**ARTICLES FOR UTM SENATE MEMBERS**

**“SUSTAINABLE CAMPUS”**

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Sustainable campus: engaging the community in sustainability

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Abstract

Purpose – The purpose of this paper is to identify the major factors necessary for engaging university campus community in sustainability. While general awareness in sustainability issues has improved in recent years through mass media coverage, this knowledge is not always translated into actual sustainable practice. Studies have indicated that there are many factors for engaging the community in sustainability.

Design/methodology/approach – A multi-disciplinary literature review is first undertaken to distil the drivers that enhance participation in sustainability programmes by the university community. Next, to illustrate the applicability of the factors identified in the community engagement framework, two case studies are undertaken to highlight the importance of the identified factors in influencing the level of community participation in their sustainability programmes.

Findings – The 6-P framework for community engagement includes factors such as psychological needs, physical facilities, personal motivations, public perception, price mechanisms and policies. The case studies of two universities’ sustainability projects illustrate that the framework is highly applicable to university communities.

Originality/value – While research on behaviour change has been undertaken by various disciplines such as urban planning, marketing and psychology, these have been done in isolation. The originality of this paper is therefore achieved by drawing together the knowledge from these well-established disciplines to develop an original 6-P framework. This framework has the potential of assisting university leaders in the development of their community engagement strategy to mobilise and motivate their community members to take practical steps towards building a sustainable campus. However, the robustness of this framework will need to be further validated in future studies.

Keywords Sustainable, Sustainability, Engagement, Community, Campus, 6-P framework

Paper type Conceptual paper

Introduction

In recent years, sustainability has become an important part of many corporate social responsibility agendas. The findings and evidence presented in the United Nations Climate Change Conferences in Mexico (2010) and South Africa (2011) have further highlighted the need for a paradigm shift towards building a low-carbon sustainable society to deal with climate change. As such, there is an urgent need for every level of society to review their actions and aim to be better stewards of our natural resources for developing low-carbon economies.

To date, much of the effort in this direction has been centralised with policymakers being the major initiators of sustainability programmes. However, the policies and...
programmes developed eventually hope to change the consumption patterns of businesses and communities. The advent of social media technologies has vastly increased the awareness of green issues among the general public. Majority of people know and are aware of the need to be environmentally sensitive. However, a survey conducted by DEFRA (2005) found that while 30 per cent of people claim to care about companies’ environmental and social record, only 3 per cent reflect this awareness in their purchases. Additionally, although 90 per cent of people know that drink cans may be recycled, only 50 per cent say they have actually done so. It therefore suggests that mere knowledge will not change current consumption patterns. A holistic strategy is needed to engage the community in sustainability practices.

The role of the community in advancing the sustainability agenda cannot be under-estimated. Professor Tim Jackson (2005) from the University of Surrey (2005) noted that “negotiating change is best pursued at the level of groups and communities”. Social support is particularly vital in breaking habits, and in devising social norms and more sustainable patterns of consumption (DEFRA, 2005). The UK Government has initiated a new Community Action 2020 – Together We Can programme to support communities in their efforts to move towards sustainable living. Similarly, the Built Environment Industry Innovation Council (BEIIC) has been set up under the Australian Federal Government’s Innovation Industry Councils initiative to consider innovative challenges like climate change and sustainability. Within the BEIIC’s 2009-2014 Strategic Plan (2009), a key proposal is to develop a community engagement strategy to promote sustainable practices.

However, changing attitude and behaviour is a difficult and complex subject. Current findings suggest that it takes more than just information dissemination to influence and close the attitude – behaviour gap. While this topic has been widely researched in many disciplines, including psychology, marketing and urban planning, the rich knowledge in this topic has been accumulating in silos. The purpose of this paper is therefore to draw together the findings from these disciplines and develop a framework for engaging the community in sustainability programmes. This paper is focused on university communities for two reasons. First, universities, being generators of cutting-edge research, can be expected to be leaders of new and innovative sustainable practices. Second, the demographic diversity within the university community (i.e. staff and students) is in itself a microcosmic society. Consequently, it is potentially a good test bed for the purpose of this paper in developing a conceptual framework for community engagement.

The paper is divided into five sections. The first provides the background to and outlines the purpose of this study. Next, the main themes of this paper, i.e. sustainable campus and community engagement, are explored to delineate the different dimensions to them. Following this, the drivers of community engagement in sustainable initiatives are identified through a multi-disciplinary literature review to result in a conceptual framework. Two case studies are then provided to illustrate the application of the community engagement conceptual framework before concluding remarks are made at the end.

**Sustainable campus community engagement**

A sustainable university campus can be defined as:

[…] a higher education institution […] that addresses, involves and promotes […] the minimisation of environmental, economics, societal and health negative effects in the use of their resources [in] its main functions of teaching, research, outreach and partnership, and
stewardship [...] to [help] society make the transition to sustainable lifestyles (Velazquez Contreras, 2002, p. 155).

The multi-faceted emphasis is largely consistent with the common “triple bottom-line” (i.e. social, economic and environmental outcomes) framework for sustainable development. While it is acknowledged that the different dimensions of a sustainable campus are equally important, the interpretation of term “sustainable campus” is typically focused on minimising environmental impacts. For example, the Talloires Declaration is a voluntary environmental agreement developed by the Association of University Leaders for a Sustainable Future (ULSF). To date, this declaration has been signed by over 430 university presidents and chancellors in over 50 countries (ULSF, 2012). The primary motivation for this declaration of commitment was the concern over environmental degradation. In this regard, the ten-point action plan advocated in it mainly ensures sustainability and environmental literacy across research, teaching, outreach and policies. Similarly, the annual report of member institutions published by the Sustainable Campus Group (SCG) consists mainly of results in environmental performance. These include energy and greenhouse gas emissions, waste and recycling, water and institutional commitment. The SCG is a membership organisation established in 2006 to advance the cause of sustainability in the Australian tertiary education sector.

To move towards a sustainable campus, Velazquez et al. (2006) proposed a sustainable university model, which states that a sustainable university should first form a sustainability vision, on which a sustainability mission is conceptualised. Additionally, a university-wide sustainability committee should be founded to establish and ratify sustainability policies, targets and goals in line with the sustainability mission. Networking with other universities to share their approaches in sustainability is also an important part of a sustainable university. Finally, sustainability strategies of a sustainable university should span across education, research, outreach and partnership and campus operations (i.e. waste, energy, water and transport).

The State of the Campus Environment report from the USA highlighted that many universities have poor access to public transport and that transport was one of the weaker links in campus sustainability (McIntosh et al., 2001). Likewise, the Campus Environmental Survey of 59 universities in the USA which signed the Talloires Declaration found that campuses have done very well in conventional operational measures such as recycling but have been reluctant to implement tougher initiatives such as buying renewable energy and promoting alternative transport (Shriberg and Tallent, 2003). They also pointed out that governance framework plays an important role in acting as a barrier or opportunity to effectively present the sustainability agenda to campus stakeholders.

Although universities have traditionally been improving their sustainability through operational measures, community engagement and outreach also plays an important role to affect lasting changes towards greater sustainable practices. Sarkissian et al published a book Kitchen Table Sustainability: Practical Recipes for Community Engagement with Sustainability in 2009, which illustrates the importance of community engagement for achieving sustainable transformations in today’s complex world. According to Sarkissian et al. (2009, p. 6), “communities are the heart and hands” of all sustainability movement, regardless of its context. Thus, there are “critical relationships” among the following three components (Sarkissian et al., 2009, p. 11):
(1) sustainability (the ultimate overall goal);
(2) communities (the means to achieving sustainability); and
(3) community engagement (method for which to mobilise the community to participate actively in sustainability programmes).

To this end, the next section draws together accumulated knowledge from different disciplines to identify the drivers of community engagement in sustainability. From here, inferences are made with regard to the elements that are important to be present in sustainability programmes that would actively engage the community, i.e. a community engagement framework in sustainability.

**Drivers of community engagement in sustainability**

Within the psychology discipline, many models have been developed to steer consumer behaviour towards environmental sustainability. For example, the *reasoned action paradigm* (Kaiser *et al.*, 1999), the *norm-activation model* (Thorgersen, 1999), the *value/belief-attitude-immediate sequence-behaviour* school (Scott and Jobber, 2000) and the *awareness-information-decision-action* model (Barr, 2003). Although these theoretical models vary in their names and descriptions, they share a common conceptual foundation, i.e. environmentally sensitive behaviour starts with individuals having an understanding of the consequences of their behaviours (knowledge). It affects their attitudes about the environment, leading to behaviours congruous with the sustainability agenda. To this end, many programmes promoting sustainable behaviour have featured information-intensive campaigns to enhance the environmental knowledge of their target audience. Yet, studies have shown that knowledge alone has little impact on changing behaviour. Further, empirical attempts to establish a clear causal pathway from knowledge and attitude to environmentally sensitive behaviour have yielded ambiguous results. Thus, there could be other contributing factors in addition to knowledge and attitude.

Bohler *et al.* (2006) noted that previous models have assumed that environmental attitudes and knowledge override essential consumer needs. Similarly, Hensher (2006) and Kennedy (2002) found that consumer decisions tend to be influenced mostly by hip pocket resources and reasoning rather than environmental knowledge and attitudes. In this regard, the classical model of Olander and Thogersen (1995) appears to be well-placed by including consumer need factors. In their model, behaviour modification is organised into *motivation-ability-opportunity-behaviour*. Motivation includes both attitudes and social norms in relation to environmentally responsible behaviours. Ability refers to the habits and task knowledge of the individual, whereas opportunity includes access to products and services as well as convenience.

In the same vein, green marketing literature emphasises the importance of developing consumer value propositions when creating marketing programmes to enhance consumers’ propensity towards purchasing product or adopting a more environmentally sensitive behaviour. Ottman *et al.* (2006) argue that:

[…] green products and services must satisfy two objectives: improved environmental quality and customer satisfaction. Misjudging either or overemphasising the former at the expense of the latter can be termed *green marketing myopia*.

In other words, simply providing information about the importance of saving the environment is unlikely to change existing habits towards more sustainable choices.
Knowledge coupled with a consumer-centred approach is required for effecting behaviour modification. Many green products have failed because of green marketing myopia – managers’ myopic focus on the “greenness” of their product/service over the broader expectations of their target consumers or community. Sometimes, consumers who buy green do so not necessarily for environmental reasons. To this end, consumer value positioning is vital to the success of green products/services, i.e. understanding what consumers value and positioning the product/service to address these needs. Ottman et al. (2006) in their study reviewed successful green products and concluded that there are at least five desirable benefits: efficiency and cost-effectiveness, health and safety, performance, symbolism and status as well as convenience. The following is a brief description of each of these values that consumers look for in green products:

- **Efficiency and cost-effectiveness**: One of the biggest selling points of green products is their potential energy and resource efficiency. While the initial purchase price could be higher, long-term operational cost savings can convince consumers to buy green. In the light of increasing energy and resource prices, such savings provide a strong reason to purchase green.

- **Health and safety**: Health and safety are key considerations when consumers make their product choices. In particular, for certain demographic groups, this may be a prime consideration, e.g. the elderly, children and pregnant women. Some green products such as green buildings are particularly well-positioned to emphasise this attribute. Given many reports on sick building syndrome and its direct impact on occupants, health and safety are an important choice consideration. Sick buildings with poor indoor air quality have been linked to headaches; eye, nose and throat irritation; dizziness; and fatigue among occupants.

- **Performance**: This refers to the performance of the core attribute of a product. For example, consumers expect washing machines to deliver a clean yet gentle wash. While green products may have the added value of lower environmental impact, consumers do not expect the core performance attribute to be compromised as a result.

- **Symbolism and status**: Green products can be positioned as status symbols. Rather than having green product perceived to be only for “tree huggers”, i.e. strong green supporter, they are today positioned to appeal to the broader segment of consumers. Toyota’s gas and electric hybrid car, the Prius, has been marketed to represent “green chic”. Research has also shown that consumers respond to social pressure and, hence, would like to be seen as supporting a good social cause, i.e. the feel-good factor.

- **Convenience**: For many consumers today, time is the only true luxury. In a time-poor society, convenience thus plays an immense role in influencing consumer’s choice of product. Green products that help save time are well-placed for market growth.

Additionally, urban planning literature is also useful in shedding light on the drivers of community engagement in sustainability. Berke and Conroy (2000) brought sustainable development to the community level by defining it as:
[...] a dynamic process in which communities anticipate and accommodate the needs of current and future generations in ways that reproduce and balance local social, economic, and ecological systems, and link local actions to global concerns.

