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THE GREEN VISIONS PLAN

for 21st century southern california

1. Analytic Frameworks for the Green Visions Plan

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THE GREEN VISIONS PLAN

for 21st century southern california

The mission of the Green Visions Plan for 21st Century Southern California is to offer a guide to habitat conservation, watershed health and recreational open space for the Los Angeles metropolitan region. The Plan will also provide decision support tools to nurture a living green matrix for southern California. Our goals are to protect and restore natural areas, restore natural hydrological function, promote equitable access to open space, and maximize support via multiple-use facilities. The Plan is a joint venture between the University of Southern California and the San Gabriel and lower Los Angeles Rivers and Mountains Conservancy, Santa Monica Mountains Conservancy, Coastal Conservancy, and Baldwin Hills Conservancy.

www.greenvisionsplan.net

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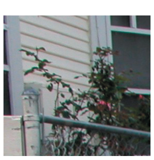
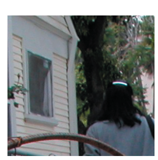
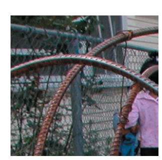

GUIDING PRINCIPLES

Introduction

The Los Angeles Chamber of Commerce released the Olmsted Bartholomew Plan for Parks, Playgrounds and Beaches for the Los Angeles Region in 1930. A visionary plan that integrated habitat conservation, watershed management, and recreation, the document has been heralded as an outstanding example of regional planning, and its recommendations still resonate today. Nonetheless, the Plan was pronounced dead on arrival by the Chamber of Commerce itself, largely due to its price tag, and literally vanished into the archives for decades. No plan of similar scope was ever drafted thereafter.

The continued rapid growth of population and outward march of urbanization in southern California makes the development of a new integrated strategic master plan for the region more critical than ever before. Moreover, the allocation of significant new bond and other funding for habitat conservation, watershed management, and recreation requires a consistent framework to support decision-making in a complex, politically fragmented urban region. State-created conservancies established for southern California have already begun important planning efforts for their specific territories. But at a time when public interest in urban open space, river parkways, and recreational needs is at an all-time high, the region as a whole still lacks an overall blueprint and the planning tools required to guide integrated investments in land acquisition, habitat restoration, park facilities, and watershed infrastructure. This lack of planning, in turn, hinders efforts to realize projects ranging in scale from butterfly gardens for dense urban neighborhoods, to urban trail systems linking schools, libraries and parks, to the restoration of riverways where freeways now command the landscape.

The *Green Visions Plan for 21st Century Southern California* is a joint venture by the Lower Los Angeles and San Gabriel Rivers and Mountains Conservancy (RMC), the Santa Monica Mountains Conservancy (SMMC), the Baldwin Hills Conservancy (BHC), and the California Coastal Conservancy (CC) to develop a comprehensive habitat conservation, watershed protection, and recreational opportunities plan for southern California. This effort, involving academic experts, political leadership, and stakeholders from the business, government, nonprofit, and community sectors, will provide a set of values and principles as well as technical planning tools, capable of guiding the development of a living green matrix for southern California. The Plan's area includes the RMC, SMMC, and BHC territories, as well as the CC's dual mandated territories (the coastal zone itself, and watersheds draining into the Pacific Ocean). Figure 1 illustrates these territories and the entire Plan area. This document provides an overview of the Green Visions Plan's goals, phasing of work, analytic frameworks, and expected deliverables.

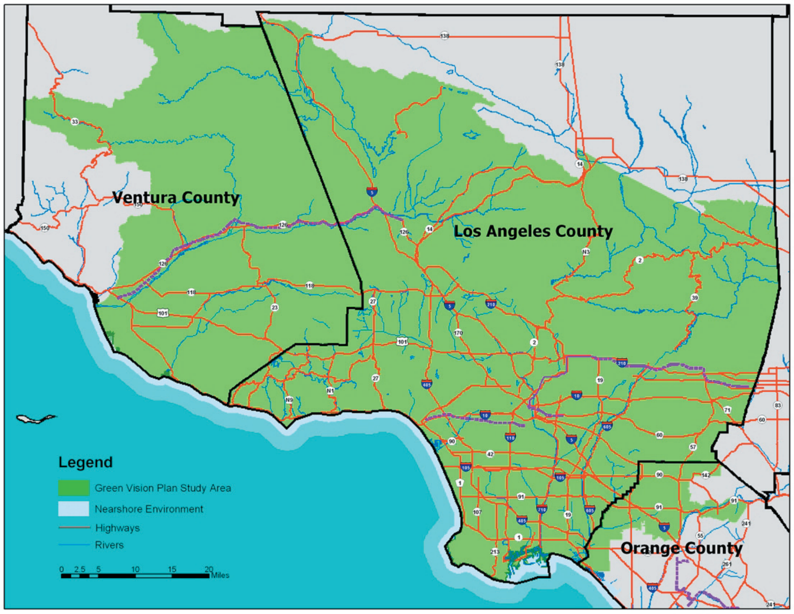

Figure 1. Green Visions Plan Area

Goals of the Plan

The goals of the *Green Visions Plan* are to:

- Protect and restore natural areas to ensure the persistence of native biodiversity and reintroduction of historically present natural communities;
- Restore natural function to the hydrological cycle to maximize groundwater recharge, improve stormwater quality, and minimize flood hazards; and,
- Increase and ensure equitable access for residents to a range of open space types and both active and passive recreational opportunities, and thereby reduce socioeconomic and geographic disparities in present-day patterns of access to these types of resources.
- Maximize political and financial support for the Plan by proposing multiple-use facilities wherever possible to meet the goals of habitat restoration and conservation, restoration of hydroecological function, and provision of recreational open space.

Clearly, these are ambitious goals. Although they are widely shared by the many public agencies and private organizations and residents concerned with making southern California more livable, equitable, and ecologically sustainable, the *Green Visions Plan* is not a regulatory plan. It will thus have no power to direct local land use. The primary value of the Green Visions Plan will be to set forth a needs-based, long-range plan designed to help the multitude of actors involved in shaping the region's future.

The Plan will highlight the opportunities and constraints that may arise as habitat conservation and restoration projects, open space acquisitions and recreation improvements, and efforts to protect watersheds are proposed and implemented. The tools and data developed as part of the Plan will also expand the analytic and planning capabilities of local agencies and organizations that seek to attract public funding or allocate their own resources, reduce the fragmented, piecemeal approach to regional resource planning, and promote projects whose collective impacts – because they are part of a larger scientifically grounded vision – are greater than the sum of their parts.

Green Visions Plan - Phase I

The University of Southern California (USC) Center for Sustainable Cities and GIS Research Laboratory (hereafter referred to as the Center and Lab) were chosen to take the lead in Phase I (pre-planning activities) of the *Green Visions Plan*. The Plan's team includes four academic scientists with expertise in urban park/open space planning (Jennifer Wolch, Geography), urban habitat planning (Travis Longcore, Conservation Biology), water resources and engineering (Joseph Devinny, Environmental Engineering), and GIS (John Wilson, Geography).

