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URBAN
FORESTER
CERTIFIED

HISTORY

In 1967, before the term Urban Forestry became widely known, a group of foresters, educators and business people working with trees in urban areas organized an information and idea-sharing network they called the California Urban Forests Council. Since 1968, and even more so since becoming a California public benefit corporation and being recognized by the IRS as a 501(c)(3) nonprofit organization in 1984, CaUFC has pioneered and shepherded the development of urban forestry throughout California. Through its efforts to promote urban forestry, CaUFC has grown to an organization of over 300 members from the public, private and non-profit sectors, and continues to expand its outreach to the growing network of people interested in urban forestry. Today, there are urban forests councils modeled after CaUFC in most every state in America.

In 1991, CaUFC coordinated and led the Local Arrangements Committee that hosted the 5th National Urban Forestry Conference in Los Angeles. The result was California's first National Urban Forestry Conference, as well as the first time over 25 tree-related resource organizations in California worked together to forge an urban forestry agenda.

CaUFC achieved another first in 1999 when it convened the California Urban and Community Forests Summit. The process leading up to the summit included meeting with regional focus groups throughout the state to facilitate the most comprehensive and useful summit possible. As a result of both that process and recommendations from the Summit, CaUFC facilitated the creation of seven regional urban forest councils, three of which have become chapters of CaUFC.

MISSION

The Mission of CaUFC is to promote the proper planning, planting, and management of urban and community forests to maximize the quality of life for every Californian by:

▲vigorously advocating for a holistic, ecosystem approach to the practice of urban forestry, especially when influencing public policy and decision makers;

▲developing and presenting educational materials and programs that meet the needs of both urban forestry professionals and the public;

▲disseminating the research, experience and knowledge of a wide range of urban forestry related disciplines to the people responsible for the management of urban and community forests;

▲creating and managing a certification program that recognizes, encourages and enhances the education, experience and professional status of urban forestry professionals, while providing the agencies, organizations and companies that utilize their services a benchmark for identifying qualified professionals;

▲developing the resources necessary to create regional urban forestry organizations within California, and to support them as well as other urban forestry related organizations; and

▲improving communication among urban forestry professionals by hosting forums and networking opportunities.

LEADERSHIP

The combined education and experience of the Board of Directors and Staff of CaUFC represent several centuries of knowledge concerning urban eco-system issues. For over 35 years, the California Urban Forests Council has provided leadership and representation that bridges all sectors of urban and community forestry throughout California.

EDUCATION

A critical aspect of CaUFC's mission is its commitment to convening and presenting cutting-edge educational and networking forums for disseminating the research, experience and knowledge of a wide range of disciplines that affect urban and community forestry.

CaUFC sponsors and presents conferences, seminars and workshops geared toward the specific needs of urban forestry professionals, the organizations and people that utilize urban forestry services, and the public. In addition to an annual conference that addresses issues critical to urban forestry in California, each year CaUFC presents a number of timely and useful workshops and seminars on topics such as: Threats to the Urban Forest, Eucalyptus Pest Management, Trees and the Law, Urban Wood Utilization, Solutions to Tree Insect Problems, Roots vs. Infrastructure, Managing and Protecting Heritage Trees, and Fire Safe Communities.

CaUFC also partners with numerous organizations, such as the USDA Forest Service, the California Department of Forestry and Fire Protection, California ReLeaf, the UC Berkeley Forest Products Lab, Fire Safe Councils throughout California, and the Western Chapter of the International Society of Arboriculture to disseminate the most current research, best practices information, techniques and practical applications for developing, managing and protecting our urban and community forests.

ADVOCACY

CaUFC works with all sectors of the urban and community forest movement to preserve and improve the urban environment by advocating for a holistic, ecosystem approach to the practice of urban forestry. A holistic view of urban and community forestry:

▲embraces both people and natural systems as integral parts of every urban forest;

▲spans a continuum of urban and community forestry related issues and concerns from inner city greening to wildfire and pest programs in rural interface areas; and

▲reflects an ecosystem approach to managing urban forests for their values and benefits in relationship to urban air quality, storm water runoff, wildlife and fish habitat, and other related ecosystem concerns.

During the past 35 years, CaUFC has become an increasingly well-respected, strong, statewide voice for the urban forestry perspective and profession within the overall ecology and environmental protection movements.

Our work has made CaUFC a highly regarded advisor and sometimes-partner in policymaking and political circles throughout the state.

CaUFC's Certified Urban Forester program will recognize, encourage, and enhance the education, experience and professional status of urban forestry professionals, while providing agencies, organizations, and companies that utilize their services a benchmark for identifying qualified professionals.

The program envisioned by CaUFC will include both educational and professional prerequisites, as well as a qualifying examination to become certified. Once certified, urban foresters will be required to acquire a certain number of continuing education units during a specified period of time to maintain their certification. People already active in urban forestry when the program commences would undergo a peer review of their education and professional experience to determine whether or not they qualify to take the examination.

Once the initial group of currently practicing urban forestry professionals who wish to become certified has either become certified or been notified of deficient credentials, all future applicants must meet the educational and professional prerequisites established by the program guidelines in order to be allowed to take the examination.

As the certification program develops, CaUFC hopes to partner with educational institutions, such as UC Davis, both Cal Poly campuses, and several community colleges, as well as organizations such as CDF FireSafe Councils and ISA, to have them provide appropriate classes toward the requirements for certification and continuing education requirements. Ultimately, CaUFC hopes that many colleges and universities will offer complete degree programs in urban forestry. Any educational needs not addressed by these types of partnerships will be presented by CaUFC.

POLICIES AND PROCEDURES

The California Urban Forests Council (CaUFC) has developed the Certified Urban Forester Program, which grants certification to individuals who meet all the prerequisites and have complied with all the requirements, including passing a required Certified Urban Forester certification examination. CaUFC may from time to time, as it deems appropriate at its sole discretion, add other designations for other people who work as urban forestry professionals.

The Certified Urban Forester Program provides professional certification, not a license. The certification program is voluntary, and is not intended to create a barrier to entering or being successful in the profession or practice of urban forestry. Certification is not a guarantee of competency, but rather an assessment or indication of a person's level of achievement and commitment to the future.