Along the same vein, Conroy and Beatley (2007) observed that community participation in sustainability programmes is “both dynamic and intergenerational, making it difficult to assess ‘success’ at any particular point in time”. Therefore, the complexity of engaging communities in sustainability is therein highlighted. Further, it is “transdisciplinary” and requires an integrated, and holistic “balance-seeking” process (Yanarella, 1999). Consequently, research on sustainable development is increasingly focused on the implementation or action component (Laws et al., 2004). There is also increasing focus on active community engagement with emphasis on collaboration with local communities and community capacity building in urban planning literature. Effective community engagement would require multiplicity of components such as education, action, trust, inclusion and strong governance (Sarkissian et al., 2009).

There have been a number of studies focusing on sustainable development within communities. However, Markey et al. (2010) noted that, while many communities have incorporated sustainable development principles into their vision statements and decision-making processes, few have succeeded in translating their high-level goals and objectives into tangible projects and actionable implementation strategies (Dale, 2001; Parkinson and Roseland, 2002; Gahin et al., 2003). In short, there are implementation gaps that prevent communities from capitalising on the many known and proven sustainable techniques and technologies (Markey et al., 2010). Sproull and Hofmeister (1986) noted that the overall success of an implementation effort will necessarily be tied to the clarity of its innovation and the related link with behavioural changes it will necessitate. In other words, understanding the drivers is the key to successfully engaging the community in sustainability.

In a study of sustainable transportation planning, Krizek et al. (2007) observed that to promote walking and cycling, there need to be adequate facilities. For walking, they include pavements, public spaces and/or road crossings. For bicycling, they include relatively wide curb lanes, on-street or off-street bicycle paths, secure parking and showers at the workplace. Additionally, Conroy and Beatley (2007) argue that, while tangible motivators such as having demonstration green building projects and parks are important, leadership, funding and timing are critical to implementing sustainable development. In the same vein, Markey et al. (2010) argued that lack of leadership in respect of unrealistic goals and poor community engagement forms potential barriers to behavioural change. The authors noted that communities need to know if they are selecting and implementing initiatives that are making a tangible difference to the sustainability of the community. Also, there are enough “low hanging fruit” or simple sustainability projects such as waste disposal, transportation and energy use that communities can undertake. These simple projects can overcome complexity and uncertainty barriers to becoming more sustainable.

In much the same way, research in sustainability in the higher education sector suggests leadership to be an important driver in engaging the university community in sustainability (Teddie-Bringas et al., 2008; Eagan et al., 2008). Carlson (2006), noted that top-level commitment, which incorporates sustainability as a top priority of universities, can create incentives for innovation in sustainability across university campuses. Additionally, Ferrer-Balas et al. (2008) argued that peer pressure from competing institutions and funding availability underpinned the progress of...
sustainability in universities. The findings of Sammalisto and Arvidsson (2005) concurred with the above.

**A 6-P community engagement framework for a sustainable campus**

The subject of engaging the community in sustainability has been the focus of many researchers in various disciplines. The preceding section has illustrated that while the terms used in each professional discipline may suggest some points of differentiation, a common theme that cuts across them all is how to encourage more positive practical actions towards sustainability. For example, within psychology, this topic has been approached from the perspective developing behaviour modification models to identify the factors that influence sustainability choices. Along the same vein, the marketing discipline has focused on identifying attributes that consumers value in green products/services. It can thus be inferred that in the development of sustainability programmes, these attributes should also be considered to better engage the community. The empirical findings from many urban planning studies are also informative in relation to the physical factors influencing the choice/decisions of communities in sustainability.

While these conceptual and empirical studies yielded rich insights into the drivers of community engagement in sustainability, closer examination suggests that there are clear areas of overlap. Synthesising these findings, an original 6-P community engagement framework is developed. This framework identifies the factors (both intrinsic and extrinsic) that would engage the community in sustainability programmes.

A sustainability programme is usually made up of smaller individual sustainability projects. One measure of the success in community engagement is the rate of participation. Therefore, if community engagement is a process in getting active participation, the individual sustainability projects are the vehicles for community to participate in sustainability. The 6Ps represent the factors that are important in raising community participation levels in these sustainability projects. It is argued that for a successful community engagement exercise (i.e. active participation), the sustainability programme being developed (which is made up of smaller projects) should demonstrate all 6Ps of the framework. However, individually, the smaller sustainability projects need not exhibit all 6 Ps in each of them. This framework is intentionally kept generic and does not seek to provide any causal links among the six factors identified.

Figure 1 explains this framework diagrammatically.

![Figure 1. The 6-P community engagement in sustainability framework](image-url)
Case studies
Having developed a holistic framework for community engagement in sustainability, the paper will now illustrate the application of the 6-P framework in two university communities. The two case studies will examine how the 6Ps are evident in the sustainability programme and how the different 6P factors have been factored into the different sustainability projects that make up the sustainability programme.

Monash University
Monash University was rated Australia’s greenest university in 2011 (My Green Australia, 2012). Some of the awards the university has won for its sustainability initiatives include: the 2010 Premier’s Sustainability Award, the UN Association Education Award and the 2009 Banksia Environmental Award. The university, which also signed the Talloires Declaration, stated that involvement and support of its community members was a primary driver of its achievement in sustainability. Monash University has established The Office of Environmental Sustainability (TOES), which is responsible for developing a sustainability programme and implementing sustainability projects within the university campus (Monash University, 2012).

While the sustainability programme at Monash consists of many individual projects, four highly successful sustainability projects are highlighted to demonstrate the application of the 6-P framework. These include:

1. Monash Footprints.
2. Bin There, Done That.
3. Monash Environmental Pledge.
4. Sustainable Transport Fiesta.

Monash Footprints. Monash Footprints is a major behavioural change sustainability project which aims to encourage a more sustainable lifestyle among its staff and students. The project is a free extracurricular course for staff and students of the university (Monash University, 2012) and has received a Highly Commended award from the ACTS Green Gown Awards (Sustainable Campus Group, 2011). In each week of the Monash Footprints course, participants are involved in a number of practical activities including: learning how to cook sustainable food; tasting organic and Fairtrade products; and learning how to reduce their environmental footprints in water, transport, energy, waste and shopping. The course also develops communication skills of participants by facilitating discussion and exchange of knowledge among them.

The course, valued at $700 for each participant, is offered free of charge and runs for 4 weeks (Monash University, 2012). The programme is delivered by four mentors, and both staff and students are welcomed to volunteer to become mentors. Mentors will first receive a one-day training course. They will then design the delivery manner of the Footprints project, which will be supported by the necessary resources from TOES. The feedback on the project has been highly positive. A mentor has commended the programme for its “informative, practical, and most of all, fun” activities (Monash University, 2012). Table I outlines 6-P factors which are addressed by the Monash Footprints project.

Bin There, Done That. Bin There, Done That is another sustainability project which has been implemented across all university campuses. The programme aims to increase
recycling rates among university staff by replacing individual waste bins under staff’s working desks with desktop bins and paper recycling boxes located under staff desks.

By arranging waste facilities in this manner, staff at Monash University are effectively encouraged to dispose of their waste in a more appropriate manner. Table II outlines the 6-P factors which are addressed by the Bin There, Done That project.

Monash Environmental Pledge. Monash Environmental Pledge project is an annual campaign of Monash University. The project invites members of the university community to pledge to mitigate their environmental impact on one of the following themes: transport, energy, waste, food and water (Monash University, 2012). The project aims to promote sustainable practices among staff and students. For each pledge received, the university will contribute $5 for the university’s green projects which have been installing green features and technology throughout its campuses. Once a community member registers his/her pledge on Monash University’s website, he/she will be given tips on how to reduce environmental footprint in the selected theme (Monash University, 2012). Each year, students and staff are asked to renew their pledges to demonstrate their ongoing commitment to the project, and the number of pledges is displayed on the university website. The programme has enjoyed high success, with over 6,000 and 4,000 pledges received in 2010 and 2011, respectively. With the funds raised as a result of this programme, a number of sustainability projects have been implemented throughout Monash campuses (Monash University, 2012). Table III outlines 6-P factors which are addressed by the Monash Environmental Pledge.

Sustainable Transport Fiesta. Sustainable Transport Fiesta was launched in October 2011 by Monash University (2011). The event, which ran for 2 weeks, aimed to encourage staff and students to travel to and from the university by sustainable transport modes (e.g. public transport, bicycles, walking and carpools). To achieve this purpose, the event involved and rewarded staff who had been or were committed to travelling with a sustainable transport mode. Each day of the event was focussed on one particular transport mode, and participants who utilised such transport mode on the day

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<th>Description</th>
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<tr>
<td>Psychological</td>
<td>The project creates greater awareness of sustainability and educates participants on how to live in a more sustainable manner</td>
</tr>
<tr>
<td>Personal</td>
<td>The course is offered free of charge, and therefore participants can participate in the programme without paying any fee. Participants also personally benefit from the programme with the opportunity to develop communication skills in a fun, interactive environment</td>
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<th>6-P factor</th>
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<tr>
<td>Physical</td>
<td>By altering arrangements of waste and recycling bins throughout staff offices, recycling practices are encouraged as a result. Staff are now more considerate of the waste they generate and dispose of</td>
</tr>
<tr>
<td>Price</td>
<td>All waste and recycling bins required for this initiative are provided by TOES at no charge to office which is interested in undertaking this initiative. Thus, staff who take ownership of this programme for their office are not required to pay an extra fee</td>
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Table II. 6-P factors addressed by Bin There, Done That project
would be rewarded. Rewards included breakfasts, reusable water bottles and coffee cups, Fairtrade coffee and chocolate (Monash University, 2012). The event was highly successful and attracted over 700 staff and student participants. Table IV outlines the 6-P factor which is evident in the Sustainable Transport Fiesta event.

All sustainability projects at Monash University are supported by TOES. Thus, the policies factor has been addressed. The above discussion has shown that the sustainability programme at Monash University has addressed all 6-P factors.

Cornell University
Cornell University, located in New York, USA, has embedded sustainability as its core value through research, education, outreach and campus management. The university aims to become carbon-neutral by 2050 and has adopted a Cornell Climate Action Plan to guide the university’s sustainability progress (Cornell University, 2008).

Cornell University’s sustainability efforts involve extensive participation and innovation from staff and students. Students at Cornell University, who have “been catalysts for change”, have formed various groups, each of which represents different interest (e.g. local food, renewable energy or composting benefits) (Cornell University, 2008). Four highly successful sustainability projects are singled out to demonstrate the application on the 6-P framework. These include:

1. Green Teams;
2. Lights Off Cornell;
3. Take Back the Tap; and
4. TCAT Public Transport Service.

Green Teams. Cornell Sustainability encourages interested staff to form their own Green Teams to incorporate sustainability into the daily operation of their departments. As of August 2012, six Green Teams have been created. Some of the existing green teams represent the following departments: Campus Life, CALS, Human Ecology and Cornell Outdoor Education. Green Teams also have their own websites, on which their mission

| Table III. 6-P factors addressed by Monash Environmental Pledge project |
|-----------------------------|------------------------------------------------------------------|
| 6-P factor                  | Description                                                      |
| Psychological               | The tips given to each staff or student who pledges to this project are useful for educating staff and students on how to reduce their environmental footprints practically and effectively |
| Public perception           | The project displays the number of pledges received publically on the university’s website, which can serve as peer pressure for other staff and students to also take their environmental pledges |

| Table IV. 6-P factors addressed by Sustainable Transport Fiesta event |
|-----------------------------|------------------------------------------------------------------|
| 6-P factor                  | Description                                                      |
| Personal                    | The event rewarded staff and students who showed commitment to travel by a sustainable transport mode. The rewards served as personal incentives for community members to participate in the event and continue utilising green transport modes following the event |
statements, recent activities and annual reports are published. On the Green Teams’ websites, sustainability manuals are also available for interested staff and students to download. Table V outlines 6-P factors which are addressed by the Green Teams arrangement.

*Lights Off Cornell.* Lights Off Cornell is an energy conservation project which engages student volunteers in switching off lights in buildings after office hours. The project initially conducted an energy audit, which estimated that up to US$60,000 can be saved annually by turning unneeded lights off at night. Every night, students are assigned to turn off lights in each building. Student volunteers also record data of lights which they turn off every night to calculate the figures of energy, money and carbon pollution saved as a result of the programme. These figures are periodically updated on the website of the programme, which also publicly shows outstanding volunteers’ achievements in the Volunteer Spotlight section. Volunteers are also issued with community service certificates from the university’s Energy and Sustainability Department following the conclusion of their participation in the programme (Cornell University, 2008). Table VI outlines 6-P factors which are addressed by the Lights Off Cornell project.

