Policy Considerations for Implementing a Sustainable Land Use Plan for the Claremont University Consortium

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Introduction:

The Need For a Consortium Sustainable Land Use Plan

Universities across the country have translated the call for immediate, worldwide action to reduce global warming into campus carbon-reduction action plans. Higher education’s support for climate action is evidenced by the nearly six hundred signatories to the American College & University Presidents Climate Commitment\(^1\). Aside from the moral value of environmental stewardship, university officials also recognize that impending regulatory and financial realities provide strong incentive for their institutions to adopt greener practices. The Claremont Colleges are no exception; Pomona\(^2\), Pitzer\(^3\), Scripps\(^4\), Harvey Mudd\(^5\) and Claremont McKenna\(^6\) all have “green” initiatives ranging from recycling to sustainable living, building and facility management practices.

The Claremont University Consortium (CUC) has not adopted a sustainability policy. Its land use policy, adopted in 2004, makes no mention of sustainability or environmentally low-impact practices. Given that the Consortium’s primary responsibility is to coordinate and manage the colleges’ land holdings, the absence of a sustainable land use plan for managing the Consortium’s assets will negatively affect the Colleges in several ways. First, the CUC’s approach could conflict with the more forward-looking land use policies of the member institutions. Second, if it neglects to work through the sustainability issues confronting it, the

\(^1\) American College & University Presidents Climate Commitment (2008). American College & University Presidents Climate Commitment. \textit{2008}.
\(^6\) Claremont McKenna College (2008). Green@CMC. \textit{2008}.
Consortium could be hampered in its responsiveness to rising energy costs and to increasingly stringent city and state regulations on energy efficiency and carbon emission. Third, if the CUC fails to actively forward the Colleges’ sustainability goals it could hamper the Colleges’ ability to compete with other undergraduate institutions in the market for Millennial students who increasingly make consumption decisions based on their perception of an entity’s social and ecological responsibility.7

This report analyzes the standards in place for establishing sustainable land use practice, reviews case studies of sustainable campus programs, and makes recommendations for strategies to achieve a green land use policy appropriate for the CUC.

The Importance of Tree Canopy in Sustainable Land Use

Anticipating the need to develop a Consortium-level sustainability policy, in 2007 the Claremont Colleges’ Council of Presidents launched a three-year Sustainability Initiative to fund studies and projects that advance the environmental sustainability of the Claremont campuses. Among the projects in 2007 was an Urban Ecology Assessment (UEA) conducted according to American Forests’ procedures, using the CITYgreen GIS software. The results from that pilot were promising enough that the Sustainability Initiative expanded the project for 2008. The focus of the 2008 study is the tree canopy covering the campuses, where tree canopy is the measure of the relative area of the physical plant devoted to treescape.

The conservation organization American Forests, which concentrates on reforestation issues around the world, has established a standard tree canopy goal of 35% for suburban areas in the Southwestern United States. It is in order to determine how close the CUC campuses currently come to this goal that the Sustainability Initiative performed successive UEA’s in 2007 and 2008. The UEA revealed that the campuses currently enjoy only a 23.6% tree cover. The 2008 study also reviews the financial impacts of falling short of the canopy goal and the benefits of meeting or exceeding the goal, and makes recommendations for increasing the canopy.

Treescape is as essential component of sustainable land use because trees perform several important functions:

- they sequester carbon, thereby reducing a campus’ overall carbon footprint;

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• as an alternative to hardscape, they decrease water runoff and storm drain impacts;
• they provide a cooling effect compared to hardscape’s tendency to reflect heat;
• native trees require less water to maintain than do their non-native counterparts;
• in hot climates like Southern California’s, they can be strategically planted to shade buildings and decrease air-conditioning-driven power needs;
• they provide water and air cleansing functions, which decreases overall pollution;
• and, finally, trees improve the aesthetic of a campus, which is desirable both for increasing the marketable value of the campuses for potential and existing students, and to improve the physical impact of the campus on surrounding residential communities.

