Exhibit A

House Concurrent Resolution 200
The Best Project Committee

Project Hawai‘i Ecosystem & Landowner Protection

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Summary of All
House Concurrent Resolution 200
Report Recommendations

Recommendation 1a - Where feasible, remove restrictive disincentives associated with assistance programs in order to increase landowner incentive to utilize these programs.

Recommendations 1b - Develop an 'one-stop shop' interactive website about all landowner assistance programs in Hawai'i . A website should identify available incentive programs, help to mitigate disincentives, and provide links to useful resources.

Recommendation 1c - The Forest Stewardship Program should be revised to equal the favorable incentives allowed under the National Area Preserve Program to demonstrate the importance of stewardship on all mauka lands.

Recommendation 1d - Improve the structure and deliverability of the Native Forest Dedication Program on the Big Island and support establishing this program throughout the state.

Recommendation 1e - Continue providing the state support and matching funds necessary to implement the Conservation Reserve Enhancement Program.

Recommendation 2b - Develop and enact a Conservation Tax Credit in State of Hawai'i.

Recommendation 2a - Actively promote the use of conservation easements with the State or local non-profits**,** and ensure that landowner property taxes are reduced as a result of the sale of some ownership rights on their lands.

Recommendation 3 – Counties should consider adopting a modified property tax valuation that rewards landowners for maintaining land uses that provide ecosystem services to the public.

Recommendation 4 - Support the development of new methods for regularly monitoring biodiversity and ecosystem services in Hawai'i that have consistent and timely information about trends and changes in the landscape that natural resource managers and policy makers need in order to make effective decisions.

Recommendation 5a - Launch landowner demonstration projects that focus on selling ecosystem services and developing business strategies to make conservation economically attractive.

Recommendation 5b - Explore diversified funding sources to pay for ecosystem services, including launching a Hawai'i Fund for Conservation.

Recommendation 6a – Further explore tasks of conservation development and transferable development rights that could protect Hawaii's environment while providing needed income to landowners and allowing appropriately designed commercial and residential development.
Recommendation 6b - Support continuing research into these and other tools with potential to create effective ecosystem service incentives for mauka landowners.

Recommendation 7a – The DLNR continue working with a planning and advisory committee to develop and promote ecosystem services in the State of Hawai'i. The current effort should continue as the BEST Project Benefits from Ecosystem Services Tomorrow.

Recommendation 7b - Facilitate opportunities for linked dialogue for policy initiatives affecting ecosystem services, including biofuels, greenhouse gas emission reductions, and other related topics.

Recommendation 8a - Landowner incentive programs need more emphasis on education and advertising in order to reach their full potential and to increase their utilization on mauka lands.

Recommendation 8b - Dedicate a full time position to advance initiatives described in this report, as well as broader ecosystem service protection efforts in Hawai'i. Duties should include:

- Facilitate dialogue and partnerships between private landowners, state and federal agencies, nonprofit organizations, and other parties.
- Outreach to landowners about the new state tax credit (if enacted).
- Work with landowners to develop pilot demonstration projects that illustrate new business strategies for land management that integrate conservation and economic objectives.
- Advance development of ecosystem services payment programs and funding sources, including linking buyers and sellers through the Hawai'i Fund for Conservation.
- Work with researchers to advance projects testing new methods and technologies to quantify and monitor ecosystem service production.
- Seek out funds through grant proposals to support all of these recommendations.
- Coordinate efforts with the BEST Steering Committee and other related policy initiatives.
- Build alliances for the development of new legislation.

Exhibit C – Forestry Related Assistance Programs

Forestry Related Assistance Programs in Hawaii:

Current programs and future trends

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Cooperative Resource Management Forester

State of Hawaii
Department of Land and Natural Resources
Division of Forestry and Wildlife

October 2006

INTRODUCTION

There are a number of assistance programs in Hawaii, but many qualified landowners are unaware of what these programs are, how to access them, the appropriate practices for them, and/or current trends which may affect them. This document outlines many of the available programs and opportunities that are available for private landowners, communities, State agencies in the State of Hawaii. This information will be updated as new programs are available and current programs change.

The following programs are listed by the umbrella agencies that manage them.

USDA FOREST SERVICE COOPERATIVE ASSITANCE / STATE & PRIVATE FORESTRY PROGRAMS

Administered by the State of Hawaii Division of Forestry & Wildlife

http://www.dofaw.net/

Urban & Community Forestry (Kaulunani) - Cost-Share 50 Federal/50 Landowner. This program promotes the creation of healthier, more livable urban environments. Kaulunani maintains, restores, and improves the health of urban trees, forests, green spaces and sustainable forest ecosystems. The Program provides educational, technical and cost-share funding to cities, counties, schools, and community groups in urban areas. Kaulunani funding is available ranging from $1000 to $10,000 for cost-share projects. Matching for this program comes primarily from public and private community, in-kind project contributions and/or labor. http://www.state.hi.us/dlnr/dofaw/kaulunani/index.htm.

Forest Lands Enhancement Program (FLEP) - Cost-Share 75/25. This program provides educational, technical, and financial assistance to private forest landowners interested in sustainable forestry management objectives in non-industrial private forests. FLEP provides education, technical and cost-share funding for small-scale forest restoration, conservation, and/or education projects ranging from $1000 to $10,000. Matching for this program comes from private landowners' in-kind contributions and labor. www.state.hi.us/dlnr/dofaw/hfsp/index.html.

Cooperative Forest Health Protection – Cost-Share 50/50. This program directs and implements measures to prevent, retard, or suppress unwanted, native and nonnative invasive insects, pathogens, and plants affecting trees and forests. The primary goals are to minimize the spread of established invasive species and reduce damage caused by native insects and diseases. The program protects and improves America's forests using cutting-edge technology to rapidly respond to forest health threats. Funding and technical assistance is available for insect and pathogen management for private landowners through the State. This program is committed to

finding innovative ways to rapidly respond to forest health threats to avoid unacceptable loss of forest resources. http://www.fs.fed.us/foresthealth/briefs/program_overview.html

Forest Legacy Program (FLP) – Cost-Share 75/25. This program protects private forestlands from being converted to non-forest uses. FLP provides an opportunity for willing private landowners to sell (fee simple or conservation easement use-rights) their land to the State of Hawaii for the purpose of preserving or restoring unique forested areas. Matching for this program must come from a non-federal source in the form of land contribution or dollars. http://www.state.hi.us/dlnr/dofaw/Legacy/index.html.

Watershed Forestry Assistance Program (WFAP) - On December 3 2005, the President signed the Healthy Forest Restoration Act (HFRA). The Act contains two watershed forestry assistance programs (WFAP), State Watershed Forestry Assistance and the Tribal Watershed Forestry Assistance Programs that are to be administered by the Secretary of Agriculture through the Chief of the Forest Service. The Forest Service is working with State Forestry Agency personnel and with Indian Tribes to develop separate guidelines for the State and the Tribal Watershed Forestry Assistance Programs. Previous plans were to issue interim guidelines for both programs in October 2004. Because no program funds are included the President's FY2005 budget, there is no justification for publication of interim guidelines. For more information on these programs, contact Karen Solari, ksolari@fs.fed.us.

OTHER STATE OF HAWAII ASSISTANCE PROGRAMS

Administered by the Division of Forestry & Wildlife

Land Legacy Conservation Fund – Cost-Share 75/25. This program provides a source for funding for the conservation of Hawaii's unique and fragile places and resources. State, county agencies, and non-profits who are seeking funding to acquire property from private entities may apply for this grant. Proposed projects may include acquisition of fee title or conservation easements. Cost-share funding is only required of nonprofit organizations. www.hawaii.gov/dlnr/dofaw/llcp

State Forest Stewardship Program - Cost-Share 50/50. The purpose of this program is to assist non-industrial private forest landowners whom manage their forests and related resources to increase the economic and environmental benefits of their lands. Cost-share funding opportunities for private landowners range from $5,000 to $75,000 per year, for 10 yrs, with a following maintenance period. www.state.hi.us/dlnr/dofaw/hfsp/index.html.

Natural Area Partnership Program – Cost-Share 2 to 1 ratio, State dollars to landowner match. This program provides state funds for the management of private lands that are dedicated to long-term conservation. This program can support a full range of management activities to protect, restore, or enhance significant native resources or geological features. The program can

also help provide funding for the development of long-range management plans. Minimum 6 - year commitment to the program. http://www.state.hi.us/dlnr/dofaw/napp/index.html

Watershed Partnerships – These programs are voluntary alliances of public and private landowners committed to the common value of protecting large watersheds for water recharge and other values. Presently eight (8) successful watershed partnerships have been established covering thousands of acres. On the ground projects focus on alien species control fencing ecosystem restoration, and technical assistance.
http://www.state.hi.us/dlnr/dofaw/wpp/index.html or www.hawp.org

Youth Conservation Corps (YCC) – The Corps is a hands-on summer learning experience educating Hawaii's youth. The YCC program usually runs from June 14 through July 30 of each year. Members and team leaders receive a stipend and if eligible, will receive three (3) college credits upon successful completion of the program. YCC programs will be held on the islands of O'ahu, Maui, Moloka'i, Kaua'i, and the Big Island. Eligible applicants must be at least high school sophomores and no older than current college sophomores. Team Leader (TL) applicants must be at least 21 and have completed their sophomore year in college. Member and TL applications must be postmarked by the beginning of March of the year of the program. No prior experience is necessary for applicants. Hawaii Youth Conservation Corps is constantly looking for interested organizations that are willing to help develop and grow the YCC. The Corps can be reached by phone or fax. Phone numbers are: OFFICE (808) 247-5753; FAX (808) 247-2115. http://www.hawaiiycc.com/program.html

Safe Harbor Agreements – This agreement encourages proactive natural resource management to benefit endangered and threatened species. It provides regulatory assurances that future property-use restrictions will not be imposed if those efforts attract endangered or threatened species to their enrolled property or result in increased numbers or distributions of listed species already present. http://www.state.hi.us/dlnr/dofaw/safeharbors/index.htm

Hawaii Invasive Species Council (HISC) – HISC is a government body established by the Legislature of the State of Hawaii with the authority to provide funding for the removal of and the establishment of State policy related to invasive species. The Hawaii Invasive Species Council's special purpose is to foster coordinated approaches that support local initiatives for the prevention and control of invasive species, such as the coordinating group on alien pest species and the island invasive species committees. http://www.state.hi.us/dlnr/dofaw/HISC/

USDI FISH & WILDLIFE PROGRAMS

http://www.r1.fws.gov/

http://pacificislands.fws.gov/worg/orghc_conpart.html

National web page providing endangered species information to private landowners

http://endangered.fws.gov/landowner/index.html

Landowner Incentive Program (LIP) – Cost-Share 75/25. The State of Hawaii contains more biologically unique species than any other state in the United States. Unfortunately, this high level of endemism is paralleled by Hawaii also having more imperiled biota than any other state. There are currently 378 listed threatened and endangered species, 127 proposed and candidate species, and 1,085 species of concern in Hawaii. Many of these imperiled species are found on private lands in the State. Over 60% of the total land area and 50% of conservation district lands are under private ownership. The cooperation and assistance of private landowners is essential to be able to conserve and restore native flora and fauna. Recognizing the need to engage private landowners in the conservation of rare and endangered species, the U.S. Fish and Wildlife Service implemented LIP to provide funding and technical assistance to enhance, protect, or restore habitats that benefit federally listed, proposed, or candidate species, or other at-risk species on private lands. http://www.state.hi.us/dlnr/dofaw/LIP/

Private Stewardship Grant Program – Cost-Share 90/10. This program supports projects on private lands that benefit species and their habitats that are listed, proposed, candidates, or rare species. It funds on-the-ground projects rather than planning, research, education, ongoing management or land acquisitions. The projects can not be used to fulfill mitigation requirements. The non-Federal match requirement can be cash, in-kind services (including volunteer labor) or equipment. A state-sponsored University or conservation group can submit a proposal as long as a willing private landowner is involved. These projects compete on a regional basis; therefore the proposals should be as complete and competitive as possible. Local Hawaii contact - Craig Rowland U.S. Fish and Wildlife Service Phone: 808-792-9450, Fax: 808-349-1413 http://pacificislands.fws.gov/worg/orghc_psg.html

Recovery Land Acquisition Grants – Cost-Share 75/25. Loss of habitat is the primary threat to most listed species. Land acquisition of fee title or conservation easement is often the most effective and efficient means of protecting habitats essential for recovery of listed species before development or other land use changes impair or destroy key habitat values. Recovery Land Acquisition grant funds are matched by States and non-federal entities to acquire these habitats from willing sellers in support of approved species recovery plans. http://www.fws.gov/endangered/grants/section6/FY2006/RFP.pdf

Coastal Program – The program's purpose is to focus the U.S. Fish and Wildlife Service's efforts in bays, estuaries and watersheds to conserve fish, wildlife and their habitats in support of a healthy coastal ecosystem. The Coastal Program has four goals: 1) Serve coastal communities; 2) Conserve pristine coastal habitats; 3) Restore degraded coastal wetland, upland, and stream habitats; and 4) Focus resources through conservation alliances. The program's approach is to

partner with coastal communities to improve the health of their watershed for fish, wildlife, and people. Coastal Program identifies, evaluates, and maps important habitats and provides technical assistance to interested parties for restoration.
http://www.fws.gov/coastal/CoastalProgram/

National Coastal Wetlands Conservation Grant Program – Cost-Share 50/50. The program was established to acquire, restore, and enhance wetlands of coastal States and Trust Territories. This program provides matching grants to State, Territories, and Commonwealth agencies to acquire coastal wetlands. Territories and Commonwealth are not required to share the costs of projects (except for Puerto Rico), and States that establish and maintains a special fund for acquiring coastal wetlands, other natural areas, or open spaces, the Federal share can be increased to 75 percent. Federal grants awarded cannot exceed $1 million for an individual projects. http://www.fws.gov/coastal/CoastalGrants/

A complete list of the grants offered by the USFWS can be found at - http://grants.fws.gov/

USDA - NATURAL RESOURCE CONSERVATION SERVICE PROGRAMS

Environmental Quality Incentives Program (EQIP) – Cost-Share 75/25. This program is a voluntary conservation program for farmers and ranchers that promotes agricultural production and environmental quality as compatible national goals. EQIP offers financial and technical help to assist eligible participants install or implement structural and management practices on eligible agricultural land. http://www.nrcs.usda.gov/programs/eqip/

Wildlife Habitat Incentives Program (WHIP) – Cost-Share 75/25. This program is a voluntary program for people who want to develop and improve wildlife habitat primarily on private land. Through WHIP, USDA's Natural Resources Conservation Service provides both technical assistance and up to 75 percent cost-share assistance to establish and improve fish and wildlife habitat. http://www.nrcs.usda.gov/programs/whip/

Conservation Security Program (CSP) - Voluntary program that provides financial and technical assistance to promote the conservation and improvement of soil, water, air, energy, plant and animal life, and other conservation purposes on Tribal and private working lands. Working lands include cropland, grassland, prairie land, improved pasture, and range land, as well as forested land that is an incidental part of an agriculture operation. In Hawaii, the programs is available for watersheds on the Hamakua coast for 2007.
http://www.nrcs.usda.gov/programs/csp/

Conservation Resource Enhancement Program (CREP) - An offspring of the Conservation Reserve Program (CRP), CREP is a voluntary program for agricultural landowners. Unique state

and federal partnerships allow you to receive incentive payments for installing specific conservation practices. Through the CREP, farmers can receive annual rental payments and cost-share assistance to establish long-term, resource-conserving covers on eligible land. CREP is a voluntary land retirement program that helps agricultural producers protect environmentally sensitive land, decrease erosion, restore wildlife habitat, and safeguard ground and surface water**.** This program is in the process of being activated in Hawaii, but at the present time is not available. http://www.fsa.usda.gov/pas/publications/facts/html/crep03.htm

Farm and Ranchland Protection Program (FRPP) – Cost-Share 50/50. FRPP provides matching funds to help purchase development rights to keep productive farm and ranchland in agricultural uses. The program works through existing programs, USDA partners with State, tribal or local governments and non-governmental organizations to acquire conservation easements or other interests in land from landowners. USDA provides up to 50 percent of the fair market easement value of the conservation easement. http://www.nrcs.usda.gov/programs/frpp/

Conservation Innovation Grant (CIG) – Stimulates the development and adoption of innovative conservation approaches and technologies while leveraging Federal investment in environmental enhancement and protection, in conjunction with agricultural production. CIG projects are expected to lead to the transfer of conservation technologies, management systems, and innovative approaches (ie: market-based system) into NRCS technical manuals or guides, or to the private sector. http://www.grants.gov/search/search.do?mode=VIEW&oppId=12168

UNITED STATES ARMY ENVIRONMENTAL CENTER

Private Lands Initiative – The Private Lands Initiative involves a cooperative agreement between an armed service and a non-governmental organization (NGO) or a state/local agency to cost-share the purchase of land titles or conservation easements from willing land owners (at market value) to minimize incompatible use. The NGO or state/local agency purchases and manages the land titles or easements. The contact person at the US Army Environmental Center for the Private Lands Initiative is Cynthia Bauer at Cynthia.Bauer@aec.apgea.army.mil Phone: (410) 436-4988. Website http://aec.army.mil/usaec/natural/natural03a.html

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U.S. ENVIRONMENTAL PROTECTION AGENCY
FUNDING PARTNERSHIPS

Clean Water Act Section 319 (Nonpoint Source Management Program) cooperation with the Department of Health - Section 319 is an amendment to the Clean Water Act to establish a

Nonpoint Source Management Program to help focus State and local nonpoint source efforts. The purpose of the program is to support projects which address polluted runoff and which will ultimately result in water quality improvements. State, Territories, and Indian Tribes receive grant money to support a variety of activities such as technical assistance, financial assistance, education, training, technology transfer, demonstration projects, and monitoring. The State, Territory, or Indian Tribe may take the provided funding and contract out to local organizations to help meet the objectives of the Act. The intent of the funding is to support efforts that will result in water quality improvements through the substantial implementation of the nonpoint source components of watershed-based plans and/or total maximum daily loads (TMDLs). Grant funds must be matched 100% with match funding or in-kind contributions from non-federal sources as determined by the State and are subject to the requirements of EPA 40 CFR Ch.1 (7-1-98 Edition), 31.24 Matching or cost sharing. At least annually, the Program issues a Request for Proposals (RFP) to solicit qualified projects for grant funding. For information please contact Lawana Collier 808-586-4345 or lawana.collier@doh.hawaii.gov
http://www.hawaii.gov/health/environmental/water/cleanwater/prc/index.html

5 Star Restoration Program – In cooperation with a number of other organizations, the program provides challenge grants, technical support and opportunities for information exchange to bring together students, conservation corps, other youth groups, citizen groups, corporation, landowners, and government agencies through projects that restore wetlands and streams. Funding levels range from $5,000 to $20,000 (average $10,000) and projects must involve a diverse partnership of ideally five organizations that contribute funding, land, technical assistance, workforce support, or other in-kind contributions. Project should include a strong on-the-ground wetland, riparian or coastal habitat restoration component. Projects can be part of a larger restoration effort but must be completed within a 1-year timeframe.
http://www.epa.gov/owow/wetlands/restore/5star/

Wetland Program Development Grants - Provides eligible applicants an opportunity to conduct projects that promote the coordination and acceleration of research, investigations, experiments, training, demonstrations, surveys, and studies relating to the causes, effects, extent, prevention, reduction, and elimination of water pollution. States, Tribes, local government agencies, interstate agencies, and intertribal consortia in EPA's Region 9 are eligible to apply under this announcement. Non-profit organizations are not eligible to compete under this RFP.
http://www.epa.gov/region09/funding/wetlands-07.html

Smart Growth Implementation Assistance - a team of multidisciplinary experts will provide free technical assistance to communities, regions, or states that want to develop in ways that meet environmental and other local or regional goals. Communities, regions, and states around the country are interested in building stronger neighborhoods, protecting their environmental resources, enhancing public health, and planning for development, but they may lack the tools, resources, or information to achieve these goals. EPA can help applicants overcome these roadblocks by providing evaluation tools and expert analysis. States or communities that want help with either policy analysis or public participatory processes. Selected communities will receive assistance in the form of a multi-day visit from a team of experts organized by EPA and other national partners to work with local leaders. www.epa.gov/smartgrowth/sgia.htm

NOAA - OCEAN & COASTAL RESOURCE MANAGEMENT
Administered by the Department of Business, Economic Development and Tourism

Coastal and Estuarine Land Conservation Program (CELCP) – Match 1:1 ratio federal and non federal funds. Program was established to protect coastal and estuarine lands considered important for their ecological, conservation, recreational, historical or aesthetic values. Provides states and local governments with matching funds to purchase significant coastal and estuarine lands, or conservation easements on such lands from willing sellers. Lands purchases with funds are protected in perpetuity. Coastal states with approved coastal zone management plans or National Estuarine Research Reserves are eligible for CELCP. Title must be held by appropriate state agency. Contact: Doug Tom (Program Manager) Hawaii Coastal Zone Management Program DBEDT (808) 587-2820 dtom@dbedt.hawaii.gov or Elisabeth Morgan (301) 713-3155 x166 or Elisabeth.Morgan@noaa.gov Website: http://coastalmanagement.noaa.gov/land/welcome.html

TAX INCENTIVES WITH LANDOWNER ASSISTANCE PROGRAMS IN HAWAII

Native Forest Dedication on the Big Island - Allows private landowners with a minimum of three (3) acres to dedicate their land as native forest under its agricultural use categories. Native forest dedication requires that you actually have native forest dedication under which individual landowners agree to maintain their land as 60% native plant species with 25% canopy cover in exchange for a reduced tax assessment. This is a 20-year dedication. The following link provides the forms for native forest dedication on the county web site: http://www.hawaiipropertytax.com/template.asp?page=Forms_Miscellaneous.htm&mnu=Home&submnu=forms&lftmnu=formsmisc Call Mike McCall at 961-8260 for more information.

State Tree Farm Program – Chapter 186, HRS authorizes the Board of Land & Natural Resources to classify private land as tree farms, if it is suited for the sustained production of forest products in quantity sufficient to establish a business. The private property (or term lease of more than 20 years) must be ten (10) acres or more to be eligible. A tree farm management plan must be prepared, made available to the public for 30 days, reviewed, and approved by the BLNR. Once each of these steps are completed, a management agreement is prepared by the Division of Forestry & Wildlife ($50). The property receives a tree farm classification and is eligible for petition to the County to qualify for a property tax assessment. For additional information contract Sheri Mann (DOFAW) at Sheri.S.Mann@hawaii.gov or by telephone: (808) 587-4172

Cost-Share Exclusion (Improvements) - Code Sec. 126 (e) Exclusion from income. http://www.timbertax.org/research/research.asp

Timber Tax.org - Website sponsored by the American Resources Group, Inc., Washington D.C. in cooperation with the National Forestry Association and National Woodland Owners Association (NWOA). Site provides an annual update on Tax Tips (federal income tax, income from timber harvests and cost-share payments) for forest landowners. http://www.timbertax.org/

LAND TRUSTS

Agencies that help private landowners facilitate incentive programs

The Nature Conservancy – The mission of the Nature Conservancy is to preserve the plants, animals, and natural communities that represent the diversity of life on earth by protecting the land and waters they need to survive. The Nature Conservancy has developed a strategic, science-based planning process, called Conservation by Design, which helps to identify the highest-priority places, landscapes and seascapes that, if conserved, promise to ensure biodiversity over the long term. In other words, Conservation by Design allows the achievement meaningful, lasting conservation results. http://nature.org/

The Trust for Public Lands – The Trust for Public Land (TPL) is a national, non-profit land conservation organization, and in 1997, they celebrated 25 years of conserving land for people. Since TPL was founded in San Francisco in 1972, it has grown from a small group of people concerned with preserving the Marin headlands just north of San Francisco to an organization of more than 200 dedicated people in 24 offices across the mainland. TPL and these local groups work with private and corporate landowners, community groups, cities and towns, and public agencies at the State and Federal levels. TPL strives to find ways that lets everyone work together, achieve our conservation goals, and see that many of America's most special places are preserved. TPL's mission statement is simple: to conserve land for people. The work, however, is complex, challenging, and rewarding. In 25 years, more than 1 million acres of land, valued in excess of $1.2 billion dollars, have been protected by TPL with the help and partnership of organizations much like the Maui Open Space Trust. http://www.bestofmaui.com/tplhawai.htm

Maui Coastal Land Trust – The mission of the Maui Coastal Land Trust is to acquire, preserve, and protect coastal lands in Maui Nui (i.e., the islands of the County of Maui) for the integrity of the natural environment and the enjoyment of current and future generations. **MCLT has three main goals -Goal 1: Operations** To establish a strong community-based organization with diversified sources of financial support. **Goal 2: Public Awareness** Educate and build alliances with landowners, developers, community groups, government agencies, the business community, and visitors. **Goal 3: Land Conservation** Institute a program to successfully acquire, preserve, and protect selected parcels of coastal land. http://www.mauicoastallandtrust.org/index.html

Hawaii Island Land Trust (HILT) – HILT is a community-based, non-profit organization whose mission is to provide an inclusive approach to land conservation on the Island of Hawai'i. HILT works with landowners who voluntarily choose to protect their land and collaborates with individuals, other non-profits, and governmental organizations to achieve conservation objectives. HILT uses a variety of tools to protect lands such as voluntary conservation easements, land donations, or fee-simple purchases. http://www.HawaiiLandTrust.org

Kauai Public Land Trust – Kauai Public Land Trust's mission is to preserve lands on Kauai for the common good through acquisition, management, and education. They work with communities, government, businesses, and landowners to ensure key resources and places are protected for future generations. http://www.ltanet.org/findlandtrust/one.tcl?pc_id=144574

NONPROFIT ORGANIZATIONS

American Forests & Global ReLeaf Grants - American Forests is the nation's oldest nonprofit citizen's conservation organization. Their vision is to have healthy forest ecosystems for every community. The Global ReLeaf Forest ecosystem restoration program looks for quality tree-planting projects that improve the environment in places that it would otherwise not be feasible. Project must be 20 acres or larger on land owned by a government entity or on public-accessible private land meeting special criteria. Edible land are environments that have been damaged by wildfire, hurricanes, tornadoes, insect/disease, misguided treatment by humans, or other causes. Funds for projects are associated with planting of seedlings though site preparation, seedling acquisition, transporation, shelters, etc. Deadlines for grants are January 15 and July 1. http://www.americanforests.org/global_releaf/grants/

RELATED LINKS

Pacific Islands Lands Institute - This Guide provides information on private initiatives that can assist landowners and communities in their efforts to manage, conserve, and preserve agricultural land, rural landscapes, open space, historic sites, and natural and cultural resources on privately held land in Hawaii. These options and approaches are available to large and small landowners and community groups. They also make good economic sense because they can reduce taxes, protect land from forced estate tax sales, keep land within families, and sustain Hawaii's landscapes. http://www.pilipacific.org/conservation_options/consr_options.html

Government Incentive Programs for Tree-Planting or Forest Management on Private Lands - http://www.ctahr.hawaii.edu/forestry/Data/incentives.html