*Take Back the Tap.* Take Back the Tap is a major water-saving project at Cornell University that is run by students. The programme aims to reduce supply and demand of bottled water and reinvest in public water infrastructure. To this end, the programme has been educating the community at the university about environmental issues surrounding water, creating viable alternatives to bottled water (e.g. increasing bottle filling stations on campus). The programme aims to ultimately eliminate bottled water from Cornell’s campus. Table VII outlines 6-P factors which are addressed by the Take Back the Tap project.

*TCAT Public Transport Service.* Cornell University has been heavily subsidising TCAT, the regional public transport service, which resulted in the following outcomes:

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<tr>
<td>Psychological</td>
<td>Sustainability information published on the Green Teams’ websites can educate staff and students about how to live in a more sustainable manner</td>
</tr>
<tr>
<td>Public perception</td>
<td>As the information of each Green Team is published on the university’s sustainability website, this can create peer pressure on other departments to form their own Green Teams</td>
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**Table V.** 6-P factors addressed by Green Teams arrangement

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<tr>
<td>Psychological</td>
<td>Energy and pollution saving figures achieved as a result of the project are published on the university’s website. These quantified environmental benefits can create greater awareness of sustainability and encourage staff and students to switch off their lights when they are not in use</td>
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<tr>
<td>Personal</td>
<td>Students who participate in Lights Off Cornell are rewarded in two ways: being recognised officially on the project website’s Volunteer Spotlight for their achievements; and being rewarded with community service certificates, which can be beneficial for their future careers</td>
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**Table VI.** 6-P factors addressed by Lights Off Cornell project
The price subsidy has encouraged active participation of students in using the TCAT public transport. In this regard, the price factor can be considered a prime driver in the success of this sustainability project at Cornell (Table VIII).

The preceding discussion has outlined four sustainability projects to demonstrate the application of the 6P framework. In addition, all sustainability projects at Cornell University are supported by the Energy and Sustainability Department. Thus, the policies factor has also been addressed.

### Conclusion

This paper has developed the 6-P community engagement framework for developing a sustainable campus and has illustrated its application through a case study method to review the current sustainability programmes adopted by two university campuses. These case examples clearly illustrate the need for a holistic approach to engage any community in sustainable development.

Knowledge from various disciplines such as psychology, urban planning and marketing must be harnessed and synthesised so that an integrated approach can be developed to better engage the community in sustainability projects. The 6-P framework suggests that psychological, physical, personal, public perception, price and policy factors are important for engaging the community in sustainable development. Future research could test the framework’s robustness in other communities or organisational settings (such as corporations and schools) by mapping existing sustainability projects of these communities to the 6-P framework to identify the gaps in the community engagement strategy. Studies in the future can also develop scales to

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<tr>
<td>Psychological</td>
<td>The project has been informing the community about issues surrounding water, which can create greater awareness of sustainability in regard to water among staff and students at Cornell</td>
</tr>
<tr>
<td>Physical</td>
<td>The project aims to create better alternatives to bottled water on campus, and access to safe, filtered water has been improved due to the provision of additional drinking water fountains</td>
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<tr>
<th>6-P factor</th>
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<tbody>
<tr>
<td>Price</td>
<td>The free TCAT public transport service is a strong incentive for the staff and students to use the service</td>
</tr>
<tr>
<td>Physical</td>
<td>The TCAT bus routes provided important physical links between the campus and student housing areas as well as the main downtown area</td>
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operationalise each of the six factors and test the wider applicability of the framework through bigger sample sizes.

The 6-P framework is useful in that it can serve as the foundation upon which further research can be based to identify the dominant factors that drive community participation in sustainability projects. In practice, the framework can become a guide for developing a community engagement strategy. The factors identified serve as a checklist during the formulation of a sustainability programme. Additionally, the 6-P framework also demonstrates the need for both top–down commitment and bottom–up initiatives for sustainability. Community engagement in sustainability requires a paradigm shift in nurturing a sustainability culture among diverse groups of people within university campuses.

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Further reading


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EDITORIAL

Leith Sharp
Harvard School of Public Health and Harvard Extension School

Higher education: the quest for the sustainable campus

I was confronted with a profound dilemma as an undergraduate engineering student at the University of New South Wales in Australia in 1992. I had been taught that our planetary life-support systems were in a state of alarming decline by an institution that operated as if what the faculty was teaching was irrelevant. Lights were left on in empty overcooled classrooms, recycling bins were nonexistent, lawns were maintained using pesticides and herbicides, diesel trucks spewed fumes as they passed on their way to drop off chlorine-bleached virgin paper. This disconnect was very alarming to me. While it was obvious that universities should play a leading role in teaching and researching sustainability issues, I wondered how it could be possible to make widespread institutional changes to meet the demands of environmental sustainability when it was not even being done in the very university sector where these ideas were being promulgated. If universities would not change, then who can and who will, I wondered? To a growing number of people, the idea of teaching sustainability without demonstrating it is highly problematic. It is also widely believed that the ability of the higher education sector to reform its own practices is an important indicator of humankind’s ability to address the global environmental imperative across all sectors of society. These sentiments have helped fuel what is now referred to as the campus sustainability movement, a movement dedicated to transforming our campuses into living laboratories for the demonstration and practice of environmental sustainability.

I have participated in this movement over the last 18 years, working with dozens of different universities around the world as a campus sustainability professional and as a member of a variety of related professional networks, as well as a lecturer in change management for sustainability. In 2000, I was recruited to found and direct Harvard University’s Green Campus Initiative (now the Office for Sustainability). Over a nine-year period, I teamed up with a large number of talented people across the institution, including my former academic and administrative co-chairs, Professor Jack Spengler and Tom Vautin, and together we worked to grow this initiative into the world’s largest green campus organization, and one of the most influential. Harvard received the highest green campus ranking in such 2008 publications as the Princeton Review Green Rating Honor Role, the Sustainable Endowment Institute Green Report Card, and the Sierra Club Top 10 Green Schools. What we experienced and discovered in this fertile period in arguably the most complex, decentralized, and politically charged campus in the world, warrants much reflection. With this in mind, I recently resigned from my role as director to open up time to write, teach, and reflect with others to gain a better understanding of the many challenges and opportunities that lie ahead in the now thriving campus sustainability movement. It is my hope that sharing some of these thoughts, in their early stages, may help motivate related discussions and further exploration.

The campus sustainability movement emerged in the early 1990s and has since gone through two evolutionary waves. The first was spent envisioning and articulating the need for campuses to incorporate all sorts of innovations to reduce overall environmental impacts. We imagined campuses filled with green buildings, renewable energy systems, local organic food, organic landscaping, enriched native biodiversity, low-pollution transportation systems, bicycle paths, onsite rainwater-storage tanks, grey and black water-treatment systems, social investments, green chemistry practices, zero solid waste laboratories, green cleaning products, and low greenhouse gas (GHG) emitting campus utilities, along with many more ideas.

Throughout the 1990s and early into the new millennium, campuses around the world experimented with various green campus projects, and we can now find examples of almost everything on the green campus wish list. However, along the way some of us started to notice that while universities were amassing project successes in a piecemeal fashion, they were not achieving the kind of deep organizational transformation many of us now see as fun-
But fundamentally necessary (Sharp, 2002). For example, it was not uncommon for an institution to construct a showcase green building project one year only to revert to conventional building design in later projects. The single success had not actually reformed the building approval and design processes within the institution. Some universities would publicize specific energy conservation projects such as lighting retrofits one year while adding air conditioning to those same buildings the following year. These universities were achieving project successes without institutionalizing energy-intensity requirements to place limits on the energy used per square foot. Other universities placed grandiose and expensive recycling bins in public places while allowing waste generation to escalate, creating an isolated success with no comprehensive waste-reduction plan.

In recognition of the need to go beyond showcase-project successes, sometime around 2003–2004 the movement entered its second wave, applying more pressure and pushing for larger public commitments, dedicated staffing investments, and some kind of specific sustainability governance structure, typically in the form of a university committee with staff, student, and faculty representation. These efforts were aimed at moving the university sector beyond the little victories of single projects, toward sustained progress aimed at reaching larger environmental goals, supported by a professional capacity that could ensure ongoing progress. During this period, some important groundwork was laid in a relatively short timeframe, both in the United States and abroad. According to a National Wildlife Federation Campus Ecology Survey (NWF Survey) conducted in both 2001 and 2008, 65% of the 1,068 schools that responded in 2008 had some form of written commitment to address environmental sustainability or stewardship (or at least had a plan in place to create one), compared to 43% of the respondents in 2001. The 2008 data also showed that about 50% of participating institutions had sustainability committees in place and 51% “have staff or administrators responsible for leading sustainability issues” (NWF, 2008). Fewer than 2% of the schools surveyed in 2001 had sustainability committees and almost three-quarters of the new campus sustainability positions were created since 2003–2004.

In 2007, the American higher education sector had approximately 285 construction projects underway that had been certified under the United States Green Building Council’s (USGBC) Leadership in Energy and Environmental Design (LEED) program (USGBC, 2007). At the time, this accounted for about 10% of LEED projects nationally. In 2009, Recyclemania, the most popular campus-recycling competition in the country, had 500 universities competing, and the winning campus achieved a very impressive 78% recycling rate. According to the association for the Advancement of Sustainability in Higher Education (AASHE), between mid-2007 and March 2009, over 620 presidents of colleges and universities in the United States endorsed the American College and University Presidents Climate Commitment (ACUPCC) that obliges signatories to achieve climate neutrality within a timeframe of their own choosing. This pledge will require these educational institutions to avoid additional GHG’s that may result from future growth, to reduce GHG emissions from existing operations, and to mitigate any remaining emissions by investing in carbon offsets, offsite renewable energy projects, and other measures. Collectively, these colleges and universities represent over 30% of the United States’ student body.

The latest NWF Survey also showed that staff, faculty, and student-advocacy groups have been equal champions of the movement, debunking a common misconception that it was primarily student driven. Faculty have stepped up to participate in new governance structures to oversee ongoing efforts; students have continued to press for greater commitments; and staff members have worked hard to prove the cost effectiveness of a variety of initiatives.

Throughout the 1990s and up until fairly recently, the view of colleges and universities was that greening their campuses would simply cost too much, taking precious funds away from teaching and research. It is only recently that our institutions are finally realizing that an enormous amount can be achieved either at no added cost or within a very reasonable payback period. It took around five years for my team to change the prevailing mindset at Harvard University, resulting in a sea change in the level of participation across the campus. We reformed age-old assumptions by implementing a slew of cost effective building projects, purchasing changes, and behavior-change programs that generated over US$6 million a year in energy and waste reduction-related savings. Harvard University was not the only institution learning this lesson. The 2001 NWF Survey showed that only 9% of respondent schools said that cost effectiveness was a driver in implementing initiatives, but by 2008 the figure had risen to 24%. This represents an important shift away from the paralyzing assumption that greening the campus costs too much and does not generate any financial return. This shift has been especially critical in sustaining green campus activities during this challenging economic downturn.

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While the movement’s first and second waves have been key stepping-stones, they have not produced the breadth, depth, and pace of change that is necessary. Most global environmental problems are escalating at an exponential rate, and despite the last fifteen years of effort, the campus sustainability movement has not yet succeeded in achieving wide-scale transformation of college and university campuses into models of sustainable practice. To increase its effectiveness, the campus sustainability movement must now turn toward organizational change management, basing its strategies on a much more sophisticated understanding about how universities (and other large organizations) actually function so we can begin to unearth the enormous opportunities for increased innovation and transformation, adopting a systems-thinking perspective to steer an effective course forward.

Perhaps the most important legacy of the movement to date is the discovery that universities (and most large organizations) operate with a substantial degree of unconscious habit and irrationality and that very few people, at even the most senior levels, actually know how they truly function. This is in part the result of the compartmentalization inherent to large hierarchical organizations. The separation of different disciplines, arenas of responsibility, and tiers of management generally prevent people from understanding the broader context or the overall systems that operate across the institution. The fact that few individuals understand the broader institutional context, its systems and behaviors, has dire consequences for our efforts to navigate toward sustainability. This is because the demands of sustainability are systemwide and involve changing organizational culture, behaviors and the entire institutional context.

Despite our best efforts, experience shows us that planning and decision making are not always rational, and policy implementation does not necessarily follow a logically cohesive pattern that is consistent over time. Moreover, at times the components of the institution do not behave or interact in a predictable or even understandable manner. Compartmentalization, territorialism, complexity, risk aversion, and hidden drivers, to name just a few such dynamics, sometimes conspire to undermine even the most sensible ideas. Despite this, the institution depends upon its ability to appear more rational and self-aware than it sometimes is. I believe that there is a deep institutional culture of denial at play to sustain a myth of rationality, which in turn prevents us from engaging in the depth of institutional analysis necessary for navigating toward sustainability.