Phase I consists of creating an inventory of plans (developed or in process) in the plan area, and developing a data catalogue to identify gaps in geospatial data and other information that must be filled before more detailed planning and the GIS-based planning tool can be developed.

In addition, the Center and Lab will provide a basic framework designed to guide the major analyses involved in actually drafting the *Green Visions Plan*. This framework will set out the basic principles and criteria used to guide the planning process, describe basic methodologies and analyses needed to develop the final plan, and identify data requirements (see subsequent sections of this report for additional details). To help hone this framework, a panel of scientific experts was convened for a day-long workshop to review the draft framework. These experts provided numerous suggestions for improving the initial draft for which we are most grateful (see Wolch 2004 for additional details).

Green Visions Plan - Phase II

In Phase II, the major tasks identified in the framework will be undertaken, to identify and assess opportunities for habitat conservation and restoration, open space acquisition and recreational facilities development, and watershed protection efforts. The GIS planning tool and data sets will also be created. To retain its utility, the data infrastructure associated with this tool that will need to be managed. The GIS Lab will therefore provide the conservancies with guidance on costs/benefits of alternative approaches to database architecture, management, public access, and storage.

Dependent upon the scale of Phase II funding, several additional tasks are projected for Phase II.

1. Infrastructure Plan Conformance and Opportunities: Over the coming decades, major investments in urban infrastructures (roads, water) will be made in the Plan territory. Such investments present both opportunities and constraints. An analysis of these plans, and their conformance with Green Visions Plan strategies, will be conducted to identify opportunities and constraints for collaboration and/or redesign of planned infrastructure renewal or expansion efforts to enhance sustainability.
2. General Plans & Land Use. The Plan territory includes large numbers of cities and unincorporated county areas. Many of these jurisdictions have General Plan provisions for parks and open space, for example, and face a variety of land use constraints. The Plan will assess issues of General Plan conformance and land use conflict in areas targeted for green infrastructure.
3. Political & Legal Issues. A coordinated, integrated plan of this scale faces political and legal constraints (for example, overlapping jurisdiction or responsibility for regional problems, lack of institutional mechanisms to implement the Plan). The Plan team will identify these issues, and include a range of recommendations for solutions.
4. Critical Places & Demonstration Project Plans. It is clear from past planning efforts that there are a series of sites that are critical to the functioning of key recreational, habitat, and watershed

infrastructure systems, yet pose specific challenges due to land ownership, pollution, or public opposition. Five 'critical places' will be identified by the Plan team, and detailed studies will be performed to identify solutions that could be immediately implemented via demonstration projects.

5. Communications & Public Education. Through a dedicated website, regular e-newsletter, and a series of briefings, the Plan will update interested stakeholders and community members on results of analysis, plan elements, and recommendations.

The major deliverables for Phase II are expected to include:

- A Plan Book with:
    - ➢ Schematic Landscape Plans for Parks & Recreational Facilities
    - ➢ Early Notice Maps for Habitat Preservation/Restoration
    - ➢ Multi-Use Facilities Plans for Watershed Protection Management
    - ➢ Model Ordinances to Enhance Local Ecosystems
    - ➢ Critical Places Assessments & Pilot Project Descriptions
- Web Site with Links to Stakeholder Organizations, Public Agencies, etc.
- Multiple Public Access GIS Tools and Geospatial Data Sets
- Regional Version of the CA Legacy Project for Decision-making
- Alternatives and Recommendations for Database Maintenance

Habitat Conservation

Basic Planning Principles

The prospect of drafting a conservation plan for a three-county, multi-watershed area is both daunting and inspiring. The study area is large, with many natural communities ranging from ruderal urban sites to wilderness. The stakeholders are many and numerous conservation plans have already been completed at finer and coarser scales. But the objective is to create a template for “needs-based” conservation funding rather than “proposal-based” allocation of resources.

The benefits of a “needs-based” conservation plan are many. Proposal driven conservation funding allocates resources in those areas where particularly competent applicants desire to complete a project. These locations may indeed be worthy, but relying simply on proposals will ultimately result in an uneven distribution of resources to those areas with active jurisdictions or nonprofits, and fewer resources in locations lacking local constituencies. The resulting mosaic of conservation and restoration actions may or may not achieve synergistic conservation goals – the whole may not be more than the sum of the parts. The objective of a needs based approach is to prioritize the types and locations of projects that will become a coherent final product.

With respect to the conservation and restoration of biological resources, the mission of the Green Visions Plan is to provide a multiple use plan that, when implemented, will protect and restore natural areas to ensure the persistence of native biodiversity and reintroduction of historically present natural communities.

The biological component of this mission requires more than simply protecting existing biological resources. It requires reestablishing the range of natural communities that once were found in the study area. This additional challenge is necessary because of the extremely urban character of much of the region. Conservation planning in this landscape, while certainly including traditional approaches of protecting existing habitat, must also envision and evaluate the feasibility of restoring natural vegetation and ecological function within the urban matrix. The importance of doing so is reinforced by the other integral components of the mission – restoring hydrological function and increasing and ensuring equitable access to recreational opportunities.

The urban character of much of the planning area requires the development of planning principles for the biological analysis that differ slightly from traditional reserve planning and design. This part of the document proposes such planning principles and outlines the analyses and methods that will create a needs-based conservation plan for this diverse region. There are six key principles to be incorporated in this part of the plan:

1. *Incorporate recovery of listed species rather than persistence.*

The study area includes the historic range of many rare and endangered species, but lacks current populations of many of them. In prioritizing parcels in a conservation plan, the potential habitat for reintroduction of such species will be included.

2. *Recognize scale-dependent nature of connectivity for different taxa.*

As a first premise, the full range of native biodiversity cannot be reintroduced to all areas. While top predators will be excluded from many areas, connectivity can be established for other species at smaller scales. Furthermore, some small species, such as invertebrates and small mammals, may be supported in relatively small patches as long as high-quality habitat is protected and maintained. The plan should not privilege reserve design and connectivity for species at one scale (e.g. landscape linkages for mountain lions) to the exclusion of important connectivity at smaller scales (e.g. along small channels for coyotes) or for isolated habitat for small species capable of sustaining themselves (e.g. butterflies in dune and bluff scrub).

3. *Successful conservation in such an urbanized environment requires restoration.*

Restoration must play an important role in a comprehensive conservation plan. This may include restoration of connectivity through dam removal, restoration of hydrological function to create successional habitats, or active planting of vegetation communities. Restoration of natural vegetation is also critical to the mission of equitable access to recreational activities.

4. *Restoration goals should be based on historical conditions and the current (altered) topohydrological context.*

Restoration of vegetation communities usually endeavors to recreate the vegetation at a site at some point in history. Guidelines for restoration should be included in the plan to identify uniform goals for future projects. This should include a commitment to the maximum degree of ecotype accuracy (e.g. local genetic stock), completeness (i.e. restoring the full range of plant species rather than only dominant species), and hydrological appropriateness. The hydrological regime is so altered in the waterways of the region that recreation of historical vegetation at a particular location is virtually impossible. The Plan will accept that this is impossible, and attempt to identify ecological appropriate vegetation types within the context of the altered hydrological regime, and any restoration of that regime proposed within the Plan.

