



Patel College of Global Sustainability

2015 Highlights

- **Worked with the Council of Deans to review and modify academic organizational model**
- **Worked with Global Sustainability Curriculum Advisory Committee to implement their recommendations**
 - Added 5 New concentrations
 - Added 11 New Certificates
 - Revised Student Support Services
 - Career Services
 - Courses
 - Revised, modified, increased, flexibility of field experience (3 choices)
 - Internship
 - Capstone Course
 - Project
 - Accepted the first Spring class in the College's history
 - Launched first RFP for interdisciplinary research proposals
 - Hosted the first North American Ecotourism and Sustainability Tourism Conference with UNWTO and TIES

I. Establishment & Brief History

The Patel College of Global Sustainability (PCGS) was established in 2009 to foster sustainable urban communities and environments through collaborative research, education and community involvement. Its research generates innovations and new knowledge that helps cities around the world, including those in developing countries, reduce their ecological footprint while improving their form and function to make them healthier, more livable and resilient.

The Patel College of Global Sustainability comprises the M.A. Program in Global Sustainability, Patel Center for Global Solutions, the Graduate Certificate Program in Sustainability and the Office of Sustainability. It is an inclusive and holistic college based on interdisciplinary research, design educations and service and has partnered with other USF Colleges to carry out those activities.

One of the most significant personnel changes within the college in 2015 was the appointment of a new director. Richard Berman officially began leading the college in August 2015 and since then, the college has experienced exponential growth in academics and outreach by developing over 18 new concentrations and graduate certificate programs combined.

II. Mission, Vision, Values & Goals

Mission

To foster sustainable urban communities and environments through collaborative research, education and community involvement.

Vision

Drawing upon various definitions of “sustainability” we seek to ensure that these efforts both endure and dramatically expand at USF; that they encourage the natural interconnections among those groups on campus addressing ecology, economics, politics and culture; that they recognize the essential contributions of scholars and professionals in engineering, business, architecture and urban planning, transportation, health, global studies and the natural and social sciences; and that they serve to create and maintain the conditions under which humans and nature can exist in productive harmony, fulfilling the social and economic requirements of present and future generations.

III. Sustainability at USF

Office of Sustainability

The Office of Sustainability coordinates and builds partnerships for university-wide initiatives that advance the University of South Florida's strategic goal of creating a sustainable campus environment. To accomplish this mission, we actively support faculty, staff, students, alumni, and neighborhood partners in their efforts to transform the University of South Florida into a 'Green University', where decisions structural and routine consider both individual and collective impacts to our campus, community, economy, and environment. As citizen-scholar activists, we share a sustainability ethic that promotes conserving resources, reducing waste, recycling and reusing materials finding new sources of clean energy, increasing energy efficiency, and diminishing lifecycle impacts and our consumption of greenhouse gas producing materials. We engage in this ethic of stewardship to guide the development and implementation of programs, policies, and other courses of action in the operation and management of the University of South Florida system as well as its institutional teaching, research, and service commitments.

Strategic Goals:

- Strengthening and supporting integrated and synergistic research across disciplinary, departmental, college and campus boundaries
- Build a sustainable campus environment at USF
- Constructing an up-to-date clearinghouse of information about all the sustainability engagement activities currently occurring at USF and encouraging and rewarding faculty, staff, and student engagement in sustainability initiatives
- Creating a sustainable environment that supports an expanded and improved teaching and research mission, a more engaged residential community, and a university-based global village

V. Education Programs delivered through PCGS

Master of Arts Program

The M.A. in Global Sustainability offers nine concentrations, all concentrations are available in a traditional on-campus format and online.

This program is designed to prepare students to address complex regional, national, and global challenges related to sustainability and the ability to innovate in diverse cultural, geographic, and demographic contexts. The Patel College of Global Sustainability strives to offer a dynamic curriculum, top-notch internship experiences, and overall superior education for our students.

- **BUILDING SUSTAINABLE ENTERPRISE**

The M.A. in Global Sustainability concentration in Building Sustainable Enterprise will provide a foundation for designing sustainable organizations and businesses and related concepts pertaining to sustainability. Organizations and businesses from all sectors need to develop sustainable practices and models to minimize their environmental footprint and maximize their social responsibility to all stakeholders to meet the requirements of a sustainable, low carbon economy. The goal of this concentration is to provide participants with the knowledge, literacy, skills and tools they need to create more sustainable organizations.

- **CLIMATE CHANGE & SUSTAINABILITY**

The concentration/certificate program in Climate Change and Sustainability will provide a strong foundation for students to advance their career by providing the knowledge and skills necessary to address regional, national and global challenges related to climate change. Students will also focus on the translation of policy and research into climate-smart mitigation and adaptation strategies for building sustainable and resilient communities through urban planning and sustainable urban development.