This versatility in function gives trees growing importance in efforts to combat global warming and sustainable land use practices, making tree planting an international priority:

In late 2006, the U.N. Environment Programme, inspired by Nobel Peace Prize winner Wangari Maathai, announced plans for a worldwide effort to plant 1 billion trees in one year. This initial target was easily exceeded, and by mid-2008, more than 2 billion trees had been planted in more than 150 countries. Leaders include Ethiopia with 700 million trees, Turkey with 400 million, and Mexico with 250 million. The state of Uttar Pradesh in India mobilized the planting of 10.5 million trees in a single day. The campaign now aims to catalyze the planting of 7 billion trees by the end of 2009—just over one tree for every person on the planet.\(^{11}\)

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Parameters for Designing a Land Use Policy

If the CUC moves forward in adopting a policy, its goals will be dictated internally by its specific sphere of responsibilities to its member colleges, and externally by the increasingly stringent City of Claremont and State of California regulations governing energy usage, water conservation, and carbon emissions. In addition, several influential groups have set standards or made compacts regarding sustainable land use practices. The Consortium can use these standards as guidance in setting its land use policy, in addition to practical results gleaned from case studies of cities and universities that have implemented sustainable land use plans.

Standards-Setting Bodies

Each member of the five undergraduate Claremont Colleges has already signed on to the American College & University Presidents Climate Commitment. This compact commits them to adopting “climate-neutral” practices. The Commitment requires its signatories to implement the following standards of practice, reprinted here as a guide to the action plan to which the Claremont Colleges have committed themselves:

1. Initiate the development of a comprehensive plan to achieve climate neutrality as soon as possible.
   a. Within two months of signing this document, create institutional structures to guide the development and implementation of the plan.
   b. Within one year of signing this document, complete a comprehensive inventory of all greenhouse gas emissions (including emissions from electricity, heating, commuting, and air travel) and update the inventory every other year thereafter.
   c. Within two years of signing this document, develop an institutional action plan for becoming climate neutral, which will include:
      i. A target date for achieving climate neutrality as soon as possible.
      ii. Interim targets for goals and actions that will lead to climate neutrality.
iii. Actions to make climate neutrality and sustainability a part of the curriculum and other educational experience for all students.
iv. Actions to expand research or other efforts necessary to achieve climate neutrality.
v. Mechanisms for tracking progress on goals and actions.

2. Initiate two or more of the following tangible actions to reduce greenhouse gases while the more comprehensive plan is being developed.
   a. Establish a policy that all new campus construction will be built to at least the U.S. Green Building Council’s LEED Silver standard or equivalent.
   b. Adopt an energy-efficient appliance purchasing policy requiring purchase of ENERGY STAR certified products in all areas for which such ratings exist.
   c. Establish a policy of offsetting all greenhouse gas emissions generated by air travel paid for by our institution.
   d. Encourage use of and provide access to public transportation for all faculty, staff, students and visitors at our institution.
   e. Within one year of signing this document, begin purchasing or producing at least 15% of our institution’s electricity consumption from renewable sources.
   f. Establish a policy or a committee that supports climate and sustainability shareholder proposals at companies where our institution's endowment is invested.
   g. Participate in the Waste Minimization component of the national RecycleMania competition, and adopt 3 or more associated measures to reduce waste.

3. Make the action plan, inventory, and periodic progress reports publicly available by providing them to the Association for the Advancement of Sustainability in Higher Education (AASHE) for posting and dissemination\(^\text{12}\).

The second influential compact is the Talloires Declaration, to which Pitzer College is a signatory. The Declaration, a multi-national compact with 378 signatories from 50 countries, is the “first official statement made by university administrators of a commitment to environmental sustainability in higher education. The Talloires Declaration (TD) is a ten-point action plan for incorporating sustainability and environmental literacy in teaching, research, operations and

outreach at colleges and universities\textsuperscript{13}.