So far, the campus sustainability movement has been catering to the ideal of organizational rationality, writing up sustainability master plans, establishing new goals and indicators, adopting annual environmental reporting requirements, and so forth, as if there is a purely rational, conscious organization to take them up. Meanwhile, no attention is being directed toward the more complex, irrational, and unconscious life of the institution, allowing it to lurk under the surface as an ever-present threat to progress. To be clear, I am not advocating that rational planning and management processes do not have a critical role to play, just that they must be supplemented with a more sophisticated approach that works to diagnose and reform the very nature of our organizations. This effort must address everything from governance structures and decision-making processes, change management, finance and accounting practices, hidden institutional drivers and compartmentalization, engagement, capacity building, systems thinking and leadership.

New governance models and decision-making processes must be created to enable effective interdepartmental, interdisciplinary, and multitier engagement in the campus sustainability enterprise. At the executive level of our institutions we need a distributed model of ownership, accountability, and control that would bring vice presidents of finance, human resources, facilities, development, government and community relations, academics, and other departments into a shared state of responsibility and collaboration. Currently, universities do not do well with interdepartmental and interdisciplinary decision-making processes because, for one thing, their success depends upon transcending institutionalized habits of territorialism involving powerful personalities and significant complexity. Instead of addressing these challenges we commonly see our organizations structure the responsibility and leadership for sustainability under just one group or department. In the long term this can create a variety of undesirable tensions and issues resulting from a lack of effective coordination and integration. Developing new governance structures and decision-making processes that distribute and coordinate ownership and responsibility for the campus sustainability agenda requires the leadership of university presidents and other senior executives.

One way our educational institutions can greatly advance their campus sustainability efforts is to better comprehend the emerging role of the campus sustainability professional. The work of enabling the entire university to achieve continuous progress toward sustainability is a professional function not yet well understood. The typical university today might consider employing just one person to coordinate, communicate, and project manage sustainability across the entire campus, generally someone with no change-management skills, structured to report up
through the facilities department. Despite their best efforts, passion, and commitment, most of these professionals are quickly overburdened and are without the skills, structure, or staffing level to achieve the necessary broad-reaching institutional engagement and transformation. What we are just starting to realize is that our organizations need to make a sizable staffing investment in a change-management function to drive organization-wide progress toward sustainability. The organizations that make this investment are able to achieve remarkable efficiencies and improvements right across the campus, producing financial and organizational returns that exceed the required investment. Without properly staffing and structuring this important change-management function, even the most progressive universities may become bogged down in a variety of destabilizing factors—political, financial, human resource, technological, or otherwise.

What does this sustainability change-management function look like and what does it do? To use the analogy of the large ship, this change-management function, in the form of a team of dedicated professionals, acts as “the rudder on the rudder,” engaging a critical mass of the university community to steer itself toward a new course. The central role of the sustainability change-management team must be as a resource and catalyst to ignite people right across the university, to take initiative in everything from green building design and operations, renewable energy, environmental purchasing, recycling and waste reduction, green cleaning, alternative fuels, green office practices, green laboratory practices, organic landscaping, and GHG reduction. The structure and skill set of this change-management team must be appropriate for fostering engagement, capacity building, leadership, ownership, communications, and continuous improvement across the entire institution at all levels of management. It needs to have a very senior reporting relationship within the organization, reporting to the President or next in command to ensure legitimacy and enable access to all groups across the institution.

Over many years, I have observed that the common belief that people are innately adverse to change is not generally true. People are not resistant to change, they are opposed to instability, and they simply assume that change equals instability. When people experience stable processes of change they generally thrive on the experience and will readily embrace more change. Furthermore, by having enough positive change experiences, people often undergo a personal transformation, shifting from being passive participants to becoming leading agents of ongoing innovation and continuous improvement in the organization. For this reason, fostering stability during the organizational change process is a key function of the sustainability change-management team because it enables an organization to establish a culture of stable innovation and transformation across the campus. To achieve this stability, the change-management team must be able to engage in sophisticated ongoing institutional diagnostics, creative problem solving and pre-emptive action to address a wide variety of real or perceived risks and barriers. Sources of potential instability that may need to be diagnosed and addressed can include fears of negative reputational impacts, financial approval limitations, managerial backlash, capacity gaps, time pressures, and technological failures, among others.

At Harvard University, I needed to build a sustainability change-management team of 24 full-time campus sustainability professionals to carry the enormous workload associated with supporting wide-scale engagement, ownership, and leadership across a very decentralized, complex, and politicized campus of 40,000 staff, faculty, and students. Our funding model included a 20% contribution to our overall budget from the President’s and Provost’s Offices. The rest of our annual funding was sourced through an entrepreneurial business model that targeted a variety of projects and programs that generated ample savings from reduced energy and waste costs (over US$6 million per year after six years of work) which in turn was used to justify ongoing investments in our sustainability change-management team. I started small and grew the team and the related number of projects at an average rate of 30% each year for eight years.

Our institutions freely use the mantra of the “business case” to challenge and scrutinize the viability of anything new without addressing the fact that in many cases the business case is being sabotaged by poorly designed finance and accounting structures. Colleges and universities are incurring enormous additional costs by failing to reform these practices to enable good business practice to flourish. For example, institutional accounting structures separate capital budget management and operating budget management, and they rarely allow for operational savings to be captured and reinvested. It is not clear how this has evolved, but it occurs in almost all large organizations. This division results in capital budget managers resisting the expenditure of any extra money, even when the operation savings are extraordinary. At the same time, the operating budget managers commonly do not have enough access to funds for ongoing efficiency improvements. Even if operating managers do manage to fund efficiency improvements to produce operational savings, they are rarely allowed to capture and reinvest these savings for further improvements. Instead, they will often see
next year’s operating funds reduced to reflect this operating cost reduction, hardly a reward for a job well done.

The pathway to campus sustainability requires ongoing piloting and experimentation. Operational savings (costs avoided) can be an ideal source of capital for these pioneering activities. Experience shows us that the first time we do something new, it generally takes more time and costs more money, but that through repetition, time and costs are often reduced by streamlining processes and improving capacities. After some repetition we come to understand the true recurring costs and savings associated with the new activity, to the point of being able to budget accurately. I saw this process at work many times at Harvard, but perhaps the most compelling example was in relation to our green building efforts. When we first started to use the USGBC’s LEED green building standard in 2001, we were told by many architects and engineers that we could expect the new activity, to the point of being able to stand the true recurring costs and savings associated with the new activity, the point of being able to budget accurately. I saw this process at work many times at Harvard, but perhaps the most compelling example was in relation to our green building efforts. When we first started to use the USGBC’s LEED green building standard in 2001, we were told by many architects and engineers that we could expect to pay 5–10% more for our buildings. After five years of piloting LEED projects across the university, building internal capacities, and streamlining the overall process, Harvard was able to achieve its first LEED platinum renovation, the highest possible green building rating, at no added cost to the project. Other LEED Silver or Gold projects on campus were down to less than 1% additional cost with payback periods of eight years. To get to this point of efficiency, we had to first invest in the piloting and learning process. Unfortunately, most institutions do a very poor job of allocating annual funds for pilot projects and valuing the related learning processes. Others expend their resources on external consultants only to be left without any internal capacity for streamlining and embedding new practices. Because of this tendency, innovation, efficiency gains, and continuous improvement in general, are sporadic at best. Capturing and reinvesting potential energy and waste savings into future pilot projects and in internal capacity building are ways organizations can stimulate new levels of innovation without drawing down funds from other areas of the university.

At Harvard, we worked to overcome many of these finance and accounting impediments by implementing a US$12 million revolving loan fund that was available to anyone with a conservation project that could achieve a payback period of five years or less. Within seven years, building and facilities staff had borrowed over US$8.5 million to fund over 200 projects, including lighting upgrades; heating, ventilation, and air conditioning (HVAC) improvements; building-commissioning projects; and occupant behavioral change programs (encouraging people to switch equipment off, recycle more, and generally do their part). The average payback period for the first 200 projects we funded was just three years. Over time, I worked to broaden the scope of the Green Campus Loan Fund to fund feasibility studies, investments in metering, onsite renewable energy projects, and innovation in renovation and construction projects. To approve proposals, we established an advisory committee of facility managers that met each month to review applications. The revolving loan-fund model is clearly a successful strategy that many organizations have since replicated. However, the deeper lesson is that we should stop creating the ongoing need for revolving loan funds—by structurally connecting capital and operating budgets and institutionalizing life-cycle costing, a well-established methodology for calculating upfront and future operating costs relating to different decision-making options. I also believe that our organizations should capture and reinvest savings that result from successful resource conservation and waste-reduction efforts as routine practice to fund dedicated annual innovation budgets for financing pilot projects and ongoing efficiency upgrades. These are necessary next steps to enable the kind of good business practices, innovation, and continuous improvement our institutions need.

Beyond the finance and accounting arena, a variety of other hidden institutional drivers also exist within our organizations, posing a danger to all sorts of well-intentioned efforts. For example, some educational institutions engage in energy-purchasing contracts based on volume consumption. Under the terms of such arrangements, if the institution consumes less power, the unit price goes up, a disincentive for pursuing aggressive conservation. Others operate central utility plants (producing steam, chilled water, or electricity) that employ a business model dependent upon keeping as many people using their services as possible. They have a basic operating cost for maintaining infrastructure and staffing that is separate from the cost of fuel consumed. This base operating cost can be up to 50% or more of the energy bill received by the customer. Under this arrangement, any effort to remove a building from this central service to use an onsite renewable energy system like solar thermal or ground source heat pumps, for example, is likely to encounter resistance from the campus-utility team. This is because if they lose any of their campus customers, they have to pass on more of the base operating cost to their remaining users, which in turn can lead to a cascading loss of customers. At one campus I am familiar with, the steam plant used a condensate return-metering system that discouraged some building managers from repairing steam traps that had blown open. A blown steam trap wastes large amounts of steam and reduces the condensate that returns to the plant, result-
ing in a lower heating bill for the building. The cost of the wasted energy gets distributed across all bill payers as a “general line loss” fee. If the building managers were to spend money to fix their own steam traps, the extra condensate return would result in a higher bill for them and a slight reduction for everyone else, hardly an ideal financial incentive structure. In these cases, and many more just like them, the institution is actually incentivizing particular individuals, groups, or components of the broader system to optimize their own particular outcomes regardless of the overall system inefficiencies. To date, our universities have been slow to identify the existence of such underlying drivers. Going forward, we clearly need to actively diagnose the larger systems at play in our organizations, including the more submerged and complex dimensions.

Just as our organizations may be harboring submerged drivers that can effectively sink innovation efforts, individuals may also be harboring attitudes and feelings that can impede real engagement and learning. In many organizations a culture of private disengagement has taken hold in certain campus populations, typically as a response to a lack of bottom-up consultation or general engagement regarding everything from budget development, training, and advancement processes to operational decisions. Because of this feeling of exclusion, I have noticed there is often a systematic lowering of expectations and a withdrawal of creative energies and self-initiative from the workplace. People put their heads down, do their jobs, and nothing more. Some common sentiments are, “I’ve had ideas for how we could improve things for years, but no one listens and so I don’t bring it up any more,” or “They put this new system in but no one knows how to maintain it properly,” or “No one’s ever explained the bigger picture to me before so I’ve never thought about it.” For any organization that is serious about making real progress toward becoming environmentally sustainable, having a culture in which these sentiments have taken root presents a profound impediment.

People are our greatest resource and, because the pathway to campus sustainability requires such wide sweeping and ongoing innovation and continuous improvement, our institutions must become learning organizations with the vast majority of people working in a state of public engagement and life-long learning. Most organizations have a long way to go before their community has evolved to this point. One of the most effective ways to foster engagement and learning across our institutions is through the use of peer-to-peer forums. During my time at Harvard, we experimented with dozens of different peer-to-peer models, working with building operations staff, kitchen personnel, residential students, facility managers, executive level managers, laboratory users, administrative staff, and more. We consistently found that structuring peers of the same social or professional group or managerial tier to engage with one another in a shared process of discovery, competition, teaching, and learning was extremely effective in tapping unprecedented effort and stimulating real learning. Peer-to-peer models of engagement are more costly to coordinate, but they produce savings well in excess of the investment, and they far outperform the common approach of having the “expert” or “authority” simply tell people what to do.