- **COASTAL SUSTAINABILITY**

The M.A. in Global Sustainability concentration in Coastal Sustainability will provide students knowledge of the history and development of the planning process and implementation, the global issues related to coastal planning including the nine planetary boundaries, and implementation strategies. Students will also be provided knowledge of community development with a particular focus on coastal habitat and marine environments.

- **SUSTAINABLE ENERGY**

The Sustainable Energy Concentration educates students in the growing field of renewable energy, which is expected to increase dramatically within a few decades creating significant employment, entrepreneurship, investment, and trade opportunities. As the U.S. and world economies seek to become more sustainable, they will be increasingly dependent on renewable fuels and power. Students will be prepared for private and public sector positions of leadership and responsibility in the biofuels, solar, wind, biomass, and other renewable energy sectors. The concentration is designed for students with a wide range of backgrounds, unlike similar-sounding programs at other institutions, which are designed for just engineers or hard-science majors.

- **SUSTAINABLE TOURISM**

The M.A. in Global Sustainability concentration in Sustainable Tourism (6 credit hours) enables students to understand the relationships between tourism, society, culture and sustainability. Students develop the skills necessary to design a successful sustainable tourism strategy and development plan that is beneficial to business, coastal and marine habitats, and the local community. This can be completed online or on-campus.

- **ENTREPRENEURSHIP**

The M.A. in Global Sustainability concentration in Entrepreneurship (6 credit hours) provides students with a comprehensive understanding of concepts, tools, and skills of sustainability and green technology. Focus areas include green technology, development, transportation, energy, and sustainable enterprise.

- **FOOD SUSTAINABILITY & SECURITY**

The M.A. in Global Sustainability concentration in Food Sustainability and Security provides students with a solid understanding of key issues in food systems and safety/security.

- **SUSTAINABLE TRANSPORTATION**

The M.A. in Global Sustainability concentration in Sustainable Transportation teaches methods for achieving a more sustainable transportation system and how that system fits into efforts to improve community design and the livability of urban areas.

- **WATER**

The M.A. in Global Sustainability concentration in Water (6 credit hours) enables students to understand the complex regional and global water-related sustainability challenges and to develop innovative, sustainable solutions specifically in the specializations of green infrastructure, urban water, and coastal issues.

Graduate Certificates

The Patel College of Global Sustainability strives to offer a dynamic curriculum, top-notch internship experiences, and overall superior education for our students.

Our graduate certificates offer students an abbreviated path to a specialization in sustainability. Graduate certificates can be earned in only 12 credit hours (four courses) and are perfect for professionals looking to enhance their skills and expertise, boost career advancement potential, and facilitate the advancement of new skills.

Certificates also function as a gateway into the Patel College M.A. program as all credits can transfer directly into the degree program.

The Patel College currently offers eleven graduate certificate programs, four of which are offered fully online and on-campus

- **BUILDING SUSTAINABLE ENTERPRISE**

The Building Sustainable Enterprise graduate certificate will provide a foundation for designing sustainable organizations and businesses and related concepts pertaining to sustainability. Organizations and businesses from all sectors need to develop sustainable practices and models to minimize their environmental footprint and maximize their social responsibility to all stakeholders to meet the requirements of a sustainable, low carbon economy. The goal of this certificate is to provide participants with the knowledge, literacy, skills and tools they need to create more sustainable organizations.

- **CLIMATE CHANGE**

The concentration program in Climate Change and Sustainability will provide a strong foundation for students to advance their career by providing the knowledge and skills necessary to address regional, national and global challenges related to climate change. Students will also focus on the translation of policy and research into climate-smart mitigation and adaptation strategies for building sustainable and resilient communities through urban planning and sustainable urban development.

- **COASTAL SUSTAINABILITY**

This certificate program will provide a general foundation for coastal sustainability. It is designed to appeal to an audience with a wide range of backgrounds and interests in the planning, policy, and management fields. The certificate will be of particular interest to those related to sustainability students, and those involved with planning and management in coastal communities.

- **COASTAL SUSTAINABILITY MANAGEMENT**

This certificate program will provide a general foundation for coastal sustainability. It is designed to appeal to an audience with a wide range of backgrounds and interests in the planning, policy, and management fields. The certificate will be of particular interest to those related to sustainability students, and those involved with planning and management in coastal communities.

- **ENERGY SUSTAINABILITY**

The certificate program will provide a general foundation in sustainability and thorough understanding of all forms of energy that can support a sustainable economy. It is designed to appeal to an audience with a wide range of backgrounds and career interests by addressing energy from all angles (technology, business, economic, policy, social) unlike similar-sounding programs at other institutions, which are designed narrowly for engineering and hard science students.

