Endowment Initiative Overview
Forest Health

Nov. 2011

From Giants to Stumps – The American Chestnut Story

"In the first half of the 20th century, nearly 4 billion of these iconic trees were felled by a lethal fungus known as chestnut blight, and southern forests and their inhabitants were transformed by what has been called one of the greatest ecological disasters of all time. The American chestnut tree grew tall and straight - 80 feet or more high and several feet in diameter - and was often free of branches for the first 50 feet or so. Because of its strong wood, the chestnut was known in the Southern Appalachians as a "cradle-to-grave" tree; its strong, rot-resistant wood served a multitude of purposes including home building, fencing—and of course, cradles and coffins."

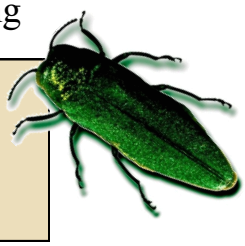
- Excerpt from the June 2008 issue of CompasS. From the Southern Research Station (SRS), Forest Service, U.S. Department of Agriculture.

Today's Threats to Forest Health

Aggravated by climate change, population growth and increased global transportation, the destruction from invasive pests has accelerated to alarming levels, affecting a wider range of tree species and forest ecosystems, and decimating large swaths of North America's natural forests. The woolly adelgid could wipe out the eastern hemlock in the Southern Appalachians. Billions of ash trees in the Mid-Atlantic and Mid-West are at risk from the emerald ash borer. Scientists have found that higher temperatures in western North America are creating drier conditions and enhancing the growth and reproduction of insects and pathogens that attack trees, which is doubling the mortality rate of once healthy conifer stands in the Pacific Northwest and beyond.

> *"We have come to the point where we simply don't have the luxury of time that affords using only 20th Century tools to deal with 21st Century challenges. New threats to forest health, exacerbated by climate change, and the rapid nature of their expansion call for new tools in the fight."*
> **Carlton Owen, U.S. Endowment for Forestry and Communities**

Damage to individual tree species is not an isolated event. It ripples through entire ecosystems and economies, particularly when the trees are or were dominant species like the American chestnut, the eastern hemlock and the conifers of the western United States. As the world's population continues to rise, more demands are put on our forests and pests and diseases can travel around the world in a matter of days in cargo holds. Health threats are advancing on new trees, in new places, and with no sign of slowing down.



The Emerald Ash Borer has killed approximately 100 million trees in the U.S. Midwest since 2002.

U.S. Endowment for Forestry and Communities

Exploring the Role of Biotechnology

While traditional tree breeding and propagation approaches will continue to have a prominent place in forest management and restoration, the severity and types of threats facing the nation's forested areas require the U.S. to respond more quickly to protect the future of our nation's forests. Biotechnology may play a vital role in the ability to tackle today's environmental problems. However, advances in biotechnology are needed to effectively use it as a forest health tool.

Further, it is important to determine the limitations of biotechnology for individual species restoration and for the protection from catastrophic loss. Acquiring this knowledge will enable us to better respond to short- and long-term conservation needs. Science is only part of the answer. Biotechnology can only play a critical role in addressing forest health threats when strong societal support and robust regulatory processes frame its use.

The Forest Health Initiative views the best way to fully explore the many scientific, environmental, social and regulatory challenges surrounding the use of biotechnology to protect natural forests is to develop a test tree that responds to an existing forest threat. We chose the American chestnut for this purpose due to the availability of data on blight resistance and breeding stock, and it provides an opportunity for regulatory agencies to review a biotech tree intended for social benefit.

The Forest Health Initiative is funded by the Endowment, Duke Energy, and the US Forest Service, and is guided by a steering committee that includes experts from Environmental Defense Fund and the Nature Conservancy.

The Braided Approach

Forest Health Initiative (FHI) Steering Committee members know from first-hand experience how important coordination is when tackling big problems. Using advanced biotechnology to help restore America's most iconic tree is as big as it gets.

SCIENCE—FHI is supporting work to revive the American chestnut with a transgenic variety modified with genes from the related Chinese chestnut, which is blight resistant. This surgical approach to traditional breeding incorporates only the few resistant genes needed to effectively inoculate the American chestnut against the blight.

POLICY —FHI engages the Department of Agriculture, the Environmental Protection Agency, and the Food and Drug Administration—agencies with jurisdiction over a biotech American chestnut—challenging each to consider how biotechnology could best be used to improve forest health.

The Committee felt that the science needed to protect forest health should not be developed in a vacuum, but in concert with societal understanding and needs, and the regulatory processes designed to protect them. To

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incorporate that ideal, three separate work groups were established to address regulatory issues, societal and environmental implications, and scientific efforts – all working in concert and 'braiding' efforts into a common goal.

SOCIAL & ENVIRONMENTAL
FHI works with more than 35 stakeholders to educate them and others about the potential of biotechnology as a tool for forest health, and on developing guidance for using biotechnology in environmentally responsibly ways.

