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What's Up?

The Newsletter of the International Canopy Network

Nalini Nadkarni, Executive Editor Jennifer Baguley, Editor

Saving the Forest Canopies of Ethiopia

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"I can try to explain it to you, but unless you see it for yourself, you really can't grasp the situation. They're going through one of the worst droughts ever, it's barely rained in three years. There is no water to grow vegetation, no water to drink. Everything is like desert. For people in the United States, it's hard to wrap your mind around that."

Anquan Boldin, Football star for Baltimore Ravens, winner of the 2013 Super Bowl

As a nerdy scientist, I was never a Super Bowl fan. This year when Anquan Boldin, who shares my passion for building stone walls in Ethiopia, made the first touchdown of the winning Baltimore Ravens, I became one. Although science and sports appear worlds apart, both of us are dedicated to aiding a country that faces drought, poverty, deforestation, and disease.

Northern Ethiopia has a serious problem with its forest resources. The last remaining forests exist as small fragments called "church forests." These forests surround virtually all the Ethiopian Orthodox churches. Thanks to Google Earth, the shrinkage of these forests in recent decades can be documented. At current rates, these precious green islands are rapidly disappearing forever. The causes are clear. Farmers plow too close to the forest boundaries, which kills the trees around the edges. Cattle meander into the woods nibbling the seedlings and threatening the next generation of trees. Villagers are constantly tempted to grab occasional dead branches for firewood. Despite these activities, Ethiopians love their church and depend on these forests for essential ecosystem services, especially fresh water. These forests provide the last remaining seed source for Ethiopian native trees, important medicines, honey, fresh water, homes for pollinators and other animals, and a highly-valued spiritual sanctuary. In short, no one in rural Ethiopia wants the forests to become extinct.

For five years, I have headed up a conservation task force to reverse northern Ethiopia's deforestation. This

The author presenting a workshop on forest ecosystem services to the Coptic priests of the Gondor region (northern Ethiopia).

requires gaining the complete trust of the church leadership, as well as offering creative solutions acceptable to the diverse needs of clergy, villagers, and the science of forest management. In some breakthrough negotiations only two weeks before the Super Bowl, we brought government officials to the table with church leadership, hopefully ending the carnage around the forest edges. Local government officials pledged to settle the boundary disputes between church forests and farmers, and church leaders promised to conserve their remaining forests. We now have generous American students and

Inside this issue: Upcoming Events : p. 2 | Tree Stewardship: p. 4 | SATF Biodiversity: p.6

citizens donating for construction of beautiful stone walls to demarcate the church forest boundaries.

Conservation is usually not this easy. Grassroots efforts that engage local people in negotiations and involve listening to different points of view often prove more successful than high -powered negotiations in far-away capital cities. The Ethiopian Orthodox church considers the stewardship of all of God's creatures as a primary mission, as do conservation biologists who seek to conserve biodiversity. Working together, church and science are achieving amazing results for Ethiopia. And it does not hurt to have a famous Super Bowl star willing to building the stone walls.

About the Author

Photo by: Carlton Ward Jr.

Margaret D. Lowman, Ph.D. a.k.a. "Canopy Meg" is an American biologist, educator, ecologist, writer, editor, and public speaker. Her expertise involves canopy ecology, canopy plant-insect relationships, and constructing canopy walkways.

Nicknamed the "Real-Life Lorax" by National Geographic and "Einstein of the Treetops" by the Wall Street Journal, Meg Lowman pioneered the science of canopy ecology. She came to North Carolina as Director of the Nature Research Center for the Museum of Natural Science, but now serves as Senior Scientist for the entire Museum and research professor at NCSU's College of Sciences. For over 30 years, "Canopy Meg" has solved mysteries of insect pests and ecosystem health in the highest layer of the world's forests, designing the tools of the trade- hot-air balloons and walkways for treetop exploration- as she went. Her personal mantra is "no child left indoors."

Bio courtesy of canponymeg.com

Did you know?

