

# URBAN CONNECTIONS AND SOCIAL DYNAMICS PROGRAM CHARTER

## Pacific Southwest Research Station



**This is an abbreviated charter we are considering VERSION 1.0**  
(e.g., staffing charts and other end materials are not included)

We would like you to review the attached and provide your comments by  
*July 2, 2010.*

We would like to know:

- (1) If you support the proposed research topics, and
- (2) If there are important questions that we have overlooked.

The information that you provide to us will be thoughtfully considered as we  
finalize the research questions and problem elements by the end of September.  
Thank you!

## **MISSION**

The mission of the Urban Connections and Social Dynamics Program is to conduct and communicate science needed to understand and enhance the interconnections among ecosystems, people, and societies.

## **JUSTIFICATION AND PROBLEM SELECTION**

### **Program Justification**

In order to maintain forests, sustain functioning ecosystems in urban and wildland areas, enhance and protect quality of life, and ensure benefits to society, the Pacific Southwest Research Station requires an expanded interdisciplinary research program that examines the urban connections and social dynamics of natural resources conservation, management and restoration.

The Pacific Southwest Research Station's geographic area encompasses California, Hawaii, and the United States affiliated Pacific Islands, a highly complex area owing to its social, cultural, economic and bio-physical diversity. California is the most populated state in the nation. Within its counties are the largest Latino, Asian, and American Indian populations and the second largest African American, Pacific Islander, and Asian populations in the contiguous United States. Hawaii and the U.S. affiliated Pacific Islands are remarkably diverse with respect to culture and race, including Native Hawaiian, Asian, Samoan, Tongan, Chamorro, and Palauan cultures, among many others. The vast majority of U.S. citizens reside in metropolitan areas or in the interface of wildland and urban areas. In California, over 90% of residents live in urban areas, and the state's population is expected to reach 50 million by 2040. For rural communities, economic, social and climate-related changes are altering cultures and connections with wildlands. The natural resources found in the PSW's geographic area represent vital values that contribute to healthy lives: clean water, clear air, natural scenic beauty, spiritual renewal, protection of rare species, wilderness, and a connection with history and place. Natural resource professionals, partners, and stakeholders, who find their work at the intersection of essential natural resources and vibrant cultural diversity, require the information and tools PSW can provide.

The PSW Urban Connections and Social Dynamics Program draws most significantly from the Outdoor Recreation and Resource Management and Use Strategic Planning Areas, and also integrates issues that reach across all seven Strategic Planning Areas. The purpose of this Program is to provide science-based knowledge, applications, and leadership to scientists, managers, policy makers, and communities. The work will result in improved management of wildland ecosystems, tropical ecosystems of the Pacific, and urban ecosystems. Our goal is to enhance the quality of life and the sustainability of species, communities, and processes across landscapes. The Program explores the myriad relationships and interdependencies between communities and

ecosystems, culture and biodiversity, humans and natural resources, all of which evolve in response to societal and environmental change. This Program is especially important for California, Hawaii, and U.S. affiliated Pacific Islands because of the tremendous cultural diversity, dense urban residency, and biophysical complexity. This program is a growth area for the Pacific Southwest Research Station. Our previous focus has included outdoor recreation research in the wildland-urban interface, urban forestry research, socioeconomic dimensions of fire and fire management and research to respond to sudden oak death.

### ***Purpose***

The purpose is to understand and enhance the interconnections among ecosystems, people and societies in order to inform policy and improve management of forests and other natural resources.

### ***Focus***

The Pacific Southwest Research Station has a strong history of socioeconomic and urban forestry research, and under this new charter, will grow to also more fully understand how natural and human systems are coupled. The research problems covered by the UCSD Program are: (1) What are the relationships among human uses, human values, ecosystem services, and management? (2) What are the roles of changing demographics, urbanization, socioeconomic, and technology on use and sustainability of natural resources? (3) What are the impacts of public policies on ecological and social patterns and processes rural-to-urban area gradients? PSW's outdoor recreation research in the wildland-urban interface, urban forestry research, socioeconomic aspects of fire and fire management, and sudden oak death syllabus are integrated into the UCSD program of work.

### ***Needs and Benefits***

The work of the Urban Connections and Social Dynamics Program will fulfill societal and managerial needs for information to facilitate natural resource management and inform policy to sustain and enhance urban greening and open space. We will help address complex issues including: how human and natural systems are coupled at multiple scales and for a range of diverse communities – from small and highly isolated rural landscapes to the largest metropolitan landscape in the United States; what are the net effects of urban forests on air quality and carbon dioxide budgets, what drives variation across urban areas, and what are societal costs and benefits; what are the impacts of changing or increasing population pressures on natural areas; and how do perceptions of climate change and wildland fire align with management options for adaptation and mitigation efforts across the rural-to-urban gradient? We will provide the scientific basis for land managers and policymakers to anticipate people's

responses to changing management strategies by examining how people perceive, use, value, and benefit from natural areas, and how they respond and adapt to change, by improving methods to quantify and value ecosystem services, and by describing people's expectations of ecosystems across the urban-to-wildland continuum. We will help policymakers and managers prepare for changing societal expectations and enable them to anticipate and respond to emerging natural resource management challenges.