Rapid Response to Future Threats

One of the most important tools in the fight for forest health is speed. FHI's focus on biotechnology is driven by the need for new tools to fight a growing number of pests, diseases and pollutants – and a host of new stresses introduced by climate change – that each year destroy millions of acres of native forest. To accomplish this, each group of the FHI is documenting rapid response plans:

- Science group - Laying out a strategy to identify, prioritize, and address forest health threats where biotech tools are deemed appropriate.
- Social & Environmental group - Creating a structured decision process that identifies risks, benefits, and options for biotech and non-biotech approaches.
- Policy group - working with regulating agencies and stakeholders on a multi-step procedure that coordinates agency communication and action.

Like forest threats, these plans will evolve over time. While the plans are not yet fully tested and complete, they have already proven invaluable in building a tight integration between the three FHI teams. These plans make it apparent to all that a wide range of organizations, from government agencies, to companies, and environmental organizations, are vowing to use science in the fight for healthy forests.

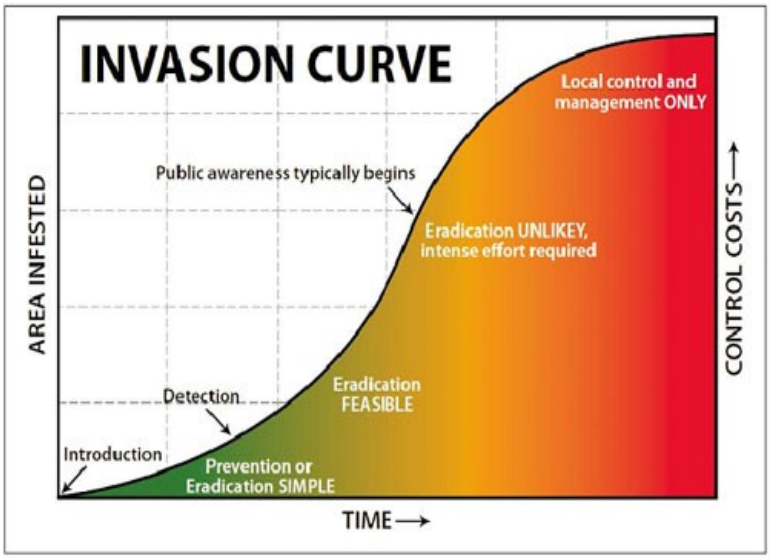

Figure from the Adirondak Almanac *(http://www.adirondackalmanack.com/2010/07/august-is-forest-pest-awareness-month.html)*

Forest Health Initiative: Benefitting Multiple Objectives

The Forest Health Initiative specifically advances the Healthy Working Forests component of the Theory of Change, which plots specific direction to the Endowment's mission "*to work collaboratively with partners in the*

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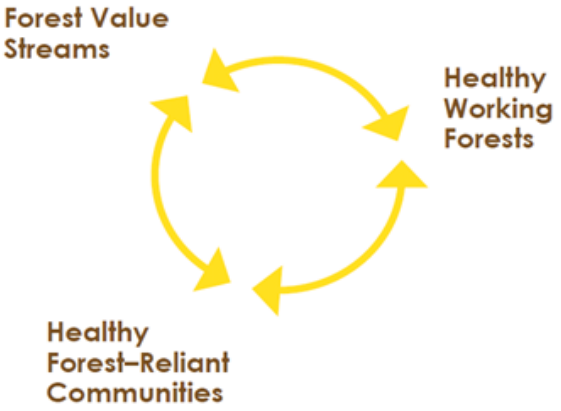
public and private sectors to advance systemic, transformative, and sustainable change for the health and vitality of the nation's working forests and forest-reliant communities."



Healthy Working Forests—The Forest Health Initiative may offer the most promise of any of the Endowment's programs for helping native trees and forests withstand the onslaught from invasive, exotic diseases and pests.

Forest Value Streams—By helping protect forest health, this Initiative indirectly supports continued development of new and existing revenue streams for forest owners, and offers protection against catastrophic losses from invasive pests and diseases.

Healthy, Forest-Reliant Communities - Invasive, exotic pests and diseases can change the landscape, as did the American Chestnut blight. The Forest Health Initiative seeks to avoid repeats of this scenario through collaborations and new technologies.

U.S. Endowment Programmatic Investments (through 8/31/2011)

			Funding		
	Award Date/ Project Type	Objective/Grantee	Endowment	Matching Funds	Total
In Progress	2008 Pilot/ Demonstration	**Forest Health Initiative**	$1,220,000	$1,500,000 (Duke Energy) $3,240,000 (Forest Service)	**$5,960,000**
	Subgrants	The Research Foundation of State University of NY	($1,088,000)		
		University of Georgia	($1,108,000)		
		Penn State University	($1,383,000)		
		Institute of Forest Biotechnology	($600,000)		
		Institute of Forest Biotechnology/ Phoenix	($300,000)		
		U.S. Forest Service Forest Genetics Lab	($1,039,000)		
		To be Allocated	($442,000)		
		TOTALS	**$5,960,000**	**$4,740,000**	

The U.S. Endowment for Forestry & Communities, Inc. (Endowment) is a not-for-profit corporation established in late 2006, at the request of the governments of the United States and Canada in accordance with the terms of the Softwood Lumber Agreement (SLA) between the two countries. The Endowment's mission is to work collaboratively with partners in the public and private sectors to advance systemic, transformative, and sustainable change for the health and vitality of the nation's working forests and forest-reliant communities.

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