Catalogue of Federal Domestic Assistance Programs - http://12.46.245.173/cfda/cfda.html

Various Hawaiian related links -
http://web.hawcc.hawaii.edu/hawcc/forestteam/ListLinksPane.htm

Federal Grants and Programs links - http://www.grants.gov/

Federal and State of Hawai'i Incentive Programs
For Land Management on Private Lands

September 10, 2007

- This chart is intended to facilitate comparison of programs and provide contact information. It is neither complete nor authoritative.
- Some programs provide funding to both State and Private lands.
- Most cost-share programs **reimburse** landowners for a portion of their costs; payments are limited by (a) % or ratio of payment to match, (b) standard rates (caps) for eligible practices or (c) annual or project total maximums.
- Most programs have guidelines for what can qualify as the "match" for the cost-share. Funding from one program usually cannot match funding from another unless one program is non-Federal and the other is Federal.
- Generally, Federal and state cost-share payments need to be reported in tax returns and may or may not be taxable; search for "Cost-Share" in www.timbertax.org or www.timbertax.org/publications/aghandbook/aghandbook.asp

Program name, & Administering Agency	**Purpose of Program**	**Eligibility Criteria**	**Incentives and/or Cost Share Levels**	**Time-Frame**	**Other Requirements**	**Contact**
State of HI Forest Stewardship Program (FSP) *Division of Forestry & Wildlife (DOFAW)*	Complete range of forest management activities, including: conservation, restoration, timber production, and plan development.	Private and privately leased "non-industrial forest landowners" (10-year minimum contract); minimum 5 contiguous acres in the FSP project.	50% cost-share, limited to $75,000/year.	10 years of cost-sharing with a post 10 or more year maintenance period. Minimum 30-year contract if involves timber production.	Pre-proposal and land management plan required; payback provisions may be required for timber harvest. Onus on grantee to obtain any necessary permits, including EA's or CDUP's.	**Sheri S. Mann** (808) 587-4172 sheri.s.mann@hawaii.gov www.state.hi.us/dlnr/dofaw/hfsp
Urban & Community Forestry - locally known as "Kaulunani" *DOFAW* *USDA Forest Service (FS) funds*	Tree-planting in urban and community settings; educational programs; technical tree-care programs; Arbor Day activities.	Public or private lands with public access. No personal landscaping allowed.	Up to 50% cost-share. $10,000/year is standard amount but exceptions are made for special projects.	Usually 1 year.	Must be a non-profit, tree advocacy or civic group, educational institution, and/or local or state government agency	**Teresa Trueman-Madriaga** (808) 672-3383 ttm@hawaii.rr.com www.state.hi.us/dlnr/dofaw/kaulunani
Watershed Partnership Program *DOFAW*	Cooperative projects that benefit on-the-ground activities protecting land for watershed conservation and implementing existing management plans negotiated under the Partnerships.	Landowner must inter into a MOU or agreement adopting the exiting management plan scope.	No mandatory cost-share requirement, but leveraging funds is encouraged.	Year-to-year as funds are available.	EA may be necessary. Onus on grantee to obtain any necessary permits. Reporting necessary.	**Christine Ogura** (808) 587-0058 Christine.s.ogura@hawaii.gov www.state.hi.us/dlnr/dofaw/wpp
Partners for Fish & Wildlife *US F&WS*	(1) Restore natural habitats and provide long-term benefits to threatened and endangered species; or (2) satisfy the needs of wildlife populations on National Wildlife Refuges	Private lands and Hawaiian Homelands	Up to 50% cost-share; technical assistance also provided	10-year minimum commitment	Projects cannot be used to fulfill mitigation requirements Onus on grantee to obtain any necessary permits.	**Benton Pang** (808) 792-9443 http://pacificislands.fws.gov/worg/orghc_partners.html http://partners.fws.gov/pdfs/05partnersgrants.gov.pdf

Program name, & Administering Agency	Purpose of Program	Eligibility Criteria	Incentives and/or Cost Share Levels	Time-Frame	Other Requirements	Contact
Safe Harbor Agreements *US F&WS*	Proactive natural resource management to benefit endangered and threatened species.	Private and public lands	Provides regulatory assurances that future property-use restrictions will not be imposed	5-15 year commitment	Activities must meet "net conservation benefit" criteria for species	Chris Mullen (808) 792-9400 http://endangered.fws.gov/recovery/harborqa.pdf
Coastal Program *F&WS* VIA DOFAW	Focused efforts in bays, estuaries and watersheds around the U.S. coastlines. The purpose is to conserve fish and wildlife and their habitats to support healthy coastal ecosystems.	Provides funding for 22 high-priority coastal ecosystems. See website for a list of those.	Generally 3 to 1 match.		Projects cannot be used to fulfill mitigation requirements or for land purchase, but funds are available to facilitate purchase i.e. appraisals & due diligence needs. Subject to Yellow Book appraisal and review.	**Chris Swenson** (808) 792-9458 www.fws.gov/coastal/CoastalProgram/ http://ecos.fws.gov/coastal_grants/viewContent.do?viewPage=home
Wildlife Habitat Incentives Program (WHIP) *USDA Natural Resource Conservation Service (NRCS)*	Restoration of unique native habitats, especially for threatened and endangered plant and animal species; priority habitats for Hawaii include native forests.	Private or leased land; state and county lands also eligible	Up to 75% cost share Up to 100% cost-share	5-10 year contract 15-year contract	Primary goal may not be commercial production. Onus on grantee to obtain any necessary permits.	**Gwendolyn S. Gilbert** Phone: (808) 541-2600 Ext. 122 Email: gwen.gilbert@hi.usda.gov **Kent Matsutani** Phone: (808) 541-2600 extension 149 Email: kent.matsutani@hi.usda.gov
Environmental Quality Incentives Program (EQIP) *NRCS*	Priority resource concerns pertinent to forestry include: (1) sedimentation from accelerated erosion; (2) noxious weeds; (3) at-risk species habitat; (4) invasive species	Private or State owned land 5-10+ year lease: cropland, rangeland, pasture, forest, other farm or ranch land	Up to 75% cost-share	3-year cost-share agreements	Applicants must be persons actively engaged in livestock or agricultural [or forest] production Onus on grantee to obtain any necessary permits.	**Shirley Nakamura** (808) 541-2600 Ext. 112 www.hi.nrcs.usda.gov/programs/eqip_and_gswc.html
Clean Water Act Section 319 Grants for *Dept of Health administers funds via EPA*	State Non–Point Source Agencies. Projects focused on reducing non-point source pollution.	State, private, communities, cities, counties, non-profits, etc.	50/50 Cost Share	Generally 24 to 36 months	Priorities vary annually i.e. Could be specific watersheds or streams, etc. Onus on grantee to obtain any necessary permits.	**Hudson Slay** (808) 586-4436 www.epa.gov/owow/nps/cwact.html

Acronyms: EA – Environmental Assessment, CDUP – Conservation District Use Permit, EPA – Environmental Protection Agency

Federal and State of Hawai'i
Land Acquisition Programs

Program Name & Administering Agency	Purpose of Program	Eligibility Criteria	Incentives and/or Cost Share Levels	Time-Frame	Other Requirements	Contact
Forest Legacy Program *DOFAW via FS funds*	Preclude conversion of forestland to non-forest uses.	Private landowner that is a willing seller, currently 75% forested and threatened by development or fragmentation; must fall within designated "Forest Legacy Areas".	Federal funds available to purchase up to 75% of market value of a conservation easement or fee simple acquisition. Carries potential tax benefits.	Permanent	Subject to competitive prioritization at state, regional, and national levels. Requires FSP Plan; may require EA and CDUP. Subject to Yellow Book standard appraisal and review.	**Sheri S. Mann** (808) 587-4172 Sheri.s.mann@hawaii.gov www.state.hi.us/dlnr/dofaw/Legacy
Recovery Land Acquisition *F&WS* Via DOFAW	Acquisition of fee title or conservation easement for protecting habitats essential for recovery of listed species before development or other land use changes impair or destroy key habitat values.	Private land willing seller in support of approved species recovery plans.	75% cost-share	Permanent	Subject to Yellow Book standard appraisal and review. Regionally competitive.	**Craig Rowland** (808)-792-9450 Craig_rowland@fws.gov www.fws.gov/endangered/grants/section6/FY2006/RFP.pdf
National Coastal Wetland Conservation Grant Program *F&WS*	Provides matching grants to States for acquisition, restoration, management or enhancement of coastal wetlands.	Projects are selected based on ranking factors: 1. Consistent with the National Wetlands Priority Conservation Plan; 2. Located in States with dedicated land acquisition programs; and 3. Located in maritime forests on coastal barrier islands.	Program fact sheet – http://ecos.fws.gov/docs/coastal_grants/web/pdf/1135.pdf		Additional ranking include credit to projects benefiting threatened and endangered species, promote partnerships, and support conservation & recovery. Program will not provide grants to support planning, research, monitoring, or construction or repair of structures for recreational purposes.	**Chris Swenson** (808) 792-9458 http://ecos.fws.gov/coastal_grants/viewContent.do?viewPage=home
Habitat Conservation Plan (HCP) Land Acquisition *F&WS* Via DOFAW	Acquisition of land that have important benefits for ecosystems that support listed, proposed and candidate species.	Land must be associated with approved HCPs.	25% of estimated project cost; or 10% when two or more States or Territories implement a joint project	Permanent	Nationally Competitive. Subject to Yellow Book appraisal and review.	Heather Hollis Heather_hollis@fws.gov

Program Name & Administering Agency	Purpose of Program	Eligibility Criteria	Incentives and/or Cost Share Levels	Time-Frame	Other Requirements	Contact
Army Compatible Use Buffers Program Formerly: Private Lands Initiative Program *US Army*	Available for NGO or state/local agency to purchase a portion of land (titles or conservation easements). Helps the Army meet Endangered Species Recovery Act and prevention of future T&E species listings.	Private landowner that is a willing seller near Army lands. Another source of funds should be identified because this program does not provide funds for an entire purchase.	Possible reduced land taxes.	Permanent	Army may use the land for low-impact training.	**John Housein** (410) 436-6465 John.housein@us.army.mil http://aec.army.mil/usaec/natural/natural03a.html
Wetlands Reserve Program *NRCS*	Offers landowners an opportunity to establish long-term conservation and wildlife practices and protection by restoring, and enhancing wetlands on private property.		Provides technical and financial support to help landowners with their wetland restoration efforts.			**Jan Surface** WRP Program Manager (808) 541.2600 Ext. 153 Jan.Surface@hi.usda.gov
Grassland Reserve Program *NRCS*	Participants voluntarily limit future use of the land while retaining the right to conduct common grazing practices; produce hay, mow, or harvest for seed production; conduct fire rehabilitation; and construct firebreaks and fences.	Minimum of 40 contiguous acres. There is no maximum acreage. Private landowners only.	This is a conservation easement in perpetuity. Easement payments for this option equal the fair market value, less the grazing value of the land encumbered by the easement. These values will be determined using an appraisal process.	10 - 30 year agreements	Required to follow a conservation plan developed by NRCS and the participant to preserve the integrity of the grassland. If restoration is determined necessary by NRCS, a restoration agreement will be incorporated within the rental agreement or easement	**Joseph May**, State Range Management Specialist (808) 885-6602 Ext. 102 Joseph.May@hi.usda.gov
Farm and Ranchland Protection Program *NRCS*	Purchase easements or other interests in land from landowners to keep productive farm and ranchland in agricultural uses.	Must be part of a pending offer from a State, tribe, or local farmland protection program; be privately owned; and have surrounding parcels of land that can support long-term agricultural production. Must have a conservation plan for highly erodible land.	Up to 50% cost-share. Possible reduced land taxes.	Permanent	Subject to Yellow Book standard appraisal and review; must be large enough to sustain agricultural production; be accessible to markets for what the land produces; have adequate infrastructure and agricultural support services.	**Paul Scales** (808) 541-2600 Ext. 108 **Mathew Wung** (808) 885-6602 Ext. 106 (Waimea, Hawaii) www.nrcs.usda.gov/programs/frpp/
Coastal and Estuarine Land Conservation Program *National Oceanic and Atmospheric Administration (NOAA)*	Protects coastal and estuarine lands considered important for their ecological, conservation, recreational, historical or aesthetic values.	Coastal states with approved coastal zone management plans or National Estuarine Research Reserves are eligible for CELCP.	Provides states and local governments with matching funds to purchase significant coastal and estuarine lands, or conservation easements on such lands from willing sellers.	Lands purchased are protected in perpetuity.	Title must be held by appropriate state agency.	**Doug Tom** (808) 587-2820 dtom@dbedt.hawaii.gov http://coastalmanagement.noaa.gov/land/welcome.html

Program Name & Administering Agency	Purpose of Program	Eligibility Criteria	Incentives and/or Cost Share Levels	Time-Frame	Other Requirements	Contact
State of HI Legacy Land Conservation Fund *DOFAW*	Provides for the acquisition of lands, including easements.	Lands for watershed and habitat protection, parks, coastal area, natural areas, agricultural production, cultural or historical sites, recreation and public hunting	County agency or nonprofit land conservation organization grant recipients must provide match funds of at least 25% of the total project costs.	Permanent	Intended for state agencies, counties, and non-profit land conservation organizations seeking funding to acquire property.	**Molly Schmidt** (808) 586-0921 Molly.e.schmidt@hawaii.gov www.hawaii.gov/dlnr/dofaw/llcp
Natural Areas Partnership Program (NAPP) *DOFAW*	Protection, restoration and enhancement of significant native resources or geological features	Private landowner who is a willing seller with intact native Hawaiian ecosystems, essential habitat for endangered species, and areas within the protective (P) subzone of the Conservation District; applicant may be cooperating entity managing such lands.	Up to 67% cost-share. Possible reduced land taxes.	Permanent dedication through transfer of fee title or conservation easement.	Development of long-range agreements and management plans; requires EA. Onus on grantee to obtain any necessary permits.	**Randy Kennedy** (808) 587-0054 randall.w.kennedy@hawaii.gov www.state.hi.us/dlnr/dofaw/napp

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Federal and State of Hawai'i
Tax Related Incentive Programs

Program Name & Administering Agency	Purpose of Program	Eligibility Criteria	Incentives and/or Cost Share Levels	Time-Frame	Other Requirements	Contact
Tree Farm Designation *DLNR - DOFAW*	Sustained production of forest products in quantity sufficient to establish a business	Private property or minimum 20 year lease	"Right to Harvest" law applies. Land will be taxed based on Agriculture zoning.		Management Plan approved by DLNR Board.	Michael Constantinides (808) 587-4186 www.capitol.hawaii.gov/hrscurrent/Vol03_Ch0121-0200D/HRS0186/HRS_0186-0002.htm
Federal income taxes *Internal Revenue Service*	Planting for timber production	Private enterprises	Deduction or amortization of planting costs - up to approximately $10,000	Amortize over 7 years		www.fs.fed.us/r8/spf/coop/taxation/ www.timbertax.org/
	Timber sales	Private enterprises	Long-term capital gains treatment	Timber held over 1 year	Must establish basis	
Property tax treatment *City & County of Honolulu*	Tree Farming	Private Property or minimum 20-year lease; minimum 10 acres	Agricultural Property Tax Reduction (1-5% of fair market value, depending upon length of dedication)	1, 5 or 10-year dedications	HRS 186 Tree Farm Designation (see above)	Real Property Assessment Division (808) 527-5510 or 5539 www.co.honolulu.hi.us/rpa/chapter_8.pdf Scroll down to page 24 in pdf- "Section 8-7.3 "Dedication of Lands for Agricultural Use"

Program Name & Administering Agency	Purpose of Program	Eligibility Criteria	Incentives and/or Cost Share Levels	Time-Frame	Other Requirements	Contact
Agricultural Property Tax **Reduction**	Commercial tree farms	Private property or lease; minimum 5 years acceptable previous agricultural land use; agricultural condominiums not eligible	Tax assessment 50% of fair market value	20-year dedication; 10-year dedications might be allowed for short-rotation tree farms	Tree farm management plan and other information.	Real Property Assessment Division (808) 241-6222 www.kauai.hawaii.gov/Default.aspx?tabid=178
Agricultural Property Tax **Exemption** *Kaua'i County*	Tree farms	Private property or lease; minimum 10 acres; land in urban district not eligible	$1000/parcel/year with a 10 year dedication and $500/parcel/year with a 20 year dedication.	Harvesting must take place 6-25 years after planting		
Agricultural tax rates *Hawai'i County*	Commercial tree farming ("Fast Rotation Forestry" and "Slow Rotation Forestry")	Private property	Agricultural Property Tax Reduction; rates based on crop and productivity	10 year dedication for private land, 5-year dedication for leased land		Real Property Tax Division – Appraiser (808) 961-8354 www.hawaiipropertytax.com Click "Forms & Instructions," then "Miscellaneous," then "Agricultural Use" links
Native Forest Dedication *Hawai'i County (Kauai County was removed from this program in 1999)*	Preservation, restoration, and conservation of native forest (defined as at least 25% tree cover and 60% cover of native forest species)	Private property or lease of at least 20 yrs, minimum 3 acres	Low tax assessments, same as for pasture	20 year agreement to use land as native forest	Forest management plan; written affidavit from recognized forestry professional that restoration plan is likely to succeed within the designated time period	Mike McCall, Wes Takai (808) 961-8260 www.hawaiipropertytax.com Click "Forms & Instructions," then "Miscellaneous," then "Native Forest Dedication"
Property tax treatment *Maui County*	Tree farms (not specifically addressed in Code, but could be considered "crop")	Private property or lease; minimum 5 years' acceptable previous agricultural land use	Tax assessment 50% of fair market value	20-year dedication; 10-year dedications might be allowed for short-rotation tree farms	Petition Director of Finance	Real Property Tax Division (808) 270-7297 http://ordlink.com/codes/maui/index.htm Scroll down to "Article 7. Valuations, then click "3.48.350 Dedicated Lands" links

Adapted from original document March 2005

Authors:
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Steve Smith, Forestry Management Consultants – Hawai'i

Biomass Incentives:
- www.hawaii.gov/dbedt/info/energy/renewable/biomass
- www.eere.energy.gov/afdc/progs/ind_state_incentive.cgi?HI

§237-27.1 Exemption of sale of alcohol fuels. (a) There shall be exempted from and excluded from the measure of the taxes imposed by this chapter all of the gross proceeds arising from the sale of alcohol fuels for consumption or use by the purchaser and not for resale.

(b) As used in this section, "alcohol fuels" means neat biomass-derived alcohol liquid fuel or a petroleum-derived fuel and alcohol liquid fuel mixture consisting of at least ten volume per cent denatured biomass-derived alcohol commercially usable as a fuel to power aircraft, seacraft, spacecraft, automobiles, or other motorized vehicles.

(c) The director of taxation shall adopt rules pursuant to chapter 91 necessary to administer this section.

Native Forest Tax Dedication Program Issues
Sec. 19-59 of the Hawaii County Code

Native Forest Dedication (Hawaii County)

Administering agency	Hawaii County
Purpose	Preservation, restoration, and conservation of native forest (defined as at least 25% tree cover and 60% cover of native forest species)
Land Eligibility	Private property or lease of at least 20 yrs, minimum 3 acres
Incentive	Low tax assessments, same as for pasture
Time frame	20 year agreement to use land as native forest
Other Requirements	Forest management plan; written affidavit from recognized forestry professional that restoration plan is likely to succeed within the designated time period
Contact	Mike McCall, Wes Takai, 961-8260 http://www.hawaiipropertytax.com Click "Forms & Instructions," then "Dedications," then "Native Forest Dedication"

- **Hawaii County Native Forest Dedication**
  - Background of act
    - Enacted in 1996
    - Enrollment has been much lower than expected, representing only a very small fraction of potentially eligible parcels.
    - Reasons for low enrollment may include high administrative and transaction costs, unfamiliarity with the program among landowners and staff in the county tax office, and availability of alternative ways to achieve the same low tax assessment (having land assessed as poor pasture)
  - What type of landowner agreement is required?
    - A landowner (including a lessee with more than 20 years remaining on the lease) may petition the county director of finance to dedicate all or a portion of the landowner's real property as "native forest" for a period of twenty years
    - The portion of real property so dedicated will then be assigned the assessed value of the lowest agricultural use category that the land could qualify for if it were to be put into agricultural use
    - The land must meet certain requirements, with an approved management plan in place, in order to receive the dedication
  - Which types of land are eligible?
    - Minimum of 3 contiguous acres
    - Qualified native forests must have at least 25% tree cover, and at least 60% native species
      - Determination can be made via resource or vegetation maps, recognized private professional, or expert agency findings (usually the DOFAW service forester)
    - Written management plan required in all cases (may include Forest Stewardship plans) and written affidavit from recognized forestry professional that management plan is likely to succeed within the designated time period
  - What is the timeframe of the agreement?
    - Native Forest Dedication law requires a twenty-year dedication
  - What is the process (including penalties) for cancellation of a dedication?

        - The tax assessment privilege is cancelled when the landowner breaches the native forest dedication (e.g. by failing to carry out the approved management plan; allowing the percentage of native species to fall below 60%; applying for rezoning to a higher use; or subdividing the property to parcels of less than 3 acres)
        - In the case of a breach of a dedication, the landowner is responsible for all differences in the amount of taxes that were paid and those that would have been due from assessment in the higher use, plus a ten percent penalty
    - Does the state reimburse the local government for lost tax revenue?
        - No

This program requires a 20 year dedication, 25% tree cover, 60% native forest species, a forest management plan, and a written affidavit from an experienced forestry professional that the plan is likely to succeed within the designated time. In return, the landowner gets a lowest Agriculture value for the assessment NOT any given low tax rate. The assessment of the value is often done by comparing what is next to the land in question.

If that land is urban vs rural vs agriculture vs poor pasture then that is likely the tax rate you will get. However, the lowest tax rate (poor pasture designated for 10 years) has a minimum acreage 725. The native forest tax break under section 19-59 allows the lowest agriculture value for the assessment for dedicating eligible property as native forest. It doesn't change the tax rate, it gives the landowner a lower assessment. There is not a special rate for native forest uses.

Conservation Reserve Enhancement Program

The Conservation Reserve Enhancement Program (CREP) is a voluntary land retirement program administer as a joint partnership between the U.S.D.A Farm Service Agency (FSA), Natural Resource Conservation Service (NRCS), and a state, Indian tribe, local government, or local non-government entity. The Hawai‘i CREP is an expansion of the FSA’s Conservation Reserve Program (CRP), which is being developed by the State in conjunction with FSA to include new parameters to target and address specific environment problems associated water quality; threatened, endangered, and native species habitat; and invasive species issues. The Hawai‘i CREP is also designed to make the conservation practices offered under CRP applicable to Hawaii’s resource needs as well as more attractive to landowners in the Islands.

What is CREP in Hawai‘i

- CREP is a twenty year incentive program to encourage farmers and ranchers to voluntarily remove targeted lands from agricultural production and enact watershed conservation practices on those lands.
- Program goals include the increase in groundwater recharge, restoring native habitat, controlling the spread of invasive species in upland areas, enhancing stream water quality, reducing coral reef degradation and enhancing near shore coastal waters.
- Program management areas will focus primarily in wetland and riparian buffer restoration and habitat reforestation.

Components

- Eligible farmers and ranchers will receive an annual rental payment for enrolling in the CREP program ranging from $36/acre/year to $72/acre/year (annual payment limitation of $50,000/year).
- Landowners will also be eligible for conservation cost-share practice implementation including, but not limited to: stream restoration; buffer reforestation; removal of invasive species; installation of protective fencing; native species planting (focusing on native hardwood planting); and other associated practices.
- Farmers and ranchers will receive technical assistance to enact these practice on their land as well as monetary compensation and financial incentives (cost-share ranging from 50% to 90% per eligible practice).
- Funds may be available to landowners for a bargain purchase of a conservation easement.
- Additional per-acre incentives, enrollment bonuses, and tax-incentive may also be available.

Eligibility

- 15,000 acres available for enrollment in selected targeted watersheds on islands of Hawai‘i, Maui, Moloka‘i, Lana‘i, Kaua‘i, and O‘ahu.
- Eligible acreages include agricultural productive lands and pasturelands.

- Landowner eligibility limitations include ownership of property or lessee for one year, and CREP has an Adjusted Gross Income (AGI) cap of $2,500,000/year unless income levels are 75% or more from farming, ranching, or forestry related operations. The AGI limitation is being renegotiated in the 2007 U.S. Farm Bill.

Enrollment

- Hawai‘i CREP will have an initial 5-year enrollment period. Hawaii's landowners within CREP watersheds will be encouraged to voluntarily enroll in the program.
- CREP will have a 15-year contact requirement.

Beneficial Environmental Outcomes

- Protection of environmentally sensitive lands
- Increased groundwater recharge
- Decreased soil erosion
- Enhanced and increase stream water quality
- Increase health of coastal coral reefs and near shore coastal waters
- Increase habitat for rare and native plants and animals
- Control of invasive species and weeds

Economic Benefits to the State

- The federal share of CREP will contribute approximately $45 million to Hawai‘i economy through annual rental payments, incentive payments, and cost-share practices reimbursements.
- Landowners should receive payments for installing/maintaining CREP activities on target areas that are at least equal to the income generated from the pasture/crop production use of the same area.

Lead Agency and Federal Partners

- State of Hawai‘i Department of Land and Natural Resources, Division of Forestry and Wildlife is the lead state agency.
- Department of Agriculture, Department of Health, and University of Hawaii will assist with program outreach, implementation and monitoring.
- The State and private partners will contribute in-kind services and supportive state expenditures.
- The State will provide policy oversight through participation in the Hawai‘i CREP Implementation Committee.
- Federal agencies involved with CREP include FSA, NRCS, and U.S. Fish & Wildlife Service
- Relationships and expectations to be finalized in a Memorandum of Agreement following approval by FSA of the Hawai‘i CREP proposal.

