



1742

# MORAVIAN COLLEGE

A SMALL NATIONAL TREASURE

June 23, 2009

Mr. Yvo de Boer, Executive Secretary  
Climate Change Secretariat (UNFCCC)  
P.O. Box 260124  
D-53153 Bonn  
Germany

Office of the President  
1200 Main Street  
Bethlehem, Pennsylvania 18018-6650

TEL 610 861-1364  
FAX 610 861-1445  
WEB [www.moravian.edu](http://www.moravian.edu)

Dear Mr. de Boer:

I am pleased to offer this letter in support of Moravian College's application to the United Nations Framework Convention on Climate Change. Tracing its founding to 1742, Moravian College is recognized as America's sixth-oldest institution of higher education. The College remains committed to educating students in the liberal arts, and has a long-standing tradition of excellence in preparing students to be teachers, musicians and scientists.

Our mission and strategic plan recognize that our world is interconnected, and we must prepare our students to succeed on a global scale. We want our students to understand the complexity of globalization and the diversity of world views, while also recognizing the impact of their actions on their immediate community and the planet.

Moravian students, faculty and alumni are actively engaged in activities involving scientific research, policy issues, and environmental projects related to climate change. They have distinguished themselves by studying and working abroad, connecting with regional partners, contributing valuable research, and teaching those who will follow in their footsteps.

Our students will be the future leaders, policy makers, scientists and teachers that shape the conscience of the United States. They will influence what action the United States takes in addressing global warming, reducing emissions and participating in global partnerships. We recognize that there is a critical need to have concepts of sustainability introduced throughout the curriculum and courses related to sustainability available for all students. The contacts, relationships and information that our representatives bring back from UNFCCC will be of great value to the College in fulfilling this commitment. I hope you will look favorably on our application and I thank you for your consideration.

Sincerely,

Christopher M. Thomforde  
President

# **United Nations Framework Convention on Climate Change**

## **Application for Admission**

**Civil Society Observer  
Non-Governmental Organization**

**Moravian College**



## NON GOVERNMENTAL ORGANIZATION CONTACT DETAILS

The information you provide below will be entered into our database and will be used in all future correspondence and documentation. Please print clearly and accurately.

**1. Official name of the organization as it appears in legal documents:**

.....Moravian College.....

Year established: .....1742..... Year incorporated: .....1954.....

Name of the organization in one of the UN languages<sup>1</sup> (if the above is not an official UN language):  
.....

Official Acronym: (if applicable)..... Official Language English.....

Official address: 1200 Main Street.....

City: Bethlehem..... Zip/Postfix: PA 18049... Country: U.S.A......

Main telephone: 001-610-861-1300..... Main fax: 001-610-861-1445.....  
Please specify (country code - city code) +number

E-mail: ..... Web Site: www.moravian.edu.....

No changes

**2. Name and position of the Head of the organization:**

.....Dr. Christopher M. Thomforde, President.....

(Mr., Ms.)	First name	Middle name	Last Name	Position
------------	------------	-------------	-----------	----------

Telephone:	<u>001-610-861-1364</u> .....	Fax:	<u>001-610-861-1445</u> .....
	Please specify (country code - city code) +number		

E-mail of the Head of the organization: thomforde@moravian.edu.....

No changes

**3. Name and position of the designated contact point for the organization, if different from the Head of the organization:**

**Please note that the designated contact point will:**

Serve as the official channel for the exchange of information with the secretariat, including nominations of representatives for sessions and matters related to side events and exhibits or other session-related activities.

.....Mr. Dennis A. Domchek, Vice President for Administration.....

(Mr.,Ms.)	First name	Middle name	Last Name	Position
-----------	------------	-------------	-----------	----------

Telephone:	<u>001-610-861-1360</u> .....	Fax:	<u>001-610-861-1445</u> .....
	Please specify (country code - city code) +number		

E-mail of the designated contact point: domchek@moravian.edu.....

<sup>1</sup> The official UN languages are Arabic, Chinese, English, French, Russian and Spanish.

No changes 

4. Please indicate below the primary theme(s) and activities of the organization relevant to the climate change process for inclusion in our database.

**Theme:**

Adaptation	Forestry	Vulnerability	
Agriculture	Legal aspects	Sustainable development	
Capacity building	LULUCF	Technology	
Climate change policy	Mechanisms	Trade	
Education, training & public awareness	<input checked="" type="checkbox"/> Mitigation	Transport	
Energy	Public health	UN Convention synergy	

**Activity:**

Advocacy	<input checked="" type="checkbox"/> Networking	Project implementation	
Fundraising	Publications	Research	<input checked="" type="checkbox"/>

No changes 

5. There are six acknowledged constituencies in the climate change process. Business and industry non-governmental organizations (BINGO), Environmental non-governmental organizations (ENGO), Indigenous peoples organizations (IPO), Local government and municipal authorities (LGMA), Research-oriented and independent organizations (RINGO) and Trade union organizations (TUNGO). **With which constituency would your organization prefer to be associated?**

BINGO

ENGO

IPO

LGMA

 RINGO

TUNGO

No changes 

We agree to accept the rules and conditions set forth in the UNFCCC Guidelines for Participation.

6. Signature of the designated contact point: ..... 

Date: ..... 6/22/09 .....