The basis of this success is tapping into innate human cognitive drivers and tendencies, something our organizations often fail to do. Cognitive research shows that approximately 95% of what we do is unconscious and the brain is constantly working to free up its 5% of conscious reserves by converting new behaviors into unconscious habit as quickly as possible (see, e.g., Bargh & Chartrand, 1999). In the institutional context, there is fierce competition for these conscious reserves, and often the process of developing new habits needs ongoing support. By creating an ongoing learning forum in which people are socially engaged with a group that they identify with and interact with frequently, we address two key learning challenges—attention and habit conversion. I now believe that connectivity between similar management tiers is just as important as the connectivity that exists up and down the chain of command. That is to say, horizontal flows of information, influence, and engagement are as important as vertical flows. This works at the very senior levels of our institutions right down the chain of command. When people ask how 620 university presidents across the United States publicly agreed to achieve climate neutrality, my answer is through the very skillful use of peer-to-peer influence. Once several presidents signed, advocates successfully leveraged this circumstance to catalyze others to do so, capitalizing on either a feeling of confidence in joining with others or a sense of risk in being left behind if they did not sign up.

So far I have talked about a number of ways in which we can achieve a new level of innovation and transformation toward campus sustainability. What remains to be discussed is how we can steer our course of innovation and transformation forward. Herein lies perhaps our greatest challenge, the task of adopting a systems-thinking approach to continuously diagnose and determine our path forward. Without taking a systems-thinking approach, universities may end up achieving significant progress in one environmental impact area while inadvertently increasing impacts on other planetary life-support systems. For example, substantial gains in greenhouse gas reduction may be achieved at the expense...
of biodiversity by using biofuels implicated in deforestation practices. Similarly, metered reductions in particular impacts may be undone by unmonitored activities elsewhere in the organization. For example, green building successes and GHG reductions may be completely negated by additional emissions resulting from campus growth, endowment-investment strategies, research activities, or travel emissions from study-abroad programs. Not only is a systems-thinking approach necessary for avoiding these risks, it is essential for discovering the big opportunities.

I believe that our educational institutions are ripe with prospects for significant impact reductions at no added cost. Many of these gains can be found via a life-cycle costing approach that considers long-term costs and benefits. Many more opportunities can be discovered by thinking about larger systems instead of separate components. For example, universities could switch to 100% post-consumer recycled paper at no added cost if they simultaneously adopted double-sided practices for all printers, copiers, and publications. Dining facilities could increase local, fair trade, and organic options at no added cost if students would agree to reduce the diversity of meal offerings and eliminate food waste. At Harvard, I worked with a graduate student to investigate a systems-thinking approach to reducing building-related GHG emissions. In our case-study, a 120,000 square foot residential building built in 1959, we were able to show on paper that by investing in energy efficiency, capturing those savings, and reinvesting them in other GHG-reducing activities, over a twelve-year investment period the net present value cost for achieving climate neutrality (zero net GHG emissions) for that one building would be just US$6,000 in today’s dollars.

Systems thinking presents us with such a profound challenge because it forces us to confront the way in which university functions are compartmentalized into divisions, units, departments, disciplines, and tiers of management. While this approach enables a good degree of control and accountability up the chain of command, it also ensures that the whole system is rarely considered when decisions are made. Whether it is the campus-energy system, purchasing, transportation, waste, or water system, there are numerous structured disconnects between all of the relevant stakeholders, with little or no effort to transcend these separations at critical planning times. All effort is directed toward optimizing single parts of the system, even at the expense of the institution overall. At one university I worked for an entire new campus was under development, but we were still unable to get the utility planning and the building-design teams to collaborate on downsizing the associated utility plant to reflect a commitment to more energy-efficient buildings. The architects did not want to answer to the utility-planning team’s requirements and the utility-planning team was preoccupied by the concern that the client would blame them, not the building designers, for any shortfall in utility provision. In one of the most ironic examples of how the culture of separation endemic to our organizations makes it so hard to make real progress, a particular green building renovation project was tested to see if it was tightly insulated enough to pass the required blower door test to become ENERGY STAR rated. It was discovered, after the fact, that the group conducting this test used a tracer gas called SF6, which happens to have a GHG potency of over 25,000 times that of carbon dioxide. It was only used in very small amounts; however its potency meant that even these small amounts were problematic.

We will not be able to realize the benefits of systems thinking until we address the separations of our universities. To think about systems effectively you need to bring the people that represent each of the system components into the room, that is, all of the key individuals who represent the system must engage in conversation before you can understand and identify system-level opportunities and implications. The nature of this conversation must advance beyond a dynamic of territorialism and component optimization toward a dynamic of deep collaboration and engaged interdisciplinary thinking. To this end, the people must be effectively incentivized and facilitated from beginning to end to strive for shared success and to generate team-based problem definition and solution development. To date, we have very few examples of effective systems thinking being achieved in our universities, but recognition of its importance is growing.

We now need to usher in the third wave of the campus sustainability movement, an era focused upon addressing the irrational and unconscious aspects of our institutions to foster a new organizational capacity for innovation and transformation, steered by a systems-thinking perspective. It must be led with authority and influence, exerted by presidents and executives, middle managers, and grassroots champions. We need leaders with a sober, realistic, and sophisticated grasp of how our institutions truly function, and a more accurate assessment of how much we can depend upon pure rationality and when we must address the less rational, unconscious, and more complex nature of our organizations. We need leaders who are willing to face the risks and opportunities that will arise by engaging in conversations that explore the very distribution of power, the architecture of decision-making processes, and the nature of governance, in pursuit of a new level of shared ownership and interconnection across all necessary disci-
plines, management tiers, and administrative functions. We must work to strengthen bottom-up and horizontal collaboration, continuous learning, and capacity building. We need to enable a systems-thinking approach to steer the course toward campus sustainability. Only by ushering in this next wave in the campus sustainability movement will we manage to navigate the next era of the long and complex journey to bring our institutional impacts down to an equitable share of what the planet’s life-support systems can support.

References


About the Author

Leith Sharp has eighteen years of experience in greening universities around the world. She has consulted and presented to over 100 organizations and is on the governing committees and editorial boards of numerous organizations, including the Association for the Advancement of Sustainability in Higher Education and the *International Journal of Sustainability in Higher Education*. Leith has received numerous awards for her work including a Churchill Fellowship and Young Australian of the Year, NSW Environment Category. From 2000 to 2008, Leith was the founding director of Harvard University’s Green Campus Initiative and led the creation of the largest green campus organization in the world, taking Harvard to the forefront as a global leader in campus sustainability. Under her leadership, Harvard achieved over 50 LEED building projects (mostly gold or better), instituted a US$12 million revolving loan fund that achieved an average return on investment of 30%+, and implemented wide-scale engagement in occupant behavioral change, onsite renewable-energy projects, GHG reduction commitments, alternative fuels, green cleaning, environmental purchasing, and much more. Leith is currently engaged in a variety of writing, teaching, speaking, and consulting activities. She has an ongoing affiliation as a visiting scholar with the Harvard School of Public Health and continues to teach organizational change management for sustainability and green building design through Harvard’s Extension School. Leith has a bachelor’s degree in engineering (environmental) from the University of New South Wales (Australia) and a master’s degree in education (human development and psychology) from Harvard University. She welcomes feedback and can be contacted via lsharp@hsph.harvard.edu or leithsharp@yahoo.co.uk.
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Greening the American Campus
Lessons from Campus Projects

Useful green infrastructure frameworks are shared from case studies at U Washington-Tacoma, U Washington-Seattle, Wellesley, and SUNY’s College of Environmental Science and Forestry.

by Thaisa Way, Chris Matthews, Nancy Rottle, and Timothy R. Toland

Campus landscapes can serve as living laboratories for reducing carbon footprints, conserving water and aquatic resources, supporting biodiversity, and building active, equitable social communities. Moreover, as learning landscapes, such campuses actively promote sustainable design by engaging faculty, staff, and students in the design and implementation process as a part of the pedagogy of place. This progressive focus positions universities as leaders educationally and environmentally.

The Association for the Advancement of Sustainability in Higher Education (AASHE) includes over 640 four-year institutions, reflecting the importance of these issues in the higher education community. Recently, AASHE launched the Sustainability Tracking, Assessment & Rating System (STARS®) 1.0 program, which is designed to provide a guide for advancing sustainability in all sectors of higher education, from education and research to operations and administration [and to] enable meaningful comparisons over time and across institutions by establishing a common standard of measurement for sustainability in higher education. (AASHE n.d., ¶ 2)

Many of the AASHE-member institutions have identified offices of sustainability and green development. However, most institutions have focused on buildings (e.g., Leadership in Energy and Environmental Design [LEED] standards) or on waste/facility management procedures (e.g., recycling products, hybrid cars) rather than on campus landscape design. A few institutions have

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turned their attention to the campus landscape and its potential as a resource and tool for both sustainability practice and pedagogy. For example, in 2009 the University of Minnesota launched the Zero + Campus Design Project to address how buildings and landscapes might contribute to reducing environmental impacts and carbon footprints. Other campus master plans and a myriad of smaller precinct plans have also addressed the call to meet sustainability goals. Such projects at the University of Cincinnati (developed by Hargreaves Associates) and Yale University (developed by OLIN) suggest the potential of teams of designers, planners, and scientists engaged in careful thinking about campus expansion within the paradigm of sustainable and green design. In the process, landscape architecture, both as a profession and an academic discipline, has the opportunity to take the lead and push the boundaries of traditional campus design and planning to engage new visions of how campus landscapes look and perform.

Landscape architecture has the opportunity to push the boundaries of traditional campus design.

Acknowledging the breadth of campus design across the nation and world and the diversity of sustainable design practices being implemented, this article does not prescribe an optimal approach; rather, it suggests frameworks and practices identified in four North American university case studies. This approach fits well within the sustainable design movement, which has increasingly acknowledged the need for individual site responses. It responds to current calls for specificity in how sustainability is defined and sustainable practices are described and offers a grounded framework for exploring this diversity. In turn, lessons from the cases suggest arguments that might be used to persuade leaders of the critical importance of changing how we plan and design future campus landscapes.

The institutions selected for this article each engaged a landscape architect in the campus design, illustrating the opportunity for the landscape architecture community to take a lead role in the sustainable design process. In the first two studies, at the State University of New York College of Environmental Science and Forestry (SUNY-ESF) and the University of Washington Tacoma (UW Tacoma), professionals worked with constituents to reflect a focus on community-based design. In the second two projects, at Wellesley College (Wellesley) and the University of Washington Seattle (UW Seattle), a landscape architecture firm was selected to lead the design projects. These four projects also represent a breadth of campus scale, from the small SUNY-ESF campus to the large UW Seattle campus, and from the private campus of Wellesley to the new public landscape of UW Tacoma. Such variety allows broad discussion while highlighting shared values, methods, and outputs.

Clearly, any campus can undertake specific and highly successful green projects, from a recycling and compost facility to solar panels or a campus farm. However, sustainable design is understood to be far more than individual insertions or elements. For the cases discussed in this article, sustainable design was considered to be a framework for planning and designing college and university campuses as promoted by AASHE and the Sustainable Sites Initiative, incorporating infrastructural systems that might set new university-wide practices. A “green infrastructure” approach, as described in this article, provides a useful rubric for planning and designing sustainable landscape systems and elements.

A ‘green infrastructure’ approach provides a useful rubric for designing sustainable landscape systems.

A significant challenge involved considerations of the appearance of the sustainable campus. Each of the campus landscapes studied had to deal with issues of branding and campus image—what would a sustainable landscape look like? How would function and performance inform and shape aesthetics and image? There is an expectation of what the American campus looks like—green lawn quads with large shade trees, old buildings, well-manicured landscapes—and campus administrators are image conscious: how does a sustainable campus also become one that remains memorable in the minds of alumni and visitors? Traditionally, administrators and leaders of academic institutions take the long view and are appropriately protective of their institution’s history and image; yet, in these projects they considered radically altering how a landscape works, how the infrastructure performs, and what maintenance is required. As sustainable approaches
can yield vastly different landscapes, this remains fertile ground for design exploration. This article suggests a paradigm shift in campus design processes to facilitate the role of campus landscapes as places that inspire and model environmental stewardship in meaningful ways while also affording diversely beautiful places in which to learn.

**Campus Planning as Community-Based Design: SUNY-ESF**

To alter the very look of a campus requires buy-in from the larger community. As research has shown, to gain this level of acceptance, the community must be engaged from the start. While many projects focus on the outcome of the master planning process, at SUNY-ESF in Syracuse, New York, engaging the community in the initial visioning of the plan was a first priority. Beginning in 2006, the SUNY-ESF administration worked with the Department of Landscape Architecture to build on ongoing research related to how sustainable values might inform the design process and what role green technology might play in a modern campus. The university president had committed to exploring and implementing alternative energy sources, and the institution had adopted a strategic plan (Vision 2020) that included, among other things, goals for renewable materials, energy, biotechnology, and sustainable systems and communities. The school was strongly positioned to develop a sustainable campus master plan comprised of more focused precinct designs and plans.