The Hawai‘i CREP is not yet available for enrollment, but is collecting contact information of landowners interested and eligible for the program. DOFAW contact: Missy Sprecher (808) 587-4167 Melissa.I.Sprecher@hawaii.gov

Overview of Conservation Easements and Related Tax-benefits

- **What is a conservation easement?**
  - A conservation easement is a legal agreement between a landowner and a nonprofit conservation organization or government agency that limits the uses to which the land may be put in order to protect important conservation values
  - Under a conservation easement, the landowner conveys some rights on his or her land while retaining other rights
  - Conservation easements are recorded on the deed to the burdened property and bind any future landowners to the terms of the easement
  - Conservation easements can be for any agreed upon timeframe, up to and including perpetuity
- **What are the benefits to a landowner of donating or selling a conservation easement over all or part of his or her land?**
  - Landowners may receive a federal income tax deduction for all or a portion of the value of a donated conservation easement
  - In 12 states, landowners may receive a state tax credit for all or a portion of the value of a donated conservation easement
  - Landowners who donate conservation easements can significantly lower their estate taxes
  - Landowners with conservation easements may enjoy reduced property taxes for land under easement

- **Federal Income Tax Benefits**
  - **In order to qualify for the charitable deduction tax benefits under Internal Revenue Code sec. 170(h), conservation easements must be:**
    - Perpetual
    - Held by a qualifying conservation entity
    - For a conservation purpose:
      - Public recreation or education
      - Habitat or ecosystem protection
      - Open space protection
      - Historic preservation
  - **Benefits to the donor:**
    - The donor may apply the fair market value of the donated easement as a deduction of up to 30% of their adjusted gross income. Any remaining value may be carried-forward for the next 5 years. Example:
      - Landowner's annual taxable income = $100,000
      - Total value of donated easement = $500,000
      - Landowner's annual tax deduction = $30,000
      - Tax deduction claimed = $180,000 ($30,000 x 6 years)
    - Fair market value of the easement is the difference between the value of the property before the granting of the restriction and the value after the granting of the restriction
    - The "Pension Protection Act of 2006" (expires 12/2007) raises the percentage of adjusted gross income to which the value of the easement

may be applied to 50%, increases the carry forward period to 15 years, and provides for a 100% income deduction for qualifying farmers

- **State Tax Credit Benefits**
  - In addition to federal income tax deductions, landowners who donate conservation easements may also be eligible for a state tax credit. Twelve states currently offer some form of state tax benefit based on the value of a donated easement, though there is no uniform model.
    - Most of these states adopt the eligibility criteria found in the federal Internal Revenue Code section 170(h).
  - The state tax credit may be for all or a portion of the fair market value of the easement, subject to an annual cap, and may allow any unused value be carried forward for a set period of years.
  - Some states make the credits tradable – meaning the tax credits may be sold to a third party for cash (usually at a reduced rate)
  - Some states also allow landowners to seek credits based on transaction costs from the easement donation (e.g. assessors fees) or for stewardship and other land management costs

- **Federal Estate Tax Benefits**
  - Estate tax benefits of a conservation easement:
    - A conservation easement lowers the assessed value of the property, thus reducing the size of the estate and, by extension, the liability for the landowner's heirs
  - Additional estate tax benefits of a donated a conservation easement:
    - Up to 40% of the remaining value of a property subject to a donated conservation easement (but no more than $500,000) may be excluded from the value of an estate when calculating estate taxes (IRS code section 2031(c))
      - Heirs may capitalize on this benefit by donating a conservation easement after the landowner's death but before filing the estate return

- **Local Property Tax Benefits**
  - Properties under a conservation easement, whether purchased or donated, generally lose much of their fair market value. Because property taxes are based on the fair market value of the property, these taxes should decrease.
  - Property taxes are assessed at the local level, however, and some jurisdictions offer little or no reduction for conservation easements.
    - This may be due to local conditions that keep property values high even with easements in place, or it may be due to the perception that the local benefits of the conservation easement do not outweigh the lost tax revenue.

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Strengths of the Bill to Establish Hawai'i Conservation Tax Credits

OUTLINE

A. The proposed bill is consistent with existing Hawai'i statutes and public policy

1. Conservation incentive tax credits are consistent with Hawai'i statute and public policy.

2. Pursuant to Hawai'i statute and public policy, conservation goals are to be achieved by cooperation among public entities, non-profit organizations and landowners.

3. Hawai'i statute and public policy endorse fiscal support for conservation.

B. The proposed bill concerning donations or below market sales of a conservation easement Section 235-110.xxx3(a)(1) is consistent with Federal Tax Law and Public Policy

1. To qualify for a federal income tax deduction, an easement first must be donated in perpetuity. Second, it must be donated to a qualified organization such as a land trust, historic society, or a public agency. Third, it must be donated "exclusively for conservation purposes I.R.C. §170(h)(4)(A).

2. The Hawai'i bill allows consistent application of the Federal Statutes and Regulations.

3. The Hawai'i bill, adopts the Federal Treasury Regulations to determine if conservation easement donations qualify for state tax credits.

C. The Bill does not provide for the transferability of the state tax credit for conservation easements to prevent possible abuses.

D. The Bill does not limit the availability of conservation tax credits to those times when the state budget is in surplus.

E. The Bill does not permit state tax credits for re-zoning or initiating re-zoning of residential land to conservation zoned land because mere re-zoning does not fulfill conservation goals.

F. The Bill does not require state agencies to issue bonds to fund the state tax credits.

G. To achieve conservation and preservation goals, state tax credits are authorized by the Bill for taxpayers who make conservation investments in land management pursuant to binding legal agreements.

H. The Bill limits the amount of the state tax credit to prevent abuse while promoting the conservation goals.

1. The bill limits the state tax credit to 50% of the value of the donation.

2. The value of the tax credit is capped at $2,500,000 per conservation easement donation.

A Bill For An Act

Strengths of Bill to Establish State Tax Credit Incentive for Conservation

A. The proposed bill is consistent with existing Hawai'i statutes and public policy

1. Conservation incentive tax credits are consistent with Hawai'i statute and public policy.

Title 12. **Conservation and Resources** sets forth statutes designed to protect "Land having value as a resource to the State: includes land having natural, environmental, recreational, scenic cultural, agricultural production, or historic value, and may also include park and trail systems that provide access to any such land." H.R.S. Ch.12, §173A-2. Conservation incentive tax credits would foster private landowner efforts to protect dwindling resource lands.

The intent of the legislature to preserve the State's fragile natural ecosystems and the sustainability of the state's water supply is set forth in H.R.S. Ch.12, §183C **Conservation Districts**. "It is therefore, the intent of the legislature to conserve, protect and preserve the important natural resources of the State through appropriate management and use to promote their long-term sustainability and the public health, safety and welfare." H.R.S. Ch.12, §183C-1 **Findings and purpose.**

Once again, in H.R.S. Ch.12, §195 **Natural Area Reserves System**, "the legislature finds and declares that (1) the State of Hawaii possesses unique natural resources, such as geological and volcanological features and distinctive marine and terrestrial plants and animals many of which occur nowhere else in the world, that are highly vulnerable to loss by the growth of population and technology; (2) these unique natural assets should be protected and preserved, both for the enjoyment of future generations, and to provide base lines against which changes are being made in the environments of Hawaii can be measured; H.R.S. Ch.12, §195-1 **Findings and declaration of necessity.**

Similarly in H.R.S. Ch.12, §195D **Conservation of Aquatic Life, Wildlife, And Land Plants**, conservation is defined broadly as "use the methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this chapter and the Endangered Species Act are no longer necessary. Such methods and procedures include, but are not limited to, all activities associated with scientific resources management such as research, census, habitat acquisition and maintenance, propagation , live capture law enforcement, and transplantation" H.R.S. Ch.12, §195D-2 **Definitions.**

In sum, state tax credits for landowners who help to conserve natural resources, are consistent with existing Hawaii statutes and public policy.

2. Pursuant to Hawai'i statute and public policy, conservation goals are to be achieved by cooperation among public entities, non-profit organizations and landowners.

Conservation easements have been enforced by Hawai'i statute since 1985. For over two decades, Hawai'i statutes have included non-profit organizations as essential participants to achieve conservation goals. The statutory definition of a conservation easement is "an interest in real property created by deed, restrictions, covenants or conditions, the purpose of which is to: (1) Preserve and protect land predominantly in its natural, scenic forested, or open-space condition; (2) Preserve and protect the structural integrity and physical appearance of cultural landscapes, resources, and sites which perpetuate indigenous native Hawaiian culture; or which (3)Preserve and protect historic properties as defined in section 6E-2, and traditional family cemeteries. H.R.S. Ch.12, §198-1 **Conservation Easement Defined.**

Non-profit organizations and public entities are authorized by statute to hold and enforce conservation easements. H.R.S. Ch.12, §198-3 **Holders.** "Any public body and any organization which qualifies for and holds an income tax exemption under section 501 9c)of the federal Internal Revenue Code of 1954 as amended, and whose organizational purposes are designed to facilitate the purposes of this chapter, may acquire and hold conservation easements by purchase, agreement, donation, devise, or bequest, but not by eminent domain."

To achieve conservation goals the Department of Land and National Resources (DLNR) is given the duty to work with a "cooperating entity" or "cooperator defined as a private nonprofit land-holding organization able to assist in the identification, acquisition, and management of natural area reserves. H.R.S. Ch.12, §195-2 **Definitions**. Likewise, under the Natural Area Partnership Program, an applicant for conservation management funds shall be a landowner or a cooperating entity of private land of natural area reserve quality. H.R.S. Ch.12, §195-6.5 **Natural Area Partnership Program.**

In summary, to achieve conservation goals, Hawai'i statutes and public policy fosters cooperation among public entities, non-profit organizations and private landowners.

3. Hawai'i statute and public policy endorse fiscal support for conservation.

H.R.S. Ch.12, §195-6.5 **Natural Area Partnership Program** provides "state funds on a two-for-one basis with private funds for the management of private lands that are dedicated to conservation…(b) In order to qualify under this program, an applicant shall be a landowner or a cooperating entity of private land of natural area reserve quality and shall agree to: (1)Dedicate the private land in perpetuity through transfer of fee title or a conservation easement to the State or a cooperating entity."

Specifically, H.R.S. Ch. 12, §183 **Forest Reserves, Water Development, Zoning**, provides for complete property tax relief for owners who donate their land for a minimum of twenty years to protect forests or watersheds. H.R.S. Ch.12, §183-31 **Watershed**

Areas (1) defines watershed areas broadly as any area from which the domestic water supply of any city, town or community is or may be obtained, or (2) an area where water infiltrates into artesian or other ground water areas from which domestic water supply of any city, town or community is or may be obtained. Further, H.R.S. Ch.12, §183-32 **Use of Funds** describes how the DLNR may appropriate funds to purchase fee simple title or forest reserve easements "for the purposes of protecting and promoting forest growth thereon and of protecting the surface and underground waters from pollution or contamination.

H.R.S. Ch.12, §195D **Conservation of Aquatic Life, Wildlife, And Land Plants,** authorizes and defines "Direct payments" as "governmental compensation of landowners for their discovery care, maintenance, and recovery of endangered, threatened, proposed, or candidate species or their essential habitat. H.R.S. Ch.12, §195D-2 **Definitions.**

In short, Hawaii statutes and public policy support using tax credits to pay for conservation easements and conservation management expenses.

B. The proposed bill concerning donations or below market sales of a conservation easement Section 235-110.xxx3(a)(1) is consistent with Federal Tax Law and Public Policy

1. To qualify for a federal income tax deduction, an easement first must be donated in perpetuity. Second, it must be donated to a qualified organization such as a land trust, historic society, or a public agency. Third, it must be donated "exclusively for conservation purposes." I.R.C. §170(h)(4)(A).

The Internal Revenue Code defines conservation purposes as:

i) the preservation of land areas for outdoor recreation by, or the education of the general public,
ii) the protection of a relatively natural habitat of fish, wildlife, or plants, or similar ecosystem,
iii) the preservation of open space (including farmland and forest land) where such preservation is-
    a. for the scenic enjoyment of the general public, or
    b. pursuant to clearly delineated Federal, State, or local governmental conservation policy, and will yield a significant public benefit, or
iv) the preservation of a historically important land area or a certified historic structure.

2. The Hawai'i bill allows consistent application of the Federal Statutes and Regulations.

The proposed Hawai'i bill defines conservation or preservation purpose in a manner consistent with the federal criteria. **§235-110.xx2 Tax Credit for Conservation definitions:**

"Conservation or preservation purpose" means protection of open space for scenic values; natural areas for wildlife habitat, biological diversity, or native forest cover; forest land preservation, agricultural preservation, watersheds for drinking water, stream flow and rainfall infiltration; outdoor recreation including hiking, biking and walking trails; and historic or cultural property preservation. The resources or areas approved for protection must be significant or important as determined by the appropriate state resource agency.

"Cultural property" means a structure, place site, or object having historic archaeological, scientific, architectural, or cultural significance.

3. The Hawai'i bill, adopts the Federal Treasury Regulations to determine if conservation easement donations qualify for state tax credits.

To determine whether Hawai'i state tax credits are allowed for donations or bargain sales of conservation easements Federal Treasury Regulation criteria described below would be applied to the five resource categories:

1. significant natural habitat
2. public recreation and/or education
3. scenic enjoyment
4. pursuant to local governmental policy (includes farmland and forest land)
5. historic preservation.

To qualify under the significant natural habitat category:

- the property must be in a relatively natural state, and
- either rare, endangered, or threatened species must be present; or the property must contribute to the ecological viability of a park or other conservation area; or it must otherwise represent a high-quality native terrestrial or aquatic ecosystem.

To qualify under the public recreation and/or education category:

- The general public must have the regular opportunity to access and use the property. This does not necessarily mean every day, but rather for a substantial number of days per year, and
- There must be something about the property that makes the public want to use it: it must either be attractive or contain resources of educational value.

To qualify under the scenic enjoyment category:

- The property must be scenic and easily seen by the public, and
- Protection of the property must yield a significant public benefit.

The entire property need not be visible to the public, but if only a small portion of the property is visible, that may be insufficient to qualify for a deduction Treas. Reg. §1.170A-14(d)(4)(ii)(B). To determine what constitutes a "significant public benefit," the regulations list these factors:

- The uniqueness of the property to the area;
- The intensity of land development in the vicinity of the property (both existing and foreseeable trends of development);
- Consistency of the proposed open-space use with public programs for conservation in the region, including programs for outdoor recreation, irrigation or water supply protection, water quality maintenance or enhancement, flood prevention and control, erosion control, shoreline protection, and protection of land areas included in, or related to, a government approved master plan or land management area;
- The consistency of the proposed open-space use with existing private conservation programs in the area, as evidenced by other land protected by easement or fee ownership by nonprofit organizations in close proximity to the property;
- The likelihood that development of the property would lead to or contribute to degradation of the scenic, natural, or historic character of the area
- The opportunity for the general public to use the property or to appreciate its scenic values
- The importance of the property in preserving a local or regional landscape or resource that attracts tourism or commerce to the area;
- The likelihood that the donee will acquire equally desirable and valuable substitute property or property rights;
- The cost to the donee of enforcing the terms of the conservation restriction
- The population density in the area of the property, and
- The consistency of the proposed open-space use with a legislatively mandated program identifying parcels of land for future protection.

By basing the state tax credit criteria on the federal regulations, the proposed bill will make implementation consistent on a state and federal level.

To qualify under the "open space pursuant to governmental policy (farmland and forest land)" category:

- Protection of the property must be "pursuant to a clearly delineated Federal, State or local government conservation policy" and
- Protection of the property must yield a "significant public benefit" as defined above, or as consistent with Hawai'i's conservation policy under Title 12 of the Hawai'i Revised Statutes

To qualify under the Historic preservation category:

- A "historically important land area" must be either independently significant or deemed to contribute to a registered historic district or must be adjacent to a property listed individually in the National Register of Historic Places where the physical or environmental features of the land area contribute to the historic or cultural integrity of the National Register property.
- A "certified historic structure" must be either individually listed in the National Register of Historic Places or certified by the secretary of the interior as

contributing to the historic character of the registered historic district in which it is located.

C. The Bill does not provide for the transferability of the state tax credit for conservation easements to prevent possible abuses.

Only two of the twelve states currently offering state tax credits allow them to be sold. Conservation state tax credit statutes in Colorado and Virginia created a back lash because they allowed conservation easement donors to sell state tax credits generated by their donations. For example, if a Colorado conservation easement donation generated a $100,000 state tax credit, the donor could sell the tax credit for an average of $82,000 to a high income taxpayer who could use the tax credit to lower his high tax liability. Transferable state tax credits were controversial because high income taxpayers who took no conservation actions lowered their tax bills. Second, the states collected fewer taxes because the total tax credits were applied immediately rather than carried forward over time and used by the donor landowner to reduce his taxes. In both Virginia and Colorado, transferable tax credits for conservation easements have been amended repeatedly to address alleged abuses of the transfer provisions. Hence, the proposed Hawai'i Bill does not permit tax credit transferability to prevent non-donating parties from using the tax credits.

D. The Bill does not limit the availability of conservation tax credits to those times when the state budget is in surplus.

Landowners have been deterred from donating conservation easements in those states that provide state tax credits only in those years when the state runs a budget surplus. Accordingly, in recent years, states such as Georgia, Maryland, Mississippi, New Mexico, and North Carolina enacted conservation easement state tax credits that did not require state budget surpluses. Instead, those states and the proposed Hawai'i bill limit the amount of the state tax credit to the amount of state taxes owed by the landowner per year. These states, following the federal government's approach also allow the unused state tax credits to be carried forward. Thus, the proposed bill creates a defined, predictable tax credit for donations of conservation easements.

E. The Bill does not permit state tax credits for re-zoning or initiating re-zoning of residential land to conservation zoned land because mere re-zoning does not fulfill conservation goals.

In early 2007, SB1122 & HB 608 was introduced to establish a tax credit to promote conservation. The bills died in committee. These bills included a provision to grant state tax credits if landowners "voluntarily reclassifies residentially zoned land owned by the taxpayer to conservation under section 205-2(e) and initiates the rezoning process;"

The re-zoning criterion was eliminated in this Bill because mere re-zoning does not fulfill the goal of conservation or preservation. Equally important, re-zoning does not satisfy the eligibility requirements for a federal income tax deduction. To maintain consistency

with Federal Tax law, landowners must make donations, or below market sales to qualified organizations that fulfill conservation purposes. For greater detail about consistency with Federal Tax Law & Public policy, see Section B above.

F. The Bill does not require state agencies to issue bonds to fund the state tax credits.

The Hawai'i bill does not require state agencies to issue bonds or otherwise raise funds to reimburse the state general fund for lost tax revenue from the use of state tax credits. California employs such an approach and the bureaucratic complexity makes the system unwieldy. The California system is to be revised in 2008 to reduce the bureaucratic bottleneck that the bond requirement creates.

Further, no other conservation programs or tax credits in Hawai'i are prefaced on issuing bonds to reimburse the general fund for state tax credits. Thus, this bill conforms to the norm where no bond issuance is required.

G. To achieve conservation and preservation goals, state tax credits are authorized by the Bill for taxpayers who make conservation investments in land management pursuant to binding legal agreements.

§235-110.xx3 Tax Credit for Conservation general provisions: (a) The tax credit shall apply to any applicant taxpayer who:

(2) Voluntarily invests in the management of the land to protect or enhance a conservation or preservation purpose under binding land protection agreements, conservation management agreements, or other legal instruments consistent with a conservation or preservation purpose.

The purpose of this tax credit is to foster private landowner efforts to protect dwindling resource lands. To qualify for this state tax credit the taxpayer would have to enter into a legally enforceable protection agreement. Second, the tax payer's investment would be scrutinized for whether it met a conservation or preservation purpose as determined by the appropriate state resource agency.

§235-110.xx2 Tax Credit for Conservation definitions: As used in this chapter:

"Conservation or preservation purpose" means protection of open space for scenic values; natural areas for wildlife habitat, biological diversity, or native forest cover; forest land preservation, agricultural preservation, watersheds for drinking water, stream flow and rainfall infiltration; outdoor recreation including hiking, biking and walking trails; and historic or cultural property preservation. The resources or areas approved for protection must be significant or important as determined by the appropriate state resource agency.

To prevent taxpayer abuse, the amount of the state tax credit for taxpayer investment would be limited to 50% of the amount that the taxpayer invested for conservation or preservation purposes.

H. The Bill limits the amount of the state tax credit to prevent abuse while promoting the conservation goals.

1. The bill limits the state tax credit to 50% of the value of the donation.

§235-110.xx4 Amount of tax credit for conservation: (a) The amount of the tax credit shall be:

(1) fifty percent of the fair market value of the land or interest in land that the taxpayer donates in perpetuity on or after January 1, 2008, for a conservation or preservation purpose to the State, or public or private conservation agency. The fair market value of qualified donations made under this section shall be substantiated by 'qualified appraisal' prepared by a 'qualified appraiser';

In short, the taxpayer only receives fifty percent of the value of the conservation easement. This creates a balance where the tax credit only equals fifty percent of the value donated by the landowner. The landowner directly absorbs the cost of the remaining fifty percent of the donation.

2. The value of the tax credit is capped at $2,500,000 per conservation easement donation.

The tax credit is limited for each conservation easement donation to $2,500,000. Landowners, donating conservation easements valued in excess of $5 million dollars will not be permitted greater tax credits. The goal is to promote land conservation with fair and appropriate state tax credits while preventing the possibility of unnecessarily enriching private parties. The tax credit is capped at a limit sufficient to provide incentives for donations of large parcels (5000+ acres) and coastal properties.

Thus, the bill creates a fifty percent tax credit limited to $2,500,000 per donation. The simple, straight-forward formula for the tax credit will make it attractive for landowners and easy for the state to implement.

A Bill FOR AN ACT

RELATING TO TAX CREDITS FOR CONSERVATION

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF HAWAII:

SECTION 1. Chapter 235 Hawaii Revised Statutes is amended by adding a new section to be appropriately designated and to read as follows:

§235-110.xx1 Tax Credit for Conservation purpose: The purpose of this part is to establish procedures for certifying whether donations of land or interests in land to public or nonprofit land conservation organizations made on or after January 1, 2008 are eligible for land conservation incentives tax credit and to administer the land conservation incentives tax credit.

§235-110.xx2 Tax Credit for Conservation definitions: As used in this chapter:
"Applicant taxpayer" means a Hawaii taxpayer who is not claimed or is not otherwise eligible to be claimed as a dependent by another taxpayer for federal or Hawaii state individual income tax purposes a conservation land tax credit, which shall be deductible from the taxpayer's net income tax liability imposed by this chapter for the taxable year in which the credit is properly claimed; provided that a husband and wife filing separate returns for a taxable year for which a joint return could have been filed by them shall claim only the tax credit to which they would have been entitled had a joint return been filed. Taxpayers include but are not limited to individuals, and corporations, or pass-through tax entities such as trusts, estates, partnerships, limited liability companies or partnerships, S corporations, or other fiduciaries. A land conservation incentives tax credit claimed by a pass-through tax entity may be used either by the pass-through tax entity if it is the taxpayer on behalf of the pass-through tax entity or by the member, manager, partner, shareholder, or beneficiary, as applicable, in proportion to his interest in the pass-through tax entity if the income, deductions, and tax liability pass through to the member, manager, partner, shareholder, or beneficiary. Either (a) the pass-through entity or 9b) the member, manager, partner, shareholder, or beneficiary, but not both (a) and (b) may claim the land conservation incentives tax credit for the same donation or expenditure.
"Bargain Sales" means a sale where the taxpayer is paid less than the fair market value of the land, or interest in land.
"Conservation or preservation purpose" means protection of open space for scenic values; natural areas for wildlife habitat, biological diversity, or native forest cover; forest land preservation, agricultural preservation, watersheds for drinking water, stream flow and rainfall infiltration; outdoor recreation including hiking, biking and walking trails; and historic or cultural property preservation. The resources or areas approved for

protection must be significant or important as determined by the appropriate state resource agency.
"Cultural property" means a structure, place site, or object having historic archaeological, scientific, architectural, or cultural significance.
"Government body" means the state of Hawai'i or any of its political subdivisions.
"Interest in real property" means a right in real property, including access, improvement, water right, fee simple interest, easement and land use easement, conservation easement, partial interest, mineral right, remainder or future interest, or other interest or right in real property that complies with the requirements of 170(h)(2) of the Internal Revenue Code of 1986.
"Land" means real property with or without improvements thereon, rights of way, easements, privileges, water and riparian rights and all other rights or interests connected with real property.
"Less-than-fee interest" means an interest in land that is less than the entire property or all of the rights in the property or a nonpossessory interest in real property that imposes a limitation or affirmative obligation such as a conservation, land use or preservation restriction or easement, or management agreement.
"National register of historic places" means the register maintained by the United States secretary of the interior of districts, sites, buildings, structures, and objects significant in American history, architecture, archaeology, engineering, and culture.
"Public or private conservation agency" means a governmental body or a private non-profit charitable corporation or trust authorized to do business in Hawai'i that is organized and operated for natural resources land or historic conservation purposes and that has tax-exempt status as a public charity under section 501 (c)(3) of the Internal Revenue Code of 1986, and has the power to acquire, hold or maintain land or interests in land.
"Qualified appraisal" means a qualified appraisal as defined in 26 C.F.R. section 1.170A-13(c)(3) or subsequent amendments.
"Qualified appraiser" means a qualified appraiser as defined in 26 C.F.R. section 1.170A-13(c)(5) or subsequent amendments.

§235-110.xx3 Tax Credit for Conservation general provisions: (a) There shall be allowed a credit against tax liability for any applicant taxpayer who:

(1) Donates land or completes a bargain sale to the State, or public or private conservation agency that fulfills a conservation or preservation purpose provided that any less-than-fee interest qualifies as a charitable contribution deduction under section 170(h) of the U.S. Internal Revenue Code of 1986 or subsequent amendments;

(2) Voluntarily invests in the management of the land to protect or enhance a conservation or preservation purpose under binding land protection agreements, conservation management agreements, or other legal instruments consistent with a conservation or preservation purpose.

(b) Donations of land for open space for the purpose of fulfilling density requirements to obtain subdivision or building permits do not qualify for the land conservation incentives tax credit

§235-110.xx4 Amount tax credit for conservation: (a) The amount of the tax credit shall be:

(1) fifty percent of the fair market value of the land or interest in land that the taxpayer donates in perpetuity on or after January 1, 2008, for a conservation or preservation purpose to the State, or public or private conservation agency. The fair market value of qualified donations made under this section shall be substantiated by 'qualified appraisal' prepared by a 'qualified appraiser';

(2) fifty percent of the amount invested in management pursuant to subsection **§235-110.xx3 (a)(2).**

(b) The amount of the land conservation incentives tax credit a taxpayer claims shall not exceed $2,500,000.00 per donation regardless of the value of the land or interest in land donated or the number of taxable years in which the taxpayer carries over any unused portion of the credit. The portion of the credit the taxpayer uses in a taxable year may not exceed the amount of the individual income or corporate income tax otherwise due. A taxpayer shall only claim one land conservation incentives tax credit per taxable year.

(c) if the tax credit under this section exceeds the taxpayer's net income tax liability under this chapter, any excess of the tax credit over liability may be used as a credit against the taxpayer's income tax liability in subsequent taxable years until exhausted.

§235-110.xx5 Application For Certification (a) Every claim, including amended claims, for the tax credit under this section shall be filed on or before the end of the twelfth month following the close of the taxable year for which the tax credit may be claimed. Failure to meet the filing requirements of this subsection shall constitute a waiver of the right to claim the tax credit.

(b) The director of taxation shall prepare forms necessary to claim a tax credit under this section, may require proof of the claim for the tax credit, and may adopt rules pursuant to chapter 91 to effectuate the purposes of this section.

SECTION 2 New Statutory material is underscored.

SECTION 3 This Act upon its approval shall apply to taxable years beginning after December 31, 2008.

Q&A Regarding Proposed Hawai‘i State Conservation Tax Credit

Proposal

To enact legislation to provide State tax credits for landowners who donate a conservation easement and/or undertake conservation activities to protect habitat, agricultural lands and cultural resources.