**Please notify the secretariat of any changes as soon as possible. This applies particularly to the designated contact point in order to ensure continued participation for your organization.**

## **About Moravian College**

Tracing its founding to 1742, Moravian College is recognized as America's sixth oldest college. Moravian is a residential, liberal arts college that draws on the Moravian traditions of community, engagement in the world, and balance among body, mind and spirit in the life of the individual. The College seeks to develop in students of all backgrounds the capacity to learn, reflect, reason, communicate, and act with integrity as individuals and in association with others. This education prepares men and women for advanced study and continuous learning, individual achievement, and leadership and service for the common good.

Many of Moravian College graduates pursue advanced study, or are employed as teachers and nurses. Our mission statement and strategic plan recognizes that our world is interconnected, and we are required to prepare our students to succeed on a global scale. We want our students to not only understand the complexity of globalization, but also to appreciate the diversity of world views, and understand the impact of their actions on people and the planet. We believe that the ever-increasing pressure on the environment demands that we prepare our students not only to understand their impact on the planet and to live more sustainably in this world, but also to commit their talents and energies to changing it for the better.

Our students represent approximately 21 states and 10 foreign countries. Moravian is committed to increasing its enrollment incrementally, ultimately reaching for a goal of 1,600 total full-time equivalent (FTE) students by 2012. There are 1,557 FTE students enrolled for the 2008-2009 academic year with a freshman class numbering 387. There are an additional 99 undergraduate students enrolled in the evening program and 150 students enrolled in the graduate program.

The College currently employs 119 full-time faculty and 90% hold a Ph.D. or equivalent. The average student to faculty ratio is 13 to 1 and the influence of the faculty on students is personal and immediate. Moravian faculty members, including the most senior, teach freshman classes as well as upper-level classes. The scholarship and dedication of our faculty creates a dialogue between teachers and students with far-reaching results. An institution-wide culture of faculty-student collaborative scholarship is extensive and growing, and the College is fortunate to have a large endowment to support this endeavor. If granted observer status, the experience and knowledge gained will come back to the campus through classes, faculty-student research and to the broader community through our many public outreach programs.

The College offers programs of study leading to the Bachelor of Arts, Bachelor of Music and the Bachelor of Science baccalaureate degrees. The Master of Business Administration and Master of Education degrees are offered through the Comenius Center.

Moravian College's Environmental Studies Program offers a course of study leading to two baccalaureate degrees: Bachelor of Science in Environmental Science and Bachelor of Arts in Environmental Policy and Economics. To reflect the values of a liberal arts education, the program consists of an interdisciplinary curriculum that engages all three divisions of the College: the Natural Sciences, Social Sciences and Humanities. Students and faculty in the program engage in activities involving scientific research, policy issues, and regional environmental projects.

## **Competence in Matters Relating to the UNFCCC**

There are five particular areas in which Moravian College relates to the matters covered by the UNFCCC, with our strengths being in research and education.

- 1. Our curriculum addresses several aspects of climate change and related issues in courses designed for both science majors and the general student body.**
- 2. Many of our students, faculty and alumni are involved with research or education concerning climate change, health, adaptation, and technology.**
- 3. We represent both the liberal arts tradition of education and the state of Pennsylvania, which has a complex role to play in a carbon-restrained future.**
- 4. Sustainability at Moravian College.**
- 5. Education about UNFCCC: Bringing COP 15 to the community.**

### **1. Moravian Curriculum: Climate Change in Environmental Studies, General Science, and the General Education Courses**

At Moravian College, we are engaged in educating our students about climate change. Enrollment continues to grow in our Environmental Studies major, which combines science, public policy, and economics, and thus is founded on the global, multidisciplinary ideal that will be in action in Copenhagen. Moravian College supports curricula that empower and encourage students to become involved in solving environmental and social problems as informed decision makers through the emphasis and application of advanced ecological principles.

Field based courses are an important part of our science curriculum and they benefit from a rich array of regional resources and partnerships. The students in the program have distinguished themselves by studying abroad, completing internships with local environmental organizations, and participating in a National Science Foundation sponsored Research Experiences for Undergraduates program.

Students in the Environmental Science program take a common core consisting of six courses (Introduction to Environmental Studies, Introductory Geology, Environmental Economics, Environmental Philosophy, Public Policy & Administration, and a senior-level, writing intensive Environmental Studies Seminar) and are required to complete additional advanced coursework in one of two tracks (Environmental Science or Environmental Policy and Economics). The curriculum is designed to synthesize multiple levels of learning and incorporate ecological principles and field environmental activities.

Students and faculty in the program connect with regional environmental projects to enhance teaching and research opportunities. Examples include working with regional watershed groups, the Pennsylvania Environmental Resource Consortium, and a major remediation project that is serving as a national and world-wide model. The Palmerton Zinc Superfund site is the most famous toxic waste site in the east and the largest site east of the Mississippi. It consists of 3,000 acres of contaminated land in Lehigh, Carbon and Monroe counties (PA) and is the largest re-vegetation project undertaken by the U.S. Environmental Protection Agency's Superfund program. It serves as a model of innovative environmental technology and citizen science, and is a case study for textbooks and the subject of numerous scientific articles. For the past five years, Moravian College students and faculty have been conducting field research and leading educational field trips at the site.