5. *Species recovery depends on maintenance and restoration of natural or semi-natural disturbance regimes (e.g., fire, flood).*

Disturbance regimes, or other ecosystem processes (e.g. nutrient flows, sediment flows) are essential to the maintenance of natural habitats. The plan will concentrate on identifying the ecosystem processes that maintain important habitats and give them equal weight in reserve design. Protecting individual occurrences of species is a flawed approach if a necessary disturbance regime is not maintained. For species using successional vegetation, or other dynamic habitats such as streamside pools, viable area for species persistence will be defined both by species ecology and the area required to maintain (or manage) an appropriate disturbance regime.

6. *The urban matrix can play a role in maintenance of regional biodiversity through education and provision of habitat for mobile species.*

Many conservation plans concentrate only on rare and declining species. While this is important, it usually leads to an approach that discounts any role for residential, industrial, and commercial areas of the city in conservation. This approach is counterproductive, because the lack of attention to the urban matrix ensures that conditions will be even worse for species in remnant habitats within that matrix. The urban matrix may provide valuable habitat for local species that are mobile (e.g. birds), species requiring small habitat areas (e.g. invertebrates), and migratory species. For example, white-crowned sparrows from northern California winter in the residential gardens of Los Angeles before returning to nesting territories in wildlands in northern California.

Methodological Approach

Four approaches are necessary to achieve the goal of conserving native biodiversity and reintroducing the range of historic natural communities. The first three are based on the well-known approaches to conservation planning: protection of rare and endangered species, ensuring representation of the range of natural communities, and designing a system that meets the traditional tenets of reserve design (connectivity, minimized edges, etc.). Existing plans, which are currently being compiled and summarized, will contribute significantly to the methodology described below.

Rare and endangered species

The first task for the species-centered portion of the conservation analysis is to identify a suite of focal species that represent a range of natural communities. Local planning efforts have already identified many of these – lesser nighthawk for alluvial sage scrub, burrowing owl for grassland, southern steelhead for streams. Other species would be included because they are associated with a particular disturbance regime or unique soil condition – Lyon's pentachaeta for disturbance, various Dudleya species for soil conditions. The focal species list should include up to 30-40 species, with the goal that the selection should provide a robust indicator of conservation value – that is, omission of one or two species or addition of species does not alter the outcome of the process.

For each focal species, natural history accounts will be prepared, with identification of landscape processes necessary for habitat maintenance highlighted. All known localities of the species will be mapped along with its historic range. Species recovery areas, where established by the U.S. Fish and Wildlife Service will also be mapped. For all species, current and historic distributions and natural history information will be used to produce a model of habitat suitability that can be used to map potential habitat within any potential conservation scheme. Prioritization of parcels will use incidence of multiple focal species, or endangered species as a rank, followed by addition of parcels within recovery areas, and then parcels within historic range that have potential for restoration. Prioritization of parcels within historic ranges will be guided by multiple use considerations as possible. Potential conservation schemes will be tested for sensitivity to the choice of focal species by applying the prioritization criteria to sets of randomly chosen species from the total number of species analyzed. If the choice of indicator species is sufficiently broad, the prioritization of parcels should not differ significantly with each random subset.

Natural community representation

Historic maps of vegetation within the study area are uneven. Some areas have detailed maps from the Weislander surveys, while others lack such documents. To allow extrapolation from areas where historic vegetation type is known, we will create a topo-climatic classification of the study area with a 10 m DEM. Vegetation in each cell both from current and historic vegetation coverages will be used to assign vegetation types to topoclimatic classifications. This interpretation will be augmented by other historical sources (e.g., journals, air photos, etc.) and field verification if necessary. Current topography will create a different vegetation map than actual historic vegetation, as a result of the drastic hydrological alteration of the region. Parcels with the rarest and least represented vegetation types will be added to the reserve design to ensure representation of the full range of vegetation types. Representation of natural communities will be especially important for many wetland and riparian vegetation types that have been so drastically altered in the modern era.

Reserve design and connectivity

The core of the reserve design for protected lands must include sufficient area and connectivity for the persistence of the top predator. Such core biological reserve areas will be identified using large mammals as focal species, concentrating on the mountain lion. This leads to the identification of a number of large-scale landscape linkages that are necessary to long term persistence. These "Missing Linkages" have already been identified through a multi-agency, multi-stakeholder process and will be incorporated into the reserve design.

The project must also identify linkages between habitats at a finer scale, to allow movement of wildlife between the larger open spaces of the urban matrix. These will be associated with the linear features of the hydrologic system as they are retooled to a multiple use design. Stepping stones of habitat within the urban area will complement the large contiguous habitats that necessarily form the core of any reserve design.

Results from these first three areas of investigation will be used to develop one or more GIS-based tools capable of prioritizing parcels for acquisition, restoration, and management. This will involve assigning a series of attributes to each parcel that could be weighted according to users' objectives to prioritize conservation actions. These values might include numerical representations of, for example:

- Number of endangered species
- Number of threatened species
- Presence of recovery area for endangered species
- Presence of recovery area for threatened species
- Presence of habitat for focal species
- Restoration potential for focal species
- Identification as part of landscape linkage
- Identification as part of local linkage
- Identification as part of "stepping stone" linkage
- Presence of rare vegetation/wetland type
- Presence of vegetation/wetland type not represented in public lands
- Presence of unique hydrological feature (e.g., vernal pool)
- Measures of connectivity (% natural habitat within certain radii)
- Measures of natural hydrological function
- Measures of natural fire regime

A prioritization scheme could select and weight variables depending on the funding source available to implement a certain project. As part of the development of the tool, a best case conservation scenario will be developed that identifies the ideal network of restored and protected lands for maintenance of biodiversity.

Urban matrix and restoration considerations

Two approaches will guide conservation efforts in the urban matrix. The first will be the development of a series of model ordinances that direct jurisdictions how to increase the ecological value of their neighborhoods. Topics for these guidelines include the resolution of human/wildlife conflicts, choice of street trees, tree trimming guidelines, building codes, noise, night lighting, fuel modification for fire safety, and "weed laws."

A second approach within the urban matrix will be to conduct an analysis that will help guide the placement of restored multiple-use "nature parks." The use of percolation theory in landscape ecology has the potential to guide the placement and size of such small urban pockets of nature. Percolation theory can yield information about the permeability of a landscape to a target species, given information about the species' mobility and random distribution of the suitable habitat patches. We will gather life history information about native target species that may become resident in small urban habitats. These species will likely include native birds and butterflies. The life history information will provide dispersal distances that can be combined with percolation thresholds to evaluate overall landscape connectivity. The result will be guidelines that not only guide how far apart small fragments should be, but the percentage of the landscape that must contain such small fragments to allow "percolation" of target species from one side to the other.