The planning process at SUNY-ESF addressed the technical and environmental issues often associated with sustainable plans; however, the process was distinctly shaped by community interaction and engagement. The Department of Landscape Architecture included a number of faculty members whose research was in participatory design. The institution’s interest in and commitment to a participatory approach to articulating the vision and developing the plan framed both the process and the responses and solutions proposed.

A campus is an “intentional community” comprised of administrators, faculty, staff, and students that fosters discourse, debate, collaboration, and social interaction (Chapman 2006; Fogg 2006; Lipka 2006; Monastersky 2006; Thayer 1994). In this environment, learning occurs in multiple settings, from the classroom and laboratory to chance encounters on the quad. As defined systems, institutions have established patterns for operations and maintenance. As physical places, they project an image to the outside world (Kenney, Dumont, and Kenney 2005). Campuses also reflect changes in values as well as in politics and ethics.

Founded in 1911, SUNY-ESF is a specialized college within the state’s higher education system and is one of the oldest campuses dedicated to the environment. While the institution has over 25,000 acres, most located remotely (including in the Adirondack Mountains), the main 18-acre campus, located just outside Syracuse’s central business district, is highly urbanized. Like many institutions, SUNY-ESF faces an aging and outdated infrastructure and a need to expand due to growing programs and outreach activities.

In summer 2006, the administration engaged the college’s Department of Landscape Architecture to help guide its planning process. After a series of initial studies, it was concluded that there were several directions the plan could take, and therefore the process was opened to the campus community. Such a community-based approach, built on local research in participatory design that took advantage of the varied expertise, backgrounds, viewpoints, and attitudes of campus constituents, offered a critical foundation for framing the master planning process (Hester 1990; Sanoff 2000; Schneekloth and Shibley 1995). Stakeholder interviews were held with key administrators, faculty chairs, department heads, and staff members to get direct input on needs and perceptions as well as ideas for potential interventions. In spring 2007, the students and faculty advisors of the Community Design and Planning thematic studio used the early input from the interviews as a basis for workshops targeting all faculty, staff, and students (see figure 1).

There was general enthusiasm for the process from the academic community, in large part because of the university’s historical focus on the environment, which encourages a shared value of environmental stewardship. In addition, because the university has just over 2,700 students and 146 faculty members, it is able to foster a sense of shared community. The general consensus resulting from the activities and discussions was that, despite the institution’s academic focus, the campus’s physical appearance did not reflect its mission or values (see figure 2). Therefore, significant physical and aesthetic change was necessary to visibly demonstrate a commitment to the environment and to sustainability. This foundational idea, directly from the community, provided the framework for all subsequent planning actions.
In summer 2007, building on community input and ongoing investigations within the department, a team of faculty and students developed a report on new opportunities and potential interventions. The proposed plan addressed several issues of pedestrian and vehicular connectivity, open-space usage, and campus aesthetics and suggested several building footprints to meet future growth needs. Building on the Vision 2020 strategic plan adopted in 2003, sustainable initiatives were proposed to meet site needs and provide educational and aesthetic benefits (see figure 3). These included stormwater management facilities (e.g., rain gardens and cisterns) and renewable energy production. An additional benefit of the plan was its ability to comprehensively identify a long-range vision for growth that included multiple aspects of the campus operations and that worked toward the goal of a carbon-neutral campus. The green infrastructure elements were viewed both as responsive to the community and as responsible approaches to the stewardship of the campus landscape. In addition, the proposed ideas were viewed as responding to and addressing the particular pedagogical foci and values of the institution and thus were widely supported.

The master plan is intended to be a 15- to 20-year planning document. Many of the proposed landscape projects can be associated with building rehabilitation and campus maintenance improvement projects, although some capital funding will be required for significant projects such as the quad improvements. While consultants were
Draft campus master plan for SUNY-ESF proposed in summer 2007. The plan proposed a complete transformation of the campus from a standard 1960s-era aesthetic to a contemporary example of a sustainable campus. Reductions in turfgrass and parking provide the opportunity to incorporate several initiatives, including rain gardens, wetlands, plantings, and ecological restorations. Public space is transformed into a range of spaces, from large-scale activity areas to small-scale private spaces.

*Image source: T. Toland*
used on specific projects when tasks exceeded faculty expertise, the foundational ideas generated by students and faculty were maintained. The projects underway include increased plantings to make the campus a teaching laboratory and facilitate the removal of high-maintenance lawn areas; a demonstration garden of campus willow (Salix cvs.); renewable energy and innovative stormwater management systems; and green roofs comprised of New York-native alvar grassland and Great Lakes dune ecosystems plants for the campus’s main entrance buildings (see figure 4).

With such a high level of community and academic support, implementing aesthetic changes would appear to be relatively easy. Indeed, the campus community at SUNY-ESF is unique among state universities in that all programs are geared toward the environment, and the student body has been vocal in its desire to have a campus aesthetic that mimics or reflects natural systems, even if these fall outside conventional norms for campus appearance. However, the image of the campus quad with its open grass lawns and rows of trees remains deeply embedded in the public’s vision of campus landscapes. Therefore, care was also taken to ensure that the campus provides a compelling aesthetic for recruitment and alumni-relations purposes. For example, although selected lawns have begun to be replaced with alternative landscapes, turf has been

Figure 5

One way that new elements are introduced to the community on the SUNY-ESF campus is through interpretive signage.

Image source: T. Toland
retained where students might use it for recreational and social purposes while still minimizing its uses in out-of-the-way corners and hard-to-maintain areas (e.g., steep slopes). Alternative recommendations for addressing turf maintenance issues have included allowing grass to grow longer, maintaining it only seasonally, and adding native plants beside turfgrass. Rain gardens were welcomed as long as they did not replace the quad, and bioswales were considered a learning opportunity as long as they did not interfere with the clean-cut look of the campus. On the other hand, approaches such as the inclusion of green roofs were popular additions to the campus (see figure 5). Drawing on Nassauer’s (1995) work on implementing the cultural language of design in natural systems plantings, strategic plant placement, patterns, masses, drifts, and other techniques have been recommended to suggest thoughtfully designed spaces.

Students, staff, faculty, and university leaders are committed to making a difference on campus and in the classroom. A variety of efforts have been launched to incorporate the landscape in the formal curricula and to provide opportunities for the public to engage in the efforts and monitor the results. Despite the small successes, challenges remain. The decision-making process is not easy, although everyone remains committed to a sustainable future. The shared values help to coalesce divergent views around the core ideas of the master plan and remind constituents of the important goals the university has regarding sustainability and maintaining the institution’s vision as a college of the environment.

**Laying a Green Foundation: UW Tacoma**

As most faculty are aware, it is often students who are on the leading edge, pushing university leadership to invest with justice and to “do” as they teach, to be as green as they preach. SUNY-ESF was able to easily engage students in the process of campus planning, in part because the university community is small and the institution is recognized for its focus on the environment. On the other hand, UW Tacoma is a relatively new branch campus without an internal community that could be easily engaged. In this case, the university turned to a professional firm, Mithun from Seattle, nationally recognized for its work in sustainable design. In addition, UW’s Seattle campus has a Department of Landscape Architecture with a community of faculty and students deeply engaged in studies of urban ecological design. Realizing the learning opportunities inherent in the Tacoma campus planning process, the department offered an advanced studio as a way to explore a variety of potential futures. Students were thus brought into the design process as a pedagogical activity and enriched the process by offering their creative perspectives.

The plan for the Tacoma campus was initially approached by master of landscape architecture students enrolled in an advanced Landscape Urbanism studio and a seminar on Sustainable Design and Green Infrastructure offered at the UW Seattle campus. The design process served as a form of experimentation by drawing on faculty research in sustainable infrastructure and a testing of theories identified in seminar readings. Students sought to expand the role of design in the development of a sustainable campus landscape and to enrich the leadership landscape architecture might offer by focusing on the campus’s “green infrastructure.”

In the larger profession, the definition of green infrastructure has evolved from meaning the large-scale, undeveloped spaces surrounding communities to encompass the natural urban systems that provide ecological and human services (Girling and Kellett 2005). The term is also used to signify a “sustainable” or “green, high performance” approach to utilities, such as stormwater infiltration, cleansing, and conveyance, that is aimed at reducing human impacts on local and global resources. At UW, these perspectives on green infrastructure are aggregated, resulting in a more scholarly definition as developed by researchers: “all natural, semi-natural and artificial networks of multi-functional ecological systems within, around and between urban areas, at all spatial scales” (Tzoulas et al. 2007, p. 6).

As the design process for the Tacoma campus was part of a larger exploration by UW faculty, the project reflects the ongoing development of a language of design that expresses the nature of sustainability and what it means to engage in this work. Drawing on explorations by UW’s Green Futures Lab, the students worked with a definition of urban green infrastructure that comprises five interacting systems: community and open space; low-impact mobility; habitat; water and natural drainage; and energy, food, and climate (or metabolism). In the context of campus planning, these systems engage both city-wide and site-scale systems and elements and relate to regional resources and ecological contexts. The community and open-space system focuses on social and green spaces and addresses the roles of these places in the larger municipal open-space system. Low-impact mobility includes transit access to
campus, proximity of housing to campus, bicycle facilities, pedestrian ways, universal access, and vibrant pedestrian environments, encouraging lifelong active and low-carbon transport habits. The water system incorporates the full hydrological cycle and the full complement of approaches to water conservation and re-use; water treatment through natural systems; mitigation of deleterious downstream effects (such as flooding, pollution, and fluctuation); and use of water to produce energy, provide habitat, and evoke human delight. The habitat system aims at integrity, functionality, and resilience of habitat for desired wildlife (native and non-native) and the campus’s relationship to the health of urban ecologies. Finally, the “metabolism” system of energy, food, and climate addresses energy conservation through building siting, cooling by water and urban forests, support of local agriculture and on-campus food production to reduce the food-carbon footprint, and local energy production. The hallmark of these green—versus “gray”—infrastructure systems is the inherent overlapping of natural and cultural systems.12

The UW Tacoma campus was founded in 1990 as a two-year upper-division and graduate campus designed to serve mostly commuter, community-college graduate, and adult students. UW Tacoma’s permanent campus opened in 1997 in the heart of Tacoma’s downtown, spearheading the successful revitalization of the city’s historical heart along the shores of Commencement Bay. In 2005, the state legislature approved UW Tacoma as a four-year university, requiring that the institution’s master plan for the 46-acre permanent campus be updated. The Seattle firm of Mithun was retained to plan for the needs of new freshman and sophomore residents by building on a 2003 master plan.13 As part of this process, by manipulating the five overlapping green infrastructure systems, the Landscape Urbanism studio explored innovative and sustainable design ideas and typologies that might inform the master plan update as well as provide specific project details at a very focused scale.

As sustainable solutions are location-specific, it was essential to develop regional and municipal scales for the five systems and to assess them at the scale of the site, with its particular opportunities and constraints. Students identified site- and region-specific characteristics and affordances that might inform the developing master plan (see figures 6–10). They learned how the steep hillside offered remarkable vistas to Mount Rainier while challenging mobility and how existing light rail and bus transit supported pedestrian access while busy car traffic impeded connections to the waterfront, museums, and cultural centers. They also

![Figure 6](image-source: N. Rottle)

One team’s master plan for the UW Tacoma campus featured an open-space framework with a central terraced green; pedestrian, bicycle, and transit access; gateways defined by ADA pedestrian bridges; and stormwater collection, display, and storage for re-use.

Image source: N. Rottle
Students anticipated the benefits that their sustainable strategies could yield. In this example, the water-harvesting strategies were expected to fulfill 100 percent of all water needs, while remaining stormwater would be cleaned before entering the Thea Foss Waterway. The growth of the proposed urban forest could yield significant ecological and aesthetic value, translated into monetary value using STRATUM street tree software.

Image source: N. Rottle

Detail of proposed water terraces and cistern storage on the UW Tacoma campus green.

Image source: N. Rottle
discovered that city stormwater was re-polluting the Thea Foss Waterway, a recently cleaned Superfund site just downslope of campus where shoreline habitat had been restored as part of a regional effort to support juvenile salmon. While learning about the site and region, students also became familiar with the university’s curricula in urban planning and ecological restoration, leading them to suggest the educational potential in displaying infrastructural models and using the site as a laboratory for these programs. Students began to predict future challenges, including potable water limitations and issues that could result due to the location of the city’s wastewater treatment facility, which may be inundated as the sea level rises. Understanding future energy needs, the campus’s carbon footprint was estimated and opportunities were identified for reduced energy use and for the use of alternative energy sources such as solar and wind. Throughout the exploration, students argued that the plan would succeed most fully if it were integrated into the institution’s pedagogy, a conclusion that is shared by all four case studies.
Graduate students worked in teams to propose 20- and 50-year master plans, tackling each of the five green infrastructure systems. Using the five-system rubric provided a structuring framework that influenced comprehensive solutions and ensured that the focus on environmental performance was not lost as students addressed the vital social aspects of campus planning. In several cases, students quantitatively anticipated resource conservation and ecological regeneration outcomes over the 20- and 50-year time spans, underscoring the unique potential that campuses have to control their buildings, landscapes, and infrastructures over time. As was found in the other university projects, without systemic green infrastructure, other sustainable elements will be hard-pressed to make a significant difference. By approaching the project as a long-term commitment, students identified unique opportunities for change.