1. What is a conservation easement?

A conservation easement is a legally binding agreement between a landowner and a nonprofit conservation organization or government agency that limits the uses to which the land may be put in order to protect important conservation, agricultural or cultural values.

Under a conservation easement, a landowner conveys some rights in his/her land while retaining other rights.

Conservation easements “run with the land” and bind future landowners to the terms of the easement.

2. Why provide tax benefits to landowners who donate conservation easements or otherwise manage their lands to promote conservation?

Landowners do not presently receive any benefits for the ecosystem services (*e.g.*, watersheds, carbon sequestration, open space) their lands provide, yet the public depends crucially upon the provision of these services.

To be attractive to landowners, conservation must be competitive with other existing or potential uses of the land – a goal that this proposal helps advance.

3. What federal tax benefits are currently available to landowners who donate conservation easements or take conservation action on their lands?

Landowners may receive a federal income tax deduction for all or a portion of the value of a donated easement. These easements must be perpetual to qualify for tax deductions.

The donor may apply the value of the conservation easement as a deduction up to 34% of their adjusted gross income and can carry the deduction forward up to 5 years.

Under the Pension Protection Act of 2006, the donor may apply the value of the conservation easement as a deduction up to 50% (100% for farmers) of their adjusted gross income and can carry the deduction forward up to 15 years. This Act expires 12/07, but may be extended.

Landowners may also receive federal tax credits for preservation of historic buildings

4. What other benefits are available to landowners who donate conservation easements or take conservation action on their lands?

Landowners who donate conservation easements can significantly lower their federal estate taxes, perhaps preventing their children from having to sell the land to pay the taxes.

Landowners with conservation easements may enjoy reduced property taxes for land under easement because of the reduced fair market value.

Landowners may also apply for a variety of federal and state grant programs to cost share land management and conservation projects on their land.

5. Do other states make tax credits available to landowners who donate conservation easements or take conservation action on their lands?

Twelve (12) states provide tax credits for landowners who donate conservation easements. Six other states are considering measures to establish conservation easement tax credits.

Each state determines how it will treat donations of conservation easements for income tax purposes. Most states limit the deduction to 25-50% of the value of the easement donation and place some sort of limit on the maximum amount of the credit. Several states also have per year and per landowner limits.

Fifteen (15) states provide tax credits for landowners who take action to preserve habitat or agricultural lands.

Twenty-nine (29) states provide tax credits for landowners who take action to protect historic or cultural resources.

6. How do state tax credits affect state budgets?

States have reported minimal reductions to state revenues in the first five years after adopting conservation easement tax credits. States with similar requirements to the

proposed Hawai‘i bill issued an average of 10 tax credits per year for the first five years after enactment reducing revenues by less than $400,000 per year.

The availability of conservation tax credits motivated preservation of an average of 11,000 acres per year at an average cost of three percent of the value of the land protected.

7. Why propose enactment of state tax credit legislation in Hawai‘i?

Hawai‘i has a very rich natural, cultural, and agricultural heritage. More than 90% of the plants and animals found in Hawai‘i are found nowhere else on earth.

This island archipelago is faced with enormous conservation challenges, including feral ungulates, invasive weeds, incompatible land use, and conversion of natural and agricultural areas.

More than half the land in the state is in private ownership. There is tremendous financial pressure to convert native forest, ranch and agricultural lands to uses (*e.g.*, urban development) that generate greater income to the landowner.

Enactment of state tax credit legislation in Hawai‘i would provide choices for landowners. A mix of existing federal and proposed state tax credits may enable landowners to conserve their land rather than sell it for development.

State tax credits would be voluntary and reward landowners to contribute to conservation.

8. What are the key provisions of the proposed Hawaii State Tax Credit legislation?

The proposed bill provides a State tax credit for a landowner who donates a conservation easement or completes a bargain sale that fulfills a conservation purpose OR voluntarily invests in management of their land to protect or enhance a conservation purpose.

The landowner would receive a tax credit equal to 50% of the fair market value of the easement or 50% of the amount invested in conservation management of their land.

The amount of the conservation credit a taxpayer claims shall not exceed $2,500,000 per donation regardless of the value of the land or donated interest in the land.

If the tax credit exceeds the taxpayer’s income tax liability, the excess tax credit over liability may be used as a credit against tax liability in subsequent years until exhausted.

9. What are the strengths of the proposed Hawai‘i State Tax Credit legislation?

The proposed bill is consistent with federal tax law and state tax law and policy.

The conservation goals of this legislation are to be achieved by cooperation among public entities, non-profit organizations and landowners, consistent with state statute and policy.

The proposed bill adopts federal Treasury Regulations to determine if conservation easement donations qualify for state tax credits, making implementation consistent on the state and federal levels.

10. What makes a <u>successful</u> state tax incentive program for conservation investment?

- Tax credits generous enough to motivate property owners to invest in conservation

- Pre-certification of conservation investment by an appropriate state agency as being significant or important to guard against abuse

- Simplicity of administration achieved by using established forms and criteria for land management agreements

- Inclusive investment requirements favoring both small projects by lower-income taxpayers and large projects by higher income taxpayers

11. What makes <u>unsuccessful</u> state tax incentive programs for conservation investment?

- Insignificant tax credits that do not motivate conservation investment

- Haphazard ad hoc administration of the program inviting abuse, including transferability of credits or retroactive application

- Under-inclusive or over-inclusive requirements for acreage or minimum investment

- Sunset clauses or linking tax credits to state budget surpluses

Exhibit I - The National Capital Project

Natural Capital Project

Overview: Aligning economic forces with conservation

A joint project of Stanford University, The Nature Conservancy, and the World Wildlife Fund

An appreciation of ecosystems as capital assets has emerged as the biggest new idea in conservation of the last decade. The idea is simple and compelling: people depend on natural capital for the stream of vital services it supplies, such as food, fuel, clean water, and flood control. If nature is properly valued, then we can greatly enhance investments in conservation and secure human welfare at the same time as we protect biodiversity.

Turning this idea into effective policy and finance mechanisms for conservation is a problem no one has solved on a large scale. Relative to other forms of capital, assets embodied in ecosystems are poorly understood, scarcely monitored, and undergoing rapid degradation. Often the importance of ecosystem services is recognized only upon their loss, such as in the wake of disastrous flooding or salinization of land and water. As a result, ecosystem capital is typically undervalued, if indeed it is considered at all.

Our Aim

The Natural Capital Project, a novel collaboration among the World Wildlife Fund, The Nature Conservancy, and Stanford University, intends to address this problem by demonstrating the economic value of conserved nature and making it easier for leaders to include these values in their decisions.

Our unique partnership, comprising two of the world's leading conservation organizations and one of the world's finest research universities, will develop novel decision-support tools – applicable anywhere – for assessing ecosystem services and informing decisions. We will apply these tools in a strategic set of demonstration projects to achieve concrete results on the ground. By demonstrating the power of this approach, providing the tools needed to replicate it elsewhere, and communicating effectively to governments, the private sector, and the general public, we aim to magnify our work and improve ecosystem management practices worldwide.

The Context

The last few years have seen an enormous increase in awareness and interest regarding ecosystem services. The Millennium Ecosystem Assessment has brought widespread credibility to the concept, and several recent "natural disasters" have cemented the idea that nature is valuable (e.g., wetlands and Hurricane Katrina; mangroves and the Asian Tsunami). Governments are beginning to show interest: Mexico and Colombia have begun to emulate the programs of Costa Rica and Ecuador, and Madagascar has pledged to triple its protected area network based largely on water supply arguments. Ecosystem services have even made the cover of *The Economist*.

Starting well before this surge of public interest, many efforts to protect and reward ecosystem services had already been initiated. For example, our own recent review of TNC and WWF revealed dozens of projects focused on ecosystem services that had been underway for several years. These efforts, and scores of others led by other NGOs, government agencies, community leaders, and others, span the globe and target a diverse array of ecosystem services, including carbon sequestration, water supply, flood control, and enhancement of scenic beauty (and associated recreation / tourism values). Together, these examples represent a powerful shift in the focus of conservation organizations toward a more inclusive, integrated, and effective set of strategies.

However, challenges remain. Public and private decision-makers still lack detailed information at useful scales actually linking benefits to people with specific ecosystem services. In many cases, information is

only available for single services and small scales, or quantitative estimates of the ecosystem services that are delivered are lacking. Because of this, sustainability of numerous programs is under question. In addition, there is a paucity of practical know-how in crafting policies, financial mechanisms, and legal institutions to capture this value and invest in sound ecosystem management. Very few specific, concrete examples exist that demonstrate the utility of properly valuing ecosystem services.

To build on the foundation of innovative projects and address these key challenges, we are designing a synthetic, standardized approach that considers multiple services simultaneously; does so over broad scales appropriate to local, regional, and national-level resource decisions; connects the cutting edge science of quantifying services with aggressive policy work to devise payment schemes and management actions accordingly, and catalyzes replication and scaling up of concrete schemes that align economic forces with conservation, yielding powerful success stories that spark both confidence and inspiration.

The Natural Capital Project's uniqueness is captured in a suite of characteristics. We are:

1. Designed for linking science and practice: this partnership brings the world's best conservation practitioners and scholars together to solve real-world problems.
2. Pragmatic and user-driven: we are focused on the needs of decision-makers and institutions
3. Built to endure: we are building the solid foundation and credibility needed to create global standards for our approach, rather than just another piecemeal effort
4. Transformative: we are designing, testing, and improving a process for catalyzing and scaling up (massively) investments in conservation

Strategic Approach

Our approach must connect the abstract theory of natural capital with the creative energy at the ground-level. We need to make it easy and routine to value nature, and with sufficient rigor to gain widespread credibility in the business and political world.

Towards this end, we have three concurrent strategic foci:

1. **Developing new decision-support tools**. These tools will enable decision-makers to quantify the importance of natural capital, to assess the tradeoffs associated with decisions, and to invest more strategically in conservation and development.
2. **Using and honing these tools in key demonstration sites around the world.** We are collaborating with scientists, policy experts, resource managers, and diverse leaders in a suite of important and contrasting regions to demonstrate and refine NatCap's tools as well as achieve real, on-the-ground results.
3. **Magnifying our impact.** We aim to embed conservation into financial and governmental institutions globally, through a well-targeted communications; engagement of key leaders in the public and private sectors; and an active learning network.

Developing New Decision-Support Tools

<u>New Tools – Mapping and Valuation</u>

The NatCap team will develop analytical tools and information to enable decision makers to identify and properly value ecosystem services and assess the costs and benefits of their protection. We are developing a software package, InVEST (Integrated Valuation of Ecosystem Services and Tradeoffs) that quantifies the value of biodiversity and a full suite of ecosystem services, in biophysical and economic terms, in maps of landscapes and seascapes and that analyzes the implications of alternative futures. Results will form the foundation for identifying equitable payment schemes, likely buyers and sellers, and other appropriate financial and policy mechanisms.

Components include:

1. Building techniques to map the ecological and physical production and delivery of key ecosystem services;
2. Quantifying and mapping the value of each service to all its human beneficiaries (including particularly vulnerable populations), by combining the biophysical outputs with economic methods and data;
3. Quantifying and mapping opportunity costs and other costs incurred by various stakeholders in managing ecosystems to ensure continued delivery of services.

New Tools – Policy & Finance

The Natural Capital Project team and its collaborators will develop new policy and finance tools and understanding to enable decision makers to choose among alternative options for economic development strategies that appropriately value ecosystem services. The group is currently contemplating a strategy that focuses on three core activities.

- First, to provide policy and financial advice and support for the Natural Capital demonstration projects and to use those projects to draw out broader lessons of relevance to other sites around the world.

- Second, to work with international development finance institutions to integrate ecosystem services into their general strategies and outreach, partnering with other organizations that have long been active in this area.

- Third, to work with the select government agencies (e.g., U.S. Department of Agriculture) to help develop, implement, and evaluate targeted policy initiatives. The USDA provides an exciting partner because its new initiatives on agricultural conservation and forestry explicitly focus on incorporating ecosystem services and they are seeking assistance from expert outside parties.

New Tools – Conservation and Poverty Alleviation / Human Development

At present the Millennium Development Goals, and institutions pursuing them, are limited in consideration of the environment. Yet the environment is the single most important asset to most of the world's poor. Some of the poorest or most traditional communities often exist in and derive benefits from some of the most important places for nature and conservation efforts. Indeed, this grinding poverty is often *the* major impediment to conservation efforts. In West Africa for example, the biodiversity rich Upper Guinean Rainforest maps squarely over Sierra Leone, a country where the average life expectancy is the lowest on earth – just 37 years.

Though often marginalized, the rural poor do indeed, through informal mechanisms, have a huge influence on the country's economy. And of course, the rural poor are dependant on natural resources in more immediate ways that those of us who can compensate for the loss of a particular service through replacement from elsewhere.

Thus, understanding how poor rural communities value nature and how they incorporate or use these services for everyday living is crucial to the ultimate success of the Natural Capital Project. The Poverty & Conservation group was only recently created (2007) to ensure consideration of the needs and aspirations of the rural poor and the landscapes they live in.

Initial goals include (1) elucidating measures of poverty and economic development that are most relevant to conservation and ecosystem services in particular; (2) determining alternative terms for showing how traditional and subsistence communities value nature; (3) incorporating non-traditional valuation into conservation planning; (4) including the importance of ecosystem services to poor communities in rural

development projects. We intend to engage with development assistance organizations and non-standard partners to the conservation movement so as to ensure that poverty alleviation strategies augment and not hinder the conservation of nature's services.

Demonstration Sites

We begin with a set of six to eight pilot projects and places in which specific tools and analyses will be developed and field tested to demonstrate the power of this new approach relatively quickly and then build momentum for much broader, longer-term efforts. In each pilot project, we will focus on services that relate intimately to human well-being and that offer scope for connecting with imminent policy decisions.

Demonstration sites are chosen through application of several criteria, which include:

- Significant Natural Capital. Rich, unique, and/or representative biodiversity, and identified ecosystem services that are central to human well-being.
- NatCap Partner Interest: Priority conservation interest to TNC and/or WWF with potential scientific/policy interest to Stanford.
- Local Leadership. Strong local project leadership to advocate for and advance project objectives.
- High Threat level. Potentially high rates of change, especially loss of natural capital.
- High Leverage Potential. Potential to influence important and imminent policy decisions.
- Stakeholder Will. Decision-makers with ability and interest to implement policies or actions to protect services
- Capacity. Scientific and institutional capacity and convening power, present in one or more of the partners
- Learning. Opportunities high for innovative, rapid, and/or complementary learning with potential for application across broader efforts.

The Natural Capital Project has thus far identified four demonstration projects; in each, the work will be conducted at several scales, from local to the state or national level: A marine demonstration site is forthcoming.

- China (with a focus on the Upper Yangtze River Basin)
- Afro-Montane region of Eastern Africa (with a focus on the Eastern Arc mountains in Tanzania)
- Hawai'i (with a focus on Hawai'i Island)
- California (with a focus on the Sierra Nevada range)

All of these areas are centers of biodiversity and face imminent threats from land conversion, and all are areas where natural systems clearly provide major services to people. In addition, they represent interesting contrasts in the biological, social, and institutional backdrop into which we aim to weave our work. Because of this diversity, we hope that developing tools and expertise in these regions will allow us to apply the lessons we learn in many other regions globally.

We will collaborate with in-country local scientists, land managers, and leaders in the public and private sectors, to develop the data and valuations that are judged to be highest priority. Information will thus be generated by, and well-circulated within, locally based "knowledge systems" (networks of individuals and organizations that link knowledge to action) for sustainable development. Through these knowledge systems, we will aim to establish new finance mechanisms, policies, or management actions for conservation of ecosystem services. Our vision is to help create law and policy – and new business opportunities – that foster investment in vital ecosystem services by individual land owners and corporations alike.

The primary desired outcome for our demonstration projects is new incentives for conservation, supported by new revenue streams, institutions, and policies that target vital services and the ecosystems that produce them.

Magnifying Our Impact

We have three efforts in the earliest stages of development to magnify our impact.

First, we will develop a strategic communications plan to inform and influence key constituencies in achieving our goals, engaging first-rate professionals in its design and execution. These key constituencies will build from, but not be limited to, our policy and demonstration site work.

Second, we aim to identify and engage leaders, worldwide, who can advance our mission. These will be key people in government and in the private sector, as well as other creative, influential individuals.

Third, we are developing a peer learning network ("NatCap Network") of pioneering sites and projects from around the world actively involved in developing and implementing ecosystem service-related projects. The goal of this consortium is to innovate, test, learn, share, and push our collective experience and know-how to new levels beyond what any project could do individually. The major requirement for entry into the Network is a general shared vision and strong commitment to active, on-going participation in the Network through continual self-reflection, contribution to discussion groups, documentation of lessons learned, peer "assists," feedback for tool development, etc. We strive for global representation and innovation.

Success

Our goal is simple: to make the valuation of nature easy, routine, credible, and accepted by business, governments, and bureaucracies. Our hypothesis is that if nature is properly valued, and tools are available to estimate those values, then more dollars and other resources will flow to conservation, to the benefit of both biodiversity and people.

We anticipate success occurring along four broad fronts: 1) compelling success stories of our decision-support tools in action from several different regions; 2) subsequent widespread uptake of the full suite of our tools and approaches; 3) the emergence of new incentives for conservation at local to global scales; 4) a broad shift in attitudes toward nature conservation, from a luxury to something essential for maintenance and improvement of human well-being everywhere.

Organizational Leads:

Stanford: Gretchen Daily, Ph.D. Senior Fellow, Woods Institute for the Environment; Professor, Biology

The Nature Conservancy: Peter Kareiva, Ph.D. Lead Scientist

World Wildlife Fund: Taylor Ricketts, Ph.D. Director, Conservation Science Program

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Exhibit J -In VEST Overview

THE NATURAL CAPITAL PROJECT

INVEST ~
INTEGRATED VALUATION OF ECOSYSTEM SERVICES & TRADEOFFS

The aim of the Natural Capital Project is to align economic forces with conservation. Our focus is on ecosystems, Earth's living natural capital. If properly managed, natural capital yields a flow of vital "ecosystem services," including the production of goods (e.g., food), life support processes (water purification), and life fulfilling conditions (beauty, opportunity for recreation), as well as the conservation of options (genetic diversity for future use).

Despite its importance, natural capital is poorly understood, scarcely monitored, and—in many cases—undergoing rapid degradation and depletion. Often the worth of ecosystem services is widely appreciated only upon their loss. As a result, natural capital is typically undervalued, to the extent that it is considered at all.

We are developing a practical and credible toolbox for quantifying ecosystem service values across land- and seascapes, to enable better consideration of natural capital in decision-making. We model key benefits of **carbon sequestration; water quality, quantity, and timing of flows (for hydropower and flood control); pollination of crops; timber and agricultural production; recreation, and other cultural benefits.**

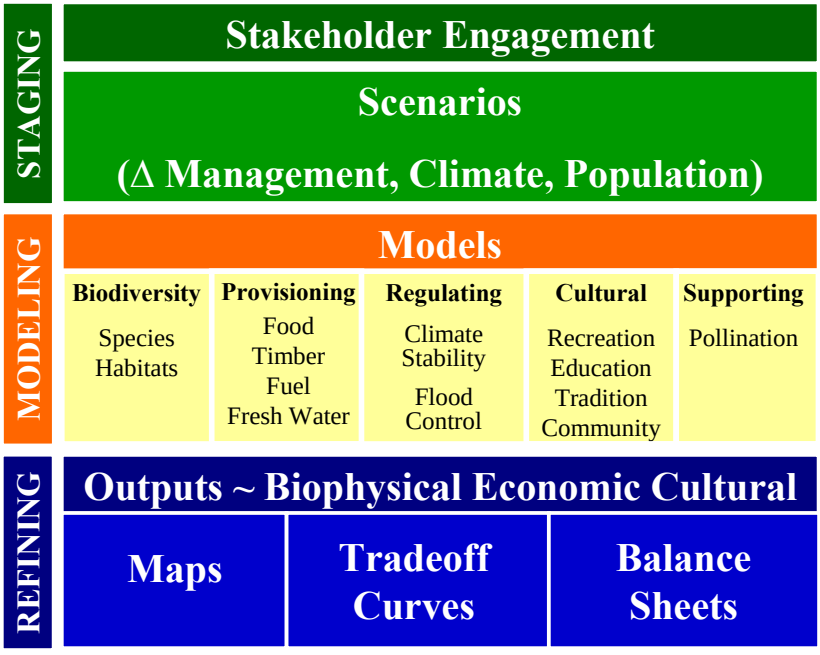
Our approach identifies where ecosystem service benefits originate and where they are consumed. It reveals how alternative choices about resource management will affect multiple aspects of the economy, human well-being and the environment.

Our methodology can help answer these types of urgent questions:

- How does a proposed forestry management plan affect timber yields, biodiversity, water quality and recreation?
- Which parts of a watershed provide the greatest carbon sequestration, biodiversity, and tourism values? Where would reforestation achieve the greatest downstream water quality benefits?
- How would agricultural expansion affect a downstream city's drinking water supply? How will climate change and population growth impact these effects?

THE APPROACH

The first step in our approach is to identify the critical choices being considered by decision makers or other stakeholders. From these we develop "scenarios" to explore answers to questions like those above, about resource management, conservation, and human well-being. They may deal with an existing landscape and identify how services are delivered today, or they can look to the future and explore the implications of new policies or a changing climate. Our approach estimates the amount and value of ecosystem services that would be provided under each scenario and represents them in many forms including maps. This modeling helps focus investments in ecosystem service provision, and also estimates the costs and benefits, in ecological and economic terms, of each decision.



THE MODELS

BIOPHYSICAL TERMS

Fresh Water
- Water supply by sector (agriculture, hydropower, etc.)
- Water quality by sector

Flood Regulation
- Flood risk

Wood, Timber
- Timber Yield
- Wood yield
- Non-Timber Forest Product (NTFP) yield

Climate Regulation
- Carbon stocks
- Carbon sequestration
- Who participates in the market

Biodiversity
- Habitat representation – area and quality
- Species richness

Non-use
- Attributes of cultural sites

Pollination
- Pollinator abundance on farms
- Crop yield due to native pollination

Agriculture
- Crop type
- Crop yield

Recreation
- Site visitation rate

Our advanced set of interacting models show how different sectors, from agriculture to energy, are affected by different choices. Users can show the tradeoffs between sectors in biophysical or economic terms. For instance, this tool can assess how a new forestry management plan will change water quality in reservoirs as well as revenues from hydropower downstream. The full set of biophysical outputs we can provide is listed on the left.

Currently, it is difficult to include ecosystem services in cost-benefit approaches to planning, because understanding of how ecosystems generate benefits, and the value of these benefits, has not been integrated. InVEST does this integration, in biophysical terms (listed on the left) and translated into economic estimates to the right.

Our approach requires some basic information about the landscape, management practices, infrastructure and governance. Additional, specialized information is needed for each service. Since data are often scarce, we provide a simple model with few input requirements as well as a more complex, data-intensive model for each service. This unique, "tiered" feature of our tool is described more below.

The outputs of our models include maps showing the parts of a landscape most important for the production of each resource and ecosystem service. With these maps, we can see which sectors and communities gain, in terms of income and resources, from a policy or program. We can also see who will lose income or resources, and redesign programs to reduce their loss.

Our approach also reveals how funds or regulations can achieve the biggest payoff for a conservation investment in the landscape. For instance, where would payments be most effective in reducing erosion and sedimentation? Where would reforestation most benefit water quality and biodiversity? Where could we optimize landscape use based on specific goals and objectives?

The use of this approach can also minimize conflict among sectors and potentially maximize benefit from land-uses for both people and the environment. *Trade-off curves* will be the most useful outputs in this sense, showing the relationship between two sectors. For example, trade-off curves can reveal how much timber can be harvested before causing major profit loss to hydropower, major flood damage costs, or severe loss of biodiversity.

Finally, *balance sheets* reveal the trade offs and synergies among all services in one simple table.

ECONOMIC TERMS

Fresh Water
- Hydropower income
- Irrigation water cost
- Drinking water cost
- Industrial water cost

Flood Regulation
- Cost of flood damage

Wood, Timber
- Net Present Value (NPV) of timber
- NPV of wood
- NPV of NTFPs

Climate Regulation
- NPV of carbon credits
- Income from markets

Biodiversity
- Existence value

Non-use
- Way of life value

Pollination
- Crop value of native habitat
- Crop value due to native pollination

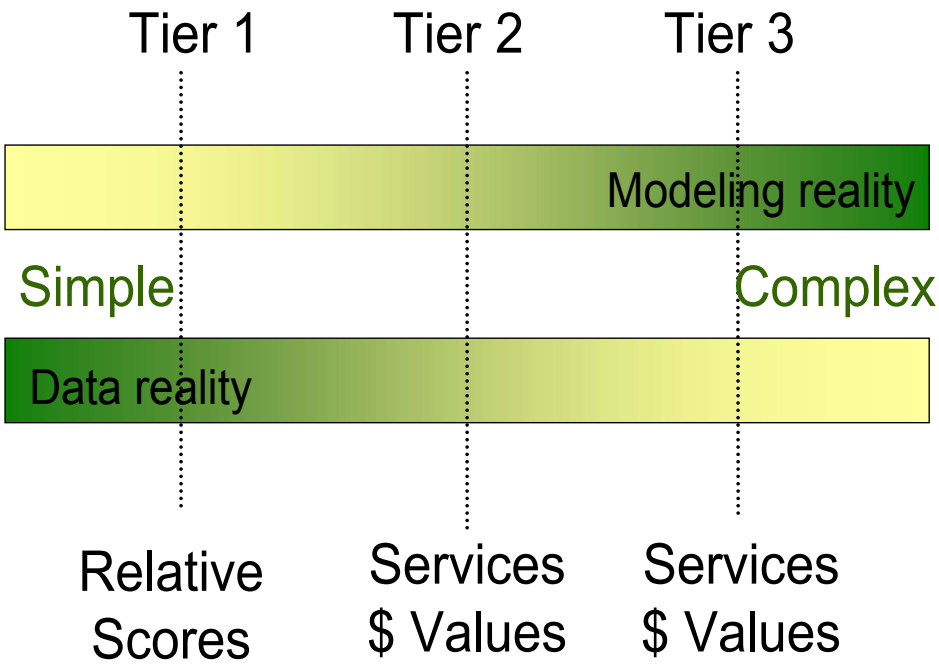
Agriculture
- Net Present Value of crop yield

Recreation
- Site income

KEEPING IT SIMPLE

Our "tiered" modeling approach ensures that our models will be useful worldwide, even in places with sparse data. The Tier 1 model for each ecosystem service is simple, and has few data requirements. The outputs of Tier 1 models are relative service levels. Given the simplicity of the models, they are not able to reliably predict actual ecosystem service levels or economic values. These outputs are provided by more complex Tier 2 models.

For example, the Tier 1 water quality model identifies areas of the landscape that control water quality. These types of outputs are very useful for prioritization exercises and management planning. The Tier 2 water quality model predicts concentrations of contaminants in streams and rivers, and estimates water treatment costs.