The plan will also include guidelines for the planning and implementation of restoration projects that will be consistent with the principles of the plan. Criteria to evaluate proposed projects and a framework to prioritize the order of restoration efforts will be provided. For example, exotic plant species removal should start at the headwaters of a watershed and work downwards rather than in the middle of the watershed where runoff will quickly bring new propagules.

Data Requirements
A significant quantity of geographic data must be acquired, manipulated, and stored to undertake this planning effort. These data will be used to make parcel-level rankings, and to develop and support proposed model ordinances. The data types envisioned for use include:

1. Vegetation
   - ❑ Wetland
   - ❑ Upland
   - ❑ Rare species
   - ❑ Invasive species
2. Soils
3. Topography
   - ❑ Current
   - ❑ Historical
4. Wildlife
   - ❑ Threatened, rare, and endangered (point data)
   - ❑ Point and range data for target species
   - ❑ Identified recovery areas for endangered species
5. Fire History
6. Land Use
7. Hydrology
   - ❑ Streamflow
   - ❑ Water quality
   - ❑ Precipitation
   - ❑ Channel characteristics (e.g., soft or hard bottom)
   - ❑ Flood control system
8. Climate
9. Other Disturbances
   - Noise (modeled from road network)
   - Artificial Night Lighting (from satellite observation)

Stakeholders
Planning for biological conservation involves many stakeholder groups, ranging from federal, state, and local public land managers and regulatory agencies, to nonprofit organizations advocating on behalf of native plants, wildlife, wilderness recreation, and urban habitat restoration and environmental education. The Biological Conservation Team will meet with a wide range of stakeholders, in small group contexts, to finesse the methodology before any analysis is completed, and again after the results of preliminary analysis are available. Moreover, we will insure that scientists with habitat conservation planning experience, and with urban and wildlands restoration expertise are part of the Steering and/or Visioning Committees, and on the Biological Conservation Technical Committee.

Watershed Health

Basic Planning Principles

Southern California faces numerous challenges in the realm of water resources. Principal among these are continued population growth and demand for imported water at a time when imports from one of the region's major sources – the Colorado River – will be shrinking. There will also be continuing problems with meeting water quality goals due to polluted urban runoff and groundwaters that contaminate the region's waterways and coastal ocean.

The poor quality of runoff water in Southern California is a result of two fundamental environmental changes: we have sealed much of the soil surface with pavement, and we routinely release pollutants in our neighborhoods. The natural hydrologic cycle, in which most of the water soaked into the ground, has been replaced by a paved drainage system that sheds most of the water quickly following storm events. As a consequence, less water enters groundwater aquifers to become the supply for drinking water wells, increased runoff threatens floods and carries trash and pollutants to the ocean, and we live in an environment that is increasingly more asphalt-black and concrete-gray than green. Although strategies to contain water demand have reduced the region's collective thirst, the increasing discharge of reclaimed wastewater and other surface discharge – lawn watering overflow, streetside car washing and others, from households, sprinklers, car-washes, and other sources – into the regions' waterways has dramatically altered stream flow regimes and hence the nature and quality of urban habitat.

The need for watershed planning and restoration is now widely recognized as the preferred approach to dealing with these issues; protecting uplands, implementing stronger source controls, treating runoff prior to discharge, greening and increasing the permeability of the urbanized portions of the region. These steps will replenish groundwater supplies, and improve the quality of the region's waterways and aquatic habitat.

Such changes will be driven in part by regulatory pressures. The Los Angeles Regional Water Quality Control Board has recently negotiated a stormwater quality control permit for the region and has begun issuing regulations defining Total Maximum Daily Loads (TMDLs) for transport of pollutants by stormwater to local receiving waters. Compliance with these regulations likely will require billions of dollars in expenditures and application of new technologies. While a major part of the effort will be eliminating the release of pollutants at their sources, some pollutants, such as nutrients and bacteria, are unlikely to be removed to acceptable levels by source control. Solution of the problems associated with these pollutants will also require changes in infrastructure design and land use patterns. The goals of these regulations are far more likely to be met at acceptable cost if water quality control measures are part of multiple-use facilities such as treatment wetlands and storm water parks – facilities that also help replenish groundwater supplies and reduce reliance on imported water.

While compliance with storm water and dry weather runoff regulations is not an explicit objective of this plan, it is clear that the objectives of runoff quality control and this Green Visions Plan are inextricably linked. A stream cannot be considered "greened" if its water is polluted. Municipalities are unlikely to invest in greening projects that do not simultaneously help them meet water quality regulations. The health and restoration of the region's riparian habitats and endangered species will depend on efforts to protect and in some instances, restore the region's natural hydrological functioning.

Hydrological restoration in the Green Visions plan area is thus critical. The goal of the Green Visions Plan is to restore natural function to the hydrologic cycle to maximize groundwater recharge, improve storm water quality, and minimize flood hazards. There are four key principles to be incorporated in this part of the plan:

1. *Streams and rivers should be restored to aesthetic and biologically valuable riparian habitats, supporting a variety of wildlife.*

Many urban areas are re-engineering streams and rivers, for their biological, social, and economic value. Green Vision planning for the Los Angeles, San Gabriel, and Santa Clara Rivers and their tributaries will focus on replacing concrete flood control channels and buried storm water pipelines with esthetically appealing riparian habitat and riverside parks. Underground storm drains will be "daylighted" to become streams again and the walls of flood control channels will be widened, sloped, and converted to parks, wildlife habitat and infiltration systems. Because the streamside habitats will represent a variety of ecological communities, it is important that their hydrological characteristics also vary: they may be deep, permanent streams, rapids, meandering ephemeral streams, ponds, or wetlands. Historical data will be an important guide in choosing the appropriate mix of hydrologic and ecological site restoration objectives.

2. *Groundwater detention and infiltration should be maximized in order to reduce polluted runoff to rivers, reduce floods, and improve groundwater supplies.*

To achieve river and stream restoration without unacceptable increases in flood risk, and to keep the streams clean, it will be necessary to provide upstream and off-stream facilities to treat and infiltrate groundwater. Treatment wetlands will provide storm water treatment, storm water detention and infiltration, wildlife habitat preservation, and passive recreation such as walking, nature observation, and picnicking. Storm water infiltration systems will primarily take the form of "storm water parks" that will provide storm water infiltration, wildlife habitat, passive recreation, and active recreation such as soccer. Polluted dry weather runoff should be infiltrated or diverted to wastewater treatment plants.

3. *Source control should be instituted to reduce the discharge of pollutants to runoff water, and storm water quality control facilities should be installed to prevent the remaining pollutants from entering reservoirs, rivers, and nearshore ocean environments.*

The "green aspects" of storm water quality control must be designed in concert with other engineering approaches. Runoff from watersheds, for example, can be reduced through the use of parking lots and other paved surfaces that allow infiltration of water; small-scale runoff treatment facilities such as SMURF can also be utilized. Following these types of interventions, the hydraulic and pollutant loads will be reduced, smaller and cheaper treatment systems become possible, and the need for concrete flood and erosion control structures will be reduced.