The National Wildlife Federation’s Campus Ecology set a goal of a 2\% per year carbon emission reduction for higher education, aiming for an 80\% cut by 2050\textsuperscript{14}. The Earth Policy Institute (EPI) sets an even more aggressive reduction timeline of 80\% by 2020, and tree canopy plays a central role in its “Plan B 3.0: Mobilizing to Save Civilization”\textsuperscript{15}. EPI aims for 16\% of that reduction to stem from curbing deforestation, and an additional 17\% from planting trees for carbon sequestration, as shown in Figure 1, reprinted from EPI’s website\textsuperscript{16}.

![Figure 1: Plan B Carbon Emissions Reduction Goals for 2020](image)

The conservation organization American Forests (AF) has set urban forest goals for sub-regions of the United States. It has set a tree canopy level of 35% for the suburban residential areas of the Southwestern United States, which includes Claremont and the Claremont Colleges. Noting the importance of trees in reducing stormwater runoff, sequestering carbon, and decreasing pollution, the organization works to increase the “green infrastructure” of urban areas. AF suggests using Urban Ecology Assessments in order to determine the current level of tree coverage in urban areas. Claremont’s Council of Presidents Sustainability Initiative followed American Forests’ protocol for conducting its UEA of the Claremont College campuses\(^{17}\).

More locally, the Inland Empire’s Green Valley Initiative is working to market the Riverside/San Bernardino County region as a collection of green communities. Encouraging cities to sign onto the progressive “Green Cities Initiative” the group describes itself as a “regional economic development plan to promote green technologies, renewable energy, alternative transportation and sustainable lifestyles to the Inland Empire.

The Western Center for Urban Forest Research and Education of the USDA Forest Service, Pacific Southwest Research Station located at the University of California, Riverside, developed Inland Empire tree planting guidelines. Their recommendations include:

- requiring shade trees in parking lots. The guidelines mention the use of special soil intended to allow healthy deep root structure while providing adequate firmness for the parking lot.
- passing ordinances that require trees to be utilized in landscaping to reduce solar heat gain and lower air conditioning costs by employing in shading buildings.

regeneration project underway in the city of Claremont with the goal of restoring pre-human levels of tree cover on the city’s foothills\textsuperscript{18}. Their goal is to reduce the fire and stormwater runoff challenges faced by the City. By replacing with trees the encroaching chaparral ecosystem that serves as fuel for wildfires, the Project plans to decrease the incidence of fire and its aftermath, erosion and increased stormwater runoff. The reforestation project is using historical data on tree coverage to establish their goals. Table 1 below, Fire Control Cost Comparison, reprinted from the ACORN website, indicates the alternative strategies the project is exploring, with reforestation to historical levels being the most cost-effective\textsuperscript{19}.

<table>
<thead>
<tr>
<th></th>
<th>Fire Control per Acre per year</th>
<th>After 10 years</th>
<th>After 100 years</th>
<th>Wildlife Habitat</th>
<th>Airshed Quality</th>
<th>Erosion Control</th>
<th>Community Building</th>
<th>Visual Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hand Clearing</td>
<td>$300-1,300</td>
<td>$3k-13k</td>
<td>$30k-130k</td>
<td>☀</td>
<td>☀</td>
<td>☀</td>
<td>☀</td>
<td>☀</td>
</tr>
<tr>
<td>Controlled Burns</td>
<td>$60-400</td>
<td>$600-40k</td>
<td>$6k-40k</td>
<td>☀</td>
<td>☀</td>
<td>☀</td>
<td>☀</td>
<td>☀</td>
</tr>
<tr>
<td>Slashing</td>
<td>$200-900</td>
<td>$2k-9k</td>
<td>$20k-90k</td>
<td>☀</td>
<td>☀</td>
<td>☀</td>
<td>☀</td>
<td>☀</td>
</tr>
<tr>
<td>Grazing</td>
<td>$8-40</td>
<td>$800-400</td>
<td>$800-40k</td>
<td>☀</td>
<td>☀</td>
<td>☀</td>
<td>☀</td>
<td>☀</td>
</tr>
<tr>
<td>Oak Regeneration</td>
<td>$110</td>
<td>$110</td>
<td>$110</td>
<td>☀</td>
<td>☀</td>
<td>☀</td>
<td>☀</td>
<td>☀</td>
</tr>
</tbody>
</table>