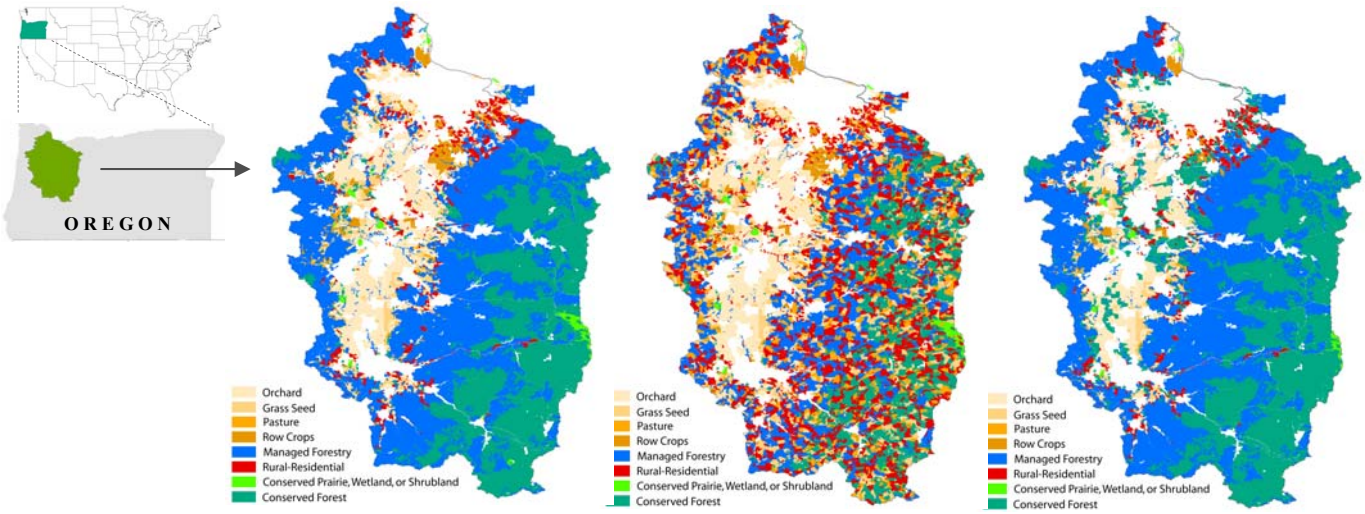


Finally, Tier 3 models are even more complex models that include time steps and feedbacks. We will not develop these kinds of models since this is the most common type of model developed by others. When Tier 3 models have already been developed for a region, we can integrate those models into our approach.

For instance, many river basins may have already developed sophisticated hydrology models. These can be incorporated as the best available water models, building on existing knowledge and efforts, and providing the most refined and detailed estimates.

THE RESULTS

The R&D team of the Natural Capital Project is developing maps showing the production and distribution of ecosystem services. These maps of the Willamette Basin, a watershed in Oregon (USA) provide a hypothetical illustration. The current landscape is shown on the left, with two alternative futures portrayed in the maps on the right. The first scenario involves an intense timber harvest program and development program, in which much of the current forested landscape (blue and green areas) are cleared and converted to housing developments (red). We are presently calculating the resulting $ change in profit from timber harvest, decline in real estate values, and opportunity cost of lost carbon sequestration potential.



Current Landscape **Timber Harvest** **Reforestation**

The alternative scenario (right) would reforest a large portion of the current agricultural areas (orchards, grain seed, pasture) on the valley floor. This scenario program would provide benefits through carbon markets and increased real estate values, but would entail an agricultural opportunity cost. These trade-offs will be quantified in the sort of balance table shown below.

Balance Table for Possible Policies in the Willamette Basin, Oregon USA

Program	Timber Profit ($ Millions)	Agriculture Profit ($ Millions)	Carbon Profit ($ Millions)	Real Estate Value ($ Millions)	Biodiversity Score
Current					
Timber Harvest					
Reforestation					

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Woods Institute for the Environment Stanford University · WWF · The Nature Conservancy

MAPPING THE FLOW OF ECOSYSTEM SERVICES IN HAWAI'I: AN INTEGRATED APPROACH

Principal Investigators: R.F. Hughes (Forest Service); G.P. Asner (Carnegie Institute); G.C. Daily (Stanford); C.P. Giardina (Forest Service); J.B. Kauffman (Forest Service); S.S. Mann (State of Hawai'i Division of Forestry & Wildlife)

EXECUTIVE SUMMARY

We seek a future in which leaders appreciate the values of ecosystems for the welfare of their people and economies, incorporate such values into resource decisions, and use financial and policy mechanisms to reward biodiversity and ecosystem conservation. Currently, key decision-makers typically do not incorporate ecosystem service values in their decisions. As a result, native habitats and populations are declining by an average of 0.5-1% per year. Such rapid degradation of ecosystems endangers not only biodiversity, but also the ecosystem functions that support human well-being.

To remedy this situation, we propose advancing the scientific basis for achieving proper valuation of ecosystem services in three critical ways. First, we will create a generalized methodology for quantifying ecosystem service flows in biophysical and spatially explicit terms. Second, we will test and deploy this methodology in Hawai'i, where there is both exceptional scientific capacity and tremendous demand on the part of decision-makers for this work. Third, we will integrate our ecosystem service science and assessments into the economics and policy work of the Natural Capital Project, both to attach values to ecosystem service flows in Hawai'i, and to explore systematically the policy and finance options for capturing these values. By demonstrating the power of this approach, providing the tools needed to replicate it elsewhere, and communicating effectively to governments, the private sector, and the general public through the Forest Service, the Natural Capital Project, and other efforts, we aim to magnify our work and improve ecosystem management practices worldwide.

Hawai'i is an ideal natural laboratory from which to launch small to large-scale and comprehensive studies of ecosystem services. It contains some of the most dramatic topographic, climatic, and soil gradients on earth. For example, a total of 26 life zones can be found on the Island of Hawai'i alone. Hawai'i also represents a microcosm of many of the world's common anthropogenic influences on water, carbon and biodiversity services of natural ecosystems, including deforestation, agriculture, non-native invasions, grazing, and fire.

Our research group will apply their combined interdisciplinary expertise in the realms of ecosystem science, remote sensing, biodiversity, and natural resource economics to advance rigorous assessment and valuation of ecosystem services within the newly established USDA-Forest Service's Hawai'i Experimental Tropical Forest and matched "extrapolation" sites on private stakeholder lands as model systems for developing and applying our approach.

Concretely, we will produce:

- General tools for mapping flows and values of ecosystem services, and a set of user-friendly maps;
- Comparisons between these maps and maps of biodiversity, to identify "win-win" areas where conservation can benefit both people and wild nature;
- Information on economic benefits and tradeoffs, packaged in a scientifically rigorous way that is useful for decision-making in collaboration with core stakeholders.

We believe that it will be through studies such as ours that Forest Service Personnel will obtain the tools necessary to accurately assess and consequently articulate the value of ecosystem services and the flows and connections among ecosystem components that previously have been misunderstood, undervalued, and/or ignored. Today, it is critical that land managers across all ranks to the Forest Service understand how they, on their individual units, can properly assess and map ecosystem flows and place appropriate values on components of the ecosystem that make up the whole.

The tools we are determined to provide through our proposed research will help land managers make better-informed decisions and intelligent trade-offs when strategically planning land use scenarios. Ultimately, their decisions help sustain and increase the well-being for people, communities, and local, regional, and global environments. Such informed planning could also aid in avoiding increased costs imposed by engineered systems attempting to replace the loss of important ecosystem functions (e.g., desalination plants, flood and erosion-control infrastructure, captive breeding facilities for rare and endangered species) and expected accompanying declines in quality of life and human health and well-being.

MAPPING THE FLOW OF ECOSYSTEM SERVICES IN HAWAI'I: AN INTEGRATED APPROACH

A Proposal from the Institute of Pacific Islands Forestry-PSW-USDA-Forest Service in Partnership with the Carnegie Institution and Stanford University
December 2006

Our vision

We seek a future in which conservation is mainstream – economically attractive and commonplace. Leaders will appreciate the values of ecosystems for the welfare of their people and economies, will incorporate these values into resource decisions, and will use financial and policy mechanisms to reward biodiversity and ecosystem conservation.

Our mission

Here we propose to advance the scientific basis for achieving this vision in three critical ways. First, we will create a generalized methodology for quantifying ecosystem service flows in biophysical and spatially explicit terms. Second, we will test and deploy this methodology in Hawai'i, where there is both exceptional scientific capacity and tremendous demand on the part of decision-makers for this work. And third, we will feed our ecosystem service science and assessments into the economics and policy work of the Natural Capital Project, both to attach values to ecosystem service flows in Hawai'i, and to explore systematically the policy and finance options for capturing these values there.

By demonstrating the power of this approach, providing the tools needed to replicate it elsewhere, and communicating effectively to governments, the private sector, and the general public through the USFS, the Natural Capital Project, and other efforts, we aim to magnify our work and improve ecosystem management practices worldwide.

The problem

The recent Millennium Ecosystem Assessment highlights the enormous value of the goods and services people obtain from wild nature. Yet, despite growing recognition that conservation often makes economic sense for society as a whole, key decision-makers – from individuals to governments, corporations, and other institutions – typically do not incorporate ecosystem service values in their decisions. As a result, native habitats and populations are declining by an average of 0.5-1% per year. The rapid degradation of ecosystems endangers not only biodiversity, but also the ecosystem functions that support human well-being.

The promise is huge: proper determination and valuation of ecosystem services can provide powerful motivations for ecosystem conservation; they can also create novel sources of financing for it. This promising approach, however, faces three serious challenges:

1. Public and private decision-makers lack detailed information at scales useful in describing how people actually benefit from specific ecosystem services;

2. There is a paucity of practical know-how in crafting policies, financial mechanisms, and legal institutions to capture these values and invest in sound ecosystem management;

3. Very few specific, concrete examples exist that demonstrate the utility of properly assessing and valuing ecosystem services, and fewer still occur at large enough scales, or in sufficiently diverse political and ecological environments, to attract adequate attention.

In short, interdisciplinary approaches that effectively link policy and natural, physical, and social sciences for the purpose of assessing and valuing ecosystem services in real-world settings remain rudimentary. A critical impediment to development of such approaches is the lack of tools for characterizing the status and dynamics of ecosystem services at site, landscape, and regional scales.

The response

We propose to address these issues by developing and applying a rigorous, scientific basis for quantifying ecosystem service flows in biophysical terms - at scales relevant to decision-makers. Our research group will combine the necessary interdisciplinary skills to advance ecosystem services assessment using Hawai'i's Experimental Forests – and matched "extrapolation sites" – as model systems. We will capitalize on the existence of a strong economics and policy team in the Natural Capital Project (Appendix 1), and link with that effort to attach values to the ecosystem service flows we quantify, and incorporate those values into resource management decisions.

Our project will have three components, of which we kindly request funding primarily for the first two.

1. *Developing the scientific basis for mapping the flow of ecosystem services in quantitative terms:* Our team will focus on two critical classes of services – carbon sequestration and hydrological services – and will map biodiversity in quantitative terms as well, because

that is the current focus of most conservation efforts. Such maps are crucial to informing resource decisions, but they simply do not currently exist.

We will conduct this work at two levels of intensity, and develop and test methods of extrapolation:

a. intensively in the Experimental Forest Units of Hawai'i Island (Laupahoehoe and Pu'u Wa'awa'a), where we will advance mechanistic scientific understanding and methodologies for quantifying biodiversity and service flows;
b. using techniques of extrapolation in two "extrapolation sites," matched to the Experimental Forest sites, using remote sensing and modeling. These sites will likely be the 809 ha Umikoa Ranch (www.umikoaranch.com) located on the windward side of Hawaii Island near the Laupahoehoe Experimental Forest Unit, and ca. 6,000 ha of private land mauka of Kailua-Kona (owned by the Greenwell and Pace families). We currently have ongoing, related work at these extrapolation sites, which make them each ideally suited to our approach.

2. *Quantifying the tradeoffs among services:* In addition to quantifying individual ecosystem services and biodiversity, it is also critical to understand and assess the interactions and potential tradeoffs among potentially competing conservation objectives. We will develop and test a methodology for quantifying tradeoffs.

3. *Attaching value to ecosystem service flows, and incorporating this value in decision-making:* We will use the formal model being developed by the Natural Capital Project, and the economics team building it, to conduct our economic valuation of ecosystem services. And we will engage the partnership recently emerging among private landowners, government parties, Stanford, and other institutions to disseminate our findings and advance the discussion of policy and finance for ecosystem service protection in Hawai'i.

Concretely, this joint project will produce:

- General tools for mapping flows and values of ecosystem services, and a set of user-friendly maps, using two sets of techniques (intensive and extrapolation) most relevant to advancing both science and decision-making. Our focus will be on Hawai'i, where there is the potential to learn quickly and provide guidance for related effort elsewhere;
- Comparisons between these maps and maps of biodiversity, to identify win-win areas where conservation can benefit both people and wild nature;
- Information on economic benefits and tradeoffs, packaged in a scientifically rigorous way that is useful for decision-making, in collaboration with core stakeholders;

The work and products of this ecosystem services mapping effort will be unique in several respects. First, we will combine development of general tools and approaches with concrete, on-the-ground work at two critical scales for advancing both science and decision-making. To do this, we will draw on complementary strengths of the research partners.

Second, while previous work has typically focused on a single service in a single location, we will take a more synthetic approach, evaluating two or more important services, plus biodiversity, simultaneously. This will allow us to assess multiple values and evaluate potential synergies and trade-offs among them.

Third, we will capitalize on the tremendous enthusiasm for this kind of work among leaders in Hawai'i (Appendix 3), to create new conservation efforts, well-supported by finance and policy that endure.

Our Focus

Hawai'i is an ideal natural laboratory from which to launch small to large-scale and comprehensive studies of ecosystem services. The islands of Hawai'i represent a microcosm of many of the world's common anthropogenic influences on water, carbon and biodiversity services of natural ecosystems, including deforestation, agriculture, non-native invasions, grazing, and increasing fire susceptibility and frequency. The Hawaiian Islands also contain some of the most dramatic topographic, climatic, and soil gradients on earth. For example, a total of 26 life zones can be found on the Island of Hawai'i alone.

We propose to focus our research in the newly designated Hawai'i Experimental Tropical Forest, an area encompassing a wide array of climatic gradients and which contains tropical rain, wet, mesic, and dry forest ecosystems that have experienced varying degrees of forest degradation from past land-uses and/or non-native species invasions. By focusing studies on the Hawaii Experimental Tropical Forest, we will not only provide a proof of concept regarding the accuracy, appropriateness, and credibility of our research approach and the tools used; we will also provide critically important and fundamental information regarding the nature and state of the resources contained within Hawaii's Experimental Tropical Forest units.

Watershed Services

Forested landscapes are the only source of freshwater for the growing population of Hawai'i. The linkages between forests and the ecosystem services of water quantity and quality has driven forest management in Hawai'i for over a century. It is widely recognized that forest cover, size, and composition are key predictors of water loss, yet few studies have quantified how forest properties impact water provisioning (http://www.fs.fed.us/ecosystemservices/watershed.shtml).

Carbon Sequestration

Hawaiian forests convert large quantities of CO_2 into biomass every year, but also release large amounts of CO_2 back to the atmosphere through plant respiration and decomposition. The net balance of these two processes, net ecosystem production (NEP), regulates net accumulation of carbon. The spatial and temporal distribution of NEP sums to landscape carbon sequestration, which determines how much CO_2 is removed from the atmosphere over the long term. To date, few operational approaches have been developed to rapidly assess the spatial distribution carbon storage, the temporal distribution of carbon accumulation in forests, and landscape scale rates of carbon sequestration, especially in the context of other ecosystem services. Initial carbon sequestration pilot efforts are now emerging in the context US Federal carbon accounting rules and guidelines, but these have not examined the suite of ecosystem services and any tradeoffs to enhancing carbon services (http://www.fs.fed.us/ecosystemservices/carbon.shtml).

Biodiversity

Although conservation efforts are now broadening to encompass ecosystem service objectives, biodiversity (as an ecosystem attribute, and not a service *per se*) is likely to remain a core focus. Approximately 1,033 plant species, 10,000 invertebrates, and 140 birds are native to the Hawaiian Islands of which 87% of the plants, 95% of the invertebrates and 100% of the forest birds are endemic (i.e., found nowhere else on earth). These natural and national treasures are integral elements of the biological and cultural heritage of the Hawaiian Islands. Yet Hawai'i is in many ways the endangered species capital of the world, having seen extraordinary rates of extinction and endangerment. Currently 317 native Hawaiian species are federally listed as threatened or endangered. An additional 109 are listed as candidate species and species of concern, and the rate of extinction for native Hawaiian species is one per year.

Trade-offs among Different Ecosystem Services and Biodiversity

Appendix 2 shows the results of one initial effort of the Natural Capital Project to quantify the tradeoffs among alternative ecosystem service and biodiversity goals (Oct 2006 in *PLoS-Biology*, paired with a related ecosystem services mapping for part of Paraguay). The maps in the figure are based on theoretical ecosystem service production functions; they illustrate new techniques for analyzing ecosystem services, but their value to management and related on-the-ground activities is limited by uncertainty.

Our proposed work would establish these production functions rigorously, and develop a general methodology for developing them and then extrapolating and scaling up from plot and landscape levels to other sites and, thus, the regional level. Our research has the potential to lead the way in this rapidly evolving field, given the tremendous opportunities in Hawai'i to understand ecosystem processes from mountain-top to the sea, in a way not typically possible in continental systems. Our work would build on previous investigations that have found that increasing C sequestration in forested ecosystems enhances water quantity and quality, particularly in areas of relatively high rainfall. However, recent research from South America has demonstrated that, in some cases, increasing carbon sequestration through plantation forestry in drier environments may degrade water quality and quantity (i.e., lowering water tables, salinization).

Comparable synergies and trade-offs between C sequestration and H_2O likely occur at points along the broad precipitation and primary production gradients encompassed within the study areas provided by the Hawaii Experimental forest, and our approach will allow us to detect, assess, and evaluate those trade-offs. Similarly, while increasing C sequestration by native Hawaiian tree species may increase and enhance native biodiversity, increasing C sequestration by the numerous invasive non-native species currently impacting Hawai'i forests may result in a degradation of native biodiversity. Again, the broad gradient in native and non-native species dominance that exists within our proposed study area will allow us to investigate these potential synergies or trade-offs.

Overall, Hawai'i's natural diversity, culture, and the variety of anthropogenic stressors on Hawai'i's natural systems make it an ideal place in which to develop approaches and methods to assess and value a variety of ecosystem services. To date, such approaches and methods, though sorely needed, remain lacking**.**

Methodology

Our overall approach will be designed to accurately quantify, assess, and value three critical ecosystem services in Hawaii: native biodiversity, water, and carbon. Assessment will fully integrate both field and remotely sensed measures of the key ecosystem characteristics determining the status of carbon sequestration and hydrological services, and biodiversity.

A new airborne remote sensing system that combines hyperspectral and laser (LIDAR) technologies will provide detailed maps of vegetation composition, structure and biomass across the Experimental Forest watersheds (http://cao.stanford.edu). The specific maps derived from remote sensing include species dominance, canopy water content, photosynthetic capacity, vegetation height and 3-D structure, and aboveground biomass. The wall-to-wall remote sensing maps will be used to target selected study areas for detailed study of biotic composition (plant, insect, bird, etc), leaf physiology, and carbon storage in plants and soils.

Carbon: Climate interacts with land-use to alter aboveground biomass and the structure of canopies and stands, and this variation is extremely difficult to resolve through plot-level field studies and modeling. Thus, remote sensing will be the key method for scaling and cross-site analyses of change in structure and biomass. Aboveground carbon stores can be readily assessed by combining airborne laser (LIDAR) measurements of vegetation height and canopy area with field-based allometrics. Our remote sensing maps will include height and canopy area of trees and shrubs, and we have already developed the allometric equations needed to convert the remotely sensed images to biomass for nearly all major native and invasive species found in the Experimental Forest watersheds and elsewhere in Hawai'i (Hughes, unpublished data). To assign the best allometric equation to a stand of trees, the species dominance is remotely measured using the canopy chemical signatures contained in the hyperspectral portion of the measurement. We will use repeated measures of aboveground carbon stores, as above, to quantify change in aboveground stores and combine these with measures of forest floor and soil C pools to estimate net ecosystem productivity (NEP), defined as the net C accumulation by an ecosystem. For managed landscapes, where management results in a change in NEP and carbon sequestration over time, we will assess and quantify creditable C using a US DOE/USDA Accounting Rules and Guidelines framework (http://www.eia.doe.gov/oiaf/1605/guidelns.html). This will require basic landscape scale information on NEP and C export (e.g., wood products, bio-energy) for both the historic management base-case and a proposed alternative management case. This approach is currently the only way to value and register carbon sequestration generating projects.

Water: Canopy evapotranspiration (ET) is the key biological pathway by which water is lost from an ecosystem, and ET can be greatly affected by invasive species and other changes in plant composition. ET cannot be directly measured from either remote sensing or in the field without expensive, labor-intensive eddy covariance towers that have only a small footprint on the landscape. However, we anticipate that remotely sensed estimates of canopy leaf area and photosynthetic capacity will be broadly correlated with canopy ET since photosynthesis necessarily requires the flow of water from soils through the plants to the atmosphere. Therefore, we plan to remotely sense leaf area and relative differences in photosynthetic capacity in order to estimate ET using a modified Penman-Montieth modeling approach. Targeted field-based measurements of photosynthesis, stomatal conductance and leaf area, along with in-situ measurements of stream flow, will provide a way to assess water losses via ET, and thus water

gains to streams throughout the Experimental Forest watersheds. We will evaluate results from this approach with stream discharge results derived from gauged streams in the Laupahoehoe Unit of the HETF – providing accurate measures of stream discharge is one of the paramount needs and goals for the HETF research program.

Biodiversity: The Hawaiian Islands are the world's most isolated archipelago, resulting in highly endemic and spectacular flora and fauna. Unlike continental systems, however, Hawaii has no native land mammals, reptiles or amphibians. We thus have the unique opportunity to survey most of the terrestrial biota by focusing on just three groups: birds, plants and arthropods. We will assess biodiversity at plot and landscape scales, using three approaches. First we will survey plant, insect, and bird diversity in the plots in the Experimental Forests from which we will be taking carbon and hydrological measurements, and determine how they are related using a stratified sampling design. Second, we will compare our field-based biodiversity results with remotely sensed vegetation parameters such as canopy composition and structure. From these comparisons, we will make a series of predictions about the biodiversity we might expect to find under different remotely-sensed vegetation scenarios. Finally, we will test these predictions by extrapolating from the plot to the landscape scale, using field verification. Our assessment of biodiversity, and conservation value, will also draw on the considerable conservation assessments that have been made by other groups (the USGS and The Nature Conservancy for instance).

Integration: We will analyze and synthesize the field and remotely sensed data, fusing relevant data sets together in order to validate the accuracy of the remotely sensed information – based on its concordance with field-based measures - and its ability to predict the distribution and dynamics of carbon, water and biodiversity. Based on these analyses, the wall-to-wall RS data will then be used to extend ES assessments across the entirety of Hawaii's Experimental Forest Units and subsequently across broader target landscapes of Hawaii Island.

Valuation: We will use the ecological-economic model being developed now by a team from the Natural Capital Project to ascribe values to ecosystem services in Hawai'i (Appendix 4). This model quantifies both the costs of ecosystem service provision and the value of the services to beneficiaries. We will use multiple valuation approaches and "numeraires" – dollars where it is appropriate, and biophysical units (such as relative amount of native biodiversity conserved) or even cultural units (if we can) where more appropriate. Concretely, costs are estimated in terms of opportunity costs – what a landowner currently providing ecosystem services would produce (in biophysical terms) and earn (in dollars) under the highest-value, realistic alternative use of the land. The benefits are estimated both in biophysical terms (for biodiversity) and also using current and projected market prices, where available (e.g., for timber production, carbon sequestration, and provision of water quantity), and using other valuation techniques such as "replacement cost" (e.g., for water filtration) and "avoided cost" (e.g., for flood control) approaches in other cases.

Broader Implications

The need to assess and value ecosystem services in an accurate and meaningful manner is an imperative not to be ignored – especially as state-level and private sector efforts begin embracing Kyoto, as demand for clean fresh water increasingly outstrips supply, and as native biodiversity comes under increased pressure from growing anthropogenic influences on ecosystems including invasive species, global change and increasing population.

Further, the mission of the State of Hawaii and the Forest Service is very much in line with the concept of ecosystem services. The broad management objectives of the State of Hawaii tie directly to the many values that the people of Hawaii expect from land and waterways managed by the State of Hawaii. The concept of Ecosystem Services is a new and important new way for land managers to place a value on the components of the ecosystem that the State of Hawaii has always been obligated to manage for, yet have been intangible, and thus undervalued. Valuing timber has been easy since such valuation was based on market trends. Other resource values such as soil productivity, water quality, and biodiversity have been more difficult to quantify. Many land managers have difficulty assessing and articulating the values of standing old-growth forest in the face of more easily attainable monetary values for timber that could be harvested and secondary values to surrounding communities resulting from stable employment at local mills or manufacturing firms.

We believe that it will be through studies such as ours that State of Hawaii and Forest Service Personnel will obtain the tools necessary to accurately assess and consequently articulate the value of ecosystem services and the flows and connections among ecosystem components that previously have been misunderstood, undervalued, and/or ignored. Today, it is critical that land managers across all ranks understand how they, on their individual units, can properly assess and map ecosystem flows and place appropriate values on components of the ecosystem that make up the whole.

The tools we are determined to provide through our proposed research will help land managers make better-informed decisions and intelligent trade-offs when strategically planning land use scenarios. Ultimately, their decisions help sustain and increase the well-being for people, communities, and local, regional, and global environments. Such informed planning could also aid in avoiding increased costs imposed by engineered systems attempting to replace the loss of important ecosystem functions (e.g., desalination plants, flood and erosion-control infrastructure, captive breeding facilities for rare and endangered species) and expected accompanying declines in quality of life and human health and well-being.

Principal Investigators:
Dr. R. Flint Hughes, Institute of Pacific Island Forestry, Pacific Southwest Station, USDA-Forest Service.
Dr. Gregory P. Asner, The Carnegie Institution, at Stanford University
Dr. Gretchen C. Daily, Department of Biological Sciences, Stanford University
Dr. Christian P. Giardina, Institute of Pacific Island Forestry, Pacific Southwest Station, USDA-Forest Service.
Dr. J. Boone Kauffman, Institute of Pacific Island Forestry, Pacific Southwest Station, USDA-Forest Service.
Sheri S. Mann, State of Hawai'i Division of Forestry & Wildlife

This research team comprises scientists that have been working at the very forefront of their respective research fields. Dr. Asner has been conducting and publishing research at the cutting edge of ecosystem to landscape analysis of global change; he has recently completed the development of the Carnegie Airborne Observatory (CAO; http://cao.stanford.edu), an advanced hyperspectral-LIDAR remote sensing platform designed to detect and quantify– in the most accurate and comprehensive manner possible – parameters across broad landscapes that are specifically relevant to the assessment of ecosystem services. The CAO is now based at IPIF as part of the USFS-Carnegie joint ecosystems program. Dr. Daily is internationally recognized for her work in the assessment and valuation of ecosystem services. Drs. Hughes, Kauffman, and Giardina have over the past 25 years conducted and published research quantifying the structure and composition of temperate and tropical forests, as well as ecosystem carbon pools and sequestration rates of creditable carbon. Ms. Mann is a forester with the State of Hawaii who works closely with all US Pacific Islands to establish policy and practices that maximize ecosystem services.