The requirements for the Certified Urban Forester Program correspond to knowledge, abilities, skills and experience commensurate with the professional practice of urban forestry. The Certified Urban Forester Program is designed to recognize urban forestry professionals who are qualified at the Advanced or Expert-level of practice, NOT someone who is entering or at the mid-level of urban forestry knowledge or practice.

The goals for this program are to:

- Encourage professional self-assessment by establishing achievement guidelines,
- Identify people with appropriate knowledge of the principles and practices of urban forestry,
- Recognize people who demonstrate a high level of competency in urban forestry,
- Encourage relevant and appropriate continuing education, and
- Raise the standards of the profession to benefit the environment and the public.

CERTIFICATION PROCESS

Obtaining Certification: To obtain certification as an Urban Forester, each applicant must successfully comply with all the certification requirements, including meeting all prerequisites as well as obtaining a passing score on the certification examination.

Maintaining Active Certification: To maintain active certification, a person must comply with any and all applicable continuing certification requirements, which include successfully completing a minimum of thirty (30) Continuing Education Units every two (2) years with a minimum of six (6) units from each of the three (3) major divisions of the CaUFC Certified Urban Forester Domains of Practice (Primary, Environmental, and secondary).

As stated above, CaUFC may from time to time, as it deems appropriate at its sole discretion, add other designations for other people who work as urban forestry professionals, or change certification requirements (both initial and continuing). Should such a change occur, all holders of any affected certification will be notified of those changes by mail and be given six (6) full calendar months from the date CaUFC mails the notice in which to comply with any such changed requirements. Once granted, certification(s) will remain valid as long as those certified stay in compliance with all applicable continuing certification requirements.

PESTS AND DISEASES

The test focuses on four major areas:

1. recognition of major categories of diseases and insect pests such as fungal wilts, root rots, wood decays, cankers and bark beetles

2. symptoms, signs, life cycles and control of major pathogens and insect pests having a large host range

3. symptoms, signs, life cycles and control of important new and emerging insect and disease problems—whether or not they have restricted host ranges.

4. nature and value of mycorrhizae. These are included under this category because the mycorrhizae universally involve fungi and are usually studied in departments of plant pathology at major universities.

Questions concerning these major categories will require that the examinee be able to recognize the *description* of a major category and *associate* it with types of pathogens, probable outcomes and possible control programs. For example, the most damaging aspect of canker diseases is that they kill single stems suddenly by creating girdling lesions on stems or the trunk. There may also be questions regarding symptoms associated with the lesions themselves. The consequence of canker diseases is frequently death of the tree or serious damage to the trees appearance. Some question require a practical approach to determine the best possible answer—the accurate diagnosis and course of treatment.

In the world of tree pathogens there are some that attack many different hosts and that can have very serious outcomes. The behavior of these pathogens is usually similar on their many hosts. Thus, these pathogens thus are somewhat elevated in their importance, and a working knowledge of their nature is an essential aspect of urban forestry. Such pathogens include *Armillaria mellea* (the cause of Armillaria root rot) and *Verticillium dahliae* (the cause of Verticillium wilt).

Historically, a small number of pathogens and insect pests have achieved special importance historically because of the great damage they have done, or because they are new and emerging threats to the urban forest. Pests that are new introductions pose a unique threat to the urban forest, particularly when their species structure includes a large number of susceptible plants. Pathogens in this group include *Ophiostoma ulmi* (the cause of Dutch elm disease), *Phytophthora ramorum*, (the cause of Sudden Oak Death), bark beetles, and the red gum lerp psyllid.

Mycorrhizae, known for decades to be highly beneficial as a treatment for seedlings of forest tree species, have more recently become important in the establishment and promotion of growth in older nursery stock and as a means of rescuing declining mature trees. Although they are not pests, Mycorrhizae are treated in this area of expertise. Knowledge of the two major types of mycorrhizae and their host ranges is essential in understanding the possible benefits of their use.


CALIFORNIA
URBAN FORESTS
COUNCIL

URBAN FORESTRY

Definition:

> A specialized form of forest management concerned with the cultivation and management of trees in the entire area influenced and/or utilized by the urban population. It includes trees on streets, in parks, on private property, as well as watersheds. Urban forests provide many benefits, including climate amelioration, engineering, architectural, and aesthetic uses. *Dictionary of Natural Resource Management*

HORTICULTURE

Definition:

> The cultivation of a garden, an orchard, or a nursery; the art and science of cultivating flowers, fruits, vegetables, and ornamental plants.
> *Dictionary of Horticulture*

Horticulture, in the context of urban forestry, is the care and cultivation of surrounding vegetation (plants and turf) as it affects trees in the urban environment. [For purposes of the Certified Urban Forester exam, the practice of arboriculture is a specialized subset of horticulture and is discussed elsewhere in this guide].

Horticultural conditions and practices applied to surrounding vegetation affects neighboring trees. The simple existence of surrounding vegetation influences the health and survival of trees sharing that space, and the surrounding vegetation itself is an integral part of the urban forest, having its own benefits, costs, and challenges. Understanding how trees are affected by the relationship between understory conditions and the care and maintenance of surrounding vegetation is critical to the successful practice of urban forestry.

Several horticultural conditions and practices that affect trees include competition for vital resources, soil biota, physical and chemical soil properties, soil/water relations, irrigation, application of nutrients and soil amendments, insect/disease/weed transmission and treatment, pruning (of understory plants and trees to benefit surrounding vegetation), soil cultivation, and all other maintenance practices.

At a minimum, the examinee should be well informed in the following subject areas:

Competition for Vital Resources

• How trees and surrounding vegetation compete for vital minerals, nutrients, sunlight, and water, and how competition for vital resources can affect the growth and health of trees and surrounding vegetation.
• Plants' ability to interfere with the germination, growth, or development of other plants in their immediate vicinity by allellopathy.

Soil Biota

• How horticultural practices can affect what living organisms are present in the soil, the importance of living organisms in the soil, and the positive and/or negative relationship of soil biota to the health of trees and surrounding vegetation.

Physical and Chemical Soil Conditions
• How horticultural practices can affect soil structure and chemistry, and the associated benefits and risks to trees resulting from such practices.

Soil/Water Relations
• How soil properties relate to their water retention characteristics, and the effects of horticultural practices such as cultivation, compaction, aeration, and irrigation on a soil's ability to retain water, drain properly, and support plant life.
• How altering grade around existing trees to accommodate new plantings can affect surface and subsurface drainage patterns and characteristics.