At this time, all of the students graduating from the Environmental Sciences program have studied abroad, giving them a global perspective. They have also worked as interns with the Alliance for Sustainability, the Alaska Fish & Game department (specifically focused on climate change effects), and Bonaire (looking at the impact of climate change on the coral reef health and fisheries). In addition, one student studied green urban design in Copenhagen and learned about intentional communities and ecovillage principles.

Some of the Environmental Courses include the following:

*Environmental Philosophy* introduces students to the ethical, metaphysical, cultural, and political issues involved in understanding humankind's complex relationship with the natural world and with other-than-human animals. Students examine the positions and philosophies of radical environmentalists, environmental ethicists, animal-rights advocates, and political ecologists.

*Environmental Policy* delves into contemporary American politics and policy on environmental issues, and current controversies in legislative and regulatory areas.

*Energy Policy* explores how contemporary society uses energy and how its use is shaped by politics and public policy, especially how energy consumption and choices of energy technologies shape patterns of human settlement, structure of social life, distribution of income, and allocation of political power. Students examine the implications of energy choices for the viability of the environment, levels of personal freedom, and possibilities of democratic government.

*Environmental Law* examines the importance of public policy and the law to environmental issues and problems. Topics include environmental values upon which policy is based; review of laws and regulations with an emphasis on NEPA, RCRA, CERCLA; and policies that apply to clean water, wetlands, endangered species.

*Environmental Economics* explores theories of externalities and public goods as applied to pollution and environmental policy, the trade-offs between production and environmental amenities and assessment of non-market value of environmental amenities. Topics include remediation and clean-up policies, development, and biodiversity management.

*Natural Resource Management* introduces the economic dimensions of environmental and energy issues. Students use economic models to approach energy and environmental issues in a way that leads to socially responsible and economically sound policy. Specific applications include fisheries, oil and gas reserves, and wildlife management.

Within the Natural Sciences Division, we offer B.S. degree programs in biology, biochemistry, chemistry, environmental science (within the environmental studies interdisciplinary program), math, neuroscience, nursing, and physics, along with a number of pre- and allied health programs or cooperative programs such as a B.A. in engineering. We also have students with dual majors in one of the science programs and secondary education.

Field based courses are an important part of our science curriculum and they benefit from a rich array of regional resources and partnerships (e.g. local watersheds, environmental associations, state parks, nature centers and a Superfund site undergoing restoration). The College also has close contacts with a number of school districts and regularly runs summer teacher-workshops with a focus on environmental science in collaboration with the Lehigh Gap Nature Center.

### **Environmental Courses**

Some of the courses for our science majors follow. All have relevance to climate change and many are required for the environmental studies major.

*Ecology* is an upper-level course taken by environmental science and biology majors. The course provides a general background for students in the ecology of populations, communities, ecosystems and landscapes as well as physiological ecology of individual organisms.

*Conservation Biology and Restoration Ecology* was first offered in fall 2008 and is a unique offering at the undergraduate level. The course was team-taught with the director of the Lehigh Gap Nature Center (LGNC). We anticipate offering this course on a biannual basis. A particularly unique focus is our work with the restoration of the Palmerton Zinc Pile Superfund site. Students directly participated in research related to habitat restoration efforts (succession studies, biodiversity assessment, development of adaptive management plans, etc.), including experimental design of new projects in partnership with state ecologists and the Audubon Society.

*Ecology of Tropical Rainforests* introduces students to the ecology of neotropical forests examines the structure of tropical forests, their evolutionary history, and factors that contribute to biological diversity with emphasis on the Amazon Basin. Special attention is given to the adaptive strategies of plants and animals and to examples of mutualistic interactions. Includes a required excursion to the upper Amazon in Peru or Bolivia to conduct field research projects, and meet indigenous peoples.

*Humankind and the Global Ecosystem* examines current trends associated with environmental change in order to understand what they mean for us and other species with which we share the biosphere. Environmental issues are viewed through the lenses of economics, politics, and culture. Topics include ecology, population growth, environmental ethics, ecological economics, sustainable development, and the loss of biological diversity and the forces that cause it.

*Environmental Chemistry* provides an overview of the primary chemical processes that affect our environment, as well as some major perturbations introduced by industrialized societies. It is required for environmental science majors and taken by some chemistry majors.

*Introductory Botany* introduces students to plant science, with attention to the historical and cultural importance of plants, the structure and function of higher plants, and a survey of major plant divisions. It is a requirement for biology majors. The class does a number of studies with plants grown in the greenhouse and the students utilize local parks for field studies.

*Field Botany* provides an introduction to plant systematics and ecology. In systematics, the focus is on our concept of species: patterns and sources of variation in plant populations, compatibility and breeding systems, hybridization and introgression, and polyploidy; in ecology, the nature of local plant communities and forces that shape them. Fieldwork includes sampling of plant communities, collecting and identifying specimens, visiting botanical institutions.

*Plant Physiology* covers the physiological functions of higher plants and relationships between these functions and the structural organization of plants. Topics include water relations and water balance, mineral nutrition, transport phenomena, assimilate allocation and partitioning, plant metabolism, stress physiology, defense strategies against herbivores and pathogens, plant growth and development.