Appendix 1

The Natural Capital Project

A Partnership Among
The Nature Conservancy, World Wildlife Fund, Inc., and Stanford University

The vision of The Natural Capital Project is a future in which conservation is mainstream – that is, economically attractive and common-place throughout the world.

To achieve this vision, we will develop and deploy conservation approaches that stand out in three respects: (i) they link conservation and human well-being explicitly; (ii) they use innovative conservation finance mechanisms and supporting institutions; and (iii) they engage leaders from diverse backgrounds – from landowners, legal scholars, and finance experts to eco-hydrologists, public officials and, not least, our brightest students.

We will focus on the supply of life-support ("ecosystem") services that relate intimately to human well-being, and that are central to imminent policy decisions. These include climate stabilization, hydrological services (provision of irrigation and drinking water; flood control), biodiversity conservation, and, in some cases, cultural values that flow from the land and the people who live there.

We will commence with three strategic and concurrent foci:

(1) Mapping ecosystem service flows
The scientific underpinnings of this work will be maps showing: (i) the levels, types, and value of services supplied by land; (ii) the degree of spatial congruence (or separation) in the supply of different services; and (iii) forecasted changes both in services, and societal need for them, under alternative scenarios of demographic, land-use, and climatic change. Using the maps, we will characterize the tradeoffs – in cost-benefit terms familiar to decision-makers – of alternative futures.

(2) Turning maps into action
From the outset, we will engage decision-makers, including private landowners, government institutions, industry, conservation organizations, and other key parties. Together we will hone our analyses to address crucial short- and long-term policy decisions, at both local and regional scales. Our focus will be on four strategically selected "demonstration" sites where, with TNC and WWF together, we have strength and commitment, and where insights of broad significance can be gleaned relatively quickly: the Upper Yangtze River Basin in China, the Sierra Nevada in California, the Eastern Arc mountains in East Africa, and Hawai'i.

(3) Magnifying our impact
As we learn, we aim to leverage our impact in these demonstration sites and expand it well beyond, through a well-targeted strategy of communication and engagement with vital parts of the private and public sectors. We will work from the outset with leaders in financial institutions, local and national government, resource-based industries, and other key arenas to frame and tackle problems in innovative ways.

Appendix 2

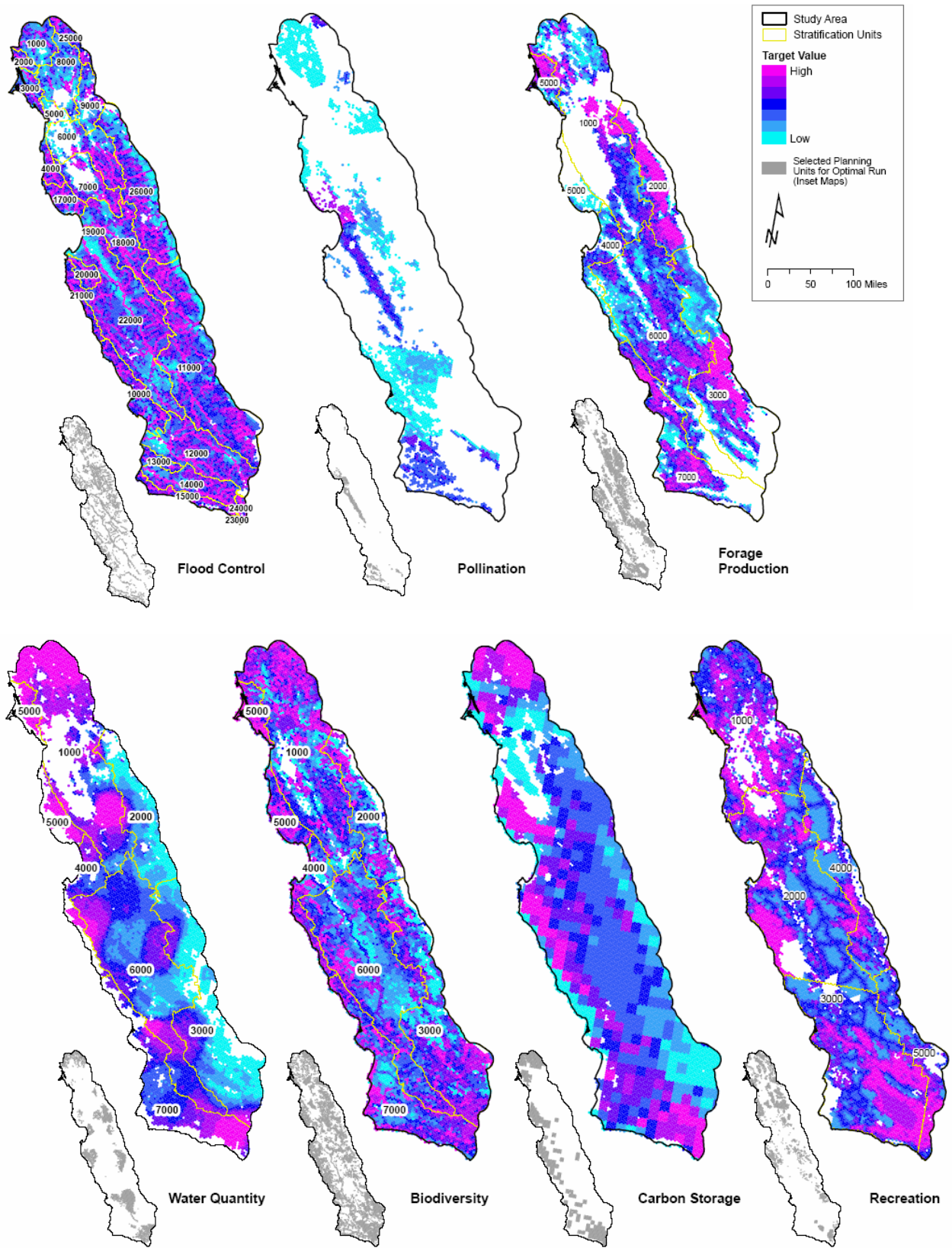


Figure 1. Mapping biodiversity and six ecosystem services in the Central Coast Ecoregion of California, showing their relative values individually in color and the "best" sites for conserving each type of benefit **independently** in the grey insets.

Appendix 3

HOUSE OF REPRESENTATIVES

TWENTY-THIRD LEGISLATURE, 2006

STATE OF HAWAII

H.C.R. NO. 200 H.D. 1

HOUSE CONCURRENT RESOLUTION

REQUESTING THE DEPARTMENT OF LAND AND NATURAL RESOURCES TO CONDUCT AN ANALYSIS OF INCENTIVES TO PROMOTE LANDOWNER PROTECTION OF IMPORTANT MAUKA LANDS.

WHEREAS, preserving and protecting our natural environment and resources is critical to ensure a promising future for our residents, especially our children; and

WHEREAS, in Hawaii, the United States, and worldwide, natural resources are being lost at an unprecedented rate; and

WHEREAS, human activity is driving the world's habitats and species to extinction, including the very plants, animals, and natural systems that control the processes we depend upon, such as the carbon cycle, pollination, and our fresh water supply; and

WHEREAS, mauka land areas in Hawaii, including intact forests, open woodlands, and pasture lands, help to control flooding, hold soil in place, stabilize the climate by absorbing atmospheric carbon, and soak up water like a sponge, gradually meting it out to provide a steady, year-round supply of pure, fresh water; and

WHEREAS, these mauka lands provide scenic beauty for residents and visitors, and many of the forests and woodland areas are the

last refuge for many of Hawaii's rare and endangered plants and animals, many of which exist nowhere else on earth; and

WHEREAS, these ecosystem services are provided to the public essentially for free as a natural occurrence; and

WHEREAS, other lands in Hawaii, such as beachfront property and agricultural lands, are easily valued by their resale and production values; and

WHEREAS, Hawaii's mauka lands and the goods and services they provide are not easily traded either domestically or internationally, hence there is no direct measure of their economic value; and

WHEREAS, one obstacle to protection of Hawaii's mauka lands is the apparent failure to recognize that the benefits of protection and conservation accrue to a large public base, but the responsibility for much of the care and management falls predominantly on a small subset of the population that owns mauka lands; and

WHEREAS, although the ecosystem services provided by mauka lands are actually public necessities, a significant free-rider problem creates a disincentive for individual landowners to invest significantly in protection and preservation without a reasonable financial return, any governmental assistance, or incentive; and

WHEREAS, a significant portion of important mauka lands is restricted by state conservation land use limitations and, therefore, cannot generate a significant revenue stream for landowners who nevertheless are assessed real property taxes on these lands; and

WHEREAS, sound economic valuation should account for the opportunity cost of a diminished natural resource and, although these ecosystem services are essentially free, their elimination or degradation and replacement will come at a significant cost; and

WHEREAS, the replacement cost of the fresh water filtration system alone, including, for example, the cost of desalination plants and the capital costs of flood control, would be astronomically high; and

WHEREAS, environmental economists recently have shown that natural capital can be valued similarly to manufacturing equipment since both provide economic value; and

WHEREAS, for example, the 100,000 acres of forested watershed in the Koolau Mountains on the island of Oahu, including their amenities, such as ground water quantity, water quality, in-stream uses, species habitat, biodiversity, subsistence, hunting, aesthetics, commercial harvests, ecotourism, and climate control, have been valued at between $7,400,000,000 and $14,000,000,000; and

WHEREAS, enhanced groundwater recharge provided by Koolau forests accounts for over $2,000,000,000 of these total costs; and

WHEREAS, we can begin to reform policy by thinking of the environment not as a "free good", but as a capital resource that will depreciate without appropriate care; now, therefore,

BE IT RESOLVED by the House of Representatives of the Twenty-third Legislature of the State of Hawaii, Regular Session of 2006, the Senate concurring, that the Department of Land and Natural Resources (DLNR), in consultation with mauka landowners, other stakeholders, and persons with relevant scientific and economic expertise, is requested to conduct an analysis of local, national, and international incentives and other programs to promote landowner protection of important mauka lands and recognize the public benefits of the ecosystem services provided by those lands; and

BE IT FURTHER RESOLVED that DLNR is requested to submit an interim report of its work to the Legislature, no later than 20 days prior to the convening of the Regular Session of 2007, and a final report of its findings and recommendations, including any proposed legislation, to the Legislature no later than 20 days prior to the convening of the Regular Session of 2008; and

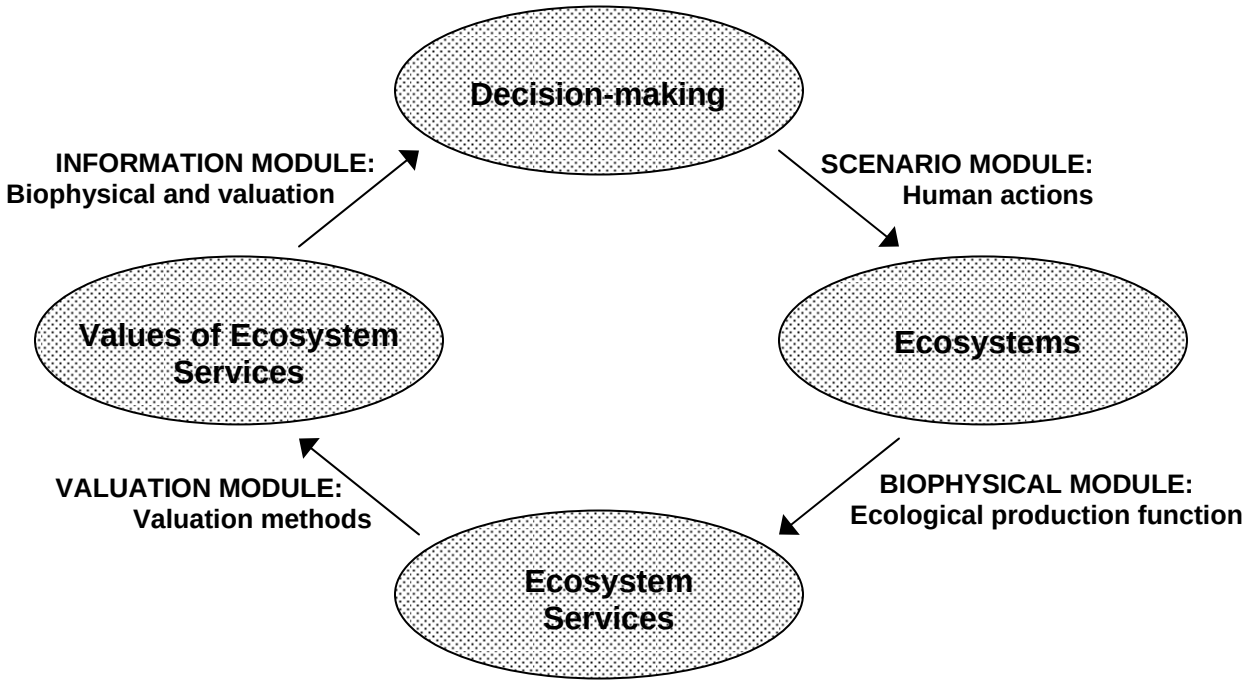
BE IT FURTHER RESOLVED that a certified copy of this Concurrent Resolution be transmitted to the Chairperson of the Board of Land and Natural Resources.

Report Title:

Department of Land & Natural Resources; Ecosystem Services Incentives Analysis

Appendix 4

The Natural Capital Project's Ecosystem Service Mapping Approach



The Natural Capital Project is a collaborative endeavor to incorporate ecosystem service information into resource management, land use, and conservation decisions. The main goal of the project is to increase awareness of the full value of conserved ecosystems and to incorporate this awareness into decision making. The development of The Natural Capital Project Mapping Approach is central to achieving this goal by effectively facilitating the use of ecosystem service information in resource management and decision making. We are striving for a simple, transparent approach that illustrates the effect of management and policy decisions on the provision of ecosystem services and the consequent change in the value of these services across a region.

Key Features of The Natural Capital Project Mapping Approach

- A tool to analyze decisions with a full understanding of the benefits and tradeoffs of a full suite of ecosystem services
- Output of the value of ecosystem services in both biophysical and economic terms for integrated decision-making
- Ability to focus on individual and multiple stakeholders and their accrued benefits
- Flexible application to a full range of spatial and temporal scales for resource management
- Utilization and integration of the best available science and data

The Natural Capital Project Mapping Approach will provide analysis and output in four key areas of ecosystem service assessment and valuation:

- the *scenario module* develops realistic scenarios that capture alternative management and policy decision;

- the *biophysical module* characterizes the biophysical attributes of the ecosystem and the production of ecosystem services under various scenarios;
- the *valuation module* assesses the value of ecosystem services, in multiple currencies from biophysical to economic to cultural;
- *information module* develops a comprehensive set of outputs on production, flows and values of ecosystem services; and pathways.

Key features of the four modules are described below:

The Scenarios Module
- Allow for end user to assess the trade-offs of different decision pathways, tracing the flow of the ecosystem services spatially and temporally
- The ability to analyze outputs from land use change models that incorporates policy variables to predict spatial value of land use change

The Biophysical Module
- Spatially-explicit mapping of biophysical attributes of ecosystems, including
    - Biodiversity
    - Water quantity, quality and timing of flows
    - Land cover and land use
    - Infrastructure
- Spatially-explicit mapping of production of ecosystem services, including
    - Carbon storage and sequestration
    - Water services including drinking water provision, agricultural production, flood control, hydroelectric power, recreation, transportation, food provision, aesthetics and biodiversity
    - Tourism and recreation
    - Cultural, aesthetic, and non-use values
    - Commodity production including agriculture output, timber, commercial fisheries, and bioprospecting
    - Non-market commodity production particularly subsistence use
    - Pollination
- Spatially-explicit mapping of flows of ecosystem services to beneficiaries

The Valuation Module
- Analysis and spatially explicit mapping of value of ecosystem services to their beneficiaries including the use of multiple currencies and valuation approaches to capture the full value of ecosystem services
- Spatially-explicit mapping of the costs of ecosystem service provision
- Determination of the less tangible valuation: existence, resilience and option valuation

The Information Module
- A transparent, simple, aggregated display of output in spatially-explicit map and tabular form for both biophysical and value metrics
- A balance sheet tailored to local regulatory framework, market opportunities, and stakeholder interests
- An analysis of the critical trade-offs
- An analysis of uncertainty

Introduction to Market-Based Conservation Approaches

1. **What are market-based mechanisms for conservation?**
    a. Markets can help to encourage conservation of private land by directing payments from beneficiaries of ecosystem services to suppliers of these services
2. **Can targeted ecosystem services be measured and monitored?**
    a. Successful financial transactions require that purchasers be assured that they are getting something for their money
    b. It is important, therefore, to understand the scientific cause and effect relationship between land use / management and service generation
3. **What are the existing and needed property rights and responsibilities?**
    a. Are currently recognized property rights sufficient to allow landowners to trade in ecosystem services, or are new property rights needed?
    b. Do landowners already have a legal or moral responsibility to provide a service? If so, are payments justified?
4. **Who supplies and who benefits from the ecosystem service?**
    a. We need to be able to trace the flow of the service
    b. Some markets will be global (carbon sequestration) while others will be fairly localized (water-related services, endangered species)
    c. Stakeholder participation, negotiation, and institution building are critical
5. **What is the economic value of the ecosystem service?**
    a. Avoided costs / Replacement costs
    b. Value of the economic activities that rely directly on the service
    c. Willingness to pay
6. **Are beneficiaries willing and able to pay for the ecosystem service? Are suppliers willing and able to provide it?**
    a. Educating consumers and suppliers of services may be needed to expand willingness of consumers and suppliers to use market-based instruments.
    b. Questions that help determine willingness to pay for an ecosystem service:
        i. Is the ecosystem service scarce or declining?
        ii. Do important economic activities depend upon the ecosystem service?
        iii. Are substitutes for the ecosystem service expensive or unavailable?
        iv. Is there a reliable source to provide the ecosystem service?
        v. Are there multiple suppliers who will compete to provide the service?
    c. Lowering market transaction costs is critical for bringing together buyers and sellers

Overview of Biodiversity Markets

1. **What service are you trying to provide or maintain?**
    a. Conservation banks are the most common form of biodiversity market: "A parcel of land containing natural resource values that are conserved and managed in perpetuity, through a conservation easement held by an entity responsible for enforcing the terms of the easement, for specified listed species and used to offset impacts occurring elsewhere to the same resource values on non-bank lands."
    b. Requires good science and expert judgment to quantify credits and debits

2. **How do you create a market for conservation credits?**
    a. Limitations on development and other forms of habitat conversion under Federal or State endangered species acts create a market for conservation credits to offset or mitigate habitat loss
    b. Need to connect potential buyers with sellers
        i. Developers in need of mitigation for proposed projects can purchase credits from conservation banks and thereby secure project approval
        ii. Conservation credits are the quantification of a species' or habitat's conservation values. In its simplest form, one credit will equal one acre of habitat or the area supporting one nest site or family group.
    c. Need a reliable means of assigning tangible monetary value to credits
        i. Markets determine credit prices, which will be influenced by mitigation costs and species or habitat values.
        ii. Challenges
            1. Acres are often a poor surrogate for conservation values
            2. Potential market for credits may be very local and small
    d. Stakeholder participation, negotiation, and institution building are critical

3. **How do you transform landowners whose lands contain endangered species habitat into conservation bankers?**
    a. Conservation credits are generated through the permanent protection of existing species habitat
        i. Credit currency is typically either acres protected, or number of individuals or breeding pairs
        ii. The number of credits is based on the quality and extent of habitat or population size
    b. Credits can then be sold within specified "service areas"
        i. Scope of service area defines area within which credits can be sold – mitigated projects must be within service area

4. **How do you monitor the success or failure of your program?**
    a. Federal or State agencies oversee conservation banks

Overview of Transferable Development Rights (TDR) Markets

1. **What service are you trying to provide or maintain?**
    a. Transferable development rights (TDRs) are used to protect contiguous areas of habitat or intact ecosystems, while still meeting local housing needs and providing an economic return to landowners.
    b. Requires implementing legislation and regulation to establish the market

2. **How do you transform landowners whose lands fall within the target conservation area into sellers of TDRs?**
    a. A local jurisdiction (alone or in partnership with conservation groups) identifies areas of high conservation value that have not yet experienced significant development.
    b. The local jurisdiction amends the general plan and zoning plans to identify the target area as a "sending zone."
    c. All new development is prohibited within the sending zone.
    d. In order to compensate landowners within the sending zone for the lost development value, these landowners may trade or sell the alienated development rights to landowners with land located in the receiving zone.

3. **How do you create a market for TDRs?**
    a. Generating an economic return for landowners within the "sending zone" requires the creation of a market for trading development rights.
    b. Prior to market creation, demand for approvals to develop at a higher density should already exist within the "receiving zone"
    c. Once the TDR program is in place, landowners within the "receiving zone" can only secure development approval by first purchasing TDRs proportional to the amount of development proposed.
    d. Market activity determines the price of TDRs.
    e. The ratio of development to conservation can be 1 to 1, with development of one acre in the "receiving zone" requiring the purchase of TDRs equivalent to one acre in the "sending zone," or the ratio can be altered to promote greater conservation per unit of development.
    f. In order to sell a TDR, a landowner in the "sending zone" must first place a conservation easement over an area of land equal to the amount of TDRs being sold. A portion of the sale price can also go into a fund to support ongoing management and restoration of the conserved area.
    d. The value of TDRs, and therefore the compensation provided to landowners within the "sending zone," requires that landowners within the "receiving zone" only be able to secure development through purchase of TDRs.

4. **How do you monitor the success or failure of the TDR market?**
    a. Success is measured in terms of the total area conserved, and the amount of compensation provided to landowners in the "sending zone."

Overview of Water Markets

1. **What service are you trying to provide or maintain?**
    a. Water quality and flow are the most common services supported by water markets

2. **How do you transform the beneficiaries of watershed services into buyers of watershed services?**
    a. Beneficiaries must be aware of their dependence upon watershed services: Visibility and tangibility of benefits determine viability of markets
    b. Need to connect potential buyers with sellers
        i. Direct transactions: self-organized private deals
            1. Downstream private entities that benefit from services pay upstream landowners directly
            2. Private beneficiaries create a fund to pay upstream landowners
        ii. Government regulated or enabled transactions: trading schemes
            1. Cap and trade program
        iii. Government funding: public payment
            1. Payments from general revenues
            2. Payment from special bond issues
            3. Payment from special taxes or fees
    c. Need a reliable means of assigning tangible monetary value to services
        i. Phase out subsidies
        ii. Ways of valuing:
            1. Avoided cost / replacement cost
            2. Value of economic activities that depend directly on service
            3. Willingness to pay

3. **How do you transform upstream landowners into land stewards?**
    a. Recognize opportunity costs assumed by landowners
        i. If payments are not made or are insufficient, landowners may revert to activities that degrade service provision
    b. Requires good science
        i. Need to understand the impacts of land cover on water quantity and quality and know what land management activities benefit or harm the desired outcome
    c. Keep transaction costs low
        i. Requires market infrastructure
        ii. Governments, philanthropic foundations, donor agencies may cover transaction costs

4. **How do you monitor the success or failure of your program?**
    a. Market participants will have a vested interest in ensuring that services paid for are actually provided, and that land protection and management lead to continued or improved service provision

Water Market Case Studies:

1. **Quito, Ecuador: FONAG Water Fund** (established in 2000)
    a. The Problem
        i. Quito (pop. ~1.5 million) derives ~80% of its drinking water from two protected areas encompassing 1.3 million acres of high-altitude grasslands and cloud forests
        ii. Although part of national park system, lands affected by cattle, dairy, timber production of 27,000 people living in/around reserves
    b. Transforming beneficiaries into buyers
        i. Quito, in cooperation with TNC, USAID, and local NGO, created trust fund (Fondo del Agua – FONAG) to pool support for watershed production among various downstream beneficiaries
        ii. Participating beneficiaries include municipal water supply agency (EMAAP-Q), electricity supplier (EEQ),beer bottler
        iii. All contributions are strictly voluntary but enable contributors to become members of FONAG's board
            1. EMAAP-Q contributes 1%-2% of water revenues
            2. EEQ pays flat fee of $45,000 per year
        iv. FONAG is a non-declining endowment fund managed by an independent financial manager
    c. Transforming upstream residents into land stewards
        i. Income return used to support acquisition of critical lands and improved agricultural practices
    d. Monitoring
        i. Lack of scientific information on hydrological linkages of land use in the watershed and corresponding lack of estimates of economic value of watershed services to beneficiaries

2. **Costa Rica: Pago por Servicios Ambientales** (established in 1997)
    a. The Problem
        i. Desire for reliable freshwater supply (among other ecosystem services of forests)
    b. Transforming beneficiaries into buyers
        i. Government has the authority to contract with landowners for the environmental services their lands provide
        ii. Funds for the Pago por Servicios Ambientales (PSA) program are channeled through the National Forestry Fund (FONAFIFO)
        iii. There is no requirement that beneficiaries pay directly for services
        iv. Fund supported by revenue from national sales tax on fossil fuels (with expectation that sale of carbon sequestration credits will one day also generate revenue)
    c. Transforming upstream residents into land stewards
        i. Funds are used to pay for contracts with land owners – including forest protection and reforestation contracts
        ii. Contract payments are priced slightly above the opportunity cost of conversion to low-value land uses such as pasture

Overview of Carbon Markets

1. **What service are you trying to provide or maintain?**
    a. Accumulating carbon dioxide in the atmosphere is acknowledged to contribute to global warming. Certain land use practices can take carbon out of the atmosphere and sequester it in plant material and in the soil. Emissions of carbon dioxide into the atmosphere can therefore be offset through actions that sequester carbon that would not otherwise be sequestered. Because atmospheric impacts are global, the market for carbon offsets may be similarly global.

2. **How do you create a market for conservation credits?**
    a. The market for carbon sequestration in the United States today is voluntary, but these voluntary markets continue to grow
        i. In Europe, emissions are restricted by law, creating a market for carbon offsets
        ii. Hawai'i just passed climate change legislation that may lead to cap and trade programs which could create a market for carbon offsets
    e. Cap and trade: establishes a limit on the amount of greenhouse gases a site can emit – if the site emits less than the limit, it can sell the surplus rights to other emitters; if the site emits more than the limit, it must purchase rights from other emitters, or purchase carbon credits for sequestration of an amount equal to its excess emissions
    f. There are no uniform standards for carbon credits
    g. Purchasers of carbon credits tend to purchase portfolios of offsets, rather than focus on one seller or one type of sequestration. Various companies and institutions are being formed to assemble and manage these portfolios.