### ***Information/Technology Transfer***

Communication and science delivery are integral to our success. Through partnerships with stakeholders we will identify issues and research needs, and improve understanding, application and use of our findings. We will continue to disseminate our findings to the scientific community through peer-reviewed journals and scientific presentations, but we will also focus on making our work understandable and useful to nonscientific audiences through collaboration with land managers, workshops, focus groups, Web sites, consultations, case studies, field visits, and social media outlets. We will partner with Pacific Southwest Research Station's communications group for many of these activities, but each scientist also understands the context for their work in the scientific, management, policy and public-relations arenas.

### ***Relationships to National Strategies and Goals***

The Urban Connections and Social Dynamics Program's work relates directly to many important national issues, including all seven specific goals defined by the USDA Forest Service Strategic Plan:

#### **Goal 1: Restore, Sustain and Enhance the Nation's Forest and Grasslands**

Many of our studies meet the need for information on global change and forest disturbances, such as fire and invasive species and have helped reduce the risk to communities and natural resources.

#### **Goal 2: Provide and Sustain Benefits to the American People**

Our work offers a solid scientific foundation for managing the ecosystem services and values provided by natural landscapes.

#### **Goal 3: Conserve Open Space**

The information generated by our research informs policy to prevent forest-land conversion and provide management options for disturbance agents (fire, invasive species) in open space areas.

#### **Goal 4: Sustain and Enhance Outdoor Recreation Opportunities**

Our work illustrates how changing patterns of land use, demographics, socioeconomics, technology, and climate influence recreation opportunities.

#### **Goal 5: Maintain Basic Management Capabilities of the Forest Service**

Through synthesis of information, tools, science delivery, and collaboration with land managers, we provide the scientific basis for natural resource management.

**Goal 6: Engage Urban America With Forest Service Programs**

Our research promotes an understanding of the benefits of urban forests, provides the scientific justification for community “greening” efforts, and builds productive relationships with local, regional and national urban forestry initiatives.

**Goal 7: Provide Science-Based Applications and Tools for Sustainable Natural Resources Management**

Our program provides science and technology solutions to stakeholders’ problems. We enhance this process by including stakeholders in knowledge development.

The program’s work interacts with all seven USDA Forest Service Research & Development’s national Strategic Program Areas:

1. Wildland Fire and Fuels
2. Invasive Species
3. Outdoor Recreation
4. Resource Management and Use
5. Water, air and soil
6. Wildlife and Fish
7. Inventory and Monitoring.

***Relationships to Other Pacific Southwest Research Station Programs***

The four fundamental programs of the Pacific Southwest Research Station represent a coordinated effort to advance science and to deliver and apply it effectively. The Urban Connections and Social Dynamics research program intentionally overlaps with the other three research programs, since we work on the urban and socioeconomic dimensions of all aspects of environment science. Researchers based in all four programs will seek out collaborative opportunities to address particular research questions that cross two or more programs. Example interactions include: work with the Fire and Fuels Program for information about the impacts and processes related to fire, fuels and smoke on people’s perceptions of fire management; to the Ecosystem Function and Health Program for information about the capacity of landscapes to sustain ecosystem services and other valued goods; and to the Conservation of Biological Diversity Program for information concerning impacts of human activities on ecosystems, and for natural resource’s connections with traditional cultures. The Urban Connections and Social Dynamics Program also links to Pacific Southwest Research Station’s strategic plans for invasive species, climate change, water, and others.

The Urban Connections and Social Dynamics Program will also work closely with the Pacific Southwest Research Station’s communications group to inform policymakers, managers, other scientists, and the public about our work using a variety of innovative print and electronic media.

## **PROGRAM PROBLEMS**

### **Problem Area 1**

What are the relationships among human uses, human values, ecosystem services, and management?

The USDA Forest Service is directed by law to manage National Forests for multiple benefits and promote healthy urban and community forests. Management decisions made by private individuals and public land management agencies can significantly impact changes in ecological processes and forest health. These decisions can affect or be affected by changes in demand or supply of ecosystem outputs' at a variety of spatial and temporal scales. Different management strategies are necessary to sustain alternative combinations of goods and ecosystem services valued by humans. For management purposes we are interested in the relationship between management trade-offs and estimates of value for related environmental, social, and economic services.