○ = Control method has positive impact  
○○ = Control method has negative impact  
○○○ = Control method has little impact

\textsuperscript{19} Ibid.
Relevant Local and State Regulations

California cities are increasingly adopting more stringent climate-neutral and resource-unintensive building, landscaping, and general municipal policies. This is in keeping with the State’s recently passed legislation emphasizing reduction in water and energy usage and drastically cutting carbon emissions to 1990 levels by the year 2020, and 8% below 1990 levels by 2050. California is ahead of Federal regulation of campus environmental practices. Currently, the Environmental Protection Agency offers only a Sector Strategies Program for colleges and universities, which is a working group comprised of sector organizations and an EPA staff liaison working to voluntarily improve “environmental performance while reducing regulatory burden:”

The Sector Strategies national liaison works with six College and University national organizations to develop sector-specific approaches to assist colleges and universities in advancing the use of environmental management systems, reducing regulatory performance barriers, and measuring environmental progress.  

California has eschewed the voluntary approach to environmental regulation for its state college campuses. California’s UC, state university and community college systems, in aggregate one of the largest education systems in the world, are subject to the same stringent building and resource regulations as other state buildings. By the target date of 2015 they must reduce their energy consumption 20%, and all buildings over 50,000 square feet must attain LEED-EB standards. Further, because of the State’s 2004 and 2007 general regulations for green building and water/energy use, even non-state owned California colleges share the same requirements as other businesses and institutions, which aims for a 20% efficiency goal for

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commercial and institutional buildings by 2015, and greenhouse gas emissions reductions as stated above.

Local government has begun preparing to adhere to tighter environmental management goals. The Green Valley Initiative (GVI), discussed in the section “Standards-Setting Bodies,” has encouraged cities, counties, and councils of government to sign onto its plan for adopting more sustainable practices. GVI sees their project as an effort to increase the region’s attractiveness to the high- and green-technology sectors, and note the added benefits of long-term efficiency and cost-savings.

The City of Claremont has adopted a draft sustainability plan that will impact all residents, businesses, and the Colleges. It sets standards for urban forest levels, water runoff/storm water retention, tree canopy, water conservation, and energy usage. The Claremont Colleges should expect the plan to directly impact its land use goals, as is clearly stated in the Sustainability Plan:

All community members, including individual citizens, community-based groups, businesses, schools and other institutions must be aware of their impacts on the environmental, economic and social health of Claremont, must take responsibility to reduce or eliminate negative impacts, and must take an active part in community efforts to address sustainability concerns. The City will therefore be a leader in the creation and sponsorship of education opportunities to support community awareness, responsibility and participation in cooperation with schools, colleges and other organizations in the community.

The City’s plan adopts the State’s guidelines for 20% energy usage reductions by 2015. It also uses the Local Government Commission’s Ahwahnee Water Principles as its guideline for water usage levels, “water-friendly site design,” and for controlling stormwater runoff and

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pollution\textsuperscript{24}. The Ahwahnee guidelines focus on increasing surface permeability and cite trees as a crucial component in decreasing stormwater runoff\textsuperscript{25}. Correspondingly, the City’s plan also identifies trees and the development of its urban forest as a major focus of its efforts. The plan extends to all public and private trees. In addition to the aesthetic trees provide in an acknowledged “Tree City,” the Sustainable Claremont Plan identifies several important beneficial functions of the city’s tree canopy:

These include reduction in energy usage for heating and cooling structures, reduction in the ‘heat island’ effect seen for example in large unshaded parking lots, cleaner air through assimilation of carbon dioxide, filtering particulates from the air and by producing oxygen; and health, aesthetic and economic benefits.\textsuperscript{26}

The City’s new, greener building codes will directly impact all new buildings at the Claremont Colleges, and possibly even existing buildings. The proposed goal would require LEED Silver Standard for private construction projects, and change requirements to institute “sustainability best practices” for streets, parking lots and landscape design\textsuperscript{27}. These translate into requirements for what the plan terms an “upward trend,” in permeable surfaces, tree canopy, and tree placement in parking lots\textsuperscript{28}.