- **FOOD SUSTAINABILITY**

This certificate program will provide a general foundation in sustainability and a solid understanding of key issues in food systems and safety/security. The program will cover (1) the concepts, principles, economics, and finance of sustainability, as well as transition towards a green economy; (2) food production, distribution, marketing, disposal, and policy; and (3) food safety and security regarding biological, chemical, and physical threats. It is designed for an audience of a wide range of backgrounds with career interests in the field of food sustainability and security.

- **GLOBAL SUSTAINABILITY**

This certificate program will provide a general foundation in sustainability and a solid understanding of key issues in food systems and safety/security. The program will cover (1) the concepts, principles, economics, and finance of sustainability, as well as transition towards a green economy; (2) food production, distribution, marketing, disposal, and policy; and (3) food safety and security regarding biological, chemical, and physical threats. It is designed for an audience of a wide range of backgrounds with career interests in the field of food sustainability and security.

- **SUSTAINABLE TOURISM**

This certificate program will provide a general foundation of sustainable tourism and related concepts of sustainability. It is designed to appeal to an audience with a wide range of backgrounds and interests in the tourism and hospitality industry. The curriculum will be of particular interest to those related to global tourism movements such as the United Nation's World Tourism Organization, the International Ecotourism Society, and the Global Sustainability Tourism Council.

- **SUSTAINABLE TOURISM LEADERSHIP**

This certificate program will provide a general foundation of sustainable tourism and related concepts of sustainability. It is designed to appeal to an audience with a wide range of backgrounds and interests in the tourism and hospitality industry.

- **SUSTAINABLE TRANSPORTATION**

The M.A. in Global Sustainability certificate in Sustainable Transportation teaches methods for achieving a more sustainable transportation system and how that system fits into efforts to improve community design and the livability of urban areas.

- **WATER SUSTAINABILITY**

The M.A. in Global Sustainability certificate in Sustainable Transportation teaches methods for achieving a more sustainable transportation system and how that system fits into efforts to improve community design and the livability of urban areas.

VI. Interdisciplinary research in PCGS

The Patel College of Global Sustainability develops research that creates solutions for sustainability development in a rapidly-changing world. Its research is based upon USF's broad, interdisciplinary expertise in the areas of water, public health, energy, global security, and social equity. This interdisciplinary approach provides a fertile foundation for the development of unique solutions to emerging and existing problems.

Key Research Areas

- **Renewable fuel and products**
- **Global change and the associated uncertainties**
- **Urban form and its influence and impact on resource management**
- **Urban metabolism – modelling resources flows (water, wastes, energy, people, goods....)**
- **Urban water – integrated urban water modelling, flexible design, transitioning**
- **Sustainable Tourism – Participation in the global research of the UNWTO International Network for Sustainable Tourism Observatories.**

Current Studies

Biofuels & Bioproducts Development

Energy production and use are strong indicators of economic prosperity and high living standards. Global energy demand is projected to grow dramatically within the next 50 years, but at the same time the public is concerned about energy security, climate change, and environmental pollution. Clearly, our country needs policies and technologies that enhance energy conservation and promote renewable energy production from sustainable natural resources. Given the critical nature of energy, we have made renewable energy R&D and education top priorities at the College with a focus on technology development in biofuels (ethanol, biodiesel, and green hydrocarbons) and biopower from cellulosic biomass and algae.



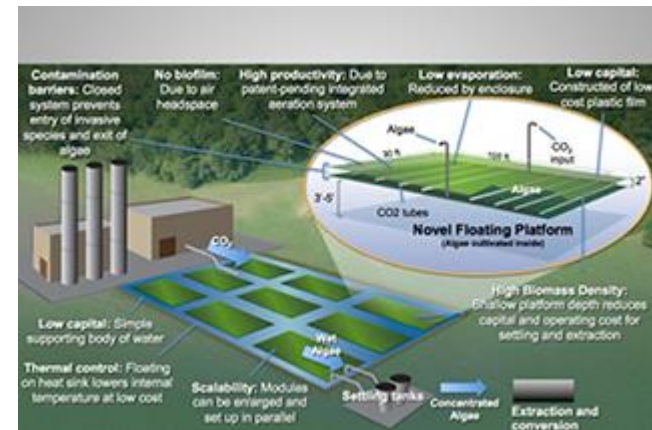
Focus Areas

- Algae Technology

Algae represents a promising source of alternative fuels and bioproducts, but with the added benefit of serving as a sink for carbon dioxide and wastewater. Using our experience in algae engineering for the production of chemicals and fuels, we use native Floridian algae strains at our lab and outdoor facilities to generate and commercialize algal products under real-world conditions. Algal lipids can be transesterified to produce biodiesel or can be thermally treated to produce aviation- and military-specification fuels. Algal sugars can be used to produce a myriad of chemicals via fermentation, whereas algal protein can serve as animal feed and fish food. Our applied research closes the gap between innovative ideas and the marketplace.