*Microbiology* is an intermediate-level elective taken by students with a wide variety of career interests, including medicine, biomedical research, food and industrial applications, and environmental microbiology. For many years, students in the course have sampled various habitats, including soil, in order to isolate, identify, and quantify microbes. One set of experiments includes measuring *in situ* CO<sub>2</sub> flux in soils containing different metal concentrations at the LGNC (the Superfund site).

*Introductory Geology* explores earth processes and their effects on materials, structure, and morphology of Earth's crust. Laboratory includes fieldwork, computer simulations, and the study of minerals, rocks, photographs, and maps.

### **General Education Courses**

All Moravian College students, regardless of major, are required to take both lab sciences and courses that relate to the impacts of science and technology on the world as part of our General Education requirements. Several of these courses include environmental issues, and one focuses specifically on climate change.

*Introduction to Environmental Studies* covers the principles of ecology and the relationship of humans to their environment with an emphasis on scientific, social, philosophical, and economic factors related to global environmental issues. Topics include agriculture and food production, water and air pollution, energy use and its environmental effects, toxic waste, and renewable/nonrenewable resources.

*Environmental Science* introduces non-science majors to the fundamental principles of ecology, the relationship of humans to their environment, and issues of both local and global concern. It

is taken by a variety of non-science majors, especially elementary education majors. Students visit a local Superfund site to see the impact of heavy metals in the soil on vegetation and the restoration project involving native grasses. Back in the lab, students design experiments in which they grow plants in soils containing varying levels of metals and conduct a number of tests to determine stress, growth rates, and metal uptake.

*Climate Crises: Past, Present and Future* was first offered in spring 2008 as a “social impact of science” course (a category required of all Moravian students). This team-taught course is unique with its interdisciplinary nature and global perspective. This course includes student-conducted experiments that demonstrate atmospheric science phenomena, climate modeling, and CO<sub>2</sub> uptake by plants. Laboratory and field projects in this class demonstrate how photosynthesis is impacted by temperature and efficiency differences between C3 vs. C4 plants in the context of systems modeling increased greenhouse gases and global warming. In addition to the chemistry labs and climate modeling, this course is closely linked to current events. Students are engaged with mock presidential debates and coal plant hearings, as well as outside lecturers, including Pennsylvania Congressman Charles Dent who led a discussion on alternative energy and climate change politics. The course is “carbon neutral” and implements projects to reduce carbon dioxide emissions. In fall 2009, students will focus on the negotiations and issues leading up to Copenhagen COP 15. We recognize the importance of preparing our students for the actual cross-discipline and cross-cultural environments and cultures in which they will be working.

### **Educational Activities**

In addition to the classroom offerings on climate change, Moravian College sponsors many educational activities that highlight environmental issues. In 2008, the College sponsored a lecture series on the intersections between nature, science and the arts, to call attention to issues in a new way and to bring different groups together to discuss the future of our environment. One of the speakers is the Pennsylvania spokesperson for the National Audubon Society. A number of our students volunteer in the community on projects related to environmental work (invasive species control, watershed monitoring and education, providing CFLs to low income families and educating them about the value of conserving energy, etc.)

### **Curriculum: Nursing and Health Concerns in Developing Countries**

The Moravian College School of Nursing has a reputation for excellence, reflected in the continued growth in enrollment. Among the program’s unique features are a focus on community and global health. Students have the option to study abroad in Australia or Honduras. These global partnerships are highly unique for a program at a liberal arts college.

Nursing students and faculty annually travel to Moravian Clinics in Ahuas, Honduras, Central America, to participate in mission work with local communities. The program offers students the opportunity to gain valuable clinical experience first-hand, experience healthcare in a developing country, and become more familiar with tropical diseases that are increasing due partially to climate change and new disease vectors.

The College has recently developed an additional partnership with the National Association of Nurses of Mozambique to develop programs to educate and advocate for nurses in Africa and

strengthen healthcare in the impoverished country. The partnership is fully funded by the President's Emergency Plan for AIDS Relief through a grant from the American International Health Alliance. A country of 20 million people, malaria, HIV/AIDS, tuberculosis, hepatitis, and typhoid fever are prevalent. Cholera is an ever-present threat to the health of Mozambicans, especially with the current epidemic in neighboring Zimbabwe.

The areas where Moravian College nursing students study abroad are particularly vulnerable to the effects of climate change. The issue of climate change is crucial to the rapidly changing field of public health and medicine, and our faculty and students are engaged in addressing these issues at an international level. Frequently, this department shares their experiences with the larger campus community, so that our students and faculty are becoming versed in these global health issues and the links to economic development and changing environmental conditions.

The Intergovernmental Panel on Climate Change has concluded that climate change “is likely to have wide-ranging and mostly adverse impacts on human health, with significant loss of life.” As global temperatures rise, mosquitoes and rodents spread diseases like malaria and hanta virus. In addition, new diseases emerge as viruses jump species. Diseases associated with poverty and famine will increase as agriculture and economies are disrupted by increased numbers of natural disasters.

### **Curriculum: Preparing the Teachers of the Next Generation**

Moravian College also has a long-standing tradition of educating teachers. The college graduates over 40 students every year who are certified teachers, extending the long-term impact of a Moravian College education to elementary, middle and high school students. There are currently over 1,400 Moravian alumni who are classroom teachers. We believe that all teachers, regardless of their special fields, should be informed about matters relating to global warming. The solutions to the problems associated with climate change will take members of all disciplines, from economics and science to art and communication, to solve. Our graduating teachers will help inform the next generation of both the risks and opportunities associated with climate change.