Irrigation
• How irrigation practices that benefit surrounding vegetation—such as overhead watering, drip irrigation, automation, and flooding—may affect neighboring trees, and how altering irrigation regimes around existing trees for new plantings can affect tree health.
• How installation of an irrigation infrastructure may damage tree roots, affecting tree health and stability.

Application of Nutrients and Soil Amendments
• How the horticultural application of fertilizers, nutrients, mulches, and soil amendments for the benefit of surrounding vegetation may affect neighboring trees.

Insect/Disease/Weed Transmission and Treatment
• How insects, diseases, and weeds interact with trees and surrounding vegetation, including vectoring and natural predation.
• How treatments of insect, disease, and weed problems in surrounding vegetation may affect health of neighboring trees.

Pruning
• The effects of pruning neighboring trees to meet the light and space requirements of surrounding vegetation, and how pruning and/or removal of understory plants can affect neighboring trees by damaging roots, and altering physical soil properties, soil moisture regimes, and sunlight levels on soil.

Soil Cultivation and Other Horticultural Maintenance Practices
• Impacts that can occur to neighboring trees when routine horticultural maintenance practices such as soil cultivation, lawn mowing, weed trimming, replanting, raking, and litter removal are carried performed repeatedly for extended periods.

FIRE MANAGEMENT/WILDLAND URBAN INTERFACE

Definitions:

1. Fire Management, as defined by the Certification Committee for the Certified Urban Forester exam, consists of the fundamental management practices and policies necessary to protect life, property and the environment from wildfire. *Certified Urban Forester Exam Committee*

2. *Wildland Urban Interface* is any area where wildland fuels threaten to ignite combustibles homes and structures.

Wildland fires are a natural part of the ecology of California. Fires have and will occur again as vegetation grows. Land managers have a responsibility to not only protect their land and the public from wildfire but also adjacent homes and residences that abut parks, open space districts, community natural areas, wilderness parks, campgrounds and similarly designated areas that may be managed by the urban forester. Management of these lands is necessary to enhance the natural resources and protect life and property, thus reducing the economic, social, political and environmental impacts of wildfire.

The wildland urban interface is expanding because of population growth into wildland areas. These trends are expected to continue. The wildland urban interface can be divided into physical areas such as watersheds and habitat areas. The most critical area for the urban forester is the wildland urban interface. Because wildfire is a natural occurrence, ecosystems will recover unless repeatedly burned every few years. Frequent burning can result in vegetation type conversion.

Public land under the jurisdiction of the urban forester should have a Fire Risk & Hazard Assessment followed by a mitigation plan. Collectively this is often called a Fire Management Plan. Risks are those conditions/activities that start wildfires—lightning, power lines, children playing with matches, cigarettes etc. Hazards include the items that make wildfire difficult to control—vegetation, topography, fire weather, and related factors. Values may be natural or developed whose loss or destruction by wildfire would be considered unacceptable. A concentrated effort needs to be made where there are high values, high risk and high hazards.

A Fire Management Plan is based on the values, and an identification of a hazard and risk assessment of an area or region. It includes mitigation activities, responsible party, priorities, and an implementation schedule. As with all plans, periodic review and updating are necessary. Cooperating organizations such as home owners associations, native plant societies, developers, the local fire department and other special interests need to be involved. The urban forest land manager must develop and maintain an annual operating plan in cooperation with other stakeholders.

The urban forester should understand basic fire management planning, potential stakeholders and the means of addressing wildfire issues as they pertain to the urban forest and urban residents.

Public land in the urban interface requires management to protect urban residents and the values that they treasure.
A basic understanding of fuel modification establishment and maintenance methods are fundamental to home and structure protection. This includes vegetation species that should be removed from fuel modification zones, treatment requirements for native vegetation and the type of design and planning for ornamental plants planted in close proximity to structures.

At a minimum, the examinee should be well informed in the following areas:

Wildland Urban Interface Issues
Habitat value, urban edge effects, invasive plants, fuel treatment methods, fuel modification as it relates to soil erosion control and slope stability, threatened and endangered species.

Fuel Treatment Methods
Mechanical, biological (grazing), hand, chemical and prescribed fire.

Data sources
Where data for developing fire management plans including all aspects of risk and hazard assessment can be acquired.

Training
Staff who work in the urban interface need to be provided with proper training regarding the fire management plan, fuel treatment methods (pruning, horticultural maintenance, recycling of biomass), roles and responsibilities, safety, and how to handle evacuations or relocations of the public.

Fire Management Plan Elements
Includes hazard and risk analysis, values at risk, fire danger rating and seasonal severity ratings based on climate and weather trends, and a mitigation program.

Fire Behavior Modification
How elimination of ladder fuels and removal of dead and highly hazardous plant species in fuel modification zones can dramatically influence fire intensity and flame lengths.

Following Wildfire A recovery plan should be established to address soil erosion, potential for debris flows, potential flood inundation, loss of access during storms, plant succession and exotic species control issues.

Several sources of wildfire planning information can be found at the following internet locations:

Firewise Program – NFPA	Firewise.org
California Fire Safe Council	firesafecouncil.org
Fuel Modification Plan	http://fire.co.la.ca.us/wai_02/Forestry_folder/pdf/fmpg.pdf

LANDSCAPE ARCHITECTURE

Landscape architects design the built environment of neighborhoods, towns and cities, while also protecting and managing the natural environment—from forests and fields to rivers and coasts. The practice of Landscape Architecture encompasses different specializations. Landscape Design, the discipline most commonly associated with the profession, is design for residential, industrial, commercial, institutional, and public outdoor spaces. When creating an outdoor space, the landscape architect finds an aesthetic balance between existing architecture, the responsible treatment of the outside environment, and the appropriate use of plant material.

Site Planning focuses on the physical design and arrangement of built and natural elements of a land parcel. A site planning project can involve designing the land for a single house, an office park or shopping center, or an entire residential community. More specifically, site design involves the orderly, efficient, aesthetic and ecologically sensitive integration of man-made objects with a site's natural features including topography, vegetation, drainage, water, wildlife and climate.

Urban/Town Planning deals with designing and planning cities and towns. Urban planners use zoning techniques and regulations, master plans, conceptual plans, land-use studies and other methods to set the layout and organization of urban areas. This field also involves "urban design", the development of mostly open, public spaces, such as plazas and streetscapes.