Our efforts are focused on:

- Design of cost-effective cultivation platforms
- Scale-up and operation of algae production systems
- Optimization of productivity
- Water, nutrient, and energy management
- Co-product development
- Intellectual property management



- Biofuels and Bioproducts from Biomass

Biomass is an abundant and inexpensive domestic feedstock for biorefineries designed to produce value-added products and clean power. Florida ranks first in the country in annual biomass productions sugarcane bagasse and yard waste in South Florida, citrus peel and agricultural residues in Central Florida, and woody biomass in Northern Florida.

We test and optimize the conversion of various biomass species to sugars in scalable and cost-effective ways through biochemical conversion. First, biomass is pretreated using mild conditions and green chemistry principles. Then, cellulase enzymes are employed to convert cellulose to simple sugars. Those sugars can form the basis of a sustainable green economy, as they are readily convertible via fermentation (or thermochemical processing) to a variety of chemical precursors for the manufacture of biofuels, plastics, resins, and other renewable products. In essence, biomass can replace oil as the source of chemicals essential for consumer products.

A biorefinery pilot plant has been designed and operated in partnership with a sugar company inside one of its sugarcane mills in Florida. It provides USF and its collaborators with unique process development and scale-up capabilities in a real-world environment.

- **Biodiesel**

Fuel diversification is needed for diesel and jet engines. The United States consumes 57 billion gallons of diesel and 5 billion gallons of military fuels annually, hence depending significantly on foreign oil. Such dependence renders the United States vulnerable to political instability around the world.

We have technical and business expertise in biodiesel production with a focus on sustainable technologies and resources:

- Biodiesel production using supercritical fluid technology
- Biodiesel from used vegetable oils
- Biodiesel from algal lipids

Production of biodiesel is conducted in batch and continuous modes. We are available to assist entrepreneurs, companies, and communities in the production, distribution, and marketing aspects of their biodiesel business.



Transitioning Urban Infrastructure

The need for transitioning of Urban Infrastructure Systems (UIS) is illustrated by the facts that the earth system is undergoing significant rapid changes which have developed from increased human activities, population growth and urbanization (Vairavamorthy et al., 2008). Whereas 48% of the world's population presently live in cities and towns, this proportion is expected to increase to about 60% in the year 2030 aggravating the need for the transition of existing systems.

To ensure a more sustainable future there is a need for more drastic measures. Technology breakthroughs and innovative designs need to be coupled with comprehensive system changes to the urban processes, institutions, and regulations that ultimately shape our cities. Cities will be faced with difficult future strategic decisions (e.g. the choice between centralized and the decentralized systems; the choice regarding the level of involvement of individual citizens, NGOs and companies; the choice between an institutional framework where separate institutions are responsible for a certain element of the urban infrastructure system or moving towards a more integrated institutional set-up). Hence it is likely that future desired UIS will look and operate differently to existing ones and will be managed and financed differently.