## **2. Students, faculty and alumni are involved with research or education concerning climate change, health, adaptation, and technology.**

### **Students and Undergraduate Research**

Student Opportunities for Academic Research (SOAR) is a Moravian College program which provides stipends, travel allowances, and research expenses to support students, in any discipline, who are engaged in scholarly or creative activity with faculty members. Major funding for SOAR is provided by The Ervin J. Rokke Endowment for Student-Faculty Research, which funds research grants and summer stipends, with supplemental funding from Moravian College. Since its beginning in 1998, the SOAR program has funded over 130 research projects that have directly involved more than 150 students and over fifty faculty members.

For the past five years, Moravian College students and faculty have been involved in the restoration efforts, conducting field research at the site and leading educational field trips at the Palmerton Zinc Superfund site, the largest site east of the Mississippi. The specific work site is a

750 -acre plot of forest in Carbon County (PA) . It serves as a national and world-wide model of innovative environmental technology, and is a case study for textbooks and the subject of numerous scientific articles. Our students are working with a collaborative Moravian College/Lehigh University team.

In partnership with the Lehigh Gap Nature Center which is located in the heart of the Superfund site, our students are involved with state ecological and native plant experts designing a study that has been implemented in 2009 employing deer enclosures, native plant plantings, and monitoring to look for enhancement of diversity in the habitat and herbivore browsing impact. The plan is to increase biodiversity and provide important way-stations and breeding grounds for migrating species from the neotropics. Community based research and experiential learning are combined into one great scientific learning experience for our students. The department of environmental studies also runs teacher-education workshops in the summer at the Center. The courses are for school teachers and fulfill the PA ACT 48 continuing education requirement.

### **Examples of recent student research projects funded through SOAR**

Todd Johnson ('09) worked with Prof. Diane Husic and the Lehigh Gap Nature Center, investigating propagation techniques for *Minuartia patula* (Michx.) mattf. (sandwort) in order to begin determining how this species is able to thrive in soils contaminated with high levels of heavy metals. The genus is not native to Pennsylvania, but the four species of *Minuartia* that grow in the east are either threatened or endangered despite the predominance of *M. patula* in the area of the Palmerton Zinc Superfund site.

Amanda deVillers ('08), Andrew Mashintonio ('09), and Amy Parrish ('09) studied stream ecology of the Fry's Run watershed with Prof. Frank Kuserk. Fry's Run is a network of streams in that combine to flow directly into the Delaware River. The students performed a variety of tests evaluating the quality of the stream. Through these tests, they were able to determine the status of the water and habitat in the stream itself. They also evaluated the habitat of three sites along the watershed and studied the quantities and types of macro-invertebrates found at the sites. At the end of the project, the students taught members of the Fry's Run Watershed Association how to perform future, basic testing of the watershed.

Amanda deVillers ('08) spent the fall semester of 2007 abroad, on the island of Bonaire in the Netherlands Antilles. In addition to her classes, she carried out research looking at fish diversity patterns and their relationship to live coral cover in the Bonaire National Marine Park using surveys from the REEF database and underwater transects. In a separate study, she also looked for changes in fish diversity over time. Her results were presented to the public in Bonaire and published in a student journal.

### **Examples of recent student SOAR projects and publications**

Sarabeth Brockley (Prof. Diane Husic) *Analysis of Succession, Biodiversity, and the Impact of Heavy Metal Contamination Surrounding Seeps and Springs within the Superfund Site at the Lehigh Gap (Pennsylvania).*

Vivian Clarke-Ruiz and Andrew Mashintonio (Prof. Frank Kuserk) *Remediation Effects on Forest Soil Microflora and Aquatic Biota Affected by Zinc Smelter Emissions near Palmerton, Pennsylvania.*

Brian Birchak (Prof. Frank Kuserk) *Remediation effects on Aquatic Macroinvertebrates Affected by Zinc-smelter Emissions near Palmerton, PA.*

Yi Li '08 and Gregory Niehoff '08 (Prof. Diane Husic) *Analysis of the Uptake and Biochemical Impact of Heavy Metals (Zinc, Lead, and Cadmium) on Four Plant Species in the Lehigh Gap (Pennsylvania).* Yi Li presented her research, *The Interplay between Oxygen and Photosynthetic Organisms: Photorespiration, Enzymes of Oxidation-Reduction Reactions, and Photo-oxidative Stress in Unicellular Green Algae*, at the 2006 National Council for Undergraduate Research Conference.

Armando Villafane '08 (Prof. Frank Kuserk) *Remediation Effects on the Forest Soil Microflora Affected by Zinc-smelter Emissions near Palmerton, PA* presented at the 2008 National Council for Undergraduate Research Conference.