**Case Studies**

Cities and campuses across the country have invested in tree canopy as an important component of their sustainable landscaping plan. Using their experiences as a guideline may inform the Consortium’s strategy as it forms its sustainable land use plan. Below are some

\textsuperscript{24} Ibid. p. 24.
\textsuperscript{27} Ibid. p. 34
\textsuperscript{28} Ibid. p. 45.
examples of how these communities obtain benefits from trees, ranging from increased property values to stormwater management.

**Santa Monica’s Urban Forest**

The Center For Urban Forest Research conducted a cost-benefit analysis of Santa Monica’s city trees in 2001 that revealed several useful metrics, which should be adjusted for 2008 dollars:

- The combined value of property value benefits generated per tree was $65/tree.
- Of this amount, yearly air pollution uptake was 10.7 metric tones, or 0.8 lb/tree. This is valued at $9/tree.
- Energy savings from shade and overall lowering of the ambient temperature was valued at 5 MBtu/tree, $5/tree.
- Stormwater runoff savings were valued at 1,856 gal and $4/tree.
- Carbon storage and sequestration per tree was valued at 151 lb and $2/tree.
- The study estimated the total annual benefits from the city’s urban forest were $27/resident and $85/tree.
- Net benefits (total benefits less costs) for FY 1999 were $10/resident, $32/tree, with a return on investment of $1.6 per $1 invested in urban forest management.

The Urban Forest Study noted that though larger trees are more expensive to maintain, they provide greater canopy cover and therefore a return on investment. Further, they commented on the importance both of diversifying the species stock and the age of the trees to ensure canopy stability in the long term.

**Princeton: An Ecosystems Approach to Landscaping**

Princeton’s Campus Plan focuses on an ecosystems approach to stormwater management, which is dependent on tree canopy to decrease the amount and speed of runoff. The campus

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The University of New Mexico: Trees in an Arid Zone

This southwestern university campus emphasizes the benefits of trees on its campus to store and sequester carbon, to increase energy efficiency through shading and windbreak; contribute to water conservation by reducing soil transpiration by providing shade; improving air, soil and water quality; more efficiently managing stormwater runoff; and increasing property values through their aesthetic impact. The university’s sustainable campus plan attributes the following measurable valuations to their campus trees:

<table>
<thead>
<tr>
<th>Feature</th>
<th>Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large Tree on West-Facing Sides of Buildings</td>
<td>$920 Net Energy Benefits of Over 40 Years</td>
</tr>
<tr>
<td>9-Year Old Tree, 28 ft tall</td>
<td>• Generate $45 in benefits from absorption of 10 pounds air pollutants, including the equivalent of a car’s 3600 miles-worth of NO₂ emissions</td>
</tr>
<tr>
<td></td>
<td>• Generate $6 per tree/year of stormwater runoff benefits at 58.1 gallon per tree per .5 inch rainfall</td>
</tr>
<tr>
<td></td>
<td>• $5.00 per tree/year carbon removal benefits at 330lbs CO₂/year and sequestering 90 lbs/year, equivalent to a car’s emissions over 500 miles</td>
</tr>
<tr>
<td>Street trees</td>
<td>Increase property values between 10-18%.</td>
</tr>
</tbody>
</table>

31 R. Gary Smith The Sustainable Campus Landscape. Albuquerque, NM, University of New Mexico.
Denton, Texas: Using Trees to Manage Stormwater Runoff

An analysis performed for the city of Denton, Texas demonstrated a substantial decrease in the speed and quantity of stormwater runoff corresponding to increased tree canopy cover. The study modeled two scenarios for the same land parcel, one in which tree coverage for the 8.36 acre lot was 82% and the other in which canopy coverage was 0%. The model noted the following substantial changes in stormwater runoff characteristics given typical rainfall for the area:

- runoff depth: increased 209.76%
- peak flow: increased 522.58%
- time of concentration: decreased by 70.14%
- runoff volume increase per square foot: 3.452 gallons
- carbon storage/year: 296.09 tons
- carbon sequestration/year: 2.31 tons
- pollution removal/year: 637 lbs, $1733