Focus Area

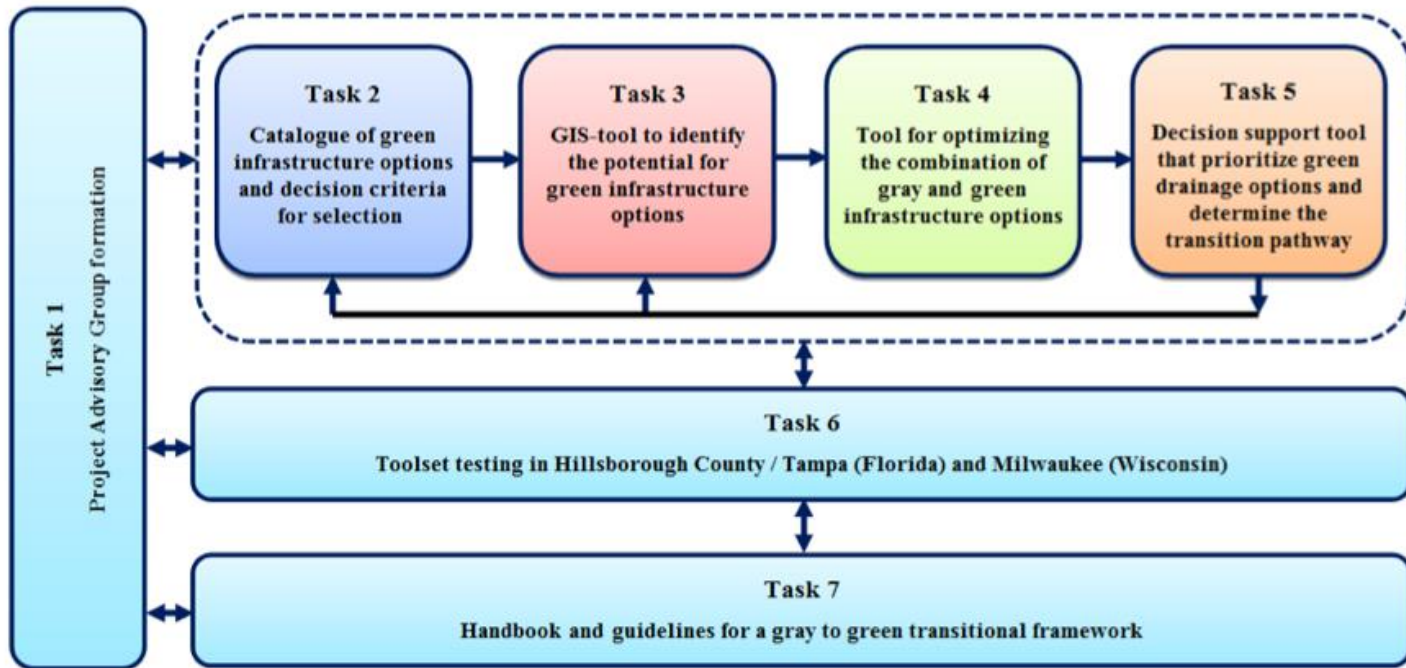
- **'From Gray to Green: Tools for Transitioning to Vegetation-Based Stormwater Infrastructure'**.

Funder: US Forest Service, National Urban and Community Forestry Challenge Program.

Goal: This project is will provide natural resource managers, planners, and engineers with a set of decision support tools to aid the strategic planning process for transitioning to green infrastructure systems that emphasize trees and urban forests.



This project will develop and demonstrate an innovative transitioning framework from gray to green infrastructure systems for urban watersheds through the execution of the tasks outlined below and illustrated in the figure below.



Integrated Urban Water Management

The global challenges of rapid urbanization and climate change adaptation in the midst of growing water scarcity is driving the need for a paradigm shift to Integrated Urban Water Management (IUWM).

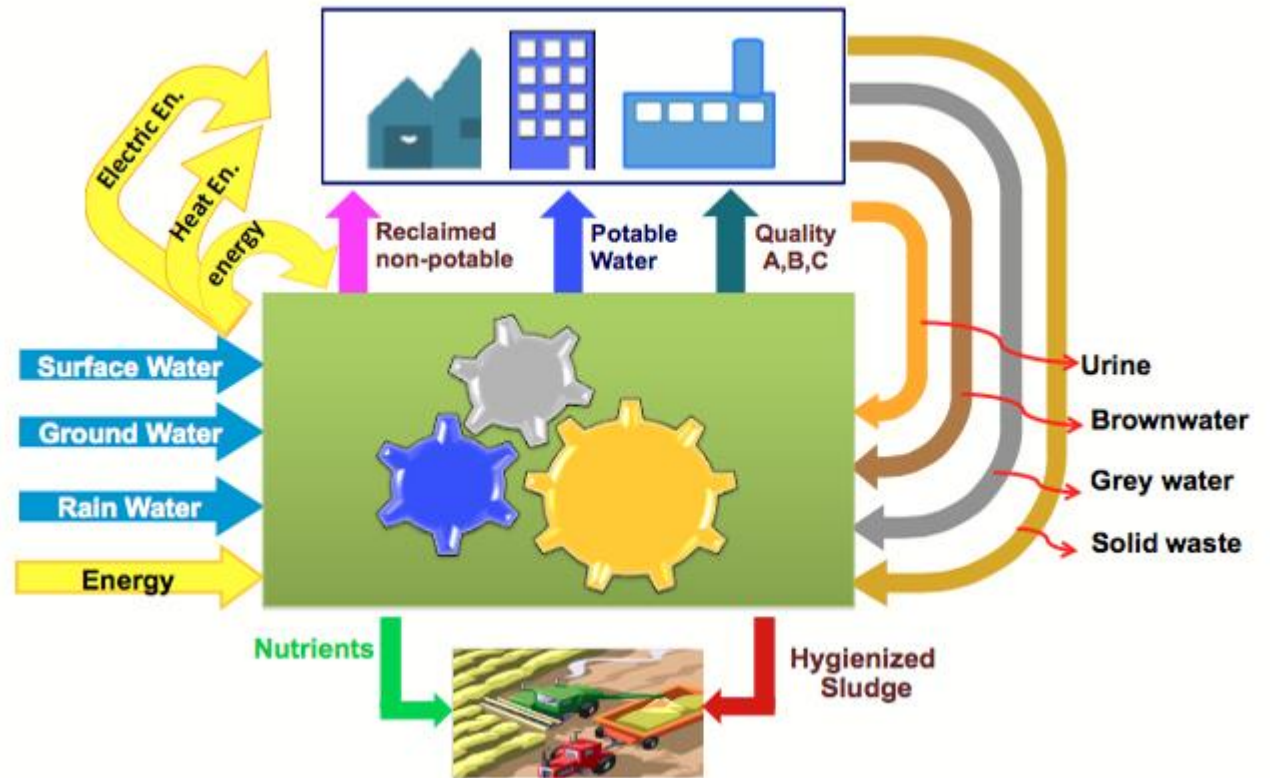
IUWM is an approach that includes: interventions over the entire urban water cycle; reconsideration of the way water is used (and reused); and greater application of natural systems for water and wastewater treatment. It provides an alternative to the conventional approach for an effective and efficient management of scarce water resources.