4. *The goals of groundwater recharge, storm water infiltration and quality control, and restoration of hydroecological functioning should be met by multiple-use facilities wherever possible in order to maximize political and financial support for the program.*

Watershed protection measures such as riparian restoration and storm water detention can readily be integrated into plans for both active and passive recreation, and the provision of wildlife habitat. Numerous models for multi-use facilities exist, and can be used to guide the Green Vision Plan.

Methodological Approach

The methodological choices for the hydrologic analysis seem less clearcut than was the case for habitat conservation – there are numerous analytical and modeling approaches that have been proposed and several that have been implemented to support specific projects in the Plan Area during the past few decades. The methodology detailed below therefore takes a different but complementary path by focusing on what we can achieve at the regional scale that is not likely to be accomplished with these other studies.

Stream networks

The first task for the watershed portion of the Green Visions Plan will compare historic hydrologic conditions and features to present conditions. Historically, the Plan area looked very different from its current network of concrete lined flood control channels, dams, storm drains, and urban hardscape. Streams once cascaded down the steep scrub-lined channels of the foothills into a braided network of washes and channels that often changed course on their journey to the ocean. These flows supported a variety of biophysical processes, including sediment transport, nutrient cycling, and groundwater recharge and discharge, pollution sequestration and transformation. Over time, these processes, critical to a number of the region's hydrology-driven ecosystems, have been severely disrupted as the flood control system and urban landscape were constructed.

The geographic location and character of this disruption will be documented by constructing two sets of GIS-based hydrologic layers – one delineating the historic stream network and the second documenting the extent and character of the present-day stream network. Much of the information about the historic conditions will be obtained from historical USGS map quadrangles and other historic sources. This analysis will be repeated to describe the present-day conditions and we will also create a topo-hydrological classification of the study area with a 10 m DEM and use this classification with data on surface water hydrology and vegetation to help document current conditions and guide the design of stream and habitat restoration efforts. This interpretation will be augmented by other sources (e.g. journals, aerial photos, etc.) and field verification as necessary. The results will include the classification of streams in terms of function (first order, second order, third order, etc.) and flows (perennial, intermittent, or ephemeral) as well as the identification of depressional features such as lakes, marshes, vernal pools, etc.

Current watershed health

Numerous models and databases exist that can be used to describe the current watershed health across the Plan Area. These resources range from the water balances developed by the California Department of Water Resources to the land use models developed by Los Angeles County to characterize water quality conditions in parts of the study area and the HGM models for evaluating aquatic habitat parameters developed by the U.S. Army Corps of Engineers.

The water quality modeling tools developed by the Los Angeles County Department of Public Works divide the landscape into a series of sub-watersheds (similar to the aforementioned historical analysis) and then into a series of land cover and land use classes. The tools then use a series of coefficients and parameters to predict the water quality impacts of these different land cover and land use components. The current version of the model runs in ArcView 3.x (Environmental Systems Research Institute, Redlands, California) and uses parameters and coefficients that have been specifically developed and calibrated for southern California conditions.

This type of model offers a viable approach to cope with the extraordinary complexity and patchiness of the built environment across the entire Plan Area. In particular, this approach would appear to offer four major advantages. First, it means that the assessment can be organized in a GIS framework – this will help us to integrate the various results across the habitat conservation, watershed health and recreational open space focus areas. Second, it will permit us to generate results that provide a regional perspective at reasonable cost. Third, the tools we build will be able to link cause and effect (e.g. land use and water quality impacts). Fourth, this approach will facilitate the specification and testing of various scenarios for improving habitat, watershed health, and recreational open space across the Plan Area. That said, we recognize that more sophisticated modeling work may be desired for small areas and/or specific project proposals.

We therefore plan to create an inventory showing the sites where more detailed analysis and modeling studies have been completed and/or is now underway. Many of these studies utilize very elaborate models such as HEC-RAS (U.S. Army Corps of Engineers) and the MIKE series developed by the Danish Hydraulic Institute and our intent here is to build a bridge between our work at the regional scale and these local projects. This approach recognizes the need for additional analysis to evaluate the specific project proposals that are identified and/or highlighted using the types of modeling tools that we plan to utilize for the Green Visions project.

Groundwater resources
There is also the need to describe the groundwater aquifers and where infiltration occurs at present. This information will be compiled and/or inferred from published maps and reports on the surface geology and soils as well as the groundwater resource itself. It will be important to characterize how this resource has changed over time because many of the proposals for restoring hydrologic function will anticipate augmenting this resource in future years.

Hydrologic function restoration
Possible sites for stream daylighting, channel naturalization, wetlands and storm water parks will be identified, and the implications of these interventions for downstream hydrology, runoff volumes, and groundwater supply estimated. Because altered hydrological conditions influence possibilities for habitat restoration, the potential for change in downslope habitat quality will also be assessed. For example, a wetland or park that is also used for storm water quality control must be downhill from the watershed served – pumping storm water is always expensive and usually not practical. The size of the facility must be sufficient given the size of the watershed and the technology employed, to provide the necessary water-handling capacity (a typical plan would involve treating the first-flush ¾-inch storm, for example).

The results from these four areas of investigation will be used to develop one or more GIS-based tools capable of prioritizing parcels for acquisition, restoration, and management. This will involve assigning a series of attributes to each parcel that could be weighted according to users' objectives to prioritize actions that restore and in some instances, enhance existing hydrologic function. These values might include numerical representations of, for example:

- Watershed or sub-watershed in which parcel is located
- Soil infiltration rate and depth to water table (i.e. underlying groundwater aquifer)
- Landscape dryness index
- Land area that drains to selected parcel (as indicated by both original and current land surface)
- Number and areal extent of selected land cover types and land uses (e.g. large parking lots, vacant lots) that occur upslope of selected parcel
- Upslope drainage area as delineated by storm drain system
- Number and areal extent of selected land cover types and land uses that occur up-slope of parcel (as defined by storm drain system)
- Volume of runoff that travels over and/or through parcel following storms of different magnitudes
- Distance from parcel to nearest stream or wetland
- Distance from selected parcel to nearest upslope storm drain
- Distance from selected parcel to nearest downslope storm drain

A prioritization scheme could select and weight variables depending on the funding source available to implement a certain project. As part of the development of the tool, a best case hydrology scenario will be developed that identifies the ideal network of restored and protected lands for the restoration and/or enhancement of hydrologic function.

The related GIS watershed tools will enable us to identify networks of locations within the region's sub-watersheds that best handle expected discharge. These tools will also provide information on large parking lots, vacant lots, and other sites that might be appropriate for engineered infiltration and treatment facilities that could be used to reduce downstream pollutant and hydraulic loads. An effort will be made to identify sites on a mix of waterways (on different parts and levels of the stream network) to facilitate the identification of sites that can contribute to desynchronization – that is, delaying a portion of the water flow so that peak flows are reduced. It is important that peak flood flows be mitigated so that the need for concrete infrastructure is reduced.