Without systemic green infrastructure, other sustainable elements will be hard-pressed to make a difference.

This preliminary design exploration built a solid foundation for campus sustainability planning, setting the tone for the ensuing master planning by Mithun and for a successive
infrastructure master plan by a partnering engineering team. Most notably, the Mithun team credits the UW process for the firm’s incorporation of “out-of-the-box thinking” and attention to sustainable infrastructure. 14 An analysis of the final plans shows consistency with many of the ideas found in the students’ work, such as a cohesive open-space structure; distinct gateways, pedestrian connections, and innovative ADA access; site views and use of rooftop spaces; stormwater treatment, collection, and re-use based on the site’s topography displayed in visible runnels for education and pedestrian quality; and on-site zero-carbon energy production with a goal to become carbon neutral through diverse strategies. Innovative water strategies were especially prominent in both the master and infrastructure plans, which recommended aggressive stormwater collection from campus roofs, ground surfaces, and contributing off-site streets as well as treatment, storage, and re-use of collected stormwater for all campus irrigation. The infrastructure plan also proposed a full graywater and stormwater collection and recirculation system to significantly reduce campus water consumption, acknowledging the educational potential of a living machine and other technologies that could bring harvested water to potable levels. Both plans prominently featured conversion of the Hood Street/Prairie Line railroad right-of-way to a pedestrian corridor that features a stormwater collection swale, an idea that was also developed by one of the students.

While green infrastructure systems can be implemented city-wide, campuses may be where these systems can be best controlled and integrated in the long term, demonstrating to the public and politicians what is possible and thus providing the type of experience that Orr (2010) advises should be in every student’s university education. Orr believes students should be challenged to engage theories of sustainability in real time by participating in projects and systems where land, air, and sea become the driving force of the curriculum and provide a context for why we learn what we learn. Likewise, these systems offer excellent learning laboratories for students who can envision the modifications they would like to see in the types of environments they use daily. 15

At the Site Scale: Design Projects for Wellesley and UW Seattle

Historical campuses present a distinct challenge for sustainable design as constituents seek to retain their historical nature, often embedded in tradition, while recognizing the new needs and opportunities of the 21st-century campus. This article now considers lessons at a smaller scale as they were learned from two specific design projects led by the firm of Michael Van Valkenburgh Associates (MVVA): the Alumnae Valley landscape restoration at Wellesley and the Rainier Vista concept plan at UW Seattle. 16 Both of these campuses feature historically significant landscapes by the Olmsted brothers. MVVA was challenged to retain the integrity of the original plans while reasserting the contemporary importance of their visions within renewed and ambitiously sustainable landscapes. Looking at these two projects together, one singularly formal and grand and the other informal and spatially complex, suggests how sustainable design is process-driven rather than form-driven and shows how it can be integrated into a range of existing landscape types.

These two projects also demonstrate a different paradigm in terms of those engaged to lead the process. The process at both Wellesley and UW Seattle was focused on the role of the landscape architecture firm as the primary leader and advisor. In the case of Wellesley, since the college did not have a professional landscape architecture department, its options did not include engaging such an internal group. In addition, part of the plan’s focus was to address a toxic brownfield site that would require extensive professional and technical attention to be able to safely transition back to public campus space. In the case of UW Seattle, the department and faculty had been part of the campus planning process for decades, and the Rainier project was viewed as an opportunity to seek outside advice that might give a different view of the challenges and opportunities. This emphasizes that there is no one best practice in terms of developing sustainable designs and plans; rather, there are multiple ways of approaching the challenges, each of which leads to different questions and diverse results.

Alumnae Valley landscape restoration, Wellesley. The campus of Wellesley is something of a landscape-scaled work of art. Conceived by Frederick Law Olmsted, Jr., in 1901, the transformation of the site into a school was guided by a deep understanding of the potential for its natural configuration to inform the daily activities of Wellesley’s students. Working with the existing site ecology, Olmsted envisioned a series of interconnected valleys and wetlands between crests (see figure 11). He advised the college to build on the high lands and to preserve the valleys for
recreation, exercise, and open space. This plan was initially embraced but never fully realized. As automobiles became more a part of 20th-century life, their impact in the form of parking lots and roads had a devastating effect on the experiential coherence and functional performance of the Olmsted plan.

Over time, development had focused on the look of the campus overall as a college, i.e., on lawn and trees rather than on any pedagogical or green-based values system. Not until the late 20th century did institutional leaders begin to see their campus landscape as more than a setting for educational pursuits. In higher education in general, the 1980s and ’90s saw a new emphasis on the need for campus leaders to engage in planning processes. Firms such as Sasaki developed extensive expertise working with both rural universities (e.g., the University of Virginia) and urban universities (e.g., the University of Chicago). With the 1983 World Commission on Environment and Development (WCED) gaining attention, students and faculty also turned to their own landscapes. In the 1990s, a few took steps to consider how to establish a sustainable master plan that might reflect the goals and visions of the sustainability and green movements. As Wellesley responded to these concerns, leaders looked at their campus landscape to find that Alumnae Valley had become a brownfield. In 1998 the school hired MVVA to complete a landscape master plan.

Reversing the trend of landscape decline, the new master plan integrated contemporary uses and functions into the landscape while reaffirming the original campus structure established in the Olmsted plan (see figure 12). The MVVA master plan identified Alumnae Valley as the major missing link in the system of valleys; concurrently, academic leaders noted the potential for engaging the landscape in the curricula. Essentially putting the values of the master planning process to the test, a design was developed for the site that would reflect and engage sustainable systems and infrastructure. The site presented significant challenges, since previous decisions had transformed the 13-acre valley from a wetland meadow to a coal gasification plant and eventually to a paved-over impermeable-surface parking lot. The Alumnae Valley landscape restoration drew on the resources of landscape architecture to tie together the site’s natural history, the objectives of the Olmsted plan, and the contemporaneous construction of a new student center. The landscape was considered a connection to both the past and the future. Completed in 2005, the restoration project replaced the brownfield-level contaminated parking lot with a lush wetland that filters surface drainage as it approaches Lake Waban and that provides strong landscape connections and views between the lake and the new campus center (see figure 13).
The toxicity of the site’s soils required a radical technical restructuring that involved a series of approaches to clean and steward the site. A three-foot layer of manufactured planting soils and clean fill excavated from other parts of the project was installed above the toxic soils. Monitoring wells were installed to ensure that toxicity would not migrate away from the site. In addition, the master plan called for the removal of over 550 cars from the core campus area, meaning that both the landscape and community behavior would be changed. Although executed in an aesthetic of robust naturalism, the restored valley was designed to fit and function seamlessly within the Wellesley campus. As implemented, the constructed nature of the landscape is neither aggressively present nor disguised; instead, it is alluded to in the slightly too steep topography and the perfectly circular pool emerging from the wetland. The environment it creates for sitting, strolling, and gathering is subtle and open-ended while also achieving a magnificence of effect in all seasons. Beyond its visual appeal, Alumnae Valley encourages a sensory immersion in the meadow/wetland landscape and provides the kind of experiential restoration that appeals to students as an antidote to the rigors of their studies. The valley is increasingly used within the formal curricula and is appreciated by both the public and prospective students. Within its short existence, Alumnae Valley has emerged as a core landscape for both social and academic activity on campus.

At the time of its original construction, the landscape base of Wellesley’s campus was considered a challenge to the more homogenous quadrangle schemes featured at
all-male universities like Harvard and Princeton. Instead of a
campus as a simple spacious area of lawn and trees with
major spaces defined by buildings, Wellesley’s campus was
in large part defined by its varied landscape and land forms.
Olmsted’s campus design emphasized the nature of the
college’s particular landscape, but also dramatized it through
the placement of buildings and further topographic alterations.
It was not meant to look like other schools, but to be
experienced as a different type of learning landscape.

Alumnae Valley continues this tradition of challenging
landscape orthodoxy not by returning to the specifics of
Olmsted’s master plan, but by allowing the most important
experiential and ecological principles it advances to become
a living part of the contemporary campus (see figure 14).
It represents conscious design and policy decisions to
reverse the site’s decline, in which the parking lot was an
outward reflection of the site’s loss of ecological function
and intensely polluted substratum. This project demonstrates
the benefits of an integrated design approach that considers
technology, aesthetics, program, and site ecology as
fundamentally interrelated systems. With respect to the
larger public of landscape users, Alumnae Valley shows
that the ongoing decline of our shared landscape is not
inevitable and that even the most dire conditions can be
salvaged and transformed into beautiful and sustainable
public realms.

Rainier Vista concept plan, UW Seattle. Although all
universities have landscapes that are highly treasured by
students and alumni alike, very few institutions are blessed
with a space similar to Rainier Vista. MVVA’s 2008
concept plan is based on the recognition that this is a nationally
important historic landscape whose greatest strength is that it
has managed to preserve its core identity as the centerpiece
of one of the oldest educational institutions on the West
Coast while evolving to meet the university’s changing needs.

Initially hired to consider a campus plan for UW in
1903, John Charles Olmsted was called back to Seattle in
1906 as the landscape architect for the Alaska-Yukon-Pacific
Exposition. This fair was to take place on the grounds of
the university, requiring the site to be designed to

Reconnecting systems at Wellesley by using topography and hydrology to treat surface water, MVVA 2005.

Image source: MVVA
meet both the needs of the ephemeral exhibition and the long-term institution (see figure 15). Olmsted studied the hillside site carefully and, after contemplation and a chance view between rain storms, chose to focus the primary axis on a view of Mount Rainier. He carved the vista out of native forest to create a direct relationship between the life of the developing metropolis and the raw nature of the mountain. It was the first time a campus had featured a sublime scene of nature as its primary view (Way 2009). More than just providing another view to Mount Rainier, the experience of the vista's signature moment lifts the spirit and humbles the soul simultaneously.
The evolution of the vista following the exposition was uneven. Underused as a pedestrian environment when campus buildings occupied only the northern terminus during the university’s original construction, it became increasingly dominated by the automobile starting in the midcentury and was then eroded by a series of piecemeal changes that failed to acknowledge its overall identity, scale, and function. As with many historical campuses, the focus was often put on buildings rather than the landscape. In 1964, Japanese cherry trees were saved from destruction and transplanted to the Arts Quad, but little else was done to improve stewardship of the landscape until much later in the 20th century. Rainier Vista was always revered by students, faculty, alumni, and the community, but it was assumed by many that such a magnificent view required little stewardship.

With the impetus of a new light-rail station planned for the southern end of the vista that would establish the landscape as a major pedestrian entrance to campus, university leaders sought professional advice on how best to address potential changes in the vista space and its framing landscape. The goals of the project included strengthening pedestrian connections, offering universal accessibility, improving plant collections and highlighting seasonal changes, diversifying uses, enhancing educational opportunities, and developing tools to engage “creative recognition of the historical development of the campus over the past 100 years [while enhancing] the ability to continue the representation over the next 100 years.” MVVA was selected because it had experience with restoring historical campus landscapes as well as with developing a sustainable plan for the university’s core precinct. The MVVA concept plan sought to reaffirm the simple power of the Olmsted vision while vigorously reimagining the vista as a higher functioning and sustainable landscape for the 21st-century university.

The formality of the landscape and, specifically, its iconic focus—the resource-hungry Drumheller Fountain—presented particular challenges. Rainier Vista is not only at the heart of the campus, but its view is also the most-often cited campus experience. Drumheller Fountain, located in Frosh Pond, is at the center of the vista, offering a gathering place as well as a formal landscape element within the more informal campus landscape. The fountain was a gift for the university’s centennial celebration in 1961 and features built-in lighting and three banks of jets, the center of which shoots water to a height of 100 feet. The fountain pumps use large amounts of electricity, and the pond is entirely fed by potable water. The formality of the fountain and its surrounding rose gardens does not easily lend itself to ideas of what a sustainable landscape might look like, nor does the use of water and energy for the jets suggest efficient use of resources. Thus, the challenge was to insert performance and green design into this landscape without losing its historical integrity and meaning.