Focus Area

Integrated Urban Water Management Toolkit (IUWM Toolkit)

Funder: Global Water Partnership (GWP)

Goal: The main goal of this project is to enhance awareness of decision makers, senior managers and practitioners on the concept and approach of IUWM and at the same time to provide the necessary tools and guidance in developing strategies and implementing IUWM on the ground.



VII. Global engagement through PCGS

Global Internships

Our students conduct their internships at many exciting places across the globe. The Patel College of Global Sustainability global internship program allows students to gain an international perspective on sustainability while implementing program knowledge and research on-the-ground to solve real world problems. Our global partners include some of the largest and most respected companies, organizations, and universities working to advance sustainability issues in the world.

2015 Internship Sites:

- Costa Rica
- Peru
- Colombia
- Hawaii
- Australia
- New York
- Nicaragua





TRANSFORMING OUR WORLD
THROUGH SUSTAINABLE TOURISM SOLUTIONS

JAN 25-27 2016



Ecotourism and Sustainable Tourism Conference

The Ecotourism and Sustainable Tourism Conference, now in its tenth year, is a unique annual conference providing practical solutions to advance sustainability goals for the tourism industry.

A leading international meeting place for tourism businesses and destinations, the ESTC will bring

together 500 professionals from across the industry and over 50 countries.

PCGS, in collaboration with **The International Ecotourism Society (TIES)** hosted ESTC North America in its inaugural year and brought academics, destinations, NGOs, policy makers, operators, consultants, authors, media, and sustainable business together to create and guide ecotourism initiatives and implementation.

ESTCNA SUB-THEMES INCLUDED:

- Eradicating Extreme Poverty and Hunger
- Ensuring Health and a Sense of Well-being for all Individuals
- Conserving, Protecting, & Sustaining Ecosystems, Places and Cultures
- Enhancing Fair and Equal Access to Education
- Maximizing Local Economic Benefits while Enhancing Sustainable Infrastructure Development