Most ecosystem goods and services do not have traditional markets and are commonly known as nonmarket goods and services (e.g., game, recreation, scenic vistas or life sustaining services like purification of air and water). Factors such as population growth, fragmentation of wildlands, species extinction, and energy/water shortages suggest that it will be difficult to meet increasing demands for ecosystem services while maintaining their quality and ensuring sustainability. Increasing threats to ecosystems highlight the need for identifying and monitoring their services both locally and globally, and incorporating their myriad values in the decision-making process.

## **Problem 1 Elements**

1.1 Design and test methods for assessing and quantifying impacts, evaluating adaptive and mitigative strategies, and increasing responsiveness to critical issues such as endangered and invasive species, pests and disease, climate change, fire, and drought.

This element will develop metrics for describing assessing and quantifying the potential impacts of critical threats to the sustainable production of ecosystem services from natural and urban ecosystems. Our science will study the interrelationship between environmental threats and humans. It will develop, evaluate, and recommend strategies to mitigate and adapt to ecosystem threats. For example, we will identify strategies that align well with organizational norms and values within the agency, as well as strategies that appear more effective from a variety of perspectives in the social and behavioral domains. As another example, we will use life cycle assessment to evaluate the effectiveness of large-scale urban tree planting to produce ecosystem services and mitigate climate change given a range of drought conditions. We will study how managers respond to changes in the supply and demand for ecosystem services resulting from crises such as fire and pest invasions.

1.2 Measure and track market and amenity/non-market values.

This element will enhance existing economic tools and develop new tools to quantify the level of ecosystem services (market and nonmarket) resulting from management of our natural and urban environments. Forests provide a wide range of goods and services that include not only marketable timber products but also recreation, open space, wildlife habitat, erosion control, clean air, clean water, and carbon sequestration. Forest data, demographics, and landscape characteristic combined with standard methods and tools will be used to estimate annual recreation value as well as provide a better understanding of recreation use. Research will quantify and monetize the effects of urban greening strategies on human health and well-being.

1.3 Evaluate relationships among values, uses, management practices, and attachment to place.

This element will identify and investigate public attitudes, values, perceptions, and attachment to place to develop a better understanding of the rapidly-changing and ethnically diverse public interacting with urban and natural systems.

Our research will establish an urban forest ecosystem services baseline for traditional urban development, against which sustainable development can be compared to quantify and demonstrate that the production of ecosystem services

(e.g., carbon offsets, storm water runoff reduction, air pollution reduction, and local food production) will be additional to the baseline.

Outdoor recreation is a key research element because it is the primary way that publics develop an understanding of nature and all its attributes. We will study the impact and influence that cultural and economic diversity have on outdoor recreation, as well as the development of outreach and conservation education tools to encourage community involvement with nature across socio-economic boundaries. In Hawaii and the Pacific Islands, scientists will evaluate how traditional ecological knowledge can inform land management practices and sustainable development, as well as how cultural variations influence public-agency relationships, interactions with publics, and managing shared resources in respect of diverse values and connections to the land.

#### 1.4 Analyze trends in the supply of, and demand for, natural resources.

This element examines societal choices and trade-offs concerning the limited benefits produced by ecosystems, such as market goods (e.g., timber, range, game) or nonmarket goods (e.g., recreation, water quality, open spaces, biodiversity). This will include understanding how change in the availability of green spaces influence human health.

Analysis of trade-offs is important because of the inherent joint production nature of many ecosystem outputs. This means that inputs used for production of one product affects the production of more than one output; for example, construction of a dam produces potable water and water based recreation opportunities. In the case of public lands this example is complicated because of interdependence between the current output choice (i.e., timber, fire danger reduction, recreation) and the initial capital stock level (i.e., stand density). For example, the goods and services produced (e.g., recreation, wildlife, timber, fire danger reduction, and water flows) are directly related to the characteristics and natural resource endowment of the area. Potential research topics include tracking the demand and supply of market and nonmarket goods and services produced from specific forest areas and determining their potential economic impact at the local, regional, or national level. Another dimension to this problem is about trade-offs associated with management policies, agencies public responsibilities, and services provided to communities.

#### 1.5 Develop decision-support tools and technology transfer products

This research element will evaluate current management tools to inform the development of new ones. It will assess the effectiveness of different approaches to engagement and collaboration during the tool-making and diffusion process. The roles of factors such as public trust, confidence, and ranges of experience and knowledge with natural resource issues will be examined to better understand the dynamics that influence the effectiveness of tools and

approaches that support mitigation of environmental impacts on natural resources in recreation settings and in the broader public sphere. It will compile a toolbox of outdoor recreation tips and solutions aimed at specific topics, informed by program science and the broader research sphere

This research will integrate plot-derived, remotely-sensed, and other data sources with analytical methods and models to produce decision support tools and technology transfer products for land and resource managers. Decision-support systems, risk assessment methods, simulation models, statistical techniques, and linkages between the urban forest/wildland-urban interface and the natural systems are areas for research and development. Examples include a web-based tree carbon calculator that extends the current tool's "snapshot" in time approach by enabling users to track urban forest populations through time and calculate the annual stream of carbon storage and release. We will develop science-based "best management practices," with associated analytical tools, that help to understand manage, and sustain open spaces, wetlands, other green infrastructure, and wildlands critical to the well-being of residents and natural resources.