### **Alumni Pursuits Related to Matters of the UNFCCC**

Our alumni are engaged in the field of environmental science at various levels, including: senior conservation advisor (The Nature Conservancy), senior vice president (National Wildlife Federation), research chemist (U.S. Environmental Protection Agency), resource conservationist (Morris County Soil Conservation District, Wildlands Conservancy), and dean (School of the Environment at the University of South Carolina). One alumnus writes software to measure energy efficiency in K-12 schools. Many others are involved with trades involving green building construction, alternative and hydrogen fuels, and recycling. Others are professors at other colleges and universities, and many teach about climate change as part of the K-12 curriculum.

### **Faculty Research and Outreach**

Provided here is a sampling of the kind of research in which our faculty are engaged.

**Dr. Diane Husic**, professor and chairperson of the biological sciences department, is on the boards of both the Lehigh Gap Nature Center (LGNC) and the Lehigh Valley Audubon Society (LVAS). Through Dr. Husic's work, the College has partnered for three years with the LGNC to offer K-12 teacher workshops on environmental topics, including air pollution, climate change and alternative energy. The biology department is also a partner with the Seven Generations Charter School, which focuses on environmental education and stewardship at the elementary school level. Through National Audubon, the LVAS and Moravian College, we have a grant to sponsor an art competition for regional school students related to responses to climate change in fall 2009.

The College's partnership with the Lehigh Gap Wildlife Refuge began in 2005 through a National Science Foundation grant and plant science consortium co-directed by Professor Husic. Since then, Husic has supervised several Moravian students whose research has focused on the

site. Together with researchers from other colleges and organizations, they have begun to re-vegetate the area with grasses, the first step in habitat restoration.

Dr. Husic is also the co-primary investigator on a grant from the Department of Conservation and Natural Resources to fund the second phase of an ecological assessment of the Palmerton Zinc Superfund site. The grant also includes funding to support student research this summer.

Dr. Husic is also involved with an Audubon/Toyota Together Green grant project performing habitat restoration on the Kittatinny Ridge. As part of the grant, students in one of Dr. Husic's classes are working with state ecological and native plant experts to design a study to be implemented in 2009, employing deer enclosures, native plant plantings, and monitoring the enhancement of diversity in the habitat and herbivore browsing impact.

**Dr. Frank Kuserk**, professor and head of the environmental studies program, is the project leader for Moravian College's Keck/PKAL Facilitating Interdisciplinary Learning Project. Project Kaleidoscope (PKAL) is one of the leading advocates in the United States for what works in building and sustaining strong undergraduate programs in the fields of science, technology, engineering and mathematics. Moravian's PKAL project, titled *Toward a Truly Interdisciplinary Environmental Studies Program*, began in 2007 and is focused on making our Environmental Studies curriculum more interdisciplinary in its approach to student learning, and creating a method to assess student learning in interdisciplinary programs.

Dr. Frank Kuserk has also been working with his students along with Wilson High School students on various ecological projects at local watersheds, including an analysis of the impact of changing water temperatures on the macro-invertebrate and fish populations.

**Dr. Chris Jones**, associate professor of biology, is participating in a new program sponsored by the Sustainable Energy Project. As part of the project, the College will be installing a solar panel and incorporating solar energy and other alternative energies into its physics curriculum.

**Dr. Kerry Cheever**, chairperson of the school of nursing, is one of the editors for a textbook on medical surgical nursing (published by Brunner & Suddarth), now in its 11th edition and translated into several languages, which is used globally to train nurses. Through her work, Dr. Cheever promotes the need to adapt nursing practices because of the increased global health threats posed by global warming.

**Dr. Hilde Binford** has trained with Al Gore as a member of the Climate Project and with the Union of Concerned Scientists. She has made presentations about climate change to various groups in Pennsylvania, including faith groups, universities, and business groups. In May 2009 she was a featured presenter for the Climate Project. Presentations planned for summer and fall 2009 include family camps, alumni groups and the public library.

### **3. We represent both the liberal arts tradition of education and the state of Pennsylvania, which has a complex role to play in a carbon-restrained future.**

#### **Contributing to Education through the Liberal Arts Model**

According to the UNFCCC website, a total of 88 colleges/universities are registered observers. Out of that group, there are only 19 U.S. universities and 3 U.S. colleges. These numbers strike us as woefully low given that these institutions are educating the future scientists, political leaders, teachers, business leaders and workforce.

As part of America's rich system of higher education, liberal arts colleges play an important role in educating the scientists of the future. Of the ten Carnegie Classifications of colleges and universities, only two classifications (Research I and Comprehensive I) grant substantially more Bachelor's degrees in science than the Liberal Arts Colleges classification (of which Moravian College is a member). The Council on Undergraduate Research reports that undergraduates and smaller schools make significant contributions to scientific research and scholarship in many disciplines. In addition, the majority of students who go on to Ph.D. programs in science come from small liberal arts colleges. Many faculty members in liberal arts schools are directly involved with research connected to climate change and its effects.

#### **Pennsylvania: Moving Towards Solutions in a Carbon-Restrained World**

Approximately 85% of all Moravian College alumni live in Pennsylvania, a trend that is reflected in recent graduates who also chose to remain as residents. Moravian students and alumni are integral to the workforce of the State and have an impact on its direction.

Pennsylvania is the 6<sup>th</sup> most populous State in the nation. It is a national leader in the biosciences and home to premier hospitals and other science institutions. It is a top employer in science industries, a leading innovator in science-related patents, and a nationally ranked investor in academic research and development. Pennsylvania is ranked among the top 6 U.S. state employers in three of the four major bioscience sub-sectors and has a bioscience sector that contributes a total employment impact of 326,226 jobs.

