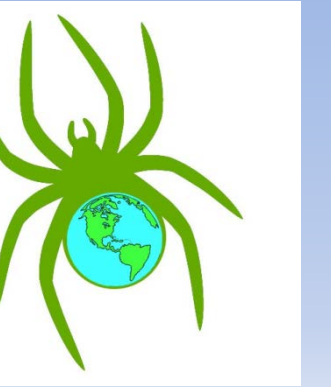




Utilizing a Green Revolving Fund For Reforestation on University of Richmond's Pagebrook Property



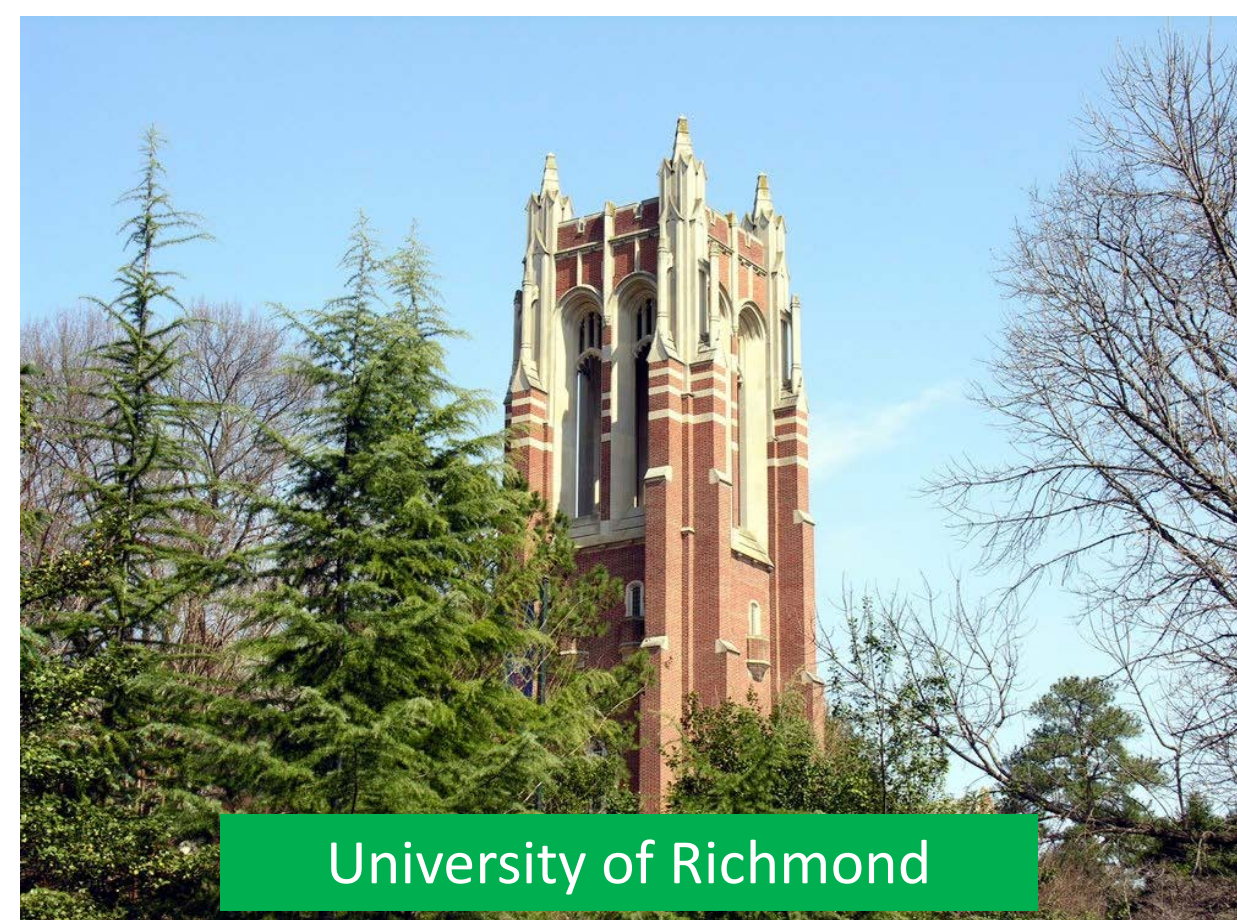
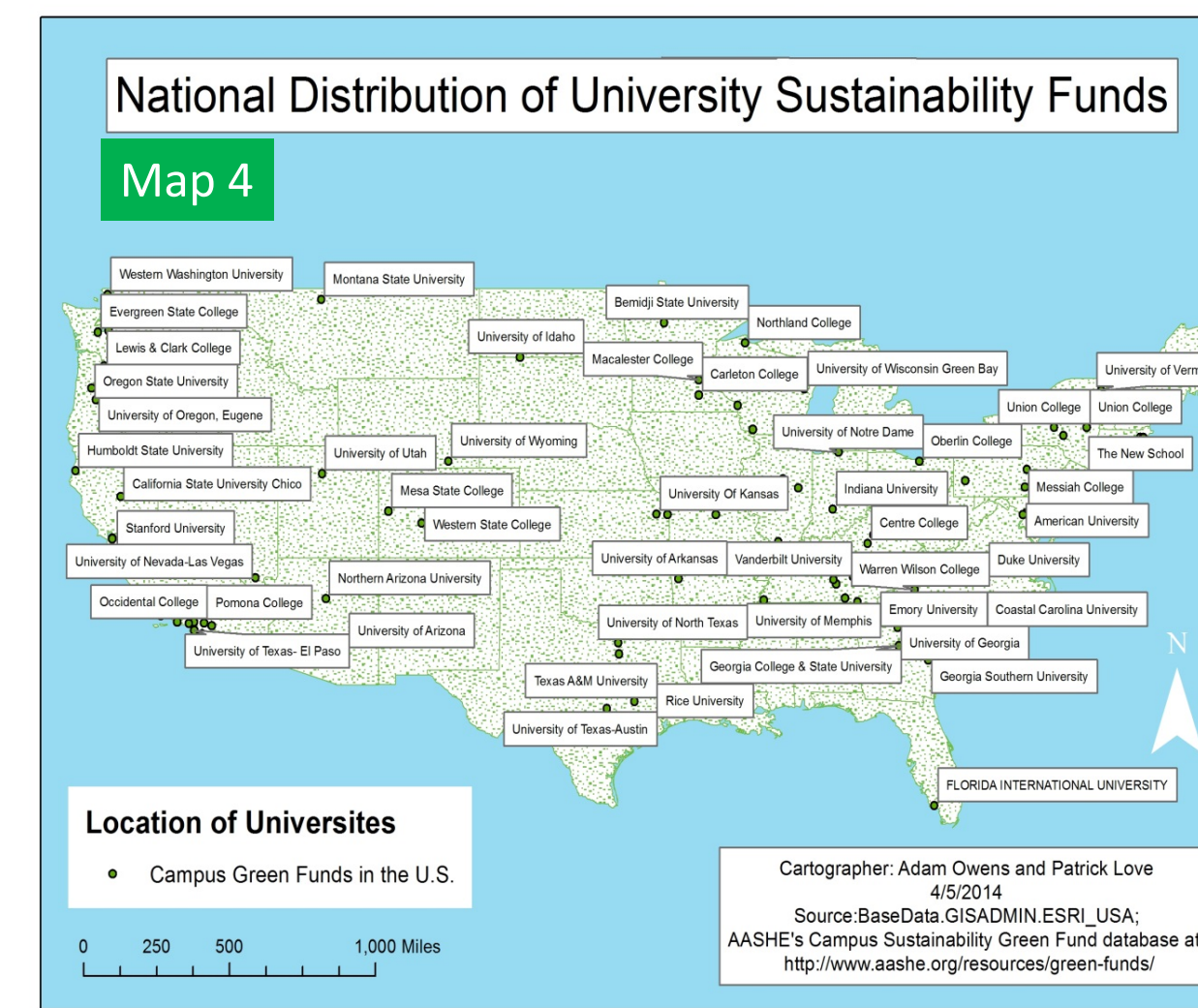
Patrick Love and Adam Owens