In response, MVVA drew on the nature of the fountain as a water resource and the drama of the vista to propose a plan that might alter the functionality of the place in order to address contemporary resource management while retaining historical continuity and integrity (see figure 16). Its concept plan proposed the integration of the original Frosh Pond into a broader system of rainwater interception, water storage, and irrigation. In addition, the plan proposed reconfiguring the surrounding Sciences Quadrangle to serve as a major meeting and events space with improved shade, seasonal plantings, paving, and opportunities to sit and thus more fully engage in the green infrastructure and systems. While still operating as symbols of the past, the pond and fountain could also emerge as symbols of the university’s commitment to a sustainable future and thus be more fully integrated into the vision of the institution as a green campus.
Throughout the upper vista, stormwater from building roofs, roads, and pathways would be collected and directed to prefabricated cisterns installed within Frosh Pond (see figure 17). The cistern volume would reduce the effective depth of water within the pond from five feet to two feet, thus improving safety while creating a large storage volume to be re-used for irrigation. In the lower vista, stormwater runoff would be collected and discharged to prefabricated cisterns located within a disused and unsightly service ramp. Hydraulically connected, the cisterns would detain stormwater flows entering the combined sewer system, thereby reducing sewer overflows into Lake Washington. Stored water from the cisterns would be circulated through a series of terraced water-garden cells in the lower vista; these cells would be planted with a variety of wetland and emergent plants to filter the water and provide a diverse wetland habitat while creating a strong expression of sustainability at this major new campus entrance. The water gardens would be defined by low terraced walls, thus providing the opportunity to sit in the center of the vista and look toward the mountain, something that is not currently possible.

At Montlake Triangle, at the lower end of the project, the planned Sound Transit light-rail station would be connected by bridges directly to the vista, so that the experience of entering the campus is grounded in a landscape rather than dominated by busy roads, as it is at present. The center of Rainier Vista would be raised at its lowest point to block views of campus traffic and to separate pedestrian and vehicle traffic, thus strengthening the historical landscape vision while improving function and safety. The vista would not be merely saved but enhanced, and water, rather than a resource used with little purpose beyond decoration, would become the catalyst for changing how the campus performs both ecologically and, subsequently, pedagogically. Probably most significant is that the MVVA plan proposed and defined an emerging relationship between the vista, the campus, and new forms of mass transportation.

As with the Alumnae Valley restoration, the Rainier Vista concept plan seeks to reverse the decline of a significant historical landscape and to strengthen both the original design vision and the contemporary function while embedding sustainable infrastructure elements (see figure 18). Both of these projects, as well as those at UW Tacoma and SUNY-ESF, focused on green infrastructure by weaving together a systems approach and by challenging the status quo in terms of community behavior and campus aesthetics. The prominent use of sustainable strategies in the renewal of these landscapes broadened the value of the projects to their campus communities by providing potential teaching tools, fund-raising opportunities, and operations and maintenance savings. These integrated benefits helped build support for the projects and resulted in further attention. Perhaps even more important is that the integration of academic, social, historical, and infrastructural concerns within an overall landscape vision will help protect these landscapes from becoming neglected again, a goal of true sustainability. 19

Conclusion

The diversity of campus projects discussed here and on the AASHE website (www.aashe.org) demonstrates that there are few hard and fast rules for sustainable campus design. AASHE’s STARS program argues that the goals and metrics for each campus will vary depending on multiple factors including economics, location, pedagogy, and social and academic communities. 20 From the scale of master
Figure 17


Image source: MVVA

Figure 18


Image source: MVVA
planning to that of individual design projects, campuses continue to push the boundaries of what we know and the questions we ask. Each campus will need to shape its own arguments and plans; however, all campuses can learn from each other as a larger community of planners, designers, and educators.

The campus master plans and design projects presented here each engaged some level of green infrastructure and/or high-performance approach framed by systems thinking. These approaches emphasized the need to go beyond adding isolated sustainable elements to a static campus to developing complementary, interconnected infrastructural networks. Furthermore, the bold application and expression of sustainable infrastructure reinvigorated highly formal and informal historical landscapes alike. A matrix outlining the green infrastructure practices and proposals in the four cases can be found in figure 19.

Throughout these projects, the importance of addressing the look of sustainability was evident. Sustainability has until recently focused almost entirely on performance in terms of energy use, water management, and other easily measurable forms of environmental stewardship. However, as Elizabeth Meyer argued in her manifesto “Sustaining Beauty,” we must pay attention to the aesthetics of performance as well as to the efficiencies of performance (Meyer 2008; Nassauer 1995). With the tradition of manicured lawns and trees at the core of campus landscapes, identifying alternatives has been challenging. Alumnae Valley presents one aesthetic option and the plan for Rainier Vista another. While the former was so

<table>
<thead>
<tr>
<th>Green Infrastructure System</th>
<th>UW Tacoma (student)</th>
<th>SUNY-ESF</th>
<th>Wellesley</th>
<th>UW Seattle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community Space (social spaces, identity, aesthetics)</td>
<td>Regional and campus open-space system; campus heart; views; porous gateways</td>
<td>Nature-based aesthetic; improved Quad; Student Center; open-space system</td>
<td>Alumnae Valley open space; events field; new campus center</td>
<td>Historical vista emphasized and preserved</td>
</tr>
<tr>
<td>Water (stormwater, wastewater, water conservation)</td>
<td>Stormwater collection for cleansing, harvest, re-use, and poetics; living machines; green roofs</td>
<td>Stormwater control and/or capture of all water; green infrastructure techniques; no irrigation</td>
<td>Wetlands restoration and creation; reconnection to Lake Waban</td>
<td>Drumheller Fountain proposed as roof water collection cistern for reuse</td>
</tr>
<tr>
<td>Mobility/Access</td>
<td>Bike/walking trail connections; land bridge/plaza connection; street revisions; ADA pedestrian access</td>
<td>Increased bike parking; enhanced streetscapes; car share program; parking moved to periphery; ADA improvements</td>
<td>New ADA connections; peripheral parking to encourage walking/biking</td>
<td>New bridge connection to light rail and pedestrian/bike networks; improved connection to south campus</td>
</tr>
<tr>
<td>Habitat</td>
<td>Long-term revegetation scheme; habitat walls; raingardens; water cleansing (salmon habitat)</td>
<td>Turfgrass removal; plant community restoration and/or creation; ecosystem-based green roofs</td>
<td>Extensive creation of wetlands and wildflower meadow habitats</td>
<td>Wetland gardens; improved soil conditions</td>
</tr>
<tr>
<td>Energy/Metabolism</td>
<td>Micro-hydro energy using stormwater; solar aspect; community gardens</td>
<td>Solar; fuel cell; biomass-fueled combined heat power</td>
<td>Low-maintenance landscape; reduced irrigation</td>
<td>Low-maintenance landscape; reduced irrigation</td>
</tr>
</tbody>
</table>

The various strategies employed by the four cases can be understood through collation into a green infrastructure rubric, offering a framework for application to the sustainable campus landscape. These fit well with the AASHE STARS program elements.
degraded that few argued against a change, replacing the sweeping lawns of Rainer Vista was highly contested. At environmentally-focused SUNY-ESF, proposals for an alternative landscape aesthetic were widely endorsed, although traditional landscape elements were retained at a reduced scale. Building on the work of Joan Iverson Nassauer, Robert Thayer, and John T. Lyle, as well as that of the Sustainable Sites Initiative, the AASHE STARS program, and related research, campus landscape architects have an opportunity to put green into action to manifest sustainable planning and design research within learning landscapes (Calkins 2009; Lyle 1994; Nassauer 1995).

Incorporating sustainable infrastructure potentially broadens the landscape’s value to the campus community.

The academy is about expanding knowledge. One of the students engaged in the UW Tacoma project expressed that “introducing innovative practices and building strategies at a university is a very sustainable thing to do—they may be experimental, but at least ‘sustainable’ design invests far into the future, as does an educational institution” (pers. comm. 2008). While universities rarely have access to the extensive financial resources needed to implement such ideas on a large scale, these studies suggest that the master plan can at least outline new ideas and articulate goals and objectives to shape eventual future decisions. Such projects contribute to efforts to develop a new paradigm for academic campuses as sustainable landscapes by offering innovative approaches to the campus as a model for future design and planning that reflect and engage the values of the 21st century and beyond. As these projects show, incorporating sustainable infrastructure into the planning and renewal of a campus landscape potentially broadens the landscape’s value to the campus community as a teaching tool, for fund-raising opportunities, and for potentially realizing operations and maintenance savings by means of reduced use of water, energy, and other additives. The master plans presented here consider a spectrum of scales and approaches that suggest the diversity of potential practices that can be employed to increase the sustainable and responsible planning and design of university campuses.

Notes

1. For example, LEED 2009 (v3) now has a regional priority category.
2. AASHE “defines sustainability in an inclusive way, encompassing human and ecological health, social justice, secure livelihoods, and a better world for all generations” (AASHE 2011, ¶ 2).
3. These faculty members included Cheryl Doble, the founder and director of the SUNY-ESF Center for Community Design Research.
4. See also Sandercock (1998) on related issues of community participation and engagement.
5. The studio was led by Professor Cheryl Doble, SUNY-ESF.
6. For current sustainability projects at SUNY-ESF; see www.esf.edu/sustainability/.
7. Nancy Rotlle led the studio.
8. The University of Washington’s Department of Landscape Architecture focuses on “urban ecological design,” defined as explorations in sustainable infrastructure, design for ecological literacy, study of human and environmental health, and culturally-based placemaking.
9. Girling and Kellett (2005) describe green infrastructure in terms of urban open space and its ecological function, defining it as the entirety of urban green spaces that “performs a multitude of vital environmental services in cities” (p. 59).
10. For example, consider the New York High Performance Infrastructure definition: Green infrastructure also refers to utilities that use natural forms and processes, such as detaining and filtering stormwater in vegetated swales and reducing impervious surfaces to increase infiltration, sometimes also called “green infrastructure” or “high performance infrastructure” (New York City Department of Design and Construction and the Design Trust for Public Space 2005, p. 1).
11. The Green Futures Lab is led by Nancy Rotlle.
12. For fuller discussions of these five green infrastructure systems, see also Rotlle and Maryman (2007, forthcoming).
13. The 2003 master plan for UW Tacoma was developed by LMN Architects and Jones & Jones Architecture/Landscape Architecture.
14. Mithun’s project manager Brodie Bain confirmed that the students’ work was inspiring to the professional teams, stating that “the UW Tacoma Green Infrastructure design studio added a dimension of analysis and dialogue to the project that proved to be valuable to our process and the final master plan solution. Strategies developed by the students focused on ecological and social concerns simultaneously, such as the use of green roofs to improve water quality and building cooling as well as views down the steep slope of the
campus. The students’ energy and perspective, with their passion for addressing the natural and human realms, highlighted what’s most important as we strive to plan for a better and more integrated world” (pers. comm. 2007).

15. In reflecting on the studio, one student commented: “I felt that the scale of a college campus was ideal for engaging larger sustainable infrastructure dynamics, as well as the manifestation of these systems at the human scale. This scale of understanding and design helped me to respond to the concept of sustainability in terms of education, beauty and function … [and the five layers of green infrastructure] helped me to address different systems and timescales in a step-by-step manner” (pers. comm. 2008).

16. Chris Matthews is a principal for MVVA, and this section has been drawn from his work on the Wellesley and UW Seattle projects.

17. Efforts included saving the medicinal herb garden when the pharmacy department cut all funding; restoring the old Montlake dump to the Union Bay Natural Area; restoring the Sylvan Theater landscape and columns; converting a parking lot into the Grieg Garden; and creating the Portage Bay Vista as a new signature open space. The Rainier Vista concept plan and Denny Yard master plan are more current efforts to restore historical landscapes to their former glory.


19. Although outside the immediate scope of this article, the concept plan played a key role in advocating the university’s position in the proposed development of the Montlake Triangle. This resulted in a five-agency (University of Washington [UW], Sound Transit, Seattle Department of Transportation [SDOT], Washington State Department of Transportation [WSDOT], and King County Metro) study to prepare a revised plan that integrates the combined interests in developing a multi-modal destination at the Montlake Triangle that builds on the Rainier Vista plan. This precedent-setting project is being jointly coordinated and funded by UW, Sound Transit, and WSDOT.

20. See https://stars.aashe.org/pages/about/. STARS 1.0, which launched on January 19, 2010, after a three-year development process, is the current version of STARS. It is the first version of STARS in which participants can earn a rating.

21. This is an important part of the work of AASHE; however, what has been missing until now from its individual reports and announcements is the larger story of how campuses are changing in both dramatic and subtle ways. The organization’s commitment to building a case studies’ database is a constructive way to begin to build the needed information (see www.aashe.org/resources/case-studies).

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