

Tropical Forests of the United States: Applying USDA State and Private Forestry Programs

Introduction

This paper describes the people and resources of U.S. Tropical Islands (Table 1) and the potential impacts and opportunities associated with the S&PF Redesign effort being undertaken by the USDA Forest Service.

The U.S. Tropical Islands (USTIs) contain virtually all of the tropical forests of the United States. Most have significant indigenous populations involved in traditional subsistence lifestyles; all have highly diverse native ecosystems with unique and often endangered flora and fauna and significant coral reef systems; all have relatively small land masses subject to high land use and development pressure; all are highly susceptible to environmental perturbations such as invasive species, storm, and climate change; and most have economies highly dependent on the mainland United States. Many of these islands have played historic roles in trade and national security due to their strategic locations. Today, at least in the Caribbean, the islands are stepping stones for movement of people (aliens), drugs, weapons, and invasive species from the islands to mainland areas and visa versa all of which destabilize local communities and may threaten national security.

Table 1: Characteristics of the U.S. Affiliated Tropical Islands

Islands	Total Area (acres)	Existing Forest (acres)	Number of Islands	Population (2006)
Hawaii*	4,110,720	1,490,000	8 with numerous atolls	1,275,000
American Samoa**	49,280	28,686	5	60,000
Commonwealth of the Northern Mariana Islands**	113,280	40,000	14	80,000
Guam**	135,680	65,005	1	170,000
Puerto Rico**	2,199,901	710,156	3	3,900,000
Virgin Islands**	85,760	not mapped	4	110,000
Republic of the Marshall Islands***	44,800	not mapped	5 and 29 atolls	60,000
Federated States of Micronesia *** (Kosrae, Pohnpei, Chuuk, Yap)	149,804	76,527	607	100,000
Republic of Palau ***	114,560	77,241	4 Main Islands, 200 Rock Islands, 6 Remote Islands	20,000

* State ** U.S. Territory *** Freely Associated State – Compact Agreement with the United States

National Interests in the U.S. Tropical Islands:

1. They preserve a rich array of flora and fauna – a **national and international biological heritage** found no where else in the nation or the world.

2. Sustainability of the tropical forests is integral to efforts to provide resilient communities, to diversify the local economies, and to mediate the impacts of burgeoning tourist industries.
3. Forests replenish important fresh water aquifers and river systems, protect reefs, shelter and protect shorelines and coastal communities from hurricanes, storm surges, tsunamis and floods.
4. The USTIs in general are the equivalent of “**canaries in the coal mine**” for issues of global warming, sea level change, storm frequency and severity, environmental degradation and effects of climate and environmental change on vulnerable human populations due to ecosystem sensitivity and connectivity.
5. The USTIs provide unique opportunities for scientific research in tropical ecology. Due to the vigorous growth potential, adaptations to natural disturbances and invasions of alien plants and animals USTIs offer many opportunities to test approaches to management and understand landscape level effects of benefit nationally and internationally. Island ecosystems are self-contained study units.
6. The USTIs provide significant cultural diversity. To know, understand and maintain these intact cultures and their knowledge about sustainable agroforestry systems and cultural uses of forest products may help guide future management of continental areas.
7. The USTIs are important in creating bridges to international neighbors and a window to the cultures of the Caribbean, Latin America, and the Pacific and Asian countries. These islands can be models for sustainable tropical forestry management in the international arena.
8. The USTIs, especially Guam, Kwajalein, Samoa, Oahu and Puerto Rico provide strategic military locations highlighting the need to sustain the services provided by the environment (e.g. potable water) to support military personnel and their families. Today, the islands are stepping stones for movement of people (illegal aliens), drugs, weapons and invasive species which could threaten national security. Sufficient attention is not currently provided to mediate potential negative affects of this movement. The United States has an intrinsic interest in ensuring a sustainable environment, vital economic development, and safety for those who live in and visit these special places.