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Implementing a Tree Canopy Goal as Part of a Consortium

Sustainable Land Use Policy

The Claremont Colleges’ Council of Presidents Sustainability Initiative-sponsored 2008 Urban Ecology Assessment (UEA) of the Claremont Colleges revealed only a 23.6% tree cover, more than 11% below the American Forests tree canopy goal of 35% for suburban areas in the Southwestern United States. The study utilized GIS software to model possible increases in canopy cover, and calculated the corresponding benefits in carbon sequestration, air pollution removal, runoff reduction, and dollars. Based on that study, it is possible to construct Table 2:

<table>
<thead>
<tr>
<th>Tree Canopy Level</th>
<th>Total Canopy Cover</th>
<th>Tons Carbon Stored/Sequestered</th>
<th>Air Pollution Removed Lbs/$ Value</th>
<th>Stormwater Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>75.5 acres (23.6%)</td>
<td>3,249.53 tons/25.30 tons</td>
<td>15,482 lbs/$38,992</td>
<td>$2,250,066</td>
</tr>
<tr>
<td>5% increase</td>
<td>79.6 acres (24.9%)</td>
<td>3,427.02 tons/26.68 tons</td>
<td>16,328 lbs/$41,122</td>
<td>$2,250,060</td>
</tr>
<tr>
<td>10% increase</td>
<td>83.7 acres (26.1%)</td>
<td>3,603.77 tons/28.06 tons</td>
<td>17,170 lbs/$43,243</td>
<td>$2,486,466</td>
</tr>
<tr>
<td>50% increase*</td>
<td>113 acres/35%</td>
<td>4,873.50 tons/37.95 tons</td>
<td>23,223 lbs/$58,488</td>
<td>$3,375,000</td>
</tr>
</tbody>
</table>

*Projected to meet American Forest goal of 35% tree canopy – all values approximate.

If the campuses were able to meet the American Forest-recommended 35% canopy coverage, it would require a nearly 50% increase in canopy. The last line of the table projects the benefits at a tree canopy coverage of 35%. This study uses American Forests costs for stormwater management per cubic foot at $2 and for air pollutant removal $2.53 per pound.

Implications of CUCSI Findings

Bringing the Claremont Colleges campuses in line with the City’s and the American Forest tree canopy and permeability guidelines faces two important challenges. First, a campus

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redesign and funding for a Consortium-wide landscaping effort intended to increase permeable area and canopy could be costly and require intensive coordination among the campuses.

Second, the 2008 UEA study of the campuses found that to attain a greater than 27.4% canopy cover would require extensive alteration to the current land use, in particular as it relates to open grass area and parking lots. Given the City’s Sustainability Plan’s emphasis on adding treescape to parking lots, this effort may be in line with the requirements and expectations of City planners. It may also require a comprehensive redesign of the transportation network spanning the campuses, including barring cars from internal campus travel in favor of tree-covered, permeable pedestrian walkways. This solution offers multiple benefits in reducing carbon emissions on the campuses, combining a reduction in car use and impermeable, heat-generating surface area with increased tree canopy and permeable surface area. Despite these benefits, however, achieving the recommended 35% canopy coverage level would require extensive coordination among the campuses and should be a joint project undertaken at the Consortium level after discussion on how best to achieve maximum tree canopy.

Further steps to move toward a Consortium sustainable land use policy, including implementation of tree canopy goals will depend on impetus from the Consortium’s members. As signatories to the American College & University Presidents Climate Commitment, the five undergraduate institutions have committed themselves to creating a specific plan to achieve climate neutrality within two years of signing the Commitment. If the Consortium does not adopt a joint sustainable land use policy, the individual Colleges would be obligated to follow their own plan to achieve a climate neutral campus, which could include the incorporation of the 35% tree canopy goals for each campus individually rather than for the Colleges as a whole. The
potential for duplication of effort and expense, failure to coordinate solutions, and inconsistent standards makes this option less desirable than a Consortium-lead effort.

