases across all seasons.
- Precipitation will increase in winter and spring over the 21st century, but climate models disagree about how precipitation may change in summer and fall.
- Heavy precipitation events have been increasing in number and intensity and are projected to continue to increase further, which could increase runoff and local flooding from stormwater.
- Extreme and exceptional droughts may increase in duration, frequency, and spatial extent compared to the end of the 20th century.
- Increased temperatures will lead to longer growing seasons and shifts in plant hardiness and heat zones.

"We see this information as an important resource as communities struggle to manage the urban forest with fewer resources," said Lydia Scott, director of the Chicago Region Trees Initiative and a co-author of the report. "They need to have the best science available to assist them to make informed decisions. The urban forest in the Chicago region provides $51.2 billion in compensatory services to the residents who live here, so careful management of this critical resource is imperative."

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