- 80% of the population in Ethiopia works in agriculture.
- Ethiopia is the 10th largest country in Africa, with a total area of 1,127,127 sq. km
- Archeologists have found the oldest known human ancestors in Ethiopia, including *Ardipithecus ramidus kadabba* (c. 5.8–5.2 million years old) and *Australopithecus anamensis* (c. 4.2 million years old).
- Among the many varieties of trees and plants found in Ethiopia are the date palm, mimosa, wild olive, giant sycamores, junipers and laurels, the myrrh and other gum trees.

Conferences, Meetings, and Events

International Society of Arboriculture Annual Conference and Trade Show

August 3-7, 2013: Toronto, Ontario, Canada

The ISA Annual International Conference and Trade Show provides a forum for the exchange of information and opportunities to network with others in the arboricultural profession.

The Conference and Trade Show feature a lineup of educational sessions led by industry leaders from around the globe, sharing their thoughts and views about the newest trends in equipment, practice, technology and research.

Highlights of the Conference include:

- International Tree Climbing Championship
- Arbor Fair
- Educational Sessions
- Trade Show
- Tree Academy Workshops

The ISA Conference and Trade Show is the premier event for arborists from around the world. Consider attending as a way to build your business network, meet the industry's leaders, and learn from the best in the profession.

http://www.isa-arbor.com/events/conference/index.aspx

Conferences, Meetings, and Events *(cont.)*

6th Annual International ESP Conference
August 26-30, 2013: Bali, Indonesia

The emphasis of this 6th International ESP conference will be on the practical application of the ecosystem services concept in planning, management and decision making, and the development of case studies. These topics will be addressed by:

- **5 keynote-speakers**: Jaqueline McGlade, Darryl Low Choy, Carl Obst, Steve Lansing and Meine van Noordwijk
- **10 special sessions** organized by UNEP, UNCCD, IUCN-CEM, ICRAF
- **20 workshops** organized by the ESP Thematic Working Groups and Biome Expert Groups
- **18 open-topic sessions** to provide an opportunity to discuss issues and ideas in a free format
- **Stakeholder discussion** about the implementation of ES in SE-Asia
- **Special issues** of the journals associated with ESP

http://www.espconference.org/ESP_Conference

2013 Partners in Community Forestry National Conference
November 6-7, 2013: Pittsburg, Pennsylvania

The Partners in Community Forestry National Conference offers a platform for sharing best practices in urban forest partnerships, planning and management, in addition to offering models of sustainability and innovation across all groups who serve community trees.

Partnering events November 4-5 include:

- Continental Dialogue on Non-native Forest Insects and Diseases– *The Nature Conservancy*
- 49th Annual International Conference and Trade Show– *Society of Municipal Arborists*
- ACTrees Day– *Alliance for Community Trees*
- 5th Annual Gathering of Sustainability and Tree Professionals– *Campus Trees and Sustainability Summit*
- Regional Meeting & Training– *Utility Arborist Association*

http://www.arborday.org/PCF/

Global Landscapes Forum
November 16-17, 2013: Warsaw, Poland

The Global Landscapes Forum combines into one event two of the world's most influential annual conferences on the role of forests and agriculture in mitigating and adapting to climate change: Forest Day and Agricultural and Rural Development Day. This will be a global platform to inform and engage world leaders, policymakers, scientists, donors, media, civil society, the private sector, indigenous and community groups, and climate negotiators on the role sustainable landscapes can play in providing food, shelter, income and ecosystem services and environmental goods.

http://www.cifor.org/glf

International Conference on Biodiversity 2013
December 16-17, 2013: Colombo, Sri Lanka

The 2013 International Conference on Biodiversity (Biodiversity 2013) is the premier forum for the presentation of technological advances and research results in the fields of Biodiversity in South Asia. It will bring together leading academics, scientists and researchers from around the world.