To determine whether a prospective site is a good candidate for creation of a storm water treatment system, or riparian restoration, data specific to the site must be available. Because storm drains are varying distances below grade, the watersheds they define may not exactly coincide with the watersheds defined by the land surface. It will be necessary to know both. The system that eventually conducts the water to the treatment facilities will likely be a combination of existing drains, new drains, and surface flows. The site should be available (not currently occupied by a school, for example) and capable of sustaining at least moderate infiltration rates, and the underlying aquifer preferably would not be polluted. The quality of the runoff from each watershed to be served will be a critical parameter, as will data on land use, surface slope, infiltration rates and soil type, depth to ground water, and the presence of ground water pollutants.

Overall, it is expected that the project will provide a general plan for multiple-use sites for storm water control, habitat, and recreation, and will provide a tool to help municipal authorities determine which watersheds fall within their boundaries and which parcels are the best candidates for storm water parks and other greening projects.

With respect to stream daylighting and channel naturalization, however, parcel capacity to handle restored upstream overland and subsurface flows once restored must be assessed. Similarly, downstream changes in hydrology created by daylighting or channel naturalization projects will influence the required capacity of the storm drain system and channel morphology at lower elevations. These changes will also influence the surface and subsurface wetness of riparian corridors, and hence the ability of corridor segments to support various types of habitat. We will therefore develop a 'landscape dryness' index that allows us to estimate how such restoration-related interventions alters potential vegetative cover and habitat suitability for wildlife.

The aforementioned GIS-based watershed tools that are produced for practitioners will work in two ways. In one instance, a user would click on the watershed and see the land area and associated waterways that could be used as a water treatment or restoration site, along with the parcel or stream segment's water storage capacity (this will vary by soil type, depth to groundwater, vegetative cover, etc.). In the second case, the user would click on a site to display which watersheds it could serve, and the flow volume that it receives during precipitation events of varying magnitude. These tools would also identify the pristine sub-watersheds that might serve as reference areas for water quality and hydrological function.

Data Requirements

Implementation of a parcel level analysis of the hydrological environment requires a number of sets of data. These include extensive geospatial data, some with associated temporal data:

1. Topography
   - ❑ Current
   - ❑ Historical
2. Flood Control System
   - ❑ Channel and Basin Size and Characteristics
   - ❑ Infiltration Capacity
   - ❑ Storm Drain System
3. Hydrology
   - ❑ Streamflow
   - ❑ Water Quality
   - ❑ Precipitation
   - ❑ Hydrographic Records
   - ❑ Channel Characteristics
4. Soil Type
5. Depth to Groundwater
   - ❑ Groundwater Pollution
6. Land Use
7. Vegetation

Stakeholders

Planning for watershed protection involves many stakeholder groups, ranging from federal, state, and local watershed and coastal zone managers, water suppliers, regulatory agencies charged with responsibility for water quality, to nonprofit organizations advocating watershed protection, habitat restoration, river recreation, and economic development. The Watershed Team will meet with a wide range of stakeholders, in small group contexts, to finesse the methodology before any analysis is completed, and again after the results of preliminary analysis are available. Moreover, we will insure that scientists with watershed protection, flood control, storm water quality, and aquatic habitat restoration expertise are part of the Steering and/or Visioning Committees, and on the Watershed Technical Committee.

Recreational Open Space

Basic Planning Principles

The Green Visions Plan area is both geographically extensive and diverse in terms of human populations, current land uses, and open space opportunities. Overall, despite its extensive wildlands, the urbanized portion of the region is park-poor and existing park and recreation resources are inequitably distributed in relation to need. Many communities are extraordinarily dense, have little private open space, and few parks or recreation facilities. Moreover, even for those residents within easy access to a neighborhood park, the range of recreational opportunities provided may be strictly limited. Finally, many residents lack access to any semblance of nature, living far from local mountains and beaches, in neighborhoods where the backyard stream has long been converted into an underground pipe. With respect to parks, recreation and open space, the planning challenge is to create a multiple use plan that, when implemented will increase and ensure equitable access for residents to a range of active and passive recreational opportunities to remedy the shortage of open space and reduce socioeconomic and geographic disparities.

Our recreation and open space planning efforts will be guided by six basic principles, based on the region's need to address profound and well-documented inequities in access to parks and open space, and the imperatives to incorporate multi-use planning objectives – such as habitat conservation and watershed protection – for all open space proposals. Lastly, our planning is guided by a commitment to engage the region's residents in both the technical specifications of our analyses and policy recommendations that emerge from the planning process.

Our basic planning principles, and their implications, are:

1. *Involve communities in the parks and recreation planning process.*

Local jurisdictions, special districts such as water boards or conservation districts, and nonprofit organizations have developed a large number of plans for recreation and parks facilities, trail development, and open space acquisition for purposes of habitat conservation and/or watershed protection. Such plans typically reflect important community goals as well as extensive scientific analysis. These plans will be integrated into the planning process. Moreover, the plan will rely upon both stakeholder and general public participation throughout the planning period, particularly in the design of analytic methods, and development of criteria for prioritizing projects.

2. *Enhance access to recreation opportunities, parks and open space for all residents of the region, especially park-poor low-income, African American and Latino communities.*

The vast majority of residents lack easy access to parks, open space, and/or recreation opportunities. Increasing access will be achieved through a prioritized plan for open space acquisition. Park-poor communities, identified on the basis of both acres of parklands and access to a mix of recreation types (active, passive, particularly sports facilities), will receive high priority for park facilities and open space acquisition. Opportunities to develop large parks will be balanced by the need to offer easy access to parks and open space in underserved areas through the development of small-scale facilities integrated into existing neighborhoods.

3. *Maximize connectivity of trail/bike pathways in the region to promote physical activity, enhance access to natural areas including the region's rivers, mountains, and beaches, and encourage nonmotorized transportation modes.*

The region already has extensive bikeways and trails, whose connectivity can be enhanced through selective land acquisition and trail construction. Wherever possible, such connections will promote linking urban trails and park facilities to the region's large landscape features (such as its rivers, mountains, and beaches). Such facilities should reinforce landscape connectivity and improve hydrological functioning.

4. *Emphasize the improvement of coastal access and connections between beaches and inland communities, to insure that the region's residents can enjoy the nature, recreational opportunities, and aesthetic benefits of the coast and its beaches.*

The coastal zone is one of the region's most cherished features, yet many residents and communities do not have access to the beach. The Plan will highlight possibilities for improving coastal access, and making stronger connections between inland communities and the coast via linkages with trails and bikeways.

5. *Incorporate habitat restoration and watershed conservation features in existing parks and new acquisitions.*

The biological and watershed components of the Plan will identify and prioritize critical habitat 'cores' for acquisition, both to protect sensitive species and improve the hydrological functioning of the watersheds. But an important planning principle for the urbanized area is to encourage new urban park facilities to serve both watershed protection and habitat restoration purposes, to take advantage of hydrological features and/ or native landscape remnants in park siting and design, and use park facilities as sites for habitat restoration.