Relevance of the Emerging National Themes and Outcomes

I. Conserve Working Forest Landscapes

1. The term “working forest landscape” has a different connotation for tropical areas than for mainland forests. The islands export products made from tropical woods (teak, mahogany, rosewood, koa and sandalwood) to support important local industries and supply national demand. Many of these enterprises are small in scale, and need technical and economic support to get established or to help mitigate the risks associated with innovation. However, once operational, these ‘niche’ markets can provide significant economic resources. It is important to implement long term management plans for high value forest related products in order to ensure long term sustainability of the products and the environment. This is an area where the Forest Service could provide invaluable technical support in developing these

plans as well as legislation to provide incentives to implement and maintain such practices. On some islands, agroforestry systems are the dominant working forests. There is a high use of forests for subsistence and cultural activities, including hunting and gathering foods, medicines and wood products on many islands and these subsistence uses are often protected by law. Recreation and tourism are also important economic outputs associated with island working forests.

2. The USTIs have limited land availability, unique land-use patterns, and variable rights of tenure (e.g. communal ownership) that present both challenges and opportunities in conserving working forest landscapes. Because of small size, limited land availability, and high population densities, many island forests are subject to intense pressure to convert forests to urban, industrial or agricultural uses which fragments the associated habitat loss (e.g. Puerto Rico has 23 percent of the territory developed in some way compared to 5 percent on the mainland United States).
3. Many of the smaller islands have limited human and infrastructure resources for forestry management or development of sustainable forest products. There are a very low number of individuals in island forestry and natural resource organizations and these often experience high turnover rates. Many islands have small and unskilled pool of workers and need assistance to develop and train a workforce for natural resource management or support development of sustainable forest product industries that are compatible with social, ecological and economical conditions found in USTIs.
4. The islands offer some unique opportunities to manage and conserve working forest landscapes. Many of the islands have begun landscape scale conservation programs (e.g. Micronesian Challenge [<http://www.pacificmagazine.net/news/2006/03/30/brazil-palau-remengesau-presents-micronesian-challenge>], Land Care [<http://www.landcareonline.com/>]) and Watershed Partnerships [<http://www.state.hi.us/dlnr/dofaw/wpp/index.html>] to manage and protect forests, reefs, surface and groundwater supplies, and important biological areas. These voluntary collaborative efforts are key to meeting future challenges. Each island has its unique tradition and culture that affects governance and program implementation. Flexibility is required to effectively implement landscape natural resource programs. By identifying local community leaders (i.e. chiefs in some cases) forestry agencies can lead collaborative, regional planning efforts with communities to meet long-term goals.
5. State and Private Forestry programs designed primarily to address mainland US needs should be flexible and recognize unique island management approaches such as agroforestry systems. These efforts should focus on developing economic self reliance by assisting with the development, promotion and demonstration of economically and environmentally sustainable production of food, fiber, and wood products from forests.

II. Protect Forest Resources from Harm

1. Tropical islands are subject to frequent environmental perturbations (e.g. native insects & disease, fires, storm damage) and human induced changes (e.g. invasive species, insects and disease, feral ungulates, erosion and climate change). In these ecosystems, threats may affect the growth of desired species, compromise the function of the native ecosystems or permanently alter forest composition and natural community dynamics. For instance, non native species invasions remain an important issue in the Caribbean and have led to

naturalization with native forest, which are now new forest types. Scientists are now studying the functioning capacity of these new forests. On many tropical islands, land degradation often follows a pattern that starts with the removal of native forest vegetation which subsequently degrades to grasslands, is maintained as grasslands through a grass/fire cycle, then further degrades into eroded badlands due to the loss of soil fertility, finally resulting into coral reef damage and fishery hatching capacity reductions due to heavy silt loads from soil erosion. Drastic examples of changes in forest area composition are 70% of the southern (volcanic) portion of Guam has been deforested; 85% of native forests on Yap have been cleared; and 90% of dry land forest habitat, 61% of wet forest habitat and 42% of wetland habitat has been lost in Hawaii.