The objective of the conference is to present and share the ongoing research activities with the scientific and research communities.

http://futureevents.org/biodiversity/

The Association for Tropical Biology & Conservation Annual Meeting
July 20-24, 2014: Cairns, Australia

Long Term Resilience of Tropical Ecosystems & Livelihoods

Venue: Cairns Convention Centre
Chair: Steve Turton (James Cook University, Australia)
Co-Chair : Susan Laurance (James Cook University, Australia)

http://atbc2014.org

Tree Stewardship in our Urban Communities

Jennifer Baguley
Graduate Student, University of Utah

Trees play an important role within communities across the United States. In addition to environmental benefits – such as improving air quality and retaining storm water runoff - urban forests provide economic and social benefits. A recent study by the USDA has shown that shade trees reduce energy costs in neighboring buildings, provide stress-reducing nature imagery, and encourage people to spend time outdoors[1]. As the urban canopy coverage declines across the country, stewardship and conservation efforts become even more important. Community conservation efforts take many forms – including grass roots advocacy groups, environmental education efforts, art and film, and civic and governmental campaigns.

Public involvement in these efforts is crucial to their success. Because trees play an important role within the public realm, there are many community conservation and/or environmental awareness campaigns that center around trees in the community. This article highlights a few of the efforts taking place across the United States.

Anna Hiatt, photographer/editor for the Story Project, with Tara Luna, botanist, in an aspen woodland on the Blackfeet Reservation. Courtesy of *The Truth About Trees*

The Truth About Trees
James Agee Film Project – Johnson City, Tennessee and University Park, Maryland

Close to 80% of the U.S. population lives in urban areas and depends on the essential benefits provided by urban trees and forests. The distribution of urban tree cover and the benefits of urban forests vary across the United States, as do the challenges of sustaining this important resource. One threat faced by nearly all urban forests nationwide is development. A recent study by the USDA Forest Service showed that tree canopy for 20 major U.S. cities has declined 2% in 10 years, with a 2% increase in impervious cover such as roofs, roads, and sidewalks. Efforts to raise awareness of the benefits of and threats facing trees are critical to preservation efforts. *The Truth About Trees,* a three-part film series directed and produced by Ross Spears, is an effort to inspire others to embrace tree preservation and stewardship. The project is supported by the National Science Foundation and combines a documentary film series with a community story project.

The goal of the filmmakers is to impart stories of hope and determination. They are sharing stories from all across the country of families and communities working together to transform the places they live. Those interviewed for the series range from biologist E.O. Wilson and tree canopy researcher Nalini Nadkarni to Molly Hatfield, who sells holiday trees in New York City.

In addition to the filmmaking crew, a small team is working with several community organizations throughout the country to gather tree stories and share them via social networking. The project has evolved from a traditional film series into what the creators are calling a "participatory documentary."

So far, the team has gathered community stories in Philadelphia, Washington, D.C., and western Montana. Through this series, the filmmakers attempt to reach a broad audience, and build strong connections with tree preservation networks at the local level. While they raise awareness about the state of forests, they hope to inspire and encourage people to become involved in their own community tree preservation efforts.

The Truth About Trees will be broadcast on PBS stations nationwide in Spring 2015.

To hear these stories or find more information on *The Truth About Trees* visit http://truthabouttrees.tumblr.com and http://www.truthabouttrees.org.

Casey Trees
Washington, D.C.

The history of the urban canopy in Washington D.C. extends back to the first President, George Washington, who chose the city's location, and the man who originally designed the city itself – Pierre L'Enfant. Designed to support a lush tree canopy with extensive green spaces and tree lined boulevards, D.C. still boasts more greenspace per capita than any other city in the United States. Some consider D.C. as the birthplace of arboriculture due to the tens of thousands of trees planted there in the 1800's, which earned D.C. its nickname, the "City of Trees."

Despite the city's original focus on trees, D.C.'s tree canopy has decreased from 50% in the 1950s to 36% today, due to climate change and other pressures, such as development and population growth[2].