At the same time, Pennsylvania contributes 1% of the total global emission of carbon dioxide and it hosts parts of four of the nation's 25 most ozone-polluted metropolitan areas. A significant reduction in Pennsylvania's emissions is essential to achieving deep reductions in carbon dioxide levels nationally. Of course, reducing emissions in Pennsylvania alone will not stem global warming. Nevertheless, Pennsylvania's emissions are so high that this single state, when compared with entire nations, ranks as the world's twenty-second largest emitter of carbon dioxide. If the United States and the world are to achieve the scale of emissions reductions needed, Pennsylvania should figure prominently in a transition to clean energy. As a leader in technology, industry and policy innovation, Pennsylvania is well positioned to drive national action to reduce emissions. Moravian College students and alumni are certainly educated and positioned to affect Pennsylvania's future.

As observers to the UNFCCC, we look forward to providing additional information about the negotiation process and the negotiations themselves with both our alumni and Pennsylvania

residents. We are particularly interested in matters that relate to our state, including technologies related to coal, hydrogen fuel, wind and solar. We are also interested in providing information to those outside of our state on matters concerning land reclamation and the need for climate change in the general education curriculum.

#### **4. Sustainability initiatives at Moravian College.**

Moravian College is regularly looking to fund environmentally respectful programs and facilities to enhance an awareness of, and a reduction in, carbon releases to the atmosphere. To this end, Moravian College will be conducting an investment grade energy audit of its campus buildings this summer. The audit will inform the College's energy management plan and be a valuable tool in implementing measures to reduce energy use across campus.

This summer, the College will complete construction on its newest building, a six-story 100,000 square foot residence hall that will house approximately 230 students, and contain classrooms and other learning spaces. The project includes many sustainable design features and practices:

- energy conservation measures will reduce energy use by 11%, which is in alignment with the ASHRAE 90.1 building standard that is a pre-requisite for LEED certification);
- runoff/watershed management and water conservation methods are incorporated into the landscape design, which also features native plants;
- green products and materials made of recycled plastic are used throughout the building and grounds;
- climate neutral materials were selected that will award credits for offsetting Green House Gas emissions (e.g. interface carpeting used throughout the building; paint used is high in recycled content and low in volatile organic compounds);
- wood trim, flooring and fixtures are composed of rapidly renewing materials versus wood that does not naturally regenerate quickly;
- to date, more than 80% of the project's total construction waste has been recycled, diverting it from landfills.

The Sustainability Task Force at Moravian College oversees the ongoing efforts at sustainability on campus. The task force, which includes faculty, students, staff and administration, recently created a new vision statement and guiding principles.

In 2008, Dr. Thomforde signed the Talloires Declaration on behalf of Moravian College, joining more than 380 university presidents and chancellors from over 40 countries in making a commitment to environmental sustainability in higher education.

#### **5. Bringing UNFCCC to Moravian College and the Community**

In 2009, first-year students will have required reading (*The World Without Us*, Alan Weisman) relating to environmental issues integrated into the Introduction to College Life course. This course is required of all freshman and runs for an entire year. Environmental stewardship and activism will be a college-wide theme for the 2009/2010 academic year. Building our participation in UNFCCC will add a unique and truly global aspect to our plans.

Moravian College will send two faculty members as representatives to the conference in Copenhagen and involve other faculty members in activities related to the conference throughout the 2009/2010 academic year. Beginning in August 2009, the faculty attending the conference along with the Academic Dean, the Vice-President of Finance, and several other members of the faculty (including nursing, education, environmental studies, environmental economics, biology, African studies, communications, political science, religion) will co-author a blog in order to explain and explore the complexities of the COP 15 meeting.

In addition to discussions on global warming, green house gases, and deforestation, the blog entries will review the progress of the two negotiation tracks leading up to Copenhagen, the AWG-KP and the AWG-LCA. Faculty will comment on and introduce reports concerning health, adaptation, mitigation, financing, and technology. Two of our faculty members are specialists on China and Africa, and they will provide insight to the impacts and concerns of the developing countries. Finally, the blog will include links to the UNFCCC website and other related organizations, as well as links to online simulations and climate modeling applications.

The UNFCCC blog will be used by several different classes: sections of Introduction to College Life, economics, biology, political science, environmental studies, religion, Writing 100 (some sections will have an environmental theme, including climate change), and Climate Crises. In addition, alumni and other visitors to our website will also have access to the blog. While in Copenhagen, our delegates will supplement the blog by making entries to a Twitter account. The benefit of supplementing the blog with Twitter is that messages will be delivered directly to subscribers (primarily students) in real time.

Over the past two years, Moravian College has successfully incorporated blogging activities into the curriculum and other campus activities. One of the first was also related to climate change: Dr. Binford reported back on her trip to receding glaciers in South America. The UNFCCC blog promises to be wide-reaching, involving the entire college community, alumni, and visitors to the site. The college public relations office will inform both the alumni (through our publications) and the general public (press releases) about the blog. It may be one of the first times a blog is used as a common platform over a period of a several months to engage students and faculty from multiple disciplines.