2. Land management requires unique approaches. Most islands have large needs for basic restoration ecology. State and Private Forestry programs are well situated to promote habitat preservation and species protection or recovery; protecting indigenous plant and animal species and essential watersheds from invasive non-native animals, plants and pathogens. S&PF programs provide core funding for natural resource management programs. Many islands are largely dependent on Federal funding to maintain programs and workforce. Relatively small amounts of funding spent on island programs can produce large, beneficial results.
3. Many of the USTIs have landscape scale conservation programs such as the “Micronesian Challenge” and National Biological Strategic Action Plans that strategically protect and reduce the loss of forests. The strategic plans set conservation goals and focus on critical issues and opportunities. The redesign of State and Private Forestry should support these strategic plans and deliver programs focused on enhancing activities that the broad group of international, national, and local governmental and non-governmental organizations have identified. Many groups, such as Hawaii’s Watershed Partnerships and the local Conservation organizations now established throughout Micronesia, as well as local government agencies work collaboratively to strategically plan, prioritize, manage and protect forests, reefs, surface and groundwater supplies, and important biological areas. These groups can be used as models to test integrating public/private partnerships and new approaches in State and Private Forestry.
4. To implement these large scale plans and to enhance State and Private Forestry Program deliveries at a landscape scale, the islands need direct access to resources and scientific information that is partially provided by both the International Institute of Tropical Forestry and the Institute of Pacific Islands Forestry to enhance the State and Private Forestry Programs. Most islands’ natural resource agencies staff need training in restoration ecology. Institute professionals and scientists can assist with the development of scientifically sound sustainable forest resource management plans and provide training and technology transfer in the islands. Through sound application of science tropical island nations affiliated with the United States can become global leaders in the demonstration of sustainable tropical forest management.
5. In order to understanding the trends, threats and patterns in the loss of forests and inherent biodiversity, tropical forests must use more intensive survey, inventory and monitoring methods than less diverse continental forested areas. The high degree of spatial variability needs to be captured in vegetation surveys. If these surveys are to be used to assess forested

conditions and trends locally and rolled up to a national level to determine funding levels, the changes in tropical forest structures need to be accurately assessed and considered.

III. Enhance Benefits Associated with Trees and Forests

The USTIs economies are directly tied to the health and status of their forests. As population and development pressures continue to grow on the islands, the wise management of tropical forests has clear and compelling public benefits for the people.

1. Tourism is attracted by the diversity of forest ecosystems as well as the extensive beach and productive reef systems.
2. Traditional cultures depend directly on the ecosystem services provided by forests (e.g. food, fuel, fiber, abundant clean water, nutrient cycling, flood and climate control, sediment retention, etc.) for their subsistence lifestyles.
3. Island watersheds are intricately linked from mountain ridges to coral reefs. Traditional land tenure systems include ridge to reef management of the land. These whole watershed focused management systems are still appropriate today.

The USTIs offer unique opportunities for State and Private Forestry programs to work collaboratively with a variety of government and non-governmental organizations at the international, national and local levels. These types of collaborations support projects that are directly tied to the protection of forest resources, thus shaping land use on a scale and in a manner that optimizes benefits in critical watersheds to protect important ecosystem services. Perhaps the most limiting factor to implementing successful natural resource programs throughout the USTI forests affiliated with the United States is the limited technical capacity of their island forestry and natural resource agencies. Local professionals are essential to participate in collaborative efforts, implement on-the-ground actions, to integrate cultural knowledge and agroforestry practices into conservation practices and to raise awareness at the local community level about the threats (invasive species, human-caused fire, water run-off and erosion, and climate change) to healthy forests.

IV. Protect Communities from Fire and Other Catastrophic Events

Islands, like coastal areas of the continental United States are subject to a variety of catastrophic events in addition to fire. Typhoons, hurricanes, tsunamis, weather patterns and ocean level changes resulting from global warming are immediate threats to communities in tropical areas. Small islands have characteristics which make them especially vulnerable to the effects of climate change, sea level rise and extreme weather events. Deterioration in coastal conditions (beach erosion, coral bleaching, is expected to affect local resources, e.g. fisheries, and reduce the value of these destinations for tourism. Sea-level rise is expected to exacerbate inundation, storm surge, erosion and other coastal hazards, thus threatening vital infrastructure, settlements and facilities that support the livelihood of island communities. Climate change is projected by the mid-century to reduce water resources in many small islands to the point where they become insufficient to meet demand during low rainfall periods. With higher temperatures, increased invasion by non-native species is expected to occur. State and Private Forestry programs will need to have the flexibility to prevent or reduce expected impacts from these catastrophic events, support research and monitoring of global climate change and develop mitigation measures to improve island communities and environmental responses and resiliency to impacts of global climate change.