Regional Landscape Planning merges landscape architecture with environmental planning. In this field, landscape architects deal with the full spectrum of planning and managing land and water, including natural resource surveys, preparation of environmental impact statements, visual analysis, landscape reclamation and coastal zone management.

Park and Recreation Planning involves creating or redesigning parks and recreational areas in cities, suburban and rural areas. Landscape architects also develop plans for huge natural areas as part of national park, forest, and wildlife refuge systems.

Park and Recreation Planning involves creating or redesigning parks and recreational areas in cities, suburban and rural areas. Landscape architects also develop plans for huge natural areas as part of national park, forest, and wildlife refuge systems.

Land Development Planning can be on large-scale, multi-acre parcels of undeveloped land and smaller scale sites in urban, rural and historic areas. As such, it provides a bridge between policy planning and individual development projects. Landscape architects working in this area require a knowledge of real estate economics and development regulation processes, as well as an understanding of the physical constraints of developing and working with the land.

Ecological Planning and Design studies the interaction between people and the natural environment. It is concerned with interpretation, analysis, and formulation of design policies, guidelines and plans to ensure the quality of the environment. This specialization includes analytical evaluations of the land and focuses on the suitability of a site for development. It requires specific knowledge of environmental laws such as the Clean Water Act, the Safe Drinking Water Act, Federal wetlands regulations, etc. This specialization also encompasses highway design and planning.

Historic Preservation and Reclamation of sites such as parks, gardens, grounds, waterfronts, and wetlands involves increasing numbers of landscape architects as growing populations lead to additional development. This field may involve preservation or maintenance of a site in relatively static condition, conservation of a site as part of a larger area of historic importance, restoration of a site to a given date or quality, and renovation of a site for ongoing or new use.

Social and Behavioral Aspects of Landscape Design focuses on the human dimension of design, such as designing for the special needs of the elderly or the disabled. This field requires advanced training in social sciences, such as behavioral psychology, sociology, anthropology and economics. Areas of study include design evaluation of existing environments, environmental perceptions, and effects of environments on people.

The practice of Landscape Architecture is tightly woven into Urban Forestry. Urban foresters are not necessarily landscape designers, but practitioners from both disciplines are involved in the creation of quality outdoor environments and often work together toward this goal. The urban forester should have a sufficient background in the process of Landscape Architecture in order to be able to:

- interpret design and construction documents
- provide educated comments and critiques of landscape plans
- understand natural systems and how the built environment affects them
- understand how grading and drainage systems are designed and implemented
- provide guidance in tree selection in the nursery
- provide specifications and guidelines for soil and site preparation, irrigation design, tree species selection, planting, staking, and aftercare

URBAN ECOLOGY

> Urban ecology is the effect the urban forest has on the quality of life and the environmental well being of the urban area and its inhabitants, as well as the contribution it makes to the global environment. The word ecology implies interrelatedness between different components, elements, and processes in the urban forest ecosystem.
>
> *Definition by the Certification Committee for the Certified Urban Forester exam*

Urban ecology, in the context of urban forestry, describes how a healthy and well-managed urban forest affects environmental quality in an urban area. [For the purposes of the Certified Urban Forester exam, assigning economic values to environmental benefits is not included in this section but is discussed elsewhere under the subject of arboriculture].

Activities that benefit the urban forest may also benefit humans and animals, by influencing physical and emotional health, quality of life, wildlife habitat quality, and moderation of natural and anthropogenic processes. Benefits may be manifested as tangible gains: enhanced visibility, reduction in breathing difficulty, and the creation of a more pleasant environment—or in less direct ways: lowered utility costs, reduced flooding and erosion, enhanced habitat for wildlife, and reduced rates of skin cancer occurrence.

Because urban forestry affects the quality of life in urban areas, it is important that the Urban Forester understand the relationship between a healthy urban forest and the benefits it can provide. The Urban Forester must understand how trees and vegetation interact with air, water, and the environment, and how these interactions relate to people and animals. The relationship between the urban forest and the environment is complex, but the principles are well understood.

Subjects related to urban (and global) ecology and urban forestry include global warming, ozone depletion, heat island effect, air quality, water quality, pesticide ecology, light pollution, noise pollution, and brownfields/urban infill/land reclamation.

At a minimum, the examinee should be well informed in the following subject areas:

Global warming
• The processes by which plants convert carbon dioxide into oxygen and the principle of carbon sequestering.
• The relationship between carbon dioxide and global warming (i.e. the "greenhouse effect").
• How and to what extent urban forests affect atmospheric carbon.

Ozone depletion
• The process by which ozone in the upper atmosphere shields us from damaging ultraviolet radiation.
• Relationship between the loss of ozone in the upper atmosphere and the increase of related human health problems, and the preventative benefits of urban forest shading.

Heat island effect
• The general principle of urban heat island effect (i.e., contributing factors) and how it is affected by the urban forest.

Air quality
• How trees and plants improve air quality directly by removing gaseous and particulate pollutants.
• How urban forests reduce energy use and related air pollution.
• The concept and mechanism of biogenic emissions from trees that contribute to air pollution.

Water quality
• The principles of surface water runoff, sediment entrainment, infiltration, and the contribution of canopy cover to reduction of surface erosion and subsequent water pollution.
• The role of canopy interception in reduction of polluted rainfall entering waterways.

Pesticide ecology
• The relationship between pesticides and the natural balance between pests and natural predators.
• Concepts of soil and water pollution relating to pesticide use.

Light pollution
• Basic principles of night lighting and how it can affect habitat values for wildlife and urban plant growth.
• Planting practices directed at reducing the harmful effects of night lighting on urban populations.

Noise pollution
• Limitations and benefits of plants as a means of reducing undesirable noise in the urban environment.
• Effects of urban noise on wildlife habitat.

Brownfields/urban infill/land reclamation
• Use of phytoremediation to restore urban brownfields.
• Land reclamation, urban infill, and ecological restoration as a means of increasing urban wildlife habitat and public open space.

Utility Arborist

Definitions:

1. A Utility Arborist is defined as an individual who has comprehensive knowledge and skills utilized to manage the interaction of the urban forest and the utility providing service to the public.