## **Conclusion**

Climate change is altering virtually every aspect of the planet from human life to the ocean conveyor, rapidly diminishing species of animals, plant life, and the life support at the bottom of the food chain. Solutions to the problem will need to be international and multidisciplinary in approach. Students educated in the liberal arts tradition excel at this cross-discipline approach to problem solving. The science, political issues, social impact, human and ecological welfare, and economic issues discussed at the UNFCCC are all issues about which Moravian College should educate its students. Perhaps just as important, the process of dialog and negotiation that occurs in Copenhagen is a model of how the world will move forward in the 21<sup>st</sup> century, and the liberal arts community in higher education should be a part of that dialog. Moravian College is looking forward to participating as an official Observer.

## **Affiliations**

Moravian College is fortunate to have relationships with some excellent organizations involved in climate change activities. It is our hope that attendance and participation in the Conference will be an introduction to additional organizations with whom we can connect.

**Pennsylvania Environmental Research Consortium:** Moravian College is an active member and sends delegates regularly to meetings. PERC is an organization comprised of environmental policy makers and universities and colleges devoted to improving environmental policy and understanding through government and academic cooperation that encourages interdisciplinary analysis and discourse. The Consortium is currently comprised of Pennsylvania's Department of Environmental Protection and Department of Conservation and Natural Resources, 56 Pennsylvania colleges and universities, plus Sustainable Pittsburgh. Moravian College is an active member.

**Union of Concerned Scientists:** Several Moravian faculty are members of this organization and our students regularly use their materials and attend regional conferences. USC is the leading science-based nonprofit working for a healthy environment and a safer world. It combines independent scientific research and citizen action to develop innovative, practical solutions and to secure responsible changes in government policy, corporate practices, and consumer choices. Begun in 1969, USC is now an alliance of more than 250,000 citizens and scientists.

**Air Products & Chemicals, Inc.:** Employs over 90 Moravian College alumni, annually hosts student interns and supports numerous programs on campus. Air Products is a global supplier of atmospheric gases, process and specialty gases and chemicals to customers worldwide. Their corporate headquarters are located in nearby Allentown, Pennsylvania. Air Products is currently working on a number of carbon capture and storage demonstration projects across the world. In 2009, the company announced work with the U.S. Department of Energy to design and construct a CO<sub>2</sub> purification system in support of an oxyfuel technology development project at a boiler simulation facility in Connecticut. Air Products is now in the midst of a CO<sub>2</sub> capture study for gasification in collaboration with the Alberta Energy Research Institute. The study, focused on advanced carbon dioxide capture technology for use with gasification, is to be completed in 2010. Air Products' oxyfuel technology can reduce the cost of capturing CO<sub>2</sub> for the power industry. The company is specifically focused on the purification of the resulting oxyfuel combustion flue gas, developing a robust process for the efficient removal of trace impurities. This technology allows cost savings in the combustion process and minimizes the content of these components in the sequestered CO<sub>2</sub>.

**Citizen's for Pennsylvania's Future (PennFuture):** several Moravian faculty members are associated with this organization. PennFuture is a statewide public interest membership organization, whose activities include litigating cases before regulatory bodies and in local, state and federal courts, advocating and advancing legislative action on a state and federal level, public education and assisting citizens in public advocacy.

**Pennsylvania Bio:** Moravian College works in partnership with Pennsylvania Bio on their efforts to educate, retain, and attract a diverse, high quality biosciences workforce. Pennsylvania Bio is an association of businesses and individuals that form a cohesive biotechnology

community in Pennsylvania and the mid-Atlantic region. The organization is the public policy leader and the principal public advocate for the bioscience community in Pennsylvania, and provides programs to advance public understanding of and appreciation for the role of the bioscience industry.

**Northampton County Conservation District:** Moravian College seeks the advice of the District in matters pertaining to the conservation of our campus properties. The District, a sub-unit of state government, was founded in 1961 to support grassroots local conservation efforts. The District performs a variety of programs ranging from reviewing erosion and sediment pollution control plans for earth disturbance activities to providing advice on starting a local watershed association.

**Lehigh Valley Audubon Society:** Dr. Husic serves on the board of directors and is the head of the education committee. The Moravian College biology department in partnership with Audubon is engaged in a bird study as a tool to monitor environmental changes in the eastern Pennsylvania region. The Audubon Society's mission is to conserve and restore natural ecosystems, focusing on birds, other wildlife, and their habitats for the benefit of humanity and the earth's biological diversity. The Audubon Society operates a national network of community-based nature centers and chapters, scientific and educational programs, and advocacy efforts on behalf of areas sustaining important bird populations. Audubon's local chapters provide advocacy campaigns, nature outings, educational programs and other events.

**Kittatinny Ridge/Toyota Together Green Program:** Students in the biology department are studying the impact of native plantings on habitat restoration and biodiversity. The data they collect will detail which formula of plantings are successful and which, therefore, should be replicated on adjacent lands and on other sites scheduled for restoration. The Lehigh Valley Audubon Society, Lehigh Gap Nature Center and Pennsylvania Audubon along with over 50 volunteers have turned an industrial wasteland into the Lehigh Gap Wildlife Refuge. The Together Green Program funded the planting of native grasses and wildflowers to an additional 100-acre area, and the building four half-acre deer fencing enclosures.

**Fry's