### ***Problem Importance***

The demand for ecosystem services from forests is growing. Policy makers and the public are learning that healthy forests can produce clean water and air, recreational opportunities, biodiversity, biomass energy, and jobs. Natural resource managers are under increasing pressure to develop forest plans and management strategies that maximize these services while facing major challenges understanding and tracking all the threats that can alter production of ecosystem services. To guide decision-making, research is needed that quantifies how management actions influence relations between forest structure and function, and how culture shapes the value of ecosystem services. Sustaining a high level of services over the long-term will require management strategies that increase the complexity and resilience of forests to threats from endangered and invasive species, pests and disease, climate change, fire, and drought. This research will increase our understanding of relations between different forest structures, disturbance regimes, and management responsiveness. Most natural resource management issues have a social dimension to them. The interrelationship between human and natural systems will be directly addressed in this problem area, by informing a deeper understanding of the full array of social, cultural, behavioral, and institutional contexts. By focusing on the urban-to-rural gradient and all levels of social systems we offer a breadth and depth to the understanding of values.

### ***Potential Clientele, Societal and Scientific Benefits***

Potential clientele include scientists, natural resource and land managers, public and private land owners, and non-profit organizations seeking assistance in developing better protocols and tools to manage natural resources and related

ecosystem services. Incorporating the human dimension of ecosystem services will provide a more balanced approach to management impacts. With more robust information managers will be better equipped to evaluate the social and economic effects of their actions as well as resulting human and natural responses at multiple scales. Our science will underpin emerging markets for ecosystem services, whose credibility depends on verifying that reported services are real, additional, and permanent. It will provide trade-offs analysis tools that private landowners and public land managers can use to manage their forests, conserve open space, and expand urban tree canopy cover. It will provide and inform tools and approaches built on state of the art science in order to aid best management practices. Overall, it is focused toward improving the decision-making capabilities of resource and land managers developing strategic and operational management plans for public and private lands.

### ***Approach to Problem Solution***

Our approach will include statistical research on estimation techniques and methods for valuation of nonmarket ecosystem services, benefit-cost analysis, and trade-offs analysis. Field measurements of relations between ecosystem structure and function will be used to calibrate and validate numerical models that predict production of ecosystem services. Surveys, interviews, case studies, focus groups, archival analysis, and the full array of socioeconomic and analytical techniques will be drawn from to support this problem area. Investigation into existing techniques used in other disciplines will be conducted as well as refinement and development of new techniques. For example, our new web-based decision support tools, incorporating user-friendly Google Map interfaces will allow homeowners and resource managers to alter landscape features and compare the effects on energy, water use, carbon storage, and other ecosystem services. Both existing and new models of tree growth, ecosystem services production, and valuation will drive the tools. Existing and new techniques will also be used to measure forest structure and the impact of management alternatives on forest structures. Cognitive, social, and behavioral models derived and examined will inform basic research progress and aid application to management. The research will be useful and include traditional and non-traditional partners and approaches. It will be related to specific elements and problem areas in other Pacific Southwest Research Station programs, encouraging cross-disciplinary collaboration within the Station, as well as with other Stations.

### ***Likelihood of Success***

Successful research in this problem area requires melding existing knowledge with visionary, new, science-based methods for valuing environmental, social and economic services provided by forest resources. Using existing economic techniques to measure nonmarket values of forest ecosystem services has been a traditional focus in Pacific Southwest Research Station fire research areas. Additionally, measuring the economic impacts and services associated with

urban ecosystems is a relatively new science, with much of the methodology originating at the Pacific Southwest Research Station. The skill base clearly exists to continue devising new methods that extend economic valuation from existing urban and fire resources to other ecosystem services including improving water quality, carbon storage, urban heat island reduction, and public health and safety. The social and behavioral sciences have been strengths within the outdoor recreation research area, and have been applied to an array of issues extending beyond the recreation setting to inform natural resource management issues. These studies will continue to include organizational and institutional explorations of capacity, and facilitators and barriers to effectiveness. Likelihood of success is high, the program having strength in both social and biophysical disciplines and an excellent collaboration with other research organizations and stakeholder groups. That said, the Paperwork Reduction Act, with its restrictions on surveys, interviews, and focus groups, creates substantial challenges for Forest Service social science research. Our ability to find innovative ways to remain in compliance with the Act while gathering necessary data will be the greatest challenge in determining our success.