Delay in pursuing more energy- and water-efficient solutions, as well as time lost for tree canopy from new planting to expand through natural growth, costs the Consortium’s members money in the face of rising energy costs and drought restrictions. Eventually, if the campuses do not implement sustainability standards such as those described in this report in the sections “Standards-Setting Bodies” and “Relevant Local and State Regulations,” the Colleges may incur fines as City and State regulations become increasingly stringent.

**Stakeholders**

The measures necessary to increase the tree canopy to 35% of acreage across the campuses will affect stakeholders at several levels. Within the campus community, sustainable land use will affect staff, faculty, and students whose physical environment, and possibly transportation options on campus, will change. As the Consortium models options for increasing tree canopy, closing the internal campus to automobile traffic is an appealing option because it simultaneously reduces carbon emissions from car trips while increasing the land available for permeable landscaping focused on tree canopy. From the perspective of sustainable practice, this option makes sense; from the perspective of the people who live and work on campus, it is a radical change in lifestyle that will require careful consensus building. There are costs associated with the construction of underground parking facilities and the internal transportation network necessary to maintain circulation throughout the Colleges. The City may be willing to partner with the Colleges in a joint effort to construct parking structures coupled with a shuttle system that could serve the entire area. The City may be able to incorporate this effort into its emissions compliance projects.
Additional stakeholders include the residential neighborhoods surrounding the Colleges’ main campuses, which already enjoy significant tree canopy. The City plans to continue to improve its tree inventory and its calculation of its tree coverage, which will help the Colleges to ascertain the percent of acreage under canopy in its peripheral neighborhoods. Given the property value enhancement attached to trees in the University of New Mexico case study, increasing street trees fronting residential areas should meet with approval from residents.

However, if the Consortium decides to close off street traffic into the campus, residents will feel the effects in three ways. First, the construction of parking areas on the periphery will negatively affect the Colleges’ neighbors. Careful coordination with the City to locate parking structures away from residential areas to be closer to downtown or in nearby commercial developments would mitigate those effects. Second, closing the campus to through traffic will affect traffic on surface streets bordering the campuses. Extensive traffic studies must be conducted to ascertain whether traffic will decrease because of the lack of flow through campus, or whether additional car trips will be pushed to the peripheral streets. Third, parking on residential streets bordering the Colleges is already negatively impacting the Consortium’s neighbors. Closing the campuses will increase the number of cars parked on peripheral streets unless very pointed measures are taken to prevent it. Perhaps the most important measure would be for the residential students to commit to leaving their cars at home when they move to campus to pursue their college careers; but additional efforts would include parking permits and rigorous enforcement on the streets surrounding the campus; and for the Colleges to offer mass transit assistance to its staff and faculty to help enable a lifestyle change regarding commuting behavior.

The City of Claremont and those of its citizens not located adjacent to the Colleges will be positively impacted by efforts the Consortium makes to increase tree canopy on the campuses.
Campus land holdings are a significant fraction of the City’s acreage, and the College’s efforts will help the City meet its overall canopy goals. Campus trees will also create positive spillover effects, both in property values and environmental benefits. The efforts of the Colleges also increase the City’s competitive advantage in attracting firms that value sustainable practices in their locational choices. This, in turn, creates a positive spillover effects for the region’s attempts to position itself to compete for green businesses and technology through advocacy groups like The Green Valley Initiative.

Identifying Costs and Benefits

Costs

There are four types of costs associated with adopting a Consortium land use policy that requires implementation and maintenance of an urban forest at 35% canopy cover for the main campuses: planning, implementation, transaction, and maintenance costs.

1. Planning: the Consortium must plan to fund a task force to model the possible scenarios for achieving optimal tree canopy coverage. Then the impacts of each scenario, including ecological, fiscal, and lifestyle must be evaluated.

2. Implementation: this will include the planting of additional trees and permeable landscape features, as well as the campus layout changes required to provide the open space necessary to conduct the plantings.