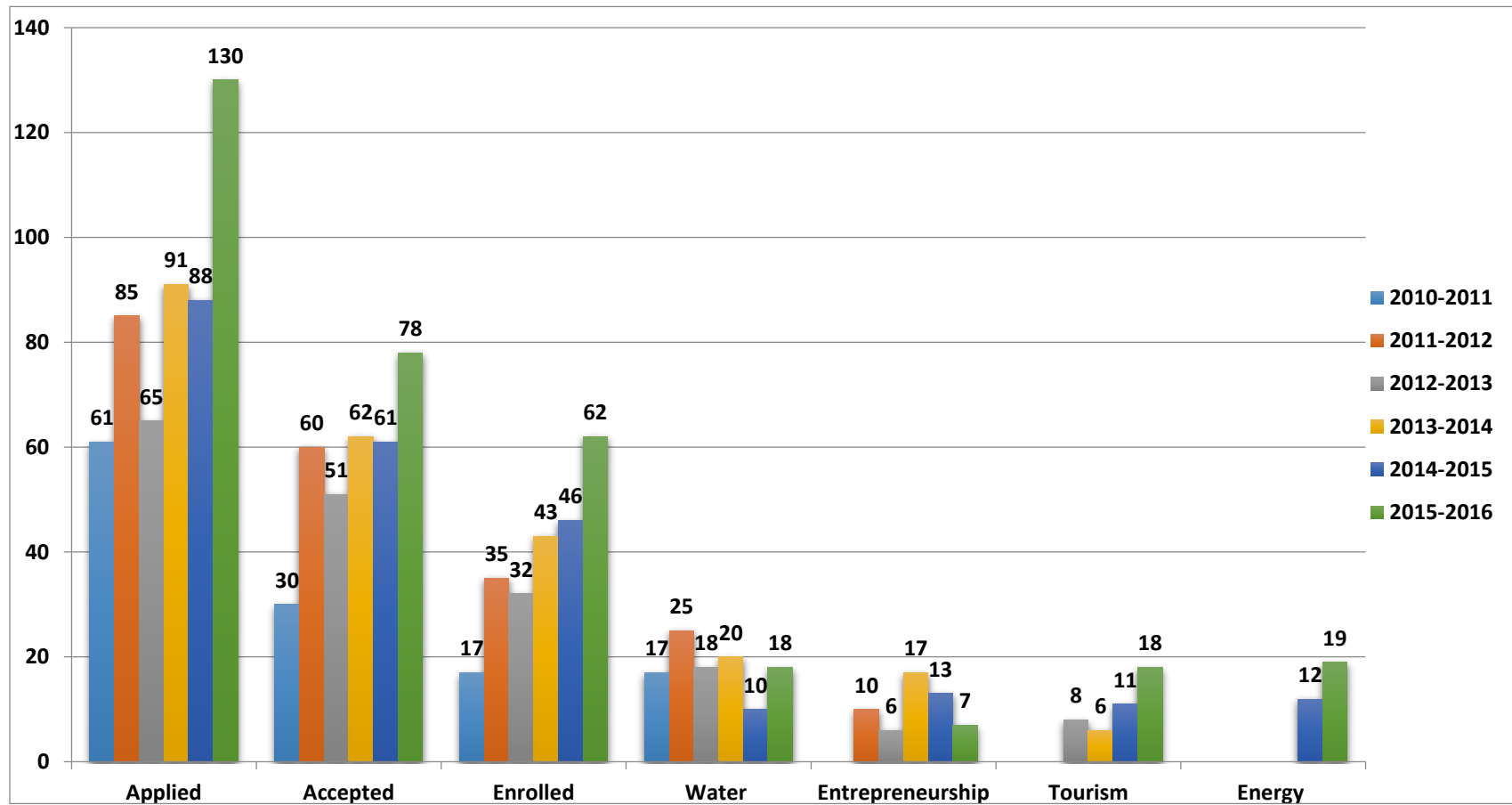
VIII. Student enrollment and degrees awarded in PCGS

Admissions

Representation from 2010-2015 of recruitment and admissions

	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016
Applied	61	85	65	91	88	130 (+47%)*
Accepted	30	60	51	62	61	78 (+28%)*
Enrolled	17	35	32	43	46	60 (+30%)*
Water	17	25	18	20	10	17 (+70%)*
Entrepreneurship		10	6	17	13	7 (-46%)*
Tourism			8	6	11	18 (+64%)*
Energy					12	18 (+50%)*

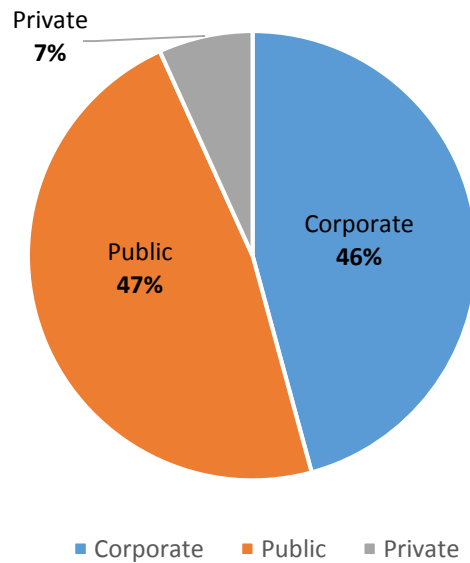
Number of students enrolled, by area of concentration:



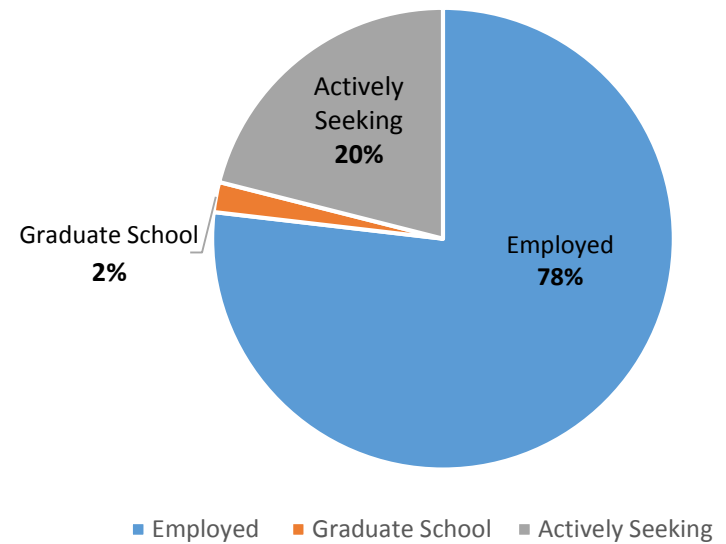
Alumni

- 80% of PCGS alumni are employed or in graduate school

Industry Employment Status 2011-2015

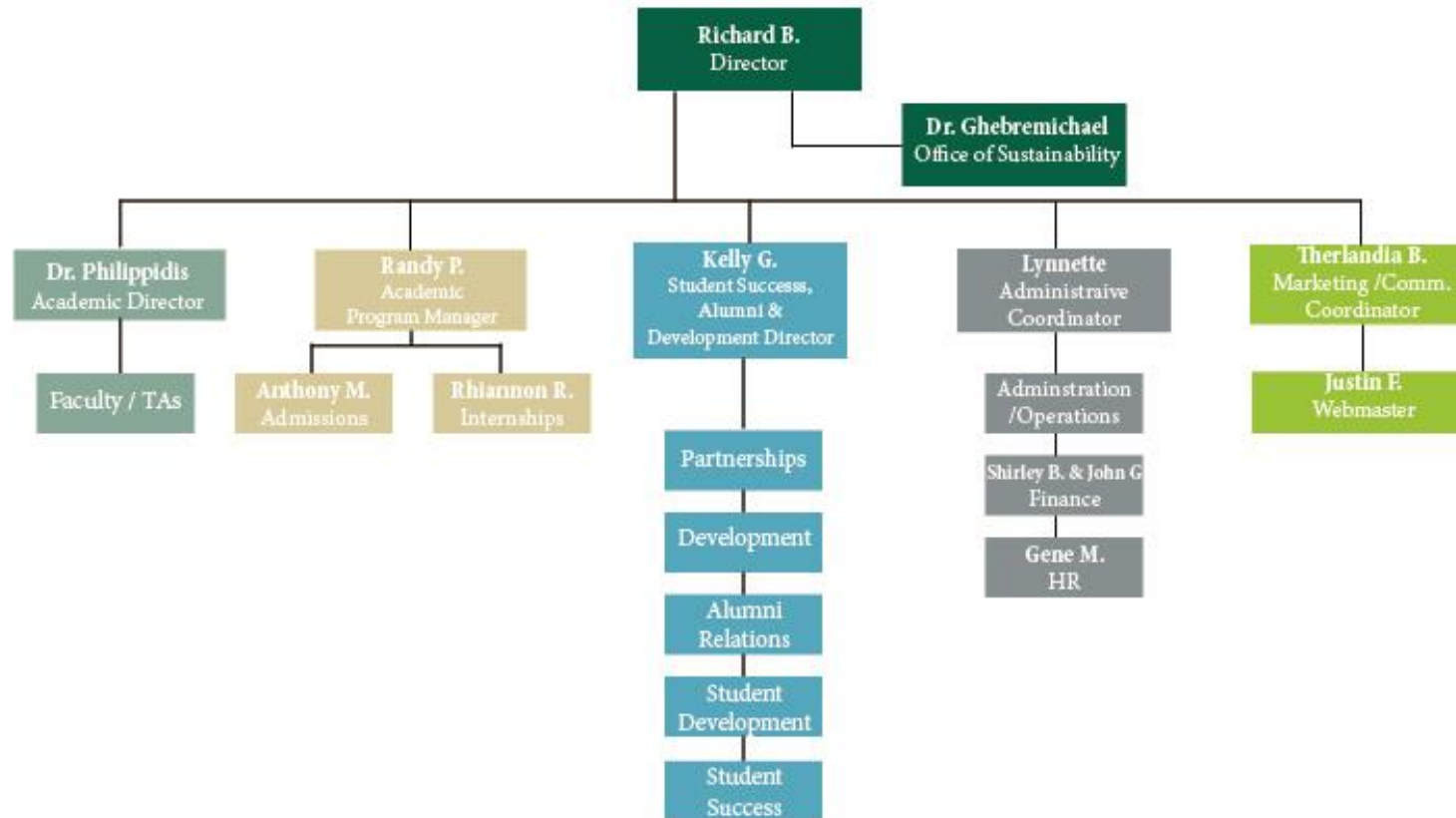


Employment Status of Alumni 2011-2015



IX. Resources within PCGS

PCGS Organizational Chart Faculty/Staff



IX. Budget

- E& G funding \$1,000,000 annually
- Endowment: \$3,200,000 annually
- Foundation funding \$450,000 annually
- Grants \$100,000