### ***Deliverables***

#### ***Outputs***

- Metrics for quantifying and evaluating strategies for mitigating the impacts of critical threats to the sustainable production of ecosystem services from natural and urban ecosystems.
- Protocols and tools to:
  - Estimate the economic value of forest ecosystem services
  - Track the demand and supply of market and nonmarket goods produced from specific forest areas and determine the potential economic impact at the local, regional, or national level
  - Integrate different data sources and enable a comprehensive understanding of long-term trends in response to biophysical drivers of change
  - Ascertain how social and economic diversity affect people's perceptions and uses of natural resources, how they value them, and what influences their attitudes
  - Inform the continuing agency initiatives aimed at sustainability, including sustainable operations as well as sustainable outdoor recreation and tourism, considering the social, economic, cultural and ecological dimensions

#### ***Outcomes***

- New knowledge and technical tools for quantifying and tracking ecosystem services will spur investment in urban greening. In turn, revenues generated from sale of these services will support high levels of management and conservation. These revenues will be critical to effective

management of natural resources given future economic burdens facing cash-strapped cities and agencies.

- Development of tools to quantify the level and value of ecosystem services resulting from different management scenarios will enhance managers' abilities to develop the most appropriate land and resource management plans.
- New knowledge and tools will help forest managers implement environmental and resource management policies more effectively.
- Improved responsiveness to crises such as fire and pest invasions and information on altering management strategies to reduce impacts before crises occur.
- Knowledge about how social and economic diversity affect people's perception and use of natural resources, how and why their attitudes toward ecosystem services vary, and what defines and influences their understanding of forest health and ecosystem management, will provide planners, policy-makers, and managers with tools to reduce conflicts related to incompatible land uses and demands.
- Improved understanding of the depth and variety of human-environment relationships and implications for effective and sustainable management of natural resources from the urban-to-rural gradient.
- Knowledge and tools that aid with the tailoring of approaches to communication, education, collaboration, and services informed by myriad social variations, such as those linked to geography, culture, age, gender, employment status, affluence, and direct experience with nature.
- Enhanced capability to project long-term trends in human-impacted forest ecosystems to evaluate resulting ecological services provides information to managers that can be used to guide investment strategies and management options.

## **Problem Area 2**

What are the roles of changing demographics, urbanization, socioeconomics, and technology on use and sustainability of natural resources?

An era of rapid change involving human and natural systems calls for this research emphasis. Social change continues at dramatic pace, affecting social systems from the global to family scale and individual human experience. These social changes are evidenced in changes in supporting mechanisms and products such as technology. Dramatic environmental change, especially climate change, interacts with and affects human action. Change and the impacts of change are pronounced in the Pacific Southwest Research Station area, elevating the significance and urgency of inquiry and presenting a unique research opportunity. This is an increasingly urbanized geographic area where many cultures and complex bioregions interact in a place that is faced with new or intensified stress factors, which result in threats to social and ecosystem

health. This research will offer a contemporary and scientifically sound understanding of the myriad interactions among demographics, urbanization, socioeconomics, technology, and environmental change. Resulting information can be used to improve both the effectiveness and efficiency of natural resource management programs.

We will consider adaptability and sustainability of human and natural systems by exploring the economic, social, cultural, and ecological dimensions as they affect natural resource definition and use. For instance, population growth and distribution are linked to trends in increasing urbanization and greater numbers of spaces identified as the wildland urban interface. These shifts influence the character of social interactions and lifestyle shifts as well as interactions with nature across the urban to rural gradient. Demographic changes linked to ethnicity and culture and the impacts on diverse settings require further study to adequately inform the agency's public service mission. Alternative family structures, economic shifts, an aging population, and forms and stability of employment represent additional examples of important influences on the management of natural resource goods and opportunities. Technology has increasingly permeated society and plays a critical role in the accessibility of public lands, representing an important platform for facilitating environmental awareness. As a reflection of social change, and facilitator of further social change, technology is of special interest in this problem area. Findings can be used to help managers, planners, and policy makers anticipate rather than react to public service needs and resulting resource impacts, and effect stable, lasting resource use patterns.

### ***Problem 2 Elements***

2.1 Understand relationships to nature held by various groups in society as they are affected by social and environmental change, including place connections, core beliefs, place meanings, and environmental identities and how these are revealed in individual, group, and societal behaviors including uses and demands for ecosystems services.