3. **How does a landowner generate carbon credits?**
    a. Carbon credits can be generated through a variety of land management practices, including:
        i. Tree planting (reforestation or afforestation)
        ii. Planting of grasses that increase soil carbon
    b. The amount of carbon credits available depends on the contract, the type of sequestration activity, and the current carbon baseline
        i. The most common baseline measure is "business as usual," or the amount of carbon sequestered under the proposed action minus the amount that would have been sequestered without the project
        ii. Carbon credits also must account for leakage, meaning any additional increase in emissions resulting from project activities
        iii. Carbon credit trading programs differ in how they deal with destructive natural events such as fire or drought

4. **How do you monitor the success or failure of your program?**
    a. Third parties inspect and verify the terms of the sale, and monitor projects to ensure that they continue to provide carbon sequestration benefits.

5. **Why invest in carbon offsets?**
    a. In the U.S., companies are investing in offsets for a wide range of reasons: meeting emerging state regulatory requirements; gaining experience with carbon markets; banking emissions offsets for use under future regulatory regimes; generating good PR; helping to prevent catastrophic climate change; and advancing other environmental and social objectives aligned with action on climate.

6. **What is the market for carbon credits?**
    a. The market for carbon sequestration in the United States today is voluntary, but these voluntary markets continue to grow
        i. In Europe, emissions are restricted by law, creating a market for carbon offsets
        ii. Hawai'i just passed climate change legislation that may lead to cap and trade programs which could create a market for carbon offsets
        iii. Other states are now passing similar climate change legislation (California was first, Hawai'i second, Minnesota third, and a suite of other states are poised to follow)
    b. Cap and trade programs establish a limit on the amount of greenhouse gases a site can emit – if the site emits less than the limit, it can sell the surplus rights to other emitters; if the site emits more than the limit, it must purchase rights from other emitters, or purchase carbon credits for sequestration of an amount equal to its excess emissions
        i. Not all cap and trade programs allow credits for offsets from vegetative sequestration – tropical forests are more heavily favored than temperate
        ii. Hawai'i's recent climate bill contains no direct references to offsets from carbon sequestration, vegetative or otherwise, but its implementing regulations may allow for such offsets
        iii. Hawai'i's bill does contain provisions that would reward actions taken by emitters prior to the regulations becoming effective

7. **What is a carbon registry?**
    a. A carbon registry is a private entity that certifies and monitors carbon offset transactions. There are three carbon registries currently operating in the U.S.:
        i. the Chicago Climate Exchange;
        ii. the Department of Energy's 1605(b) program; and
        iii. the California Climate Action Registry.
    b. Because there are no uniform standards for carbon credits, these registries all employ different rules for qualifying, monitoring, and verifying projects.

8. **How does a landowner generate carbon credits?**
    a. Even in the absence of regulatory requirements, some power companies and other carbon emitters are voluntarily offsetting their emissions by

paying landowners to conserve or restore forest on their land. These emitters approach landowners directly, or through a carbon registry, to purchase carbon credits to offset their emissions.

b. The amount of carbon credits available, and therefore the size of the payment, depends on the type and length of the contract, the type of sequestration activity, and the amount of carbon already sequestered on the property. In some cases, purchasers of carbon credits, acting alone or in cooperation with conservation groups, will pay a premium for "charismatic" carbon offsets generated by projects with unique or added values like biodiversity.

Carbon Markets Case Studies

Pacific Gas and Electric's (PG&E's) ClimateSmart Program (established in 2007)

3. PG&E is offering its 10 million California customers the option of paying an average of 2-4% more on their utility bill (~$5 per residence) to offset their climate impact
4. The program will use the proceeds to protect and restore northern California forests currently under threat of conversion
5. PG&E expects the program to raise $20 million over the next three years through participation of approximately 5% of its customers
6. PG&E expects the program to provide approximately 2 million tons of offsets (at an estimated cost of $10/ton for carbon storage)
7. PG&E will cover the costs of administering and marketing the program through an approved rate hike averaging 2 to 3 cents per month
8. The program will be monitored and certified by third parties, including the non-profit California Climate Action Registry

PowerTree Carbon Company, LLC

1. In 2003, 25 leading U.S. electric power companies established the PowerTree Carbon Company, LLC, a voluntary consortium that has committed $3 million to establish six bottomland hardwood reforestation projects in the Lower Mississippi Alluvial Valley (LMAV) states of Louisiana, Mississippi, and Arkansas
2. Project partners include the Federal government, national conservation groups, and landowners.
3. As the trees grow, they will eventually capture more than 1.6 million tons of carbon dioxide (CO2) from the atmosphere – as well as provide critical habitat.
4. The six projects will provide CO2 management at a cost of less than $2 per ton.
5. Participants will share the greenhouse gas benefits on a pro rata basis and may register these shares with the Department of Energy's voluntary Energy Policy Act section 1605(b) database.

Special Focus on Carbon Offsets Offered through Travel Companies

Online travel agencies have recently partnered with carbon-offset providers to provide customers with the choice of offsetting the carbon emissions generated by their travel activities. This brief explores the accessibility and availability of carbon-neutral travel offered through such partnerships, as well as the derived benefits to consumers, carbon-offset providers, and online travel agencies.

List of travel companies and partner carbon-offset providers:

(1) Travelocity – Conservation Fund
(2) Delta.com – Conservation Fund
(3) Expedia – TerraPass
(4) Orbitz – Carbonfund.org
(5) STA Travel Australia – Origin Energy
(6) Air Canada - Zerofootprint

How does a buyer purchase the credits?

- The option of purchasing carbon offsets is offered as a travel accessory or an extra service after a customer goes through the process of making a flight reservation. (Travelocity, Delta.com, Expedia)
- Alternatively, the offsets can also be exclusively offered separately, independent of the ticket-purchase process. (Orbitz, STA Travel Australia, Air Canada)

How accessible are the credits?

- Finding the credits is not intuitive, so the accessibility of the service is very low. Customers must often scroll to the bottoms of pages and/or click at least two links away from the main page page (Travelocity, Delta.com, Expedia, STA Travel Australia). In some cases the carbon-neutral option simply was not reachable during the normal process of making travel arrangements (Orbitz, Air Canada)
    - See “Navigation Path” in spreadsheet for more details.
    - A Terrapass executive claims that the partnership is nevertheless a success, and that customers are willing to navigate to the page where they can purchase the credits: http://marketinggreen.wordpress.com/2006/12/05/marketing-carbon-offsets-in-a-voluntary-market/

How does the buyer know how many credits to purchase?

- Travel agencies simplify the credit-purchasing in various ways
    - Travelocity offers three options that packaged air travel, hotel stay and rental car purchase, and are distinguished by the number of persons and length of stay
    - Delta.com offers a separate rate for domestic and international flights

- Expedia and Orbitz offer three options that denote different flight mileages at approximately 2,500; 6,500; and 12,500 miles. Customers can add up the miles on each leg of their flight and select the appropriate option.
- STA Travel Australia offers specific rates for varying combinations of arrival and destination locations: Domestic, Australia to New Zealand, International, Europe, Asia
- Air Canada similarly offers rates for varying combinations of arrival and destination airports

How do the prices of credits offered through these partnerships compare to those offered by the offset provider directly?

- In general, the prices can be cheaper or more expensive than offsets alone because most options offered detach the credits from actual "carbon dioxide/ miles flown" equivalents (i.e. the Conservation Fund partnerships)
    - However, in the Terrapass-Expedia partnership carbon credits are more expensive than those credits offered directly with Terrapass.

Is the buyer rewarded? How?

- Only the Terrapass-Expedia partnership rewards the buyer with a Terrapass luggage tag acknowledging the purchased carbon offsets.

What type of credits are available from each provider?

- Travelocity and Delta.com, operating through the Conservation Fund, provide carbon credit offsets through re-vegetation of various National Wildlife Refuges. Third party-certification through US Fish and Wildlife, State and federal public land agencies, Environmental-Synergy Inc, and Environmental Resources Trust
- Expedia, through TerraPass, offers carbon credit offsets: 33% through renewable energy certificates (RECs)[*] which support renewable energy projects; and 66% in the form of credits retired from CCX. Third party-certification through CCX, Center for Resource Solutions, and Green-E Program (RECs)
- Orbitz, through the Carbonfund.org, lets the customer choose where the offsets should be made in one of three categories: carbon credits, RECs, or reforestation. Third party-certification of carbon credits through CCX or WhiteTag, RECs through Environmental Resources Trust or Green-E Program, reforestation through Environmental Resources Trust; Climate, Community and Biodiversity Alliance, Joint Implementation Removal

[*] A REC represents the environmental attributes associated with a unit of renewable electricity. For every unit of renewable electricity generated, an equivalent amount of RECs are created. The purchase of RECs supports renewable electricity generation, which helps offset conventional electricity in the region where the renewable generator is located. RECs can be quantified in tons of CO2 based on regional data provided by the Department of Energy's E-GRID program.

Units (RMUs, Kyoto Protocol unit equal to 1 metric tonne of carbon dioxide)
- STA Travel Australia, through Origin Energy, offers carbon credit offsets through various conservation projects including "advanced flaring technologies, tree planting, free water-saving showerheads, free energy-efficient light bulbs, etc." Independently-verified.
- Air Canada, through Zerofootprint, offers carbon offsets through reforestation in British Columbia, and purchase of RECs. Offsets meet ISO 14064-2 standards and are independently audited. Our renewable energy offsets are certified by Green-E and EcoLogo.

How do the programs distinguish themselves?

- Terrapass - Expedia lets buyers show that they offset carbon through use of a branded luggage tag
  - Market leaders in each respective business
- Carbonfund.org - Orbitz lets buyers choose how to offset carbon – RECs, carbon credits, or reforestation
- Conservation Fund's GoZero – Delta/Travelocity is the simplest to understand and purchase (buyer is not required to estimate miles flown)
- Origin Energy – STA Travel and Zerofootprint – Air Canada both calculate carbon based on destination and arrival airports

Website URLs of carbon offset providers that detail the types of carbon credit:

- **The Conservation Fund** (Travelocity, Delta.com)
  - http://www.conservationfund.org/gozero/faqs
- **TerraPass** (Expedia)
  - http://www.terrapass.com/projects/verification.html
- **Carbonfund.org** (Orbitz)
  - http://www.carbonfund.org/site/pages/our_projects/category/Verification/
- **Origin Energy** (STA Travel Australia)
  - http://www.originenergy.com.au/home/template.php?pageid=1963
- **Zerofootprint** (Air Canada)
  - http://zerofootprint.myshopify.com/pages/faq

Website URLs of travel agency pages that detail programs:

- **Travelocity:**

        - http://activities.travelocity.com/nexres/activities/detail.cgi?src=10010405&ses=d5e7a00b753e5835d859a758739fe838&actType=special&supplier_id=22105&low_price=10.00
    - **Delta:**
        - http://www.delta.com/about_delta/global_good/conservation_fund/index.jsp
    - **Expedia:**
        - http://www.expedia.com/pub/agent.dll?qscr=tsdt&stat=5&ofid=6779&&zz=1184605042000&
    - **Orbitz:**
        - http://www.orbitz.com/App/PerformMDLPDealsContent?deal_id=eco-vacations&cnt=OVI
    - **STA Travel – Australia:**
        - http://www.statravel.com.au/cps/rde/xchg/au_division_web_live/hs.xsl/carbon_credits.htm?WT.mc_id=onsite_link_carbon
    - **Air Canada**
        - http://flightoffsets.zerofootprint.net/(S(5iionh55fxe0htfghukdshma))/en/calc.aspx

Proposal for Landowner Conservation Demonstration Projects

Creating Conservation Business Models for Mauka Landowners

Project Goal: We aim to **make conservation economically attractive and mainstream** in Hawaii by:

- Working with landowners to develop creative financing strategies and partnerships to pay for conservation
- Creating new revenue streams for conservation
- Developing methods for measuring conservation outcomes in order to create verifiable, tradable credits
- Working with landowners to identify cost-effective practices for achieving conservation outcomes
- Initiating transactions between landowners (sellers) and buyers of conservation credits (see companion document describing proposed "Hawaii Fund for Conservation")

To advance this goal, we must develop incentives that:

- Maintain and enhance biodiversity and ecosystem services (e.g., clean water, climate stabilization, scenic beauty) on a wide range of existing land uses
- Address the opportunities and challenges facing different types of mauka landowners towards expanding conservation land uses
    - Integrate conservation and production practices on working lands
    - Tailor financing strategies and partnerships to meet landowner's situation and achieve conservation targets cost-effectively
    - Tap into existing revenue streams and develop new, complementary revenue streams and incentive structures to encourage conservation.

Why is the time ripe for this project?

- Motivated by House Concurrent Resolution 200, there is a recognized need to:
    - Proactively address threats to existing conservation values on mauka lands
    - Expand opportunities to restore and enhance these conservation values
    - Create incentives to encourage greater conservation practices
- Active interest from mauka landowners in developing new business opportunities for their land linked with conservation.
- Recent passage of House Bill 226 mandating greenhouse gas emission reductions in Hawaii provides a possible opportunity for carbon sequestration credits from land management.

Demonstration projects – *putting ideas into action*

- The proposed demonstration projects provide an opportunity to translate our broader vision into concrete business opportunities and management plans for landowners designed to align conservation and economic incentives.

- A key step in doing so is to identify opportunities to stack multiple revenue streams linked with conservation activities to make conservation competitive with alternative land uses:

    - Tap into *existing revenue streams*
        - Various state and federal programs providing financial and technical assistance are available to landowners (e.g., FSP, WHIP, EQIP).
        - These funding sources provide a critical foundation from which to start building conservation business models

    - Develop *new revenue streams and incentive structures* that complement existing sources and expand conservation efforts on mauka lands
        - The HCR 200 working group is currently focusing on several specific opportunities (see companion documents for detailed information)
            - *Payments for ecosystem services* – landowners supplying a service receive payment from parties benefiting from the service.
                - We are exploring payments for forest carbon sequestration as our first point-of-entry, given the recent passage of HB 226.
            - *Hawaii Fund for Conservation* – creating a clearinghouse to facilitate transactions between buyers and sellers of conservation credits
            - *State tax credits* for conservation easements and investments in conservation management
            - *Native forest property tax dedication* – remove a disincentive for keeping land in native forest by reducing the real property tax rate.
        - Our work is being informed by a policy analysis of existing conservation incentives to help identify where creating new incentives could open up significant opportunities for conservation.

- The demonstration projects present an opportunity to develop methods to measure conservation outputs (e.g., tons of carbon dioxide sequestered) and to create metrics for translating these outputs into tradable credits, thus assuring potential buyers of conservation credits, and other funding sources, that they are receiving an actual conservation return on their investment.

- Initially, we plan to work with two to five landowners with different types of land covers and socioeconomic situations to address a wide range of factors in developing conservation business models and to lay the foundation for future work.

- Through these projects, we will develop practical models for outreach to the broader community of mauka landowners.

Illustrative examples of potential demonstration projects

- Creating islands for tree regeneration on pastureland
    - Goal: develop a business model for working ranches to integrate conservation practices for native tree regeneration
    - Major management practices: fence islands, scarify to regenerate koa trees, potential plantings of other native tree species
    - Expected benefits: carbon sequestration, potential habitat for biodiversity if appropriately designed and managed, improved forage quality for cattle
    - Project will define metrics to quantify provision of each benefit, which will help create conservation credits to sell to buyers.

- Enhancing the conservation value of existing native forest stands
    - Goal: develop a business model that rewards landowners for maintaining and enhancing the conservation value of existing native forest stands
    - Major management practices: fence parcel, remove feral ungulates, outplantings of native understory species
    - Expected benefits: maintaining forest carbon stock, enhancing habitat to support biodiversity, potential outplanting of endangered species
    - Project will define metrics to quantify provision of each benefit, which will help create conservation credits to sell to buyers.

Overview of Project Structure and Proposed Timeline:

- We envision the demonstration projects occurring over a total period of six-years with specific goals delineated for each of two three-year phases.

- Our approach is modeled after existing projects developing payments for ecosystem services, while being tailored to fit the specific situation in Hawaii.

[Continued on next page]

	Phase I (2008 – 2011) ***On-the Ground Learning***	**Phase II (2011 – 2014)** ***Broadening the Impact***
Objectives	Develop business models for conservation on mauka lands. Identify cost-effective conservation land management practices. Encourage landowner experimentation by reducing financial risk through guaranteed payments. Establish and test protocol for monitoring and verifying conservation outcomes. Map ecosystem services using the InVEST model being developed by the Natural Capital Project. Convene discussions between landowners, project development team, and potential conservation buyers who would begin purchasing credits in Phase II. (This work would be linked with the proposed "Hawaii Fund for Conservation")	Establish self-perpetuating business arrangements between buyers of conservation credits and landowners (sellers) mediated through the "Hawaii Fund for Conservation" (see companion document). Connect conservation payments to land management *outcomes* (e.g., tons of carbon sequestered). Enhance the conservation value of mauka lands across Hawaii.
Funding Source	Seed grant for project development obtained through HCR 200 legislative process Cost-share assistance from existing government landowner assistance programs Apply for additional grants (e.g., USDA Conservation Innovation Grant)	Landowners receive payments from buyers of conservation credits through the "Hawaii Fund for Conservation". Landowners pay management and infrastructure costs. Landowners apply for government cost-share assistance and tax credits where eligible.

How are payments to landowners structured?	Landowners receive payments to offset 100% of management and infrastructure costs. Payments are linked to management *actions* (e.g., installing a fence). Landowners also receive a participation rental payment.	Payments are made from buyers of conservation credits to landowners through the "Hawaii Fund for Conservation." Payments linked to management *outcomes* (e.g., tons of carbon sequestered).
No. of participating landowners	2 to 5 landowners (identified through HCR 200 process) who voluntarily participate	Open to all interested landowners

Proposal – Launching a "Hawaii Fund for Conservation"

Investing in Hawaii's natural capital, communities, and economy

Project Goal: The Hawaii Fund for Conservation seeks to increase revenue flowing into conservation by establishing a clearinghouse to facilitate transactions between buyers of conservation credits (private sector, government, and others) and sellers (landowners).

Through the "Fund," we aim to:

- Increase funding to maintain and enhance biodiversity and ecosystem services supporting Hawaii's communities, economy, and unique natural heritage.
- Accelerate the development of conservation credits linked to the biodiversity and ecosystem service benefits flowing from land management
- Provide Hawaii's landowners with new and diversified income opportunities to expand the extent of land being managed for conservation
- Provide buyers of conservation credits with a credible and transparent process through which they can make conservation payments for voluntary or regulatory-driven purposes

Potential strengths of establishing a "Fund":

- Bring together conservation buyers and sellers by creating a clearinghouse for conservation payments in Hawaii
- Develop standardized conservation credits that meet the needs of buyers and sellers and that capture the uniqueness of Hawaii's native species and diverse ecosystems
- Lower transaction costs for investing in Hawaii's ecosystem services and biodiversity
    - Buyers purchase certified conservation credits from the "Fund"
    - Landowners contract with the "Fund" to supply these credits
    - "Fund" takes responsibility for ensuring that buyers' needs are met by the provision of services from sellers
- Maximize conservation benefits through targeted, cost-effective investments by the "Fund"

Conservation Targets and Related Payments

Initially, our goal is to develop financial instruments capable of promoting three conservation targets – carbon sequestration, water-related services, and biodiversity – that are critically important in Hawaii and sensitive to substantial impacts from land management.

- *Carbon* – The recent passage of House Bill 226 has heightened attention on reducing Hawaii's greenhouse gas emissions to address climate change.
- *Water* – Continued increases in demand face regional challenges related to water supply, quality, and timing.

- *Biodiversity* – Hawaii's unique flora and fauna are globally recognized, yet under continued threat from habitat loss, disease, invasive species, and other factors.

The Fund could eventually be expanded to include additional conservation targets. Transactions should be designed to provide opportunities for including additional targets in the future.

Developing financial instruments will require addressing and linking multiple steps:

- Cultivate knowledge about which land management practices most effectively yield particular conservation outcomes:
    - While we have a relatively large knowledge base to draw upon, one of the largest outstanding questions is the relationship of water services provision with land cover and land use
    - Draw upon expertise of research scientists and land managers from public and private lands
- Develop credible and transparent protocols for measuring, monitoring, and verifying the conservation outcomes flowing from land management, and thereby develop currencies and commodities for conservation targets
- Create legally binding contracts between the "Fund" and buyers and sellers.
- Participate in the global discussion on approaches for conservation payments; Hawaii can both learn from and emerge as a leader in these efforts.

Carbon Sequestration: Payments will be linked to offsetting emissions through carbon sequestration projects involving native reforestation and forest conservation.

- Much of the "Fund's" initial efforts will be focused on carbon payments, given the rapid growth in this sector worldwide over recent years, and interest from Hawaiian landowners.
- Establish precedent in Hawaii for including forest carbon sequestration as an offset mechanism for parties subject to regulation under Hawaii's recent climate change legislation, House Bill 226.
    - Forest carbon sequestration projects in Hawaii provide a means of achieving State emissions reductions while investing money back into Hawaii's economy.
- We aim to enhance the potential for these carbon projects to generate co-benefits for biodiversity and other ecosystem services through appropriate forest management practices and the use of native species.
- An initial challenge for the "Fund" will be establishing a unique value for Hawaiian carbon credits, given the presence of a global market for carbon and the difficulty of competing with other suppliers of carbon credits on price alone.

Biodiversity: Payments will be linked to range of values associated with biodiversity including: existence value, opportunities for scientific research, recreation, and other activities.

Water: Payments will be linked to the land cover types and management practices that enhance target services.

- Potential water-related benefits include sustained provision of water supply, improved water quality, and reduced sedimentation causing damage to coral reefs.
- A challenge will be designing payments at the watershed or regional scale to align hydrologic features with local water user needs.

Proposed Timeline

- Launching the Hawaii Fund for Conservation will require a multi-year effort drawing upon a wide range of expertise including buyers of conservation credits, landowners, public agencies, nonprofits, research scientists, finance professionals, and other parties.
    - We aim to take small initial steps to test and refine our ideas and to cultivate a shared vision for how to move forward over the longer term.
- To facilitate this process, we propose the following two-phase timeline, which is linked with the proposed demonstration projects for HCR 200.
    - The two initiatives are directly connected to ensure that we build the necessary ecological, financial, and institutional knowledge to operate the "Fund"

	Phase I (2008 – 2011) ***Development Stage***	**Phase II (2012 – 2014)** ***Full Launch***
Objectives	Develop credible and transparent conservation credits for carbon, water, and biodiversity. Establish measurement, monitoring and verification guidelines. Create pilot contracts for conservation payments between the "Fund" and targeted buyers of conservation credits. Create pilot contracts for provision of services between the "Fund" and landowners participating in demonstration projects (see companion document).	Launch a full-scale, independently operated "Fund" that receives payments from buyers and contracts with sellers to provide services. Expand participation beyond buyers and sellers involved in Phase I.

Funding Source	Seed grant to cover costs of "Fund" development team; conservation payments from participating buyers.	Buyers of conservation credits pay into the "Fund"; landowners receive payments from the "Fund".

Evaluating the Potential for Conservation Development: Biophysical, Economic, and Institutional Perspectives

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Abstract: *The widespread conversion of rural land to low-density residential development poses an immediate threat to biodiversity and to the provision of ecosystem services. Given that development will continue and environmental stakes are high, analyzing alternative growth strategies is critical. Conservation development is one such strategy that has the potential to benefit ecosystems and diverse stakeholders including developers, homebuyers, governments, and society as a whole. Conservation development clusters homes on one part of a property to manage the most ecologically important land for the conservation of biodiversity and ecosystem services. We draw on lessons learned from landscape ecology, open-space development, and regional planning to weigh the biophysical, economic, and institutional evidence for and against conservation development. Conservation development offers many potential environmental and economic advantages: relatively high home values and appreciation rates, lower development costs, and social and ecological benefits to society including landscape connectivity, protection and active stewardship of important ecological assets, and the maintenance of ecosystem services. But this approach also has shortcomings: it may require enlightened institutional regulations and regional planning (and/or ecologically aware developers), it is not always more profitable than conventional development and thus may require subsidies or incentives, and additional research is required to fully understand its benefits and drawbacks. With more information on the effects of clustering, the development of flexible zoning laws, and effective regional planning, conservation development could be a viable strategy for sustaining biodiversity and ecosystem services in changing landscapes.*

Keywords: biodiversity, cluster development, economic incentives, exurban, open-space development, regional planning, rural sprawl, zoning

Evaluación del Potencial de la Desarrollo para la Conservación: Perspectivas Biofísicas, Económicas e Institucionales

Resumen: *La conversión generalizada de terrenos rurales a desarrollos residenciales de baja densidad es una de las amenazas inmediatas para la biodiversidad y para el suministro de servicios ambientales. Debido a que el desarrollo continuará y que las apuestas ambientales son altas, el análisis de estrategias alternativas de crecimiento es crítico. El desarrollo para la conservación es una de esas estrategias que tiene el potencial para beneficiar a los ecosistemas así como a los actores diversos, incluyendo urbanizadores, compradores, gobiernos y la sociedad en conjunto. El desarrollo para la conservación agrupa a las casas en una parte de la propiedad y maneja la parte ecológicamente más importante para la conservación de la biodiversidad y los servicios ambientales. Se parte de lecciones aprendidas de la ecología del paisaje, el desarrollo de espacios abiertos y la planificación regional para sopesar la evidencia biofísica, económica e institucional a favor y en contra del desarrollo para la conservación. El desarrollo para la conservación potencialmente ofrece muchas*

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ventajas ambientales y económicas: casas con valor y tasas de aprecio relativamente altas, menores costos de desarrollo y beneficios sociales y ecológicos para la sociedad, incluyendo conectividad del paisaje, protección y administración activa de valores ecológicos importantes y el mantenimiento de los servicios ambientales. Pero este enfoque también tiene defectos: puede requerir de regulaciones institucionales y planificación regional bien informadas (y/o urbanizadores con conciencia ecológica), no siempre es más rentable que el desarrollo convencional y por lo tanto puede requerir de subsidios o incentivos y se requiere de más investigación para comprender sus beneficios e inconvenientes completamente. Con más información sobre los efectos del agrupamiento, la promoción de leyes de zonificación flexibles y la planificación regional efectiva, el desarrollo para la conservación podría ser una estrategia viable para mantener la biodiversidad y los servicios ambientales en paisajes cambiantes.

Palabras Clave: biodiversidad, desarrollo de espacios abiertos, expansión rural, exurbano, incentivos económicos, planificación regional, urbanización agrupada, zonificación

Introduction

The growth of sprawl in the United States today is unprecedented and unlikely to diminish. Over 80% of housing development in the past decade was in rural areas, and nearly 60% of these homes were on lots $\geq$1.6 ha (4 acres) (Heimlich & Anderson 2001). These numbers reflect a profound shift in land use: the conversion of rural lands to low-density "exurban" developments (Odell et al. 2003; Maestas et al. 2003; Theobald 2004). This is the fastest growing development style today (Crump 2003), and it has dramatic ecological and socioeconomic consequences (Wilcove et al. 1998; Marzluff 2001; Huston 2006) that are global in scope (Friesen et al. 1995; Tjallingii 2000; Liu et al. 2003). Conversion of rural land is likely a greater threat to conservation than either urban or suburban development because its environmental impacts—habitat loss and fragmentation (Theobald et al. 1997), loss of ecosystem services (Daily 1997), and the introduction of exotic species (Conway & Lathrop 2005)—occur over relatively large and unaltered areas (Radeloff et al. 2005).

