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How Private Industry has met the Challenge of Conservation of Forest Genetic Resources of Tropical and Subtropical Tree Species

W. S. Dvorak
Director: Camcore &
Professor of Forestry, North Carolina State University

dvorak@unity.ncsu.edu

Private forest industry has often been criticized on how it manages forests and protects genetic diversity. To demonstrate that it can be part of the solution in the protection of forest species and populations, forest industry joined forces with North Carolina State University (NC State) and the Guatemalan government in 1980 to form Camcore, an international conservation and domestication cooperative. The program has now grown to include 25 of the major pulp and paper companies and solid wood producers in the southern hemisphere on four continents (see www.camcore.org for complete membership list). Camcore represents a major success story of how private industry can make a major, positive impact on the management of forest genetic resources by working together.

Camcore works in the following way. Scientists and technicians from NC State make research seed collections in threatened tree populations in regions like Central America and Mexico and Southeast Asia. The seeds are packaged into progeny trials that serve as both genetic tests and *ex situ* conservation planting and distributed to the industrial members. The Camcore staff at NC State coordinates the seed exchange, designs and analyzes the trials and makes the results available to all of its members. The members of Camcore, in turn, agree to establish, manage, protect and measure the field trials. The Camcore staff visit the trials and conservation planting once each year in the 17 countries where it works to make sure that high quality standards are maintained. When the field trials reach half rotation age (8-10 years), the best trees are selected for the next cycle of breeding. The strength of the Camcore approach is that conservation is an obligation of membership. Each company is responsible for the success of its own field trials and *ex situ* plantings; the establishment of many trials leads to greater precision in determining the best species, populations, families and individual trees. Since 1980, Camcore has sampled over 12,000 individual trees of 42 different tropical and subtropical species at 498 different locations in Mesoamerica and Southeast Asia. A data base is maintained of the trees sampled in natural stands as well as for the progeny that are planted across as many as 16 countries. In a normal year, the program handles millions of bits of data. Camcore has established over 2500 hectares of progeny trials and conservation plantations since 1980

The species in the Camcore portfolio include those from the *Pinus*, *Eucalyptus* (Non-Australian), *Gmelina* and *Tectona* genera as well as lesser known broadleaf species

native to Central America and northern South America. Species included in the conservation effort range from those with known economic potential (like *Gmelina arborea* and *Pinus patula*) to those that have little foreseeable value in plantation forestry but need protection. For example, Camcore began working with a little known pine species called *Pinus tecunumanii* in Guatemala in 1980. Through intensive explorations we now have found 48 locations where the species naturally occurs in Central America and have established over 180 different genetic trials and *ex situ* conservation planting of the species across a number of tropical and subtropical countries. We now have the factual information to say that *P. tecunumanii* has great potential as a future plantation species because of its good growth, adaptability, wood quality and disease resistance. A second example includes the *ex situ* conservation efforts for *Pinus maximartinezii*. It is a rare nut pine that is found only at one site in central Mexico. It will never be of value in plantation forestry but Sappi Forests in South Africa, a member of Camcore since 1989, has established the largest known *ex situ* conservation planting of the species in a well-protected area at its research headquarters near Pietermaritzburg.

Camcore and private industry are now involved in two additional important conservation activities for tree species in the tropics and subtropics. First, in South Africa, Camcore members are establishing special conservation parks to hold genetic material from many populations sampled in Camcore collections made over the years. Essentially, this is an effort to move the genetic material from the field trials to a more centralized location that can be easily protected. Each conservation park is approximately 25 ha in size and contains one-quarter hectare plots of individual populations. In turn, each population contains representation from a reasonable number of individual families to maintain its genetic integrity for future generations. The parks will not only be a holding place for genetic material, but hopefully will serve as a place where students can conduct research. Second, Camcore is returning seeds from its genetic trials and conservation plantings back to the country of origin where the collections were originally made as long as 20 to 25 years ago. Our hope is that the reintroduction of seeds to the country of origin can be used to replace genetic material lost through deforestation years ago.

Since 1980, forest industry has invested US\$40 million in the Camcore conservation and testing program. Included in these costs are financial support for the salaries of a small number of dedicated researchers at NC State, graduate stipends for students interested in conservation and tree improvement projects and the establishment and upkeep of large number of trial and conservation plantings. The Camcore program demonstrates the important role of forest industry in the management of forest genetic resources. Its corporate membership continues to grow.



Selection of a *Pinus tecunumanii* tree in a natural stand in Guatemala for seed collection as part of Camcore efforts to conserve the species.



Gmelina arborea from Myanmar growing in Venezuela. Camcore members now have one of the largest genetic bases in the world of this species to conduct future breeding and *ex situ* conservation efforts.



Camcore conservation park in South Africa established by Sappi that includes a number of populations of *Eucalyptus urophylla* (left) from collections made in Indonesia. Each Camcore industrial member in South Africa will establish a park with 6 to 7 species and as many as 40 populations of different tree species.