Introduction

In 2013, the University of Richmond directly sponsored 3,076,643 miles of travel for faculty, staff, and student, conferences, engagements and sporting events. This type of travel emits over 2,410 tons of carbon into the atmosphere. This research and proposal recommends that the University implement a fee-structure that incorporates the cost of the carbon emitted, and invest the money into a green revolving fund that will allocate money to reforesting the University's Pagebrook Property (Map 1) and purchasing new lands. The reforestation, maintenance, and monitoring of the area will be completed by students interested in forest ecology. The exploration of the possibilities of what to do with the Pagebrook Property were assembled by investigating ways that the University can utilize the land that will maximize the biodiversity of the local ecological community, creates wildlife corridors for endangered species (see below) and revitalize water quality within the James and Chesapeake Watersheds while furthering the university's mission of undergraduate education (Map 2). The suggested best management practices from green revolving funds result from rigorous research of the practices of 83 institutions in the United States that currently have green funds in place (Map 4). The ultimate goal of this proposal is to convince the University that it can continue to be an innovative sustainable institution by implementing an original solution that will mitigate the carbon footprint for University sponsored travel and create a unique educational experience for students close to campus (Map 3).

Background

After a 2008 campus wide energy audit, the University put money into investing in improving campus efficiency through the creation of a revolving fund. The Energy Master Plan that Eneractive Solutions identified and prioritized numerous opportunities for energy and environmental improvements with the lowest cost and highest payback (Eneractive Sol., 2013). The master plan is broken down into three phases that will be implemented in the next 20 years (Zanella, 2014). The projects in phase one have short payback periods, and are less capital intensive, whereas the future projects have higher costs, complex implementation requirements, and the of emerging technologies. The dollars saved from the projects up to the cost of the project, plus interest, will be repaid to the fund. Our research of other peer institutions found other institutions (i.e. Yale University, Macalester College, and William and Mary) that had voluntary fees in place for domestic travel that contributed to green revolving funds. The model that we are suggesting is a systematic institutional change for the University of Richmond that would internalize the cost of carbon by creating a mandatory fee structure that would add to our green revolving fund. The Pagebrook property was originally purchased from the Commonwealth of Virginia in 1996 as a potential site for future expansion of UR's campus. It has been left in a 'land use' state over the past 5 years in order to avoid paying rollback taxes, fines and interest on the property currently valued at 3 million dollars. The legal description of land use prohibits development of buildings and roads, but reforestation is permitted.



University of Richmond

Climate Change and the University of Richmond: Earth Week, April 21-25 Environmental Studies/Geography Senior Seminar

Green Revolving Fund
Fee-structure is put into place for University sponsored travel that flows into fund



Reforestation Efforts
Money from fund is used to sponsor reforestation on the Pagebrook Property.



Conservation of Property
Expected sequestration from the trees will reduce carbon emissions from domestic travel by 67% by 2044.