Given that substantial growth is inevitable and the environmental stakes are high, it is critical to evaluate the merits and shortcomings of alternative development strategies. Conservation development, which we define and describe in this essay, appears to have potential for conserving biodiversity and ecosystem services. We assessed the opportunities and challenges of conservation development from critical biophysical, economic, and institutional perspectives.

We focused on residential development in the exurban landscape, also known as rural sprawl (Daniels 1999; Radeloff et al. 2005). In contrast to urban or suburban development, exurban development occurs at low densities and over large areas of agricultural land or relatively intact native habitat (Theobald 2004). Some of the forces behind current rural development trends stem from deeply held personal and cultural preferences (Sullivan 1994) and may prove difficult to overcome. We focused instead on the forces that are quantifiable, can be addressed directly, and have tremendous unrealized potential for conservation.

Contrasting Approaches to Development

Conservation development is difficult to define because it has been used to describe everything from projects with some open-space amenities to projects that deliberately set out to protect and restore important parts of ecosystems. We used the following definition of *conservation development* here and propose it for use in the field: Conservation development is a form of development that relies on scientific assessments of the ecological importance of a property's assets to identify what parts of a property should be protected and restored and how the remainder should be developed in a manner compatible with the protection of these assets. For a project to qualify as a conservation development, it must provide for ongoing stewardship of the protected portion of the parcel. Conservation developments most often maintain approximately the same or lower overall home density (as measured by the ratio of building lots to total area) as conventional development in a region (Table 1, Fig. 1).

In contrast, conventional development, as we define it here, refers to development that occurs without the identification, restoration, and protection of a property's conservation values. These developments often consist of single-family detached homes in exurban areas on lots of the minimum size allowed by local zoning regulations. Conventional developers tend to develop the maximum number of saleable lots or homes allowed, weighing the demands of the local housing market and the physical features of land. This calculus frequently results in a subdivision or ranchette design that fills parcels wall-to-wall with evenly spaced lots, each with its own single-family home, with allowances only for roads and features deemed unbuildable for physical or regulatory reasons. Natural elements that remain in final conventional development

Table 1. A comparison of hectares developed and preserved in a potential conservation development compared with a potential conventional development on the same parcel of land.*

	Conservation development	*Conventional development*
Maximum percentage of land converted to residential use (%)	50	85
Maximum number of individual lots	100	85
Spacing of individual lots	clustered	diffuse
Size of individual lots (ha)	≤0.5	1
Wetland preserved (ha)	10	10
Forest preserved (ha)	30	5
Agricultural land preserved (ha)	10	0
Homes adjacent to protected land (%)	100	0
Infrastructure required	less	more
Relative sale price per home	higher	lower

**Parcel size, 100 ha; minimum lot size allowed by local zoning, 1 ha; natural features, 50-ha agricultural area, 10-ha forest, and 10-ha wetland.*

plans typically play a largely aesthetic role and are disconnected from other natural elements in the broader landscape and region. The basic differences between conventional development and conservation development are illustrated in Fig. 1 and Table 1.

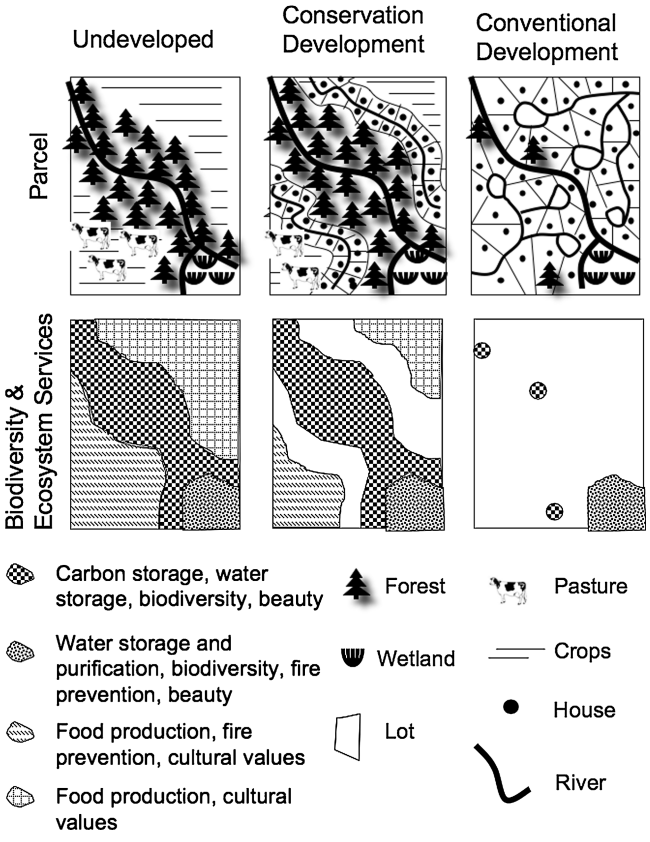

Figure 1. A comparison of the land use and land cover of a parcel and the ecosystem services provided under three possible development scenarios: undeveloped, conservation development, and conventional development. As shown, developers can enhance the relatively small individual lot size by making each lot contiguous with the protected area.

Conservation development should be distinguished from open-space development, a form of cluster development designed primarily for aesthetic values and recreational opportunities. Open-space development has been widely used for more than 3 decades in the U.S. Midwest and Southeast as a means of combating sprawl and protecting the character of rural communities (Arendt 1992). Although open-space development is increasingly referred to as conservation development, it is often only the name that has changed, and these projects rarely meet their limited conservation goals (Hale et al. 2005; Hastings et al. 2006). Hereafter, we refer to conservation development as we envision it—a potential but rarely realized development strategy that integrates conservation of biodiversity and ecosystem services with development.

Overarching Questions

Although conservation development holds promise as a tool for protecting biodiversity and ecosystem services, and for combating the negative effects of sprawl, careful analysis is needed to demonstrate the benefits and drawbacks of this approach. We divided the key overarching questions and more-focused subquestions (numbered below) into three categories of inquiry: biophysical, economic, and institutional.

Biophysical: What changes can be made to exurban development to achieve positive conservation results? (1) In what ways does conventional development negatively impact biodiversity and ecosystem services? (2) What changes in development design and management would best mitigate these harms?

Economic: What economic factors encourage, or discourage, more widespread use of conservation development? (1) What do stakeholders—developers, municipalities, homebuyers, and neighbors—need in order to understand the benefits of this approach and overcome the risks? (2) Does conservation development result in higher

home values and higher return on investment for real estate developers? What factors determine value?

Institutional: How can planning and zoning regulations be used to promote conservation development and associated regional conservation planning? If existing regulations serve as barriers to implementing conservation development, what modification would remove the barriers? (1) What are the legal and political barriers to enacting such changes? (2) Can the desired conservation results be achieved through conservation development absent regional conservation planning? (3) What lessons do various forms of regional-scale conservation planning—such as the U.S. Endangered Species Act's (ESA) habitat conservation plans (HCPs)—offer conservation development?

These questions are largely unanswered in the scientific, policy, and development literature; thus, the ecological and economic consequences of conservation development are almost entirely unknown. We addressed the above questions by drawing on the best available evidence: results from existing studies and lessons from other fields. Perhaps most importantly, this analysis illuminates the biophysical, economic, and institutional aspects of conservation development that require further analysis. Because the greatest opportunities and biggest potential roadblocks to conservation development appear to lie with institutions, we devote much of our discussion to them.

Biophysical Considerations

Land conversion for housing development is a leading cause of habitat loss and fragmentation (Theobald et al. 1997; Wilcove et al. 1998; Marzluff & Ewing 2001) that threatens both biodiversity (Ehrlich 1988; McKinney 2002) and the provision of ecosystem services (Balmford & Bond 2005). Although there is abundant evidence that conventional development degrades natural systems, the ecological benefits of conservation development remain largely unstudied and therefore less clear (Maestas et al. 2003). We suggest that the ecological impacts of development could be reduced by modifying three dimensions of development design: (1) site selection, (2) housing density, and (3) landscaping and land management. We present ecological arguments for each and then discuss how conservation development could incorporate these elements.

Site Selection

Landscapes are spatially heterogeneous with a variety of habitat types that serve diverse ecosystem functions (Turner 1989). Ideally development would occur outside areas with especially unique ecological characteristics or capacity to provide key ecosystem services (Svoray et al. 2005). Traditionally, however, growth follows exactly the opposite pattern; conventional developments are sited in or near highly productive areas that are rich in biodiversity, thus having a disproportionate impact on natural systems (Romme 1997; Scott et al. 2001; Hansen & Rotella 2002; Hansen et al. 2002; Odell et al. 2003; Radeloff et al. 2005).

Regional conservation planning can be a valuable tool for protecting key ecological assets while accommodating development (Lathrop & Bognar 1998; Beatley 2000). Effective land-use plans include greenways or habitat networks that control sprawl and preserve or restore connectivity between natural communities (von Haaren & Reich 2006). Maintaining contiguous habitat through these mechanisms is widely recognized as necessary for the preservation of species and services (Simberloff & Abele 1982; Wiersma & Urban 2005).

In contrast to conventional development, conservation development acknowledges spatial heterogeneity by protecting areas with key habitat or ecological functions. When knit together through effective land-use planning, conservation development can enable the creation and maintenance of integrated networks of protected land that collectively provide for the protection of biodiversity and the provisioning of critical ecosystem services (Arendt 1996, 2003). Through simple mechanisms such as clustering homes away from ecologically sensitive areas, conservation development has the potential to provide crucial benefits to natural communities (Donnelly & Marzluff 2004) and is a new and powerful tool that allows regional planners to meet landscape level conservation goals. If conservation developments are to achieve these goals, a better understanding of the ecological effects of various patterns of housing density is required.

Housing Density

Increasing housing density to reduce the "footprint" of development may or may not have net benefits for biodiversity and ecosystem services (Nilon et al. 1995). Results of several studies show that reducing housing density in favor of open space can reduce the impact of exurban residential development on biodiversity and enhance the flow of some ecosystem services. In Colorado, for instance, empirical work shows that clustered developments are less harmful to songbird and mammal communities (Odell & Knight 2001; Odell et al. 2003). The abundance of human-tolerant biodiversity increases in developed areas and the abundance of human-sensitive species decreases, thereby creating a zone around each home in which the community composition is altered, favoring human-tolerant species. In developments where houses are clustered, each house's zone of influence overlaps with others, thereby reducing the area affected and retaining more species that are sensitive to humans (Odell & Knight 2001; Odell et al. 2003). Similarly, in a theoretical exploration, cluster developments produced the least volume of water runoff compared with three other

development types, including conventional development (Brander et al. 2004).

Conservation developments may not, however, always have greater biodiversity conservation value than conventional low-density developments. Hastings et al. (2006) show that clustered housing developments have a plant and wildlife community much more similar to low-density developments than to undeveloped areas. Clustered housing developments and dispersed developments shared two critical characteristics that undermined their capacity for conservation: small protected areas and high non-native vegetation cover relative to undeveloped areas. Nilon et al. (1995) also found that clustered housing developments support fewer forest birds and more nest predators and brood parasites than either undeveloped land or dispersed single homes.

Additional reasons why, despite a smaller footprint, conservation development may not realize the potential of higher conservation value for biodiversity and ecosystem services include (1) the history of land use can profoundly influence the current and potential conservation value of a site and the magnitude of interventions required to restore conservation value; (2) neighboring land use and regional or global changes can have a substantial impact on conservation value, overriding actions taken at the scale of the conservation development; and (3) development of any kind (conservation or otherwise) inevitably favors species with a higher tolerance for human disturbance, including invasive species in numerous direct (e.g., importing species) and indirect (e.g., changing fire regimes) ways.

Landscaping and Land Management

The preservation and restoration of indigenous species in and around developments is key to minimizing conservation impact and adding ecological value (Mckinney 2006). In addition to causing direct habitat loss, development often facilitates biotic homogenization through the introduction of non-native plants and animals and the elimination of native species (Knight & Clark 1998; McKinney & Lockwood 1999; Miller et al. 2001; Hansen et al. 2005). Developments may even function as ecological traps, luring animals to places with attractive food or cover, but causing population declines with inflated predation rates or other impacts of human settlement (Hansen & Rotella 2002; Maestas et al. 2003; Battin 2004).

Although some impact in the immediate vicinity of any development appears inevitable, there are demonstrated ways of mitigating these impacts. Retaining or planting native vegetation instead of lawns and other non-native plants (Bormann et al. 1993; Marzluff & Ewing 2001; McKinney 2006), minimizing road density (Vos & Chardon 1998; Hawbaker & Radeloff 2004), controlling invasive plants and introduced predators (i.e., cats; Danielson et al. 1997), reducing the impacts of human recreation (Knight & Gutzwiller 1995) and encouraging natural processes such as pollination, hydrology, and fire (Marzluff et al. 1998) on adjacent undeveloped lands could enhance the conservation value of development.

Economic Considerations

Even when ecological benefits exceed those of conventional development, conservation development will only be widely adopted if it is profitable and prudent for developers to do so (i.e., if the economic benefits outweigh the costs and real or perceived risks). The potential economic benefits of conservation development take two forms: direct benefits to private developers and broader benefits to society. If conservation development can be shown to be more profitable than conventional development—that is, if the increase in value per unit area created through conservation development more than offsets the decrease in otherwise developable area lost to conservation—then developers should adopt this practice of their own accord. Widespread adoption could be accomplished by removing any existing institutional barriers to the use of conservation development. It is not clear, however, that conservation development is necessarily more profitable than conventional development. Nonetheless, even when it is not profitable, conservation development may still provide a net benefit to society. In this case local or regional governments may choose to offer economic incentives to encourage the use of conservation development to create these public goods.

Conservation development has a number of economic benefits for developers. The most direct is a decrease in the amount (and thus cost) of infrastructure required to support a given amount of development, assuming that roughly the same number of houses are built within a smaller area (Table 1). The National Association of Home Builders found that an average cluster development cost 34% less to develop than a conventional subdivision (Thomas 1991).

In addition to cost savings, there is evidence that parcels in a conservation development can be more valuable than those in a conventional development. There is abundant evidence that proximity to open space, such as parks, increases property values (Heal 2003). For instance, one developer found it was most profitable to build 15% fewer houses on his parcel to ensure that open space was visible from each property. This less-is-more strategy resulted in homes with 25% higher values than a conventional development approach (McAliney 1993). In addition, when a hedonic pricing method is applied proximity to open space has a measurable positive impact on housing prices (Lutzenhiser & Netusil 2001; Irwin 2002), and the highest increases in property value are observed for homes within approximately 455 m of permanently protected natural areas, the same open-space features

associated with conservation development (Lutzenhiser & Netusil 2001; Irwin 2002).

Conservation development may also allow developers to compete more effectively against other developments in the region for buyers. In competitive markets conservation development offers developers a means of differentiating their homes from those in other developments that tend to offer limited variations on a common theme. In addition to the open-space benefits discussed above, homebuyers may be attracted to conservation developments because home values have been demonstrated to appreciate faster in conservation developments compared with those in conventional developments (Lacy 1990). These potential benefits of conservation development should, however, be viewed in context. Any benefits may be offset by higher perceived risks on the part of both developers and homebuyers. In addition, conservation development may be perceived as less advantageous than conventional development because the identification and protection of important ecological assets could eliminate the best potential home sites on a property.

Regardless of whether conservation developments can offer direct economic benefits to developers, local communities may recognize the potential for greater public benefits and reduced social costs. Local jurisdictions benefit from conservation development by protecting open space without raising taxes, maintaining property tax revenue (which is not the case for traditional conservation approaches such as nonprofit or public acquisition of open space), incurring fewer public costs, such as maintenance of infrastructure, and avoiding the loss of ecosystem services (Thomas 1991; Brabec 1992; McAliney 1993). Preserving ecosystem services may save communities' money in the long term through the provision of local benefits such as flood control, provisioning of clean water, and landscape stabilization (Daily 1997; Daily & Ellison 2002). These services are often assumed to be free, and the areas that provide them are often not recognized as being of value. Therefore it may be some time before communities recognize the value of protecting areas that provide these services.

The private benefit to developers will not always be enough to encourage conservation development, despite demonstrable benefits to society. In these cases governments may use incentives to close the gap and encourage more widespread use of this approach. Some such incentives are already available to developers and private landowners. For instance, federal and state agencies such as the Natural Resource Conservation Service and U.S. Fish and Wildlife Service offer payments and/or tax reductions in exchange for setting aside land for conservation or agriculture. Although conventional developers are poorly positioned to access these profit streams, conservation developments, especially those proposed for existing agricultural lands, are eligible for many of these programs.

Local governments can also avail themselves of other incentives at no additional cost, although the use of such incentives may require greater institutional support. Developers currently incur high costs from the attorney fees and lost economic opportunities associated with the land-use approval and permitting process. When local jurisdictions wish to compete with one another to attract desirable economic development to their area, they may do so by implementing a system to "fast track" selected developments (Abrams 1994). This technique can be adapted to promote conservation development by making fast-track permitting available to developers seeking to implement conservation development plans. Similarly, local boards or planning agencies can offer developers a "density bonus" (Abrams 1994), whereby developers who adopt a conservation development approach are awarded additional lots than otherwise allowed under traditional zoning.

As is illustrated by the potential of density bonuses and other planning tools, institutions play a pivotal role that is difficult to overestimate. The institutions most relevant to this discussion are state and local governments, especially their planning agencies. The positive economic incentives detailed above apply only if the institutional infrastructure is in place to facilitate the use of conservation development.

Institutional Considerations

Conservation development has the potential to offer both ecological and economic benefits, but this strategy is unlikely to be viable unless institutional barriers are removed and institutional incentives, as needed, are in place. Furthermore, to the extent that ecological benefits require the protection of extensive contiguous areas, conservation development approaches will need to be undertaken in the context of regional planning.

Although many counties and municipalities possess planning regulations that explicitly or implicitly permit conservation development, some jurisdictions contain planning regulations that discourage or even prohibit it. Local jurisdictions generally utilize four primary tools for regulating new developments: comprehensive plans, zoning ordinances, subdivision regulations, and building codes (Jurgensmeyer & Roberts 1998; Ellickson & Been 2000). In many cases, conservation development requires certain variances from these regulations including exemptions from the minimum lot size, set back (i.e., distance from the street), and frontage (or length of lot contiguous to the street) requirements. Without variances for these regulations, developers cannot cluster lots and manage the remaining areas as agriculture or native habitat (Table 1, Fig. 1) (Ellickson & Been 2000).

These variances and exemptions must be approved by the local planning agencies and may require changes to

local zoning ordinances, which may in turn require new enabling legislation at the state level, depending on current laws and distribution of power within the state (Ellickson & Been 2000). In most jurisdictions, however, clustered conservation development will be permissible within existing zoning because the resulting development will still comply with overall density and permissible use requirements (Jurgensmeyer & Roberts 1998). Indeed, developers and planners are already working in several different communities to implement conservation developments or other forms of open-space development.

As described above some jurisdictions may choose to create incentives to encourage the use of conservation development. One opportunity to create such an incentive comes with the process of determining the number and location of developable lots. Planning regulations that enable conservation development should identify the minimum ratio of conserved land to developed land that will qualify the project as a conservation development. If that ratio is set at 1:1, developers must set aside 0.4 ha of land for every hectare developed. Regulations may also require that the conserved area be contiguous. In creating these guidelines for conservation development, the local jurisdiction must determine whether otherwise undevelopable areas, such as wetlands, flood plains, and steep slopes, can be credited toward the protected area or whether they should be removed from consideration before dividing up the rest of the land. A local government may choose to create a "de facto density bonus" by crediting the area of these undevelopable parcels as conserved land and thereby allowing developers to build more total lots than they would be able to under conventional zoning.

Jurisdictions that wish to offer an even greater incentive for conservation development may create an additional density bonus by allowing developers to include more lots in their conservation development than would be allowed by existing zoning regulations. This density bonus may also be linked, on a sliding scale, to the total area protected. This approach has the added benefit of encouraging the conservation of larger contiguous blocks of land.

Transferable development rights are another incentive available to planners. These allow development rights to be transferred out of ecologically important areas to receiving areas (potentially with density bonuses for moving development where it should be).

None of these incentives, however, necessarily encourage conservation development to happen in the most ecologically important areas. Local jurisdictions can encourage the conservation of large blocks of important habitat via large-scale multijurisdiction regional conservation planning. Perhaps the most important thing that can be done to maximize the biodiversity and ecosystem service benefits of conservation development is to create regional plans—extending beyond the political boundaries of cities, counties, and possibly even states—that define areas that should be included in extended networks of protected land. With regional plans in place, local jurisdictions can target incentives for conservation development in high-priority areas.

The most important element of regional planning for conservation development is the identification of these priority conservation areas and the linkages required to connect them in a regional network. Creating such a map and planning tool faces little risk of resistance from local governments because it preserves all current zoning powers at the local level and merely provides data that allow greater coordination and accountability (Lundgren 2004). Regional-scale planning in this form should appeal to local governments afraid of losing power or planning authority because maps of areas of conservation priority offer guidance without compelling action. Rather than dictate action or condemn properties that fall within designated conservation areas, these maps instead provide a basis for evaluating new regulations and proposed development plans, especially plans for conservation developments.

Although some communities have successfully developed regional plans, despite the potential for combating sprawl and avoiding negative externalities, large-scale regional planning remains a difficult prospect under the current legal and regulatory regime (Bray & Silkin 2000; Lundgren 2004; Harvard Law Review 2005; Jackson 2005). Incorporating ecological principles into regional planning has proven even more difficult, as demonstrated by the mixed success of regional-scale HCPs under the ESA (Caldwell et al., 2006).

Many existing examples of regional conservation planning rely on the threat of negative consequences to encourage or require local participation. For instance, regional HCPs have emerged as a way to manage the strict development restrictions imposed on areas hosting endangered species (Stanford Environmental Law Society 2001). Both individual landowners and municipalities can work with regulatory agencies to create HCPs that exempt landowners from the ESA's take prohibitions in exchange for protection of habitat elsewhere, thus clearing the way for development (Stanford Environmental Law Society 2001). Developing areas that host endangered species without an HCP invites the full range of penalties provided for by the ESA.

Rather than rely on the threat of negative consequences for noncompliance, as in the HCP example, states and regional authorities can instead offer positive incentives for local governments and developers who participate in regional conservation planning. Conservation developments that protect significant portions of designated conservation areas could be eligible for positive incentives, encouraging the use of conservation development over conventional development in the same area.

These positive incentives can come at little cost to the state when they take the form of streamlining the regulatory approval process. Fifteen states have statutes similar

to the federal National Environmental Policy Act (NEPA), which requires agencies to undertake environmental impact assessments (EIAs) for any actions that pose potential significant environmental impacts. State NEPAs, however, may allow categorical exclusion of certain actions from EIA requirements (Sive & Chertok 2005). For instance, a state may grant a local government a categorical exclusion from that state's environmental impact statement requirements for new actions, including the issuance of development permits, consistent with regional conservation plans (Lundgren 2004).

Under the current land-use approval regime, development projects can take 5–10 years to move through the stages of zoning and subdivision approval, finding of consistency with the comprehensive plan, environmental permitting, utilities approval, and compliance with other local ordinances (Frece 2005). The length of this approval process affects both the holding costs of developers, the risks of their investments, and the confidence of their investors. Because developers must contend with basic regulations in any jurisdiction, the ability to enter into a streamlined process for planning and environmental reviews presents a significant incentive (Ellickson & Been 2000).

One final issue for the local jurisdiction to address is who will own and manage the protected space and who will pay for ongoing management. Possibilities include local government, the homeowners association, the developer, the original landowner, or a land trust or other nongovernmental conservation organization. Individual jurisdictions will need to determine which group possesses the right combination of technical capacity, access to resources, and ability to represent the public interest.

By accommodating further growth, but doing so in an ecologically responsible and regionally appropriate manner, conservation development has the potential to avoid the negative consequences of sprawl and current ad hoc attempts to control this sprawl. As long as attempts to control sprawl remain local in scale, the actions of individual jurisdictions will have unintended negative consequences, including increased development pressure on surrounding communities (especially those with smaller tax bases) (Jackson 2005) and a shortage of affordable housing resulting from inflated home values as demand grows faster than supply (Weinberg 2000). Conservation development addresses some of these externalities by protecting ecosystems and wildlife habitat while still providing housing. Conservation development guided by regional planning addresses even more of these negative consequences by accommodating appropriate levels of development for the region in less ecologically valuable areas. Unfortunately, the current legal and regulatory regime does not encourage or reward such coordination (Bray & Silkin 2000; Lundgren 2004; Harvard Law Review 2005; Jackson 2005).

Conclusion

Rampant low-density residential development is taking a critical toll on biological diversity and ecosystem services. We now have the opportunity to counter this crisis head on by linking development design to conservation. There are two big challenges to making conservation development an ecologically and economically successful alternative to conventional development. (1) Conservation developments will not achieve conservation goals unless they are designed specifically to protect and restore biodiversity and ecosystem services. Simply increasing housing density and setting aside land may be insufficient. Instead, conservation developments must occur in the context of regional planning, and their design and management must be informed by property-level ecological resource assessments. (2) Institutional change necessary to enable conservation development will not occur until stakeholders recognize the full value of this approach. In some cases the benefits will accrue to the developer in the form of higher home values and lower infrastructure costs. In other cases local jurisdictions will need to use incentives to more closely align the private benefits of conservation development with the social goods it provides, including protected and potentially increased ecosystem services.

These challenges can be met, but developers and communities will not be convinced of the ecological and economic benefits possible with conservation development until they see on-the-ground examples. Environmental entrepreneurs can play an important role in testing the potential of conservation development by implementing and documenting conservation development projects. These initial projects will also provide conservation biologists a much needed opportunity to test the actual conservation benefits of this approach (Radeloff et al. 2005).

Conservation organizations and jurisdictions also have great potential to change the path of rural development. By working with local governments, conservation organizations can promote changes in zoning laws and approval processes where economic benefits alone are not enough to drive the spread of conservation development. Conservation organizations can also play key roles by catalyzing and executing regional conservation plans in collaboration with government agencies. Jurisdictions can take steps by initiating resource assessments to identify priority conservation areas and engaging in regional planning to provide linkages between these conservation areas.

Although regional planning has long been recognized as a necessary part of efforts to combat sprawl, there has not yet been sufficient political momentum to enact the necessary changes. Conservation development, with its capacity to benefit multiple, diverse stakeholders, could serve as the catalyst for this change. Harnessing

development to benefit both natural systems and human communities may be the most effective means we have of maintaining the conservation and cultural value of our rural landscape.

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