6. *Promote joint use recreation facilities with school districts, such as LAUSD, and other types of public facilities (such as libraries).*

Joint-use planning of public facilities is widely recognized as a critical strategy for improving neighborhoods and providing focus locations for community life. Plans for the construction of a large number of new schools over the coming decade offer a range of park and open space possibilities. Such joint-use opportunities will be identified via mapping and dialogue with school district representatives.

7. *Balance needs of urban residents with those of wildlife, to minimize deleterious human disturbance of ecosystems, and conflicts between wildlife and recreationists.*

Increasing access to the region's wildlands also increases interaction between people, companion animals, and wildlife, and the potential for detrimental disturbance of soils, vegetation, and wildlife habitats (foraging areas, nesting sites, cover). The plan will differentiate open spaces targeted for habitat conservation and restoration in terms of their sensitivity to a range of user activities, to protect sensitive species.

8. *Use park and open space facilities to promote environmental awareness, education, and access to the region's natural areas.*

Since many residents have poor physical access to natural areas, the plan will rely upon the development of a network of 'nature parks' to introduce people to bioregional flora and fauna, and to serve as a public transportation hub for regular outings to the region's large-scale natural areas, such as its rivers, mountains, and beaches. This network will be designed to maximize habitat value for mobile species.

In addition, we will rely upon a small set of landscape and park design principles in our recreation planning efforts, and related model ordinances for cities, that reinforce the planning principles and help meet the habitat conservation and watershed protection goals of the Green Visions Plan.

1. Native and/or regionally appropriate vegetation will dominate the park plant palette proposed for new or renovated park and recreation facilities.
2. Parks structured around ecosystem functions, such as stream daylighting parks/paths, stormwater parks, and nature parks, will be used to improve hydrological functioning, increase connectivity between habitat patches, provide support for migratory bird and insect populations, and provide everyday access to nature for local neighborhoods.
3. Developable slopes and canyons within residential areas, critical to native avifauna as well as informal recreation, will be targeted for preservation, and local trail and open space development.
4. Landscape connectivity at both small and large scales will be emphasized in the development of planning priorities.

Methodological Approach

Our analytic approach is based on estimates of need for additional parks, open space, and recreation facilities, as well as an assessment of current and potential supply of land for new opportunities, and projects already identified by localities, special districts, and community-based organizations.

The needs analysis will involve characterizing population at the census track level according to 'neighborhood types' (e.g. Latino-dominated, etc.) or subareas, and defining park-poor and park-rich areas based on the distribution of existing park/recreation resources. To characterize existing resources, a GIS data layer describing all existing park and recreation facilities, open space, and trail systems, along with a schools layer (existing and planned), and other key public facilities will be created. Existing open space and recreational facilities will be characterized according to a taxonomy of open space opportunity/recreation types or mix (e.g. hiking or bike trails, wilderness areas, native habitats, riparian zones, as well as recreation facilities such as swimming pools, tennis courts, etc.). This facility characterization system will be based on web-based data collection, sampling and ground truthing protocols, and will provide detailed information on current acres of park and open space lands in the region, and mix of recreational opportunities.

To assess both absolute levels of access and inequities in access, ½- and ¼-mile buffers will be created around each tract centroid, and access of populations of all neighborhood types to any park space will be estimated. Populations with and without ¼ or ½ mile access will be characterized according to neighborhood race/ethnic and socioeconomic parameters, to produce a visualization of the location and type of neighborhoods according to their park-richness. This analysis will be repeated for types of facilities in the park taxonomy. We will use the street grid to estimate network distances, and adjust for residential density and major arterial barriers to access.

In addition, we will develop a generalized accessibility measure that indicates access to all types of facilities, to establish areas that are park-rich or park-poor with respect to open space type/facility mix.

Finally, we will develop a weighting scheme recognizing that recent rounds of park bond funding have been able to augment park, open space, and recreation resources in some communities but not others. We will plot the distribution of park bond resources (such as Prop. K in the City of LA, Prop. A in LA County, Props. 12 and 13, Prop. 40, etc.) to identify communities that are both park-poor and which have received less than their pro-rata share of park bond resources, and use this information to adjust the demand surface.

On the basis of the needs analysis, we will map 4-5 categories of need for park/recreation space, and 4-5 categories of need for greater mix of open space/recreation opportunities. These maps will be completed at the census tract level.

Potential supply will be derived from County Assessor information, conservancy information, and other sources to identify potential parcels for land acquisition. These parcels will be ground truthed with cities and counties, community-based organizations (watershed councils, recreation coalitions, etc.) to insure accuracy. In addition, we will augment this map layer with planning projects identified in local general plans, special purpose plans (such as the Forest Plans, species and wetland recovery plans, flood control plans, etc.), and nonprofit organization plans (including groups such as watershed councils, tree-planting organizations, and recreation groups).

Parcels identified via this data collection process will be grouped into 4-5 categories of priority with a series of specially constructed GIS-based tools according to their ability to meet specific criteria, judged on the basis of our habitat conservation and watershed analyses, and local-area plans. These values might include numerical representations of, for example:

Current land use is suitable (vacant, public land, school sites, remediable brownfield, etc.)
Adjacent to streams (surface or potentially daylighted)
Potential to link to trail system, and/or major rivers and associated park/trail networks
Drains 1 square-mile subwatershed area
Developable slopes
Ability to enhance green matrix connectivity and coastal access
Coincides with areas designated for focal species or wetland recovery or restoration
Potential for user/wildlife conflict and human disturbance of sensitive species' habitat
Park bond expenditures historically low relative to regional average

Maps of priority parcels will be analyzed in conjunction with our demand surface. We will produce a small number of scenarios that reflect alternative weightings of social and environmental values, to show stakeholders the implications of stressing access improvements relative to watershed protection.

These scenarios will create a preliminary identification of projects, by subregion of the plan area (with subregions defined initially by city and/or major topohydrological features such as watersheds). Each scenario will be evaluated according to the extent to which it meets the overall goals of the Green Vision Plan (based on acres of habitat protected, acre-feet of runoff absorbed or contribution to groundwater recharge, share of underserved population enjoying better park access).

In addition, the GIS planning tool, reflecting parks and open space data on demand and supply, will allow users to create their own preferred scenarios and priorities, by altering weights of social and environmental values as reflected in the aforementioned criteria, and/or by adding their own (i.e. new) criteria.

Data Requirements
Several data sources are key to the recreation component of the analysis:

1. Census 2000 data at census tract level
2. Parcel data from County Assessor files
3. Park, open space, and recreation facility information by acre, type, and quality
4. Road data for network analysis
5. Plan inventory projects for recreation/park, habitat restoration or conservation, and watershed protection, by acreage and type
6. Digital Elevation Models (DEMs)
7. Topohydrological features
8. resence/absence of sensitive species
9. Current land use

Stakeholders
Planning for recreational opportunities involves a wide variety of stakeholder groups, many with diverse interests in terms of active versus passive recreation, small versus large park sites, multi-use versus single use facilities, etc. The Recreation and Open Space Team will conduct focus groups with key stakeholders and organizations (the Verde Coalition, Trust for Public Land, TreePeople, and others) to finesse the methodology before any analysis is completed, and again after preliminary analysis results are available. Moreover, we will insure that grassroots organizations are part of the Steering and/or Visioning Committees, and on the Recreation & Open Space Technical Committee.