2. A Utility Arborist is also defined as an individual functioning as a liaison for either a private or publicly owned utility organization with the functional knowledge of the interaction between the urban forest and the utility.

A utility arborist must be able to analyze all interactions between the urban forest and the utility in question. To thoroughly comprehend this interaction, a utility arborist must be able to identify all the different types of utilities. Focus should be placed on the utilities with a potentially hazardous interaction with the urban forest. These include the following:

Over Head Utilities

- Transmission Power Lines
- Primary Power Lines
- Secondary Power Lines
- Telephone Lines
- Cable Lines
- Fiber Optic Lines
- Utility Hardware (i.e. Transformers, Lightning Arrestors & Circuit Breakers)

Underground Utilities

- Gas Lines
- Water Lines
- Sewer Lines
- Fiber Optic Lines
- High Voltage Lines
- Telephone Lines
- Cable Lines

A Utility Arborist has a responsibility to accomplish firm goals. Through a variety of strategic procedures, these goals can be proactively attained. These goals include the following:

Provide public safety and reliable service.

- Maintain clearance from all overhead and underground utilities according to guidelines set forth by the Public Utilities Commission and State Forestry Department.

- Achieve clearance using proper tree selection removal of hazardous trees and appropriate pruning strategies. These may include crown reduction and directional pruning.
- Public awareness education programs.
- Regular inspection of all vegetation as well as routine pruning cycles.
- Maintain fire safe guidelines in all areas with fire potential.

Provide a safe working environment.

- Only qualified personnel can get within close proximity to energized over head utilities according to ANSI Z133.1-1994
- For underground work, Underground Service Alert (USA) should be notified within a timely manner. 800 277-2600
- Job supervisors have an obligation to understand the interaction between different components of the utility and how they work together to distribute to customers. This knowledge will help to forecast any potentially hazardous situations.
- For every hazard resolution scenario, a determination of danger level must be assessed. From this assessment, the proper work crew should be assigned accordingly.

Provide space for the urban forest above and below ground.

- Evaluate planting sites that are adjacent to utilities above and below ground.
- Utilize the right tree in the right place concept in order to insure the trees growing space.
- Strive to be a part of the planning process to insure survival of the urban forest.

Establish high-quality public relations with utility and public.

- Understand who the local utilities are. Private or municipal? Be familiar with the representative from each utility that could have a potential conflict with the urban forest.
- Evaluate what public outreach programs are established. Particularly the programs that educate on the pro-active approach of a utility. Investigate other programs (i.e. educational programs on how trees cool homes during the summer to reduce the use of electricity from air conditioners).
- Work cooperatively with underground utilities through the use of dig alert indication markings.
- Be familiar with the terms relating to specific regulations for high fire risk areas.

Geographic Information Systems (GIS)

Definitions:

1. A Geographic Information System is "a system of hardware, software, data, people, organizations and institutional arrangements for collecting, storing, analyzing and disseminating information about areas of the earth." (Chrisman 1997)

2. GIS is also defined as the organized activity by which people:

    - measure aspects of geographic phenomena and processes;
    - represent these measurements, usually in the form of a computer database, to emphasize spatial themes, entities, and relationships;
    - operate upon these representations to produce more measurements and to discover new relationships by integrating disparate sources; and
    - transform these representations to conform to other frameworks of entities and relationships.

3. GPS or Global Position System is a radio navigation system that allows land, sea, and airborne users to determine their exact location, velocity, and time 24 hours a day, in all weather conditions, anywhere in the world. GPS devices are being increasingly used to collect data and integrate it with GIS systems.

Geographic Information Systems (GIS) have been used for decades in land-use planning and policy making. Within the last decade, most cities, counties, and large land management organizations in California now either develop and employ their own GIS technology or have access to GIS data from commercial sources for decision making purposes. Increasingly, GIS technology is used to help justify maintenance, planting and preservation activities in urban forestry. Initially used by large natural resource and land management organizations, GIS software is now much easier to use so that more people now use it. American Forests pioneered the use of GIS technology in urban forestry by forming a partnership with Environmental Systems Resources Institute (ESRI) to develop "City Green" software. This software allowed planners to analyze storm water runoff, air quality, summer energy savings, carbon storage and tree growth. Another software program developed by the United States Forest Service is called the Urban Forests Effects (UFORE) model which is used to examine similar characteristics of the urban forest and more closely calculates air pollution mitigation provided by urban forests.

A 2004 government computer week report indicated that GIS applications have become integral resources in various local functions, including public works, financial, public safety and economic development. For example:

* 77 percent of respondents use such technology to view aerial photography.

* 70 percent use it to support property record management and taxation services.

* 57 percent use it to provide public access information.

* 41 percent use it for capital planning, design and construction.

* 38 percent for permitting services, emergency preparedness and response activities.

* 33 percent for computer-aided response activities.

Land managers have a responsibility to not only protect their land and the public from hazards but also adjacent homes and businesses that abut parks, open space districts, community natural areas, wilderness parks, campgrounds, landscape maintenance easements and similar designated areas that may be managed by the urban forester. Management of these lands is necessary to enhance the natural resources, and protect life and property thus enhancing the economic, social, political and environmental benefits of the urban forest. GIS technology helps the urban forester more effectively management the resources, manage staff time, budgets, scheduling and coordination of work.

GIS assists users in answering "what if" scenarios". Questions such as what will happen if the landscapes under management are not maintained for several years? If a park is converted from a tree covered landscape to an open soccer field, what will be the impacts be to storm-water runoff, views, noise, cost of maintenance and related resources?

Data collection for use in GIS is increasing becoming cost effective. The use of Global Position System (GPS) systems tied to software contained in handheld Pen Based Computers allows for rapid field data collection. Existing data files maintained in Microsoft Excel and Access can easily be imported into GIS without the need to develop new data. Data sharing between various agencies enables GIS technology to quickly be utilized. The urban forest manager can use GIS data to be a better manager.

Setting up a GIS can be an expense and time consuming task. In smaller communities, partnerships with other agencies or working with several smaller communities to hire a consultant to build an area wide GIS application may be considered to reduce cost. This concept has been widely used in the emergency response community. A single emergency Fire or Police dispatch center may take emergency calls for several cities. Costs are shared between the communities based on workload, area and similar criteria.

GIS data is becoming readily available via the Internet. Using ArcIMS, a product of ESRI, people now via the Internet can display, query, and analysis data in an easy-to-use Web browser.