Emphasis includes the continuing transformation of the social importance of natural spaces and natural amenities (e.g., water, air, wildlife, plants and trees), how they are perceived and used (e.g., outdoor recreation), and how these uses intersect with other socially important values such as community, family, and culture. This is a research element spanning human scales from the individual, to the group (such as neighborhoods or communities), to organizations (e.g., NGOs or agencies).

2.2 Examine how changes in technologies affect perceptions and uses of natural resources and ecosystem services.

The diffusion of many technologies into society has resulted in shifts in accessibility and timeliness of information, transfer of information across social networks, consumption of discretionary time especially among youth, and everyday life experiences. This element will examine the impacts of technological change related to perceptions of nature, accessibility of nature, degrees of contact and experience with nature, experience and management of conflicting uses, the continuing infusion of technology into the nature-based experience, and the impact of technologies on land use (e.g., how Global Positioning System units may aid greater exploration of unfamiliar and less travelled landscapes). The role of technology in communication of natural resource management opportunities and issues will also be examined here (e.g., the World Wide Web and the podcast as a tool to inform a tourist on a stroll through an urban greenspace). The interaction between social change and technology is at the center of this element.

### 2.3 Inform the understanding of public service for a changing society.

Evaluate pre-existing tools and approaches and develop new tools and approaches that support and aid service delivery, co-production and planning, including the roles of agents such as volunteers, community-based organizations, and government entities at various levels. Evaluate and provide science-based knowledge to managers, planners, policy makers and others advancing the development of programs that foster urban natural resources stewardship and outdoor recreation. Initiatives designed to connect people, especially youth and aging baby boomers, to nature are of particular interest. Examine and inform approaches to communication that reflect a knowledge and respect of modes of communication within communities of interest and communities of place, and approaches to collaboration and integration of diverse voices into management plans and service provision that overcome barriers to equitable access.

### 2.4 Examine how environmental change (e.g., changes in climate patterns), might influence ecosystem services, especially outdoor recreation (from urban greenspaces to remote wilderness) and water.

Examine how climate change and other environmental changes affect the use of water in urban and wildland areas, influencing sustainable selection and maintenance of urban greenspaces and trees and the importance of these natural features for myriad socioeconomic and ecological benefits; how the demand for water and changing resource availability impacts opportunity for ecosystem services, especially outdoor recreation, and potential distributive impacts involved in scarcity of such resources; and the transformation of place and connection to nature as it is affected by adaptation and mitigation measures. This includes human response to adaptation and mitigation measures at all human and landscape scales.

### ***Potential Clientele***

Natural resource planners will use this work to inform future ecosystem services delivery as well as approaches to communication, collaboration, and engagement. Managers benefit through opportunities to improve planning, program delivery and sustainability efforts. Stakeholders such as universities benefit from having cutting-edge research to use as they train future resource managers and program leaders. Publics benefit from improved agency-public transactions and a chance to enjoy programs and services better designed to meet their needs and interests into the future. Both managers and publics enjoy a potential for improved collaboration, partnerships and interactions. Scientists in other agencies and in academic settings benefit from the contribution of knowledge about social change in public and private spheres. This research problem seeks to advance disciplinary science (e.g., journal articles and station publications) as well as to provide more applied evaluations and inform programs that directly affect agency work.

### ***Societal and Scientific Benefits***

While an array of social and ethnic studies lends insights of substantial value to natural resources management, the majority is not focused on this sector specifically. This program of study will add significant value by integrating the natural and human systems into a research effort aimed at serving natural resource management concerns and societal concerns at present and into the future.

### ***Approach to Problem Solution***

As befitting the broad range of scientific disciplines included in this problem area, a variety of social science research methodologies will be utilized including surveys, interviews, focus groups, and archival analysis. Those approaches requiring approval through the Paperwork Reduction Act require special consideration and processes, but will be essential to our work in this area. This represents a major challenge to the success of this research area. Participant observation and other naturalistic approaches will be employed as needed. Other possibilities include voluntary contributions such as citizen science and participatory action research. Understanding of community networks, leadership, and modes of contact will also be necessary.

### ***Likelihood of Success***

The Pacific Southwest Research Station has an established history of success with research aimed at social change and delivery of ecosystem services. Yet there are many topics and segments of the diverse population that have received little research emphasis in the face of limited resources. A concentrated effort requires additional investment of both human and supporting capital, and will result in a very high likelihood of success.

## ***Deliverables***

### ***Outputs***

This research program will provide diverse social science results that are integrated across natural and human systems, serve natural resource management needs, and address societal concerns. To accomplish this, a broad range of studies will be conducted that employ methodologies and theoretical approaches as diverse as the problems themselves. Outputs will include scientific, peer reviewed articles and monographs, scientific conference presentations and symposia, station publications such as technical reports or proceedings, and managerially focused products such as policy guides, international collaboration, or unit-level consultations on issues related to program science.