GIS Tools

The three analytical frameworks described in the previous section specified the various types of geographically referenced data that will be required to develop the Green Visions Plan and to engage the region's residents in both the technical specifications of our analyses and policy recommendations that emerge from the planning process. These geospatial data resources will be used to develop suites of customized maps and complementary information products that are tailored to serve both the tasks and audiences at hand. Hence, multiple versions of the maps will be produced for display in plan documents, public meetings, and on the web. The major challenges and tasks fall into three categories as follows.

Geospatial Data Compilation
Our analytic approach relies on the acquisition and use of a series of geographic datasets containing various shapes (i.e. points, lines, pixels, and polygons) and their attributes. The sample lists provided with each of the three analytical frameworks give some guidance as to the type of geographically referenced data that will be required to develop innovative and sustainable habitat conservation, watershed health, and recreation plans. These diverse data themes will require the management of multiple geospatial data formats – point/line features (vectors), grid cells/pixels (rasters), and various forms of imagery and photography – and the implementation of a series of solutions to cope with the geographic registration and conflation problems that typically accompany geospatial data drawn from different sources.

GIS Analysis, Modeling, and Mapping
The preparation of the Green Visions Plan will require various types of spatial analysis and modeling, as noted under each of the three analytical frameworks. All of the aforementioned models can be implemented in a GIS environment and some additional analysis (e.g., buffering, network analysis, topological overlays, and terrain analysis) will be required to produce the types of outputs that are envisaged.

We anticipate building different tools and information products for different groups – with one set for the conservancies and another for the general public and perhaps a third set for local cities and regulatory agencies. This approach will maximize the likelihood that we can deliver tools and information products of value. The tools, themselves, are likely to vary both in terms of their level of sophistication and in terms of what they can and cannot do, whereas the information products are likely to vary in terms of their geographic extent and specificity (i.e. resolution). We plan to work with our conservancy partners to prioritize the needs of the three audiences (and the information products that might be constructed for each group) and to spend some substantial time trying to understand the decision processes of the different groups of users (and perhaps less time on the technical design issues).

There are several different options to choose from in building decision support tools for these different audiences. These options range from a Legacy- or GAP-style product, that is essentially a database generalized to some resolution that users can deploy on their own, to an intermediate tool that shows some type of composite score and pre-set buffers for a land parcel the user clicks on, to a system that provides parcel scorecards, flexible weighting systems, and various web mapping options.

The habitat conservation, watershed protection, and recreational open space analytical frameworks anticipate using the third option. This option envisages producing scorecards for parcels that list the appropriate characteristics of each parcel and the area surrounding it. The habitat conservation scorecard might provide scores for those characteristics deemed central to an assessment of value for conservation or potential for restoration, for example:

Number of endangered species
Number of threatened species
Presence of recovery area for endangered species
Presence of recovery area for threatened species
Presence of habitat for focal species
Restoration potential for focal species
Identification as part of landscape linkage
Identification as part of local linkage
Identification as part of “stepping stone” linkage
Presence of rare vegetation/wetland type
Presence of vegetation/wetland type not represented in public lands
Presence of unique hydrological feature (e.g., vernal pool)
Measures of connectivity (% natural habitat within certain radii)
Measures of natural hydrological function
Measures of natural fire regime

We would anticipate constructing these tools so that parcels could be scored on each of these criteria (with 0 indicating low value, i.e. no endangered species present or likely to be present, and 10 indicating high value) and the scores for individual criteria then summed to produce a composite score for any one or all three of the Green Visions Plan goals. These summary scores or ranks could easily incorporate different weights for different criteria and to support this option, we anticipate providing sliding bars to enable users to vary the weights to suit their own needs and/or interests. This approach will provide us with the opportunity to consider the social setting as well as the underlying science.

The scorecards themselves will focus on the parcel or some other unit of analysis (as discussed below) and help users to evaluate the significance of doing x or y at this place. Some additional analysis and mapping tools will also need to be provided to support regional assessment (e.g. where would you look to invest $40 million for riparian habitat restoration if funds for this specific purpose were suddenly made available?).

The choice of the parcel as the basic unit of analysis here may be problematic. Some of the concerns about this choice focus on geographic variability – the parcel might serve as the best unit of analysis in built-up areas but not in other areas for example – whereas others focus on the desirability and need for contextual queries – the parcel might serve as a locator to launch a query over a larger area (sub-watersheds, habitat corridors, circular windows, etc.) centered on that particular parcel. The basic problem is that the choice of spatial unit is critical and there was not be one option that would best serve all of the different variables and/or parts of the Plan Area. Some additional work is needed to clarify the desirability of the different options (i.e. parcels, 1 hectare square grid cells, quarter sections, circular windows of varying sizes, etc.).

We may also want to consider expanding the scorecards to include some consideration of threats. This is tricky because these threats can and will change quickly. In addition, some threats will take the form of direct competition (i.e. they would be parcel-specific) whereas others will focus on connectivity issues and other types of linkages. Both of these categories of threats may be difficult to identify and capture with the types of GIS tools envisaged here.

The various issues raised here point to the need to clarify the scope and purpose of the various analytical and mapping functions that are included in the final design. We will therefore solicit additional feedback on these designs from the Steering and/or Visioning Committees, and the Habitat Conservation, Watershed Health, and Recreation & Open Space Technical Committees at regular intervals in hopes of building tools that serve the needs of the various stakeholders.

Geospatial Data Management

There are various paths that can be taken to manage the geospatial datasets that are prepared and used to prepare the plan and the accompanying tools, and we anticipate describing several of these options in the Green Visions Plan itself. Taking no action would provide a set of tools that decline sharply in usefulness through time as the geospatial data becomes less accurate in terms of its depiction of conditions on the ground with time (much like the decadal census). Providing more or less continuous updates would help to sustain the viability of the tools through time but would require a level of inter-agency cooperation and data sharing that is currently not found in the Los Angeles Metropolitan Region. There are of course many other options beyond these two extremes that involve periodic updates for some or all of the datasets (as described below).

This last comment is relevant because the need for and desirability of updates will vary by data theme. Some datasets will not change very quickly whereas other datasets will change from one day or month or year to the next. The land ownership information exemplifies this second possibility and these data could be acquired on a one-time basis (e.g. as a snapshot at the start of the project), at one of several prescribed time intervals (e.g. once every quarter), or continuously via some type of distributed data sharing arrangements. The technical possibilities are numerous and the most substantial data maintenance challenges probably involve the development and implementation of data sharing agreements among the various government agencies that might contribute their data to the Green Visions Project.

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