Casey Trees is a non-profit organization with a mission to "restore, enhance and protect the tree canopy of the nation's capital." The organization was founded in 2001 with a gift from Betty Brown Casey in memory of her husband.

In pursuit of their goal to restore the moniker "City of Trees" to Washington D.C., Casey Trees has set a goal of attaining 40% canopy cover by 2035. To achieve their goal, Casey Trees has planted over 12,000 trees; educated thousands of residents about the importance of urban tree canopy; supported the tree planting efforts of the D.C. Government, the National Parks Service, community groups and residents alike; inventoried and tracked the District's tree resources to promote continued public funding for D.C.'s trees; and advocated for green, tree friendly development and similar pursuits.

For more information on the history, programs, or ways to get involved with Casey Trees, visit http://caseytrees.org.

TreeUtah
Salt Lake City, UT

Salt Lake City's tree canopy currently rests at 10%, while the canopy cover recommended by *American Forests* for metropolitan areas in the region is 25%-40%[3]. To expand urban tree canopy cover, Salt Lake County set a goal in 2007 to have one million trees for one million residents by 2017.

One organization helping Salt Lake County reach this goal is TreeUtah. TreeUtah is a non-profit organization dedicated to tree planting and education. They hope to inspire and empower communities in Utah to become active, knowledgeable stewards of their natural environment.
TreeUtah seeks to educate people about the environmental and social benefits that trees provide. Some of these benefits include improving quality of life through better air and water quality.

Since 1990, TreeUtah has planted more than 325,000 trees with the help of over 125,000 volunteers around Utah. They are continually seeking help to maintain and increase the urban forests in Utah.

For more information, visit http://treeutah.org.

Conclusions

The Truth About Trees, Casey Trees, and TreeUtah are just a few of the many programs taking place across the United States to engage citizens with the trees in their community. There are more than 50 forestry organizations nationwide, each focusing on its own local challenges and threats to the urban forest. Because trees are such an integral part of the everyday lives of community members, involvement at the local level is critical to the survival of urban forests.

The International Canopy Network would like to learn more about the community engagement and stewardship efforts happening around the world to preserve and restore forests. Contact us at canopy@evergreen.edu to tell us about the programs taking place in your community.

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Biodiversity in South American Temperate Forests Canopy: a new challenge for researchers and conservationists

Daniela Mellado-Mansilla & Gabriel Ortega-Solis
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The South American Temperate Forest (SATF) corresponds to a narrow strip of land in the southwest corner of the American continent, between 35° and 55°S. During the Tertiary period, geological processes such as continental drift, the rise of the Andes, and the Atacama Desert formation isolated the temperate forest in the southern continent, creating a barrier to species exchange with other regions. Because of this isolation, species richness of the SATF is lower than tropical forests, but the SATF has a high percentage of endemic species with 34% of angiosperms, 23% of reptiles, 30% of birds, 33% mammals, 50% of fish, and 76% of amphibians.

One of the least studied aspects of the SATF is canopy biodiversity. The few plant ecology studies conducted in the SATF have focused on epiphytes and only two have accessed the canopy. The remaining investigations have been carried out at a maximum height of three meters (Pincheira-Ulbrich 2011). The same trend applies to canopy fauna research, with only 3 scientific articles published to date. This lack of research makes knowledge of SATF biodiversity scarce, hampering the implementation of appropriate measures for protection.

Epiphytes in the SATF

The SATF has approximately 50 species of epiphytes, with 30 species of ferns and 22 species of angiosperms (Armesto et al. 1996). The inclusion of parasites raises the number to 65 species (Villagrán and Hinojosa 1997). The most abundant epiphyte family is Hymenophyllaceae (filmy ferns) with 24 species, genus *Hymenophyllum* being the most rich with 19 species. There are about 800 species of mosses (Ardiles *et al.* 2008), and many of them grow as epiphytes. The SATF is one of the richest places in the world for bryophytes and lichens (Galloway 1995; Asakawa *et al.* 2009).
Clement *et al.* (2001), reported that filmy ferns (Hymenophyllaceae) were dominant in the *Fitzroya cupressoides* canopy, followed by bryophytes, lichens and vines in decreasing order. Some species of terrestrial plants such as *Nothofagus dombeyi, Nothofagus nitida* and *Laureliopsis philipiana* were found growing accidentally in the canopy. Clement *et al* (2001) also found 24 species of epiphytes. A similar result is reported by Díaz *et al.* (2010b) in the canopy of *Eucryphia cordifolia* and *Aextoxicon punctatum* in Chiloé (Chile) with 22 species of epiphytes.