Methods and Assumptions

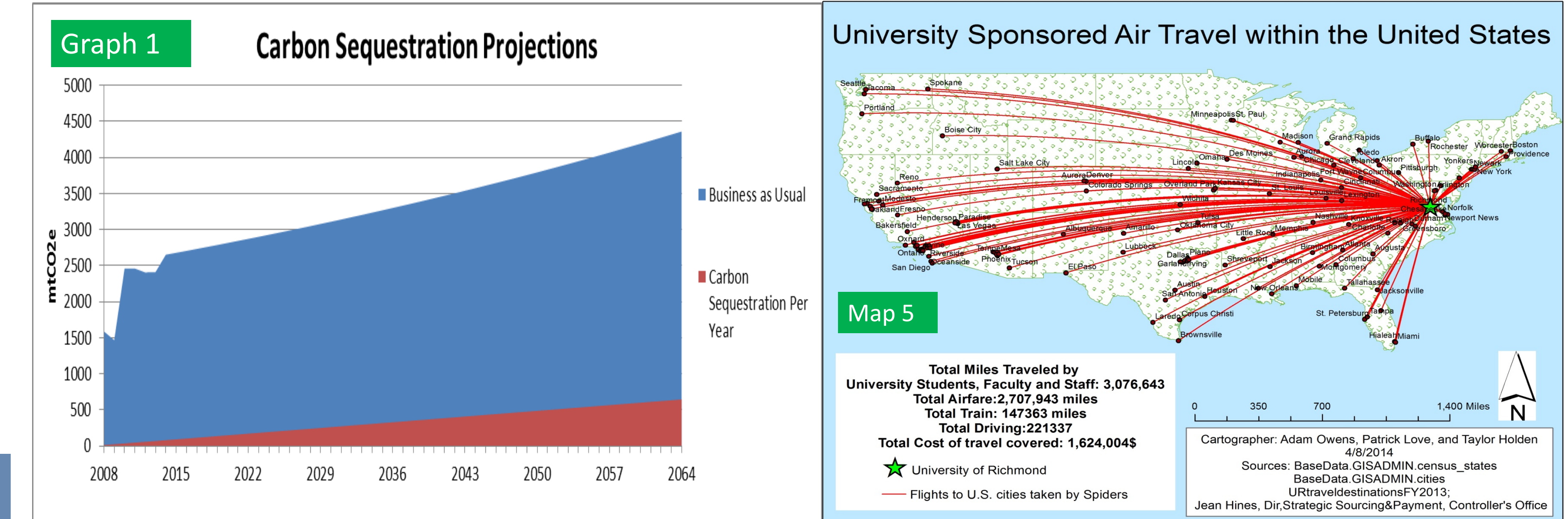
In order to create the fee-structure that internalizes the cost of carbon from University sponsored travel, we conducted a meta-analysis of firms that provide offsets for carbon dioxide emissions. We examined ten firms that offer offsets for different types of transportation. With this information we created a fee-structure that would charge \$0.006/passenger mile for air travel, \$0.004/passenger mile for car travel, and \$0.001/passenger mile for train travel (Map 5). Given these fees placed on all University sponsored travel, the University would have received \$17,280.37 in 2013 to put towards green revolving fund projects. We derived the total project cost for reforesting the Pagebrook Property at around \$9,000.00 using cost estimations for seedling, planting and site preparation costs (Nepal et al. 2010). Given the cost of the project and the excess of cash that would be put into the green revolving fund, the University could invest in other sustainable solutions. We assumed a 1% growth rate for University sponsored travel over the 50 year time horizon because reporting data will become more accurate (Zanella 2014). We anticipated that the loblolly forest growth will remained unthinned and have maximum growth over 50 years, leading to the total amount of carbon sequestered at 300 tons of CO2 tons/acre (Nepal et al. 2010). With a 47 acre plot, the total amount of carbon sequestered per year, for a 50 year time period, would be 282 mtCO2e. Given the 1% growth rate in University sponsored travel over a 50 year time period, this project would offset the carbon for 5.64 years between 2014-2064.



Results

Seedling Cost = \$31.18/acre x 47 acres = \$1,269.00
Planting costs = \$60.06/acre x 47 acres = \$2,822.82
Site preparation = \$103.94/acre x 47 acres = \$4,885.18
Total project cost = \$8,977.00
Air Travel Fee = \$0.006/ passenger mile x 2,707,943 miles = \$16,247.66
Car Travel Fee = \$.004/passenger mile x 221,337 miles = \$885.35
Train Travel Fee = \$.001/passenger mile = 147,363 miles = \$147.36
Total Fee Charged for 2013 = \$17,280.37
Total Carbon Sequestered over 50 years= 300 ton/mtCO2e /acre x 47 acres = 14,100 mtCO2e
Carbon Sequestered per year = 14,100 mtCO2e / 50 years = 282 mtCO2e
Total Years offset assuming FY2013 offsets = 14,100 mtCO2e / 2500 mtCO2e/year = **5.64 years of carbon offsets for University sponsored travel for \$9,000**

Conclusions



The University of Richmond's administration and student body will mutually benefit from the reforestation of this property. It is a tax deductible plan to conserve a natural area and it is an opportunity for undergraduate students to visualize carbon offsetting and participate in hands on ecological field work. Additionally, the reforestation of this area is a low-cost strategy for offsetting carbon as compared to other projects that have been paid for in recent years. The project has the capability to offset almost 6 years of University sponsored travel, over a 50 year time period given annual emissions of 2,400 mtCO2e, for only \$9,000 (Graph 1). The reforestation of this area will provide a unique learning opportunity for students to learn about forest ecology, carbon sequestration, landscape rehabilitation, and sustainability on the University's campus. The reforestation project will be implemented as an independent study option for environment studies, geography and biology students interested in pursuing the concepts of silviculture, botany, or forest ecology. Theory of forest ecosystem management can be tested by monitoring the regeneration growth rate and changes in species composition of trees and native animal species over time. Students under the direction of UR faculty (Lookingbill, Hayden, Salisbury...) or NGO/GO partners will learn planting techniques and forest maintenance.

Acknowledgements

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