V. How can the Current or Proposed Redesigned S&PF Programs better meet needs of Tropical Forests?

1. Provide adequate flexibility within programs and support the concept of integration among programs for the USTIs to more realistically fit into the national themes. Flexibility among mainland programs is necessary to allow islands to adopt practices needed those programs to meet unique island ecosystem and cultural approaches such as ridge to reef work, coral reef protection, watershed protection and restoration and education programs that mirror these approaches.
2. Provide greater flexibility in designing monitoring and inventory programs that capture existing representative data from small and highly diverse ecosystems and/or forest types and rare biodiversity. Many national level data sets, including Forest Inventory and Analysis (FIA), the National Landcover Data (NLDS) and the National Risk Map are not detailed enough to characterize island conditions in a national context that is meaningful for both National and USTI frameworks. In many cases, the islands are not represented at all in the nationally consistent data sets because data is collected differently on islands than on continents. These data sets should be extended to include the islands at a spatially relevant scale, or locally generated data sets should be reviewed for quality so that they can be used by policy makers at local and national levels.
3. S&PF programs need to provide adequate technical service, training, infrastructure development to meet the large needs of the islands many of which have small staffs and experience high staff turnover.
4. Standards for defining success or failure may need to be scaled for islands. If one considers the total population served based on the relative low dollar amount spent, islands have a high ratio of success. Focusing only on the number of projects or acres will not adequately measure the impacts of those projects. Measures of success on islands should be based on a percentage rather than absolute metrics. For instance, the total acreage affected by restoration efforts funded by the Forest Stewardship, should be described as a ratio to the total amount of acres on that island and not compared to the absolute number of acres reforested in any given state.
5. Economic development programs are urgently needed but should be designed for island communities. Many programs designed for national factors do not fit islands well. For instance the Rural Development program would be more applicable for USTIs if they allowed integration of urban areas into the Rural Development program because the two often have similar objectives in USTIs.
6. Urban and community programs should be strengthened to the support increasingly urbanized islands (i.e., Puerto Rico, Guam, Oahu, St. Thomas, Majuro, Kwajalein), and those islands experiencing conversion of natural forests to intensely managed agroforestry systems (i.e. American Samoa, Chuuk, Phonpei, Kosrae). Urban and community programs work well in many island settings to integrate community and resource protection needs. Population pressure will continue to grow especially along coastal zones where people concentrate (Puerto Rico has over 1,000 people per square mile).

7. Policy development and technical assistance is a critical need for the USTIs. Support for forest conservation laws and/or the lack of enforcement of existing laws is a critical problem for many USTIs, and one for which the Forest Service needs to provide strong technical support.
8. Conservation education is a component of many existing S&PF programs and is an integral aspect of all environmental work done on islands. It is important that education funding be either included in the programs themselves and/or as a stand alone program so that islands have dedicated and continuous funding for enhancing public support for natural resources management.

VI. The Islands' Vision for the Future of State and Private Forestry

Providing tropical island-based S&PF programs the flexibility needed to function effectively within the proposed national procedures will benefit our clients, the forests of the tropical islands, and the nation as a whole. The islands are harbingers of the future given their high population densities and dependency on external subsidies of energy, food and materials. USTI are also where the effects of global climate change are expected to be most seriously felt. The way in which islands address and resolve these issues will benefit national S&PF programs that are often operating under less stressful conditions than in the islands.

In addition, tropical islands provide real time opportunities for the application of S&PF program principles to complex natural and human systems functioning as closely coupled socio-ecosystems. The lessons from such situations are exportable to continental systems where the connections between the social and ecological conditions are not as obvious as they are to islanders. We expect to greatly improve on the concepts of white water to blue water that the Forest Service is fomenting in national and international arenas. In short, vibrant S&PF programs in the tropical islands of the nation will have benefits that go well beyond the benefits that the islands themselves derive from these programs.

This paper has been prepared by forestry representatives of the U.S. tropical islands and the US Forest Service for use by the State & Private Forestry Program Redesign Committee.

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