Eucryphia cordifolia tree. Photo credit: Daniela Mellado-Mansilla and Gabriel Ortega-Solis

One of the most representative and abundant epiphytes in the SATF canopy is the endemic *Fascicularia bicolor*, the only epiphytic bromeliad in this forest. *F. bicolor* provides a large amount of green biomass and arboreal soil to the canopy. In coastal forests of Chiloé, an emergent tree of 1.2 m in diameter support 500 kg (fresh weight) of epiphytes. *F. bicolor* contributes up to 57% of all that biomass, so this species is probably the most influential in the treetops (Díaz *et al.* 2010b). In a recent study in Valdivian forests, we determined how diameter at breast height (DBH) and height of the host tree species are related to the occurrence of *F. bicolor*. The tree species and DBH are the main predictors for *F. bicolor* presence. The positive association between *F. bicolor* and trees with greater DBH indicates that this epiphyte depends strongly on the presence of old trees. Old trees and old-growth forests are currently scarce in much of its distribution range, which would affect the conservation of thi s endemic epiphyte (Ortega-Solis *et al.* in prep).

Recently our team has also studied the remaining native tree canopy within the city of Valdivia (Chile; 39° 48 'S, 73° 14'W), where it is possible to find *Nothofagus obliqua* trees

Fascicularia bicolor, the only epiphytic bromeliad native from southern South-America Photo credit: Daniela Mellado-Mansilla and Gabriel Ortega-Solis

exceeding 2 m DBH and reaching 27 m in height. We found 11 vascular epiphyte species growing on these trees, with a wide variety of bryophytes and lichens. The oldest trees have a greater richness of vascular epiphytes, possibly indicating a pattern of succession at the canopy level. Richness of vascular epiphytes is greater above 6 m (Mellado-Mansilla 2013), possibly because of the microclimate. Biodiversity inventories made from the ground could leave out many epiphytic species, affecting their management and conservation in urban landscapes.

Canopy fauna

Invertebrates are the most studied group of fauna in temperate forest canopy. Clement *et al.* (2001) investigated arthropod diversity in the vertical profile of *F. cupressoides,* reporting that mites, spiders and psocids were the most abundant groups. Compared with similar coniferous forests in the northern hemisphere, invertebrate richness and abundance on *F. cupressoides* was significantly lower.

Arias *et al.* (2008) reported the capture of 25,497 individual invertebrates in 29 trees of various species. Individuals were classified into 485 morphospecies of which 223 could correspond to previously undescribed species.

From this information, we estimated that the number of invertebrate species that inhabit the treetops could exceed 600. Xylophagous, phytophagous, and saprophagous percentages were similar to those reported for Gondwanic forests and different to those described for Laurasic forests.

Regarding the invertebrate distribution in the canopy, the existing arboreal soil macrofauna is dominated by millipedes, oligochaetes and isopods, while the more abundant foliage groups are Coleoptera and Hemiptera (Díaz *et al.* 2012). These groups may have an important functional role in the treetops. However, their effects on the health of host trees, nutrient cycling and interactions with other taxa have not yet been evaluated.

Other studies in the canopy have reported one species of amphibian, *Eupsophus calcaratus*, collected at 16 m in the canopy of a 30-meter tall *Eucryphia cordifolia* in Chiloé Island, Chile (Díaz *et al.* 2010a) and the nesting in the canopy by birds such as *Enicognathus leptorhynchus* (Peña-Foxon *et al.* 2011).