3. Transaction: the Colleges and Consortium must allocate staff time and funds both for initial and for ongoing negotiation and planning of the campuses’ sustainable landscape needs.
4. Maintenance: the ongoing upkeep of the campus forest and landscape resources will require funding, as will maintaining the new campus layout features.

**Benefits**

A complete cost/benefit analysis must be conducted when the Consortium models its options for increasing tree canopy; however, this study and the 2008 Campus UEA have enumerated the fiscal and ecological benefits associated with each tree planted. The determination of net benefits must be weighed against each college’s need for carbon offsets and stormwater management cost reduction. As state energy and carbon reduction requirements go into effect, and local City ordinances come to bear on college expansion and refurbishment plans, the benefits of increasing tree canopy will include substantial cost-avoidance in fines and delayed environmental impact evaluations. Further, more efficient resource management across the campuses will provide cost-avoidance by lowering annual maintenance fees and energy costs.

**Potential Funding Partners**

The Consortium should seek to partner with organizations whose mission it is to increase urban forestation, manage local energy and water resources, and to improve the region’s competitiveness through progressive green practices.

**Water Resource Managers**

The Metropolitan Water District, Three Valleys Municipal Water District, and the San Gabriel and Los Angeles Rivers and Mountains Conservancy (RMC) (www.rmc.ca.gov) all have a vested interest in seeing Claremont as a whole increase its tree canopy in order to more
effectively use their water resources, and to control the quantity and purity of stormwater runoff. RMC is a quasi-public state agency “in a position to toss a good deal of money over to Claremont and to Three Valleys as well”\textsuperscript{34}.

**Urban Forest/Green Infrastructure Initiatives**

Several sources of funding exist for increasing tree canopy in urban areas. The challenge the City of Claremont and the Claremont University Consortium will face is the high density of tree canopy already in place. Other, more urban, areas face a greater shortfall in their existing green infrastructure. If the two entities, the City and the Consortium, work together and demonstrate their commitment not only to urban forests, but also to overall reduction of greenhouse gas emissions, this will strengthen their case. The strongest evidence of that commitment would be to change the transportation circulation on the campuses to eliminate car traffic while increasing green space. Potential funding partners with this focus include American Forests; and California ReLeaf, the urban forestry division of the Trust for Public Land. The public utilities servicing Claremont will be interested in any project that can demonstrate a decrease in carbon emissions related to energy production or water conservation; towards this end, emphasizing the shading, cooling and water conservation benefits of trees in an improved campus design will increase available funding options.

**Green Economic Development: Green Valley Initiative (GVI)**

Green Valley Initiative focuses on promoting economic growth in the region by attracting the emerging green technology sector. Towards this end GVI encourages local governments to

adopt sustainable practices in order to increase the region’s attractiveness to these businesses, whose management and employees value these practices in their locational choices. Claremont and the Consortium may be able to attract private sector funding from this group if they can model a gold-standard approach to reducing greenhouse gas emissions, managing stormwater runoff and water purity, and fundamentally greening the transportation options across the campuses and the downtown.
Conclusion

The Claremont University Consortium’s member colleges have already adopted policies intended to advance the sustainability of their operations. In the National Wildlife Federation’s 2001 survey of almost 900 university leaders, respondents cited several reasons for their institutions’ adoption of sustainable practices:35

- Fits with culture and values of campus (64%)
- Good for public relations (47%)
- Environmental improvements are cost effective (41%)
- Helps with student recruitment (17%)

State and local measures implemented since the survey in 2001 have added additional motivation for campuses to adhere to more resource-efficient practices. The City of Claremont has moved to hold itself and its constituents to a level of sustainability practice that ensures “The ability for the City and residents of Claremont to meet the needs of the present economy, society and environment while preserving the ability of future generations to meet their needs.”36 All of these goals will require the Consortium’s members to change their land use practices in ways that will affect many stakeholders. The long-term benefits, from cost savings to a healthier campus environment, will position the Consortium’s members to compete in the more sustainable economy of the 21st century.

References

Claremont McKenna College (2008). Green@CMC. 2008.
R. Gary Smith The Sustainable Campus Landscape. Albuquerque, NM, University of New Mexico.