Existing sources of data for GIS are the local Assessor Office which maintains all the parcel information for their geographic area. This includes such important data as all street and house numbers, street names, which properties are developed, those that are vacant etc. Using aerial photography that has been orthorectified or matched to map data eliminates distortions. Overlays of map and photographic data become seamless which greatly improves its use.

The urban forester should understand basic GIS technology, potential stakeholders and issues as they pertain to the urban forest and urban residents. Public land throughout the community requires cost effective management to protect urban residents and natural resources and the values that they treasure.

Local government planning offices often have General Plan data elements in GIS format that are important to the urban forester. These include hazard and risk analysis, values at risk, zoning, goals and policies for the built, natural and social environments, growth forecasting and areas targeted for community revitalization.

A basic understanding of GIS data quality is fundamental to community enhancement and protection. This includes information concerning both the natural and built environments. It should include all vegetation species, plant communities, areas that are under the urban forester's jurisdiction, land uses, management objectives, maintenance requirements for the vegetation, presence of overhead and underground utilities and the interests of the community.

The examinee should be well informed in the following areas as a minimum:

Data Sources – where data for developing and maintaining a GIS for urban forest management can be acquired including all aspects of risk and hazard assessment.

Partnership Opportunities – sharing data between organizations results in improved management at reduced cost. Government agencies and non-profit organizations are most likely to share data that is of mutual benefit. The local fire department or Office of Emergency Management often maintains or has access to several of the data layers.

Wildland Urban Interface Issues – habitat value, urban edge effects, invasive plants, natural plant communities, areas susceptible to soil erosion, slope failure and flooding, soil water holding capacity and acidity or alkalinity and threatened and endangered species are important management issues.

Training - staff who work in urban forestry need to be provided with proper training regarding the use and benefits that GIS has to the organization, the need for good accurate data collection and reporting, roles and responsibilities for data collection and processing, and how to develop and conduct public meetings using GIS data. GIS operators need to be provided with training to maintain skills and improve their level of productivity.

System Requirements – in-house GIS systems require a moderate to high end desk or laptop computer to run the software and management the data efficiently and effectively. Large hard disk space is a requirement along with the ability to backup the data frequently to protect it from loss.

Several sources of urban forest planning information can be found at the following internet locations:

Urban Forestry Management Plan for Vandenburg Air Force Base:
http://gis.esri.com/library/userconf/proc97/proc97/to200/pap179/p179.htm

Handheld Technologies for Urban Forestry - Inventories, GIS, & More:
http://www.umass.edu/urbantree/publications/amforestsproceed.pdf

The Urban Forest Effects (UFORE) Model:
http://www.fs.fed.us/ne/syracuse/Tools/tools.htm

TREE INVENTORY

A tree inventory is a listing and description of trees and planting sites. It is used by Urban Foresters to determine the location, species, size, condition, and landscape value of the existing tree population.

Ideally, tree inventories are conducted as part of the initial planning and design process and can be helpful to other disciplines when designing and siting structures and when determining the suitability of a site for grade changes, road and parking locations, utility routes, and major landscape features (Harris, Clark, Matheny, 2004).

A tree inventory can include the following information for an individual tree:

- Tree Number or identifying "address"
    - If trees are located on a map, this number is graphically represented and refers to the tree's number in the inventory.
    - Trees are often identified in the field with brass or aluminum circular tags affixed to their trunks.
- Species
    - Common name, scientific name (including variety or cultivar, if applicable)
- Trunk diameter
    - Typically, diameter at 4.5 feet above natural grade (dbh)
- Tree Height
    - Can be approximated
- Canopy Spread
    - Depending on the application, can be measured, paced, or approximated.
- Tree Health
    - Can use descriptive terms or a rating system
- Form and Structure
    - Can use descriptive terms or a rating system
    - May include hazard potential
- Pests and Diseases
- Target Rating
- Comments/Recommendations for Maintenance/Treatment

A tree inventory sometimes accompanies or is part of a tree risk assessment. The application may warrant the use of the ISA Hazard Evaluation Form (Matheny and Clark, 1991).

Inventories permit better hazard reduction, budgeting, and work planning. A tree inventory is a powerful management tool because it:

- provides an *overview* of the ages, types, and condition of trees
- allows you to *make a maintenance schedule* on a solid basis
- makes it easy to set *priorities* for pruning and removal work
- is an excellent tool for *budget* planning and negotiation

- aids greatly in dealing with *homeowners*
- supplies guidelines for new tree selection

  (http://www.co.st-lawrence.ny.us/)

"Off-the-shelf" or proprietary inventory software is available for more complex tree inventories. Capabilities are infinite and categories can be customized to fit the desired application with minimal effort. A simple database can be created in Microsoft Access, for example, and mapping can be accomplished using ArcView GIS.

Attributes commonly included in more comprehensive inventories are:

- Presence of overhead wires
- Maintenance cycles
- Type of pruning
- Equipment needed
- Labor hours and costs
- Equipment hours and costs
- Supply and contract costs
- Size of planting space
- Hardscape damage
- Work Orders

Many of these systems provide means to calculate species value (CTLA Valuation) and have powerful querying capabilities.

Maps vary from a complex GIS interface to a hand-drawn sketch of a property. Some inventory software systems contain electronic mapping capabilities. An aerial photograph, site survey, or AutoCad drawing can be imported into the program, and tree numbers and other features digitally incorporated.

In the absence of a map, specific "addresses" can be assigned to each tree. They can be actual street addresses or a descriptive abbreviation.

Sometimes tree inventories are conducted to express tree canopy cover, diameter class distribution, regeneration potential, and longevity (Harris, Clark, Matheny, 2004).

Recycling And Biomass

Green waste or Bio-resource is a complex question for today's urban forester. With state and local legislative mandates to reduce and recycle municipal solid waste, the urban forester may find themselves with up to 30 percent of this responsibility via the urban landscape.

Should this influence our planning or how we perform maintenance? Do we look at this as a bio-resource or as an issue that is not our problem by simply paying the cost for disposal?

Today's urban forester should understand the impacts of plant selection and pruning methods and how they relate to the volume of biomass created in the community. They should also know the general facts regarding the use of mulch in the landscape and compost amending soils.