### ***Outcomes***

Research under each of the program's elements will therefore deliver outcomes that improve our understanding of the relationships to nature held by various groups in society as they are affected by social and environmental change, how changes in technologies affect perceptions and uses of natural resources and ecosystem services, public service for a changing society, and how environmental changes might influence ecosystem services, especially outdoor recreation, urban greenspaces, wilderness, and water.

## **Problem Area 3**

What are the impacts of public policies on ecological and social patterns and processes for rural-to-urban gradients?

Public policies and social patterns impact ecosystem functioning from the urban core to the surrounding natural landscapes. Policies also impact social (from the individual to the societal level) interactions with ecosystems from the urban core to the rural surround. These policies may be initiated by entities external to the Forest Service (for example other federal management agencies), and by the Forest Service. The lifecycle impact of these policies is important to understand, especially new and emerging policies that can shift the relationships between human and natural systems. It is also important to explore the roles of various stakeholders and publics in the formation, and modification of policy. Understanding policy formation and the range of interrelationships proposed can provide managers, decision-makers, and other institutions may lead to improved policies and the ability to address barriers to effective natural resource management and public service.

### 3.1 Examination of public policies enacted by entities external to the Forest Service (local, regional, state, and federal).

Public lands are affected by policies and programs of various managing agencies and by the policies and programs guiding the land uses surrounding public lands, and in cities. City and county land use decisions direct urban expansion and development in the surrounding countryside, including pockets within protected lands such as National Forests. These in turn impact forest health and public land integrity, including invasive species introductions, air quality, soils, water diversions and availability, ability to support various outdoor recreational uses, and fauna and flora. Urban land use decisions determine local ecosystem services creation, maintenance, or elimination. These decisions are made by policy makers, land, and infrastructure managers external to the agency.

Local, regional and state public land policies and regulations are designed to achieve ends that are often defined in management plans developed by local and state agencies and by laws. We will examine how such policies and regulations are developed, for example, what type of science is used as their basis? We will also explore the impacts and effectiveness of such policies for multiple stakeholders, as well as for Forest Service lands and their management. One area of interest is the suite of policies and politics determining city and county general plans and zoning policies and programs that direct land use designations and densities, transportation policy, air quality regulations, and water management. Other areas of interest include urban park planning and watershed planning which affect recreation availability and ecosystem management in gradients from the city core to surrounding wildlands. Policies surrounding fire management and preparedness will be a focus under this element. We will examine the effectiveness, processes of enforcement, and impacts of these policies on ecosystem function, fire prevention or mitigation, and social systems, for example, by understanding who bears the cost of carrying out and adhering to these policies. Other areas of interest related to policies will include those designed to limit the spread of invasive species, to improve water quality and integrity of watersheds, to improve air quality, and to protect habitat for threatened and endangered species. These policies influence agency effectiveness and decision-space, and management can be improved through an understanding of these myriad impacts and effects.

### 3.2 Examine policies within the Forest Service for their implications on agency managed lands, lands surrounding agency-managed areas, stakeholders, and publics.

We will examine the impacts of Forest Service programs linked to urban forestry and watershed management, considering the attributes and functions of urban ecosystem services and social dynamics around these ecosystem services. Under this element, the potential distributive effects of policies and programs on minority, limited resource, and otherwise underrepresented groups will also be

examined. Forest Service land use decisions, including management plans, are public documents developed with public comment. However, there is little longitudinal research on their impacts. For example, we will seek to understand the impact of watershed management on Forest Service lands as it affects neighboring urban regions and open space resources along watersheds. We will examine the impacts of land use regulations on traditional uses of natural resources for such activities as cultural celebrations and gathering of alternative forest products. Land use decisions will be explored to understand their impacts on outdoor recreation and tourism, with an interest in visitors, concessionaires, guides and outfitters of management. Policies linked to fire and fire management will also be explored, along with how they intersect with other policies (such as those set out by homeowners' associations), and uses, such as impacts on outdoor recreation access and effects on surrounding communities depending upon recreation and tourism dollars.

### 3.3 Examine the impact of new and emerging policies, especially within the agency, but also external to it.

Policies are frequently emerging or being revised, with limited to no understanding of the novel effects they may have. This element will address the impact of policy change and emergence on human and natural systems. For example, recent sustainability mandates related to operations, and to recreation and tourism, will be explored for impacts, degree of implementation, and effectiveness. Likewise, cities and municipalities are enacting public policies focused on changing to a green infrastructure. These changes will have implications on budget, management, urban ecosystems, and social response, areas fruitful for investigation. Recent changes in fire policy are also of interest in this element as they may influence communications regarding fire as well as determinations surrounding fire use. Potential shifts in natural resource management and surrounding public service will be explored. Forest Service management policies for adaptation and mitigation to address climate change impacts on the agency's lands may have impacts on surrounding communities and urban areas. Monitoring those policy changes on the capacity of the agency's resources to sustain multiple use policies is another area of proposed emphasis. Findings will lead to development of a toolkit of best management practices from experience with programs and study of their quantitative and implementation impacts.