Conservation

The SATF has suffered a significant reduction in its area throughout history. In the early 1900's, thousands of hectares of forest were burned to establish cattle farms or remove valuable conifer species such as *Fitzroya cupressoides* and *Pilgerodendron uviferum*. The integrity of

native forests has been threatened even within protected areas, for example, by the Chilean forestry law enacted in 1931, which allowed harvesting of the forests within national parks. Between 1975 and 2000 the area covered by the SATF decreased by 67% at its northern coastal range, in close relation to the expansion of exotic forest plantations (Echeverria *et al.* 2006).

Although in recent years the area of temperate forest protected by state forest services and private initiatives has increased, many of the protected areas are in the higher elevations of the Coastal and Andes ranges, while the highest species richness of both animals and plants occurs at lower altitudes. As a result, the habitat of many species has a poor protection level (Díaz *et al*. 2002). It should be noted that the highest concentration of vascular flora and high endemism in the SATF occurs between 36° and 40°S (a peak of epiphytes occurs at about 40°S) (Villagran & Hinojosa 1997). However, the greatest diversity area is poorly represented in state protected areas (Armesto *et al*. 1992).

It is crucial to generate information on biodiversity and functions of the canopy in the SATF, to support management measures and protection. The canopy is a frontier of knowledge to various branches of ecology, from ecophysiology to ecosystem ecology. Since the first studies on forest canopies, we have obtained significant knowledge on the ecology and biodiversity of forests, with the discovery of new species, new floristic patterns, and the role of canopy biota on nutrient and hydrological cycles (Nadkarni *et al.* 2011). This research is an incentive and challenge for researchers and conservationists working on SATF, especially when we are forced to deal with threats such as climate change, fragmentation, habitat loss and others that could endanger the long-term viability of South American temperate forest, of which there is still much to learn and discover.

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Forest Canopy Research Sampler

Wu, T. G., M. K. Yu, G. Wang, Z. X. Wang, X. Duan, Y. Dong, and X. R. Cheng. 2013. Effects of stand structure on wind speed reduction in a Metasequoia glyptostroboides shelterbelt. Agroforestry Systems 87:251-257.

In a *Metasequoia glyptostroboides* coastal forest shelterbelt near Shanghai, China, we studied relationships between stand structure and wind shelter effect. We located 16 plots at intervals of 500 m along the shelterbelt and characterized both horizontal and vertical structure of each plot. Wind speed was measured within each plot and at different distances windward and leeward. We found that wind shelter effects were closely related to stand structure of the studied *M. glyptostroboides* shelterbelt. Stands with high basal area but intermediate crown index and intermediate proportion of large trees (LT) produced the best shelter effects, with significantly longer shelter distance (d70, shelter distance which the wind speed U does not exceed 70 % of U (0)) and slightly lower minimum relative wind speed (U (m) /U (0)). Simple structural indices that can be easily measured in the field were good predictors of the shelter effect. LT was the best predictor of d70, while basal area at ground level was the best predictor of U (m)/U (0). The relationships between stand structure and shelter effect provides a practical guideline to the design, construction and management of forest shelterbelts. In order to provide the best shelter effects, high basal area of > 50 m^2 ha^{-1} at ground level or > 33 m^2 ha^{-1} at breast height coupled with an intermediate LT value of about 60 % should be maintained for the studied *M. glyptostroboides* shelterbelt.

Recent Citations in Canopy Science

Because no central journal on canopy science exists, it is useful to publish citations on canopy studies in the recent literature. The citations below were found on weekly literature searches on Current Contents on Diskette (CCOD).

Ecosystem Processes

Azhar, B., D. B. Lindenmayer, J. Wood, J. Fischer, A. Manning, C. McElhinny, and M. Zakaria. 2013. The influence of agricultural system, stand structural complexity and landscape context on foraging birds in oil palm landscapes. Ibis **155**:297-312.

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Forest Management

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Forest-Atmosphere Interactions

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