Motivated urban foresters will seek out opportunities in their community to use their biomass for local benefits. When searching for opportunities and people who may assist in identifying them include, landscape managers for mulch or compost, community groups doing planting or plant restoration projects, landfill personnel for alternative daily cover at their landfill sites and possibly biomass use at power plants. In addition, the agriculture industry is rapidly increasing their use of organics both as compost and mulch. When you find partners, are you willing to adjust maintenance methods or equipment to help your waste to become a product for the next end user? Local use of these materials should also help reduce cost by minimizing trucking and transportation with the additional benefits of using less fossil fuel.

Scientific data is becoming available to us rapidly and constantly to help us understand why these benefits occur and how to apply the best management practices. With this knowledge we can maximize our ability to work with others. The best future usage of our biomass is rapidly evolving with current efforts including conversion of woody debris to clean burning fuels and creating lumber from urban tree logs. Research continues to improve efficiencies, bringing us closer to the day when biomass resources will return as a fiscal benefit. Beginning with the urban foresters and their consideration of biomass from the urban forest as a product and as a resource combined with our knowledge, we can work together with researchers and practitioners (supported by better equipment and techniques) to utilize a holistic approach to urban forest planning and management. Today's urban forester has the challenge to bring together these opportunities for the benefit of the urban forest and the communities they serve.

CaUFC

CALIFORNIA URBAN FORESTS COUNCIL

ECOSYSTEM AND WATERSHED MANAGEMENT

Definitions:

> An ecosystem is a biotic community together with its physical environment, considered as an integrated unit. An ecosystem can be characterized as a viable unit of community and interactive habitat (US Army Corps of Engineers). Ecosystem implies interconnectedness in a biological sense and boundaries may be difficult to define.
>
> A watershed is a geographical unit defined by surface hydrology (topography and waterflow). Watershed implies interconnectedness in a hydrological sense, and its boundaries are well defined.

An ecosystem and a watershed could be equivalent but usually they are not. A single watershed may include numerous ecosystems, and a large ecosystem could also encompass several watersheds. All urban areas are located in one or more watersheds, and all urban areas contain ecosystems in or around them. A city may occupy a portion of a watershed, an entire watershed, or straddle several watersheds. Whereas the exam category "Urban Ecology" treats the immediate urban area, ecosystems and watersheds may extend well beyond that area into surrounding natural lands.

Urban forest ecosystems may include viable habitat for wildlife. Natural undisturbed lands in or near urban areas provide higher quality native habitat for wildlife. Together they may form a critical assembly of habitat and connecting corridors for wildlife species, as well as enhance the quality of life for urban residents.

The watershed unit is important because it is related to climate, storm water runoff, water quality, geopolitical boundaries, wildfire, erosion, and resource management.

For the purpose of the Certified Urban Forester exam these two types of areas overlap and are treated together. [Recreational value of these elements is not discussed here, but is included in the section on Land Use Planning & Ordinances].

The Urban Forester should understand how well-managed ecosystems and watersheds in the vicinity of their city will affect the health of the urban forest, and the quality of life, safety, and prosperity of the urban population. It is important that they see the relationship between good ecosystem/watershed management and the benefits provided to the urban community.

Preservation of open space may be driven by ecosystem and watershed management concerns, or vice versa. Habitat values and ecosystem and watershed management may be affected by local, state, and federal laws, and the urban forester may interact with regional, state, and federal land managers regarding management issues.

Subjects related to ecosystem and watershed management include watershed level planning, urban/natural interface issues, open space preservation and urban sprawl, habitat protection and

wildlife preservation, ecological restoration, invasive species, wildfire management and control, and erosion and flood control.

At a minimum, the examinee should be well informed in the following subject areas:

Watershed level planning
• The importance of considering surface hydrology and topography in the entire outlying watershed area as it impacts the urban area.
• How management practices in the watershed can influence the water quality, erosion, flooding, and ground water recharge in the urban area.

Urban/natural interface issues
• Issues regarding habitat value and urban edges (pet/wildlife interactions, invasive plants, fire clearance/habitat loss, animal threats to humans and vice versa, fire clearing and erosion, slope stability, etc.)

Open space preservation/urban sprawl
• The dynamic tension between the need to expand housing and the loss of vital natural habitat, including laws and agencies that may be relevant.
• Current concepts in urban planning that address urban sprawl and alternative designs to conserve wildlands.

Habitat protection/wildlife preservation
• State and federal laws governing habitat protection, biological impact assessment, and protected species.
• Basic tenets of biological reserve design (edge effect, connectivity, edge to area ratio, etc.)

Ecological restoration
• Basic theory of ecological restoration and its limitations and benefits when compared to habitat preservation.

Invasive species
• Problems associated with the "escape" of non-native invasive plant and animal species and potential effects on adjacent natural lands and species/habitat protection.

Wildfire management and control
• The role fire plays in ecosystem management (habitat effects) and watershed management (hydrological effects).

Erosion and flood control
• Impacts of vegetation management, fire, loss of permeable surface area, and channelization of runoff on flooding and soil erosion deposition issues.

PUBLIC WORKS

Definitions:

1. Public Works is defined as an individual or individuals whose responsibility is to manage the urban forest and its interaction with both infrastructure and people in a public area.
2. Public Works is also defined by several municipal and, or organizational departments. For example, Public Works Department, Parks and Recreation Department, Water Department, Golf Course Landscape and Open Space management are some of the entities that deal with the interactions of the urban forest.

A dictionary definition of '*public*' can mean community and '*works*' can mean moving parts. The purpose of Public Works is to manage a community's interaction with all of its moving parts. The moving part of a community requiring close monitoring is the urban forest.

The urban forest has a major effect on Public Works, as do trees and their interactions with infrastructure. Infrastructure is both public and private. Some examples of public infrastructure are streets, sidewalks, sewers, overhead and other utilities, gas lines, street lights and traffic control devices. Private infrastructure includes buildings, signs, views, parking lots and hardscape. Public Works also reviews private development plans to minimize negative interactions between infrastructure and trees.

Public Works has a responsibility to attain certain goals set forth by their governing entity. These goals include the following:

- Manage all portions of the community's urban forest.
- Maximize the benefits of the urban forest.
- Resolve conflicts between the urban forest and any infrastructure.
- Minimize cost of maintenance.
- Enhance and preserve the urban forest.
- Collaborate with all managers of adjacent assets and effected public.
- Help provide a safe and healthy urban forest.
- Recycle and reuse all green waste.