### 3.4 Examine how stakeholders and agency policies intersect.

This element will provide focus on studies that examine the interactions between agencies and publics in the development and execution of policy. Specifically, we will examine how input is received during policy considerations, and the mechanisms of collaboration and whether they actually are effective. Additional explorations include a study of the perception and navigation of regulations

affecting interactions and exchanges among agency and publics. This will include studies exploring agency/public relationships and how these might influence perceptions about, development, and acceptance of policies.

### ***Problem Importance***

Policies drive human interactions with natural systems. Much research has been conducted on the impacts to natural systems themselves, little on the creation of the policies. Researchers need to understand the social, economic, and political contexts shaping policy. Multiple geographic scales and societal scales are imbedded in this proposed emphasis area, enriching the breadth and potential contribution.

### ***Potential Clientele***

Managers and stakeholders within and external to the agency will have an interest in the findings from this area of work. Decision-makers at all levels of government, from localities to Washington, D.C. will benefit from greater research into the reasons for policy making and the impacts on society itself and the ecosystem resources managed by the agency.

### ***Societal and Scientific Benefits***

The definition of, and management policies to preserve, enhance, and or create ecosystem services managed by federal agencies, and promoted by agency scientists are shaped by historical political, economic, social and cultural contexts of previous policy and new science. These policies are important to understand relative to their potential effectiveness. This represents a unique science niche, and is especially needed in the largely populated and socially diverse bioregions that make up California, Hawaii, and the U.S. affiliated Pacific Islands.

### ***Approach to Problem Resolution***

Social science methodology will consist of analytical observational, archival, survey, and participatory methods drawn from the broad array of socioeconomic disciplines.

### ***Likelihood of Success***

This program area has the building blocks for success in place, but personnel are stretched thin. This problem area aligns with areas of research that are being funded by the National Science Foundation, and other major research funders indicating interest and potential available capital and resources external to the agency. It rests on developing collaborative research with the other research programs in the Pacific Southwest Research Station. Collaboration with these

other program areas can in turn inform the development of better and more effective policies and approaches.

### ***Planned Deliverables***

Studies of the different fire clearance regimes within the Pacific Southwest Research Station's area and the policy process that created the regimes will be conducted with an eye towards effectiveness of fire clearance regimes and the use of scientific information to inform clearance regulations. Part of this work will include an examination of funding levels for fire suppression, analysis of codes and ordinances for fire safety, and the role of land use plans. Findings will be provided to fire management within and external to the agency and will be shared through publications and presentations in applied and scientific outlets.

Studies focused on urban ecosystem service implementation will be conducted and will emphasize the implementation of green infrastructure strategies. By examining adoption of these strategies in some localities and not others, we seek to understand barriers in implementation. For example, some may use partners more successfully to leverage their efforts and maximize success. We will also examine degrees of impact on community and ecosystem well-being at various levels of implementation. Outcomes will include Best Management Practices, case studies of specific programs and lessons learned, and explanation of unintended consequences or potential pitfalls, all to inform land managers from the city to the wildlands.

Implementation of the sustainable recreation and tourism policy at the national level will be examined for its degree of diffusion, forms of adoption, successes, and potential pitfalls. Using a formative evaluation approach, this analysis will aid further refinement of this policy and aid an understanding of the costs and benefits attached to its various forms of implementation. By adhering to the full components of sustainability, this analysis will aid understanding of the impacts and benefits of this emerging policy for the ecosystem, the agency, recreating publics, and surrounding communities. This will be ongoing work as environmental change, especially climate change, will continue to challenge delivery of ecosystem services.

Invasive species are problematic for many public lands managers, they have serious impacts on water availability for natural ecosystems and may change local flora. Policies are developed at multiple levels about non-native and invasive species control. Evaluation of these policies and understanding the process of their development will be an important output of this research, as well as the cost of control and method to finance the programs. This research should inform policy about invasive species management and possible best practices.

Studying city, county and state land use programs and policies of localities will inform the management of public lands, including those within the wildland urban interface and public green spaces. Findings will assist in the identification of

threats to ecosystem services through such forces as habitat fragmentation. These should assist better approaches to adapt to and mitigate impacts on natural resources overseen by the agency and a variety of stakeholders.

### **ESTIMATED DURATION**

The Urban Connections and Social Dynamics Program is chartered for 10 years (2011–2021) with a mid-term review and potential charter revision after 5 years (in 2016). Amendments will be made to the charter as needed to address emerging issues.