Management strategies are implemented to achieve the goals of a successful Public Works department. These management strategies include the following:

- Enhance the urban forest's canopy coverage.
- Exploit the planting site. Implement the right tree in the right place concept to avoid conflicts with infrastructure.
- Optimize wildlife habitat within the urban forest.
- Preserve species, size and age diversity within the urban forest.
- Maintain an effective, implemented, tree inventory.

- Protect, preserve, and manage the urban forest through the current urban forestry best management practices.
- Effectively manage budgets and staff while implementing the most cost efficient methodology.
- Strive for cooperation between the public and private agencies that are involved in the management of the urban forest.

Accomplishing success as a Public Works entity requires the vision to see the urban forest as an infrastructural element. The urban forest has both positive and negative effects on other infrastructural elements in the public right of way and adjacent properties. How it is managed will directly affect the net benefits in proportion to costs.

COMMUNITY RELATIONS

Community and Public Relations are terms often used synonymously. Local government and non-profit agencies employ community relations more frequently than business, for example, that favors public relations.

Definitions:

4. The actions of a corporation, store, government, individual, etc., in promoting goodwill between itself and the public, the community, employees, customers, etc. (Webster's Unabridged Dictionary)
5. The Public Relations Society of America, adopted in 1988, offers the following definition: "Public relations help an organization and its public adapt mutually to each other." This definition implies that research, planning, communications dialogue and evaluation are utilized. Using this definition, the Urban Forester recognizes that the organization has multiple publics from which they must earn consent and support.

Background

Community and public relations have developed over the past 100 years as a way to bring private and public policies into harmony. When an Urban Forester uses public relations knowledge and skills, it considers employees, staff, local political bodies, local institutions or society at large.

When an Urban Forester is located or employed within a small government organization, community relations activities may be totally designed, developed and carried out by the Urban Forester. In larger government organizations, each department often has one or several people responsible for community relations activities. Working through this group or office is often necessary and is a department policy. Due to the often complex nature of urban forestry, the community relations office may work hand in hand with the Urban Forester and have them available at scheduled events to respond to media or public questions. Preparation and anticipation of the issues are considered in advance so that quality short responses can be developed.

What it Does

Community Relations as a management function encompasses many functions. These may include:

- Anticipating, analyzing and interpreting public opinion, attitudes, and issues that might impact the operations or plans of the organization. This may include such urban forestry controversial decisions as removing overmature trees along a public street or landscaping a local historical building.

- Planning and implementing the organization's efforts to influence or change public policy. Internally, this may include setting objectives, planning, budgeting, recruiting

and training of staff, developing facilities, and otherwise managing the resources of the urban forestry organization needed to plan, plant, provide for, and maintain the urban forest.

The Urban Forester uses a variety of communications skills to promote urban forestry. Media includes print, radio, television, Internet, public meetings and various related means of communication. In larger organizations, public service announcements may be developed and distributed to target media. The specific means is determined by the audience the Urban Forester is attempting to reach. For example, to inform residents when tree pruning crews will be conducting their work, door knob flyers or direct mailings would more likely be used than face to face communication. When homeowner associations are involved, contacting the organizations well in advance helps to get the needed information out to an entire community.

How Community Relations Helps

Internally, community relations can motivate and enhance productivity as well as create team spirit. It can also help recruit and retain qualified staff.

Community relations events help to assure that executives and public representatives are not isolated from the issues. Involvement of local representatives in Arbor Day programs, dedication ceremonies and similar events help promote local urban forestry programs. The Urban Forester may be asked to develop a short presentation for the representative to deliver. By incorporating key urban forestry principles into the presentation, both the community and representative will have an opportunity to learn more about urban forestry.

Externally, knowing the issues and concerns increases the effectiveness of community relations. The Urban Forester prepares the public or community relations office by telling them the kinds of telephone calls that are received as well as the typical issues and concerns. The community relations office can then be better prepared to represent urban forestry issues if the organization comes under attack. It further helps the community or public relations office to best represent the organization's position.

A community relations staff assists the urban forester in managing change. For example, the Urban Forester may want to transfer the role of tree planting to community based groups. This change may have a profound effort on staff and people within the community. Community relations staff must be prepared to field and answer questions, maintaining good communication within the community.

The Urban Forester as Community Relations Person

The Urban Forester is sometimes responsible for his/her own community relations. Some of the duties include:

Planning, developing, implementing, and coordinating a variety of public information and community outreach programs, activities, and projects in support of the Department's or

organizations services and programs; analyzing market data and creating and updating plans for such activities such as Earth Day, Arbor Day, and similar events. The ability to communicate in a multi-cultural environment is highly important in California where larger cities contain a mixture of nationalities and languages.

Representing the department, agency or organization at a variety of community outreach activities and public awareness programs; speaking to groups and individuals regarding department or organization activities and services, and participating as an active and continuing member of designated communication organizations, committees/project teams, and designating special interest work groups. These groups may include the local beautiful organizations, Fire Safe Councils, regional urban forest councils, local university curriculum advisory groups or solid waste reduction committees.

The Urban Forester develops good working relationships with local media. Newspaper staff writers and correspondents, and local cable television are all important links to the local public. The Urban Forester provides members of the community with similar as well as opposing views. Time and effort is required to develop an effective community relations program.

At a minimum, the examinee should be well-informed in the following areas:

The importance of community relations to an effective urban forestry program.

An awareness of the key issues within the community that involve urban forestry and how the urban forestry program is addressing them.

Training of urban forestry staff. There are five key questions that the staff should be able to answer regarding their urban forestry program: *who, what, when, where* and *why*.
Several sources of urban forest community relations efforts or specifications, duties and responsibilities for these positions can be found at the following internet locations:

City of Carlsbad, Community Forest Management Plan, Chapter Two – Community Education:
http://www.ci.carlsbad.ca.us/cserv/cfmppdf/chapter2.pdf

County of Solano, Community Relations Coordinator:
http://www.co.solano.ca.us/resources/HumanResources

BlueMineGroup – Strategic Marketing and Communications:
http://www.blueminegroup.com/outreach.asp

Additionally, the Public Relations Society of America has several publications that help to hone needed skills and knowledge. These can be found on their web site at:
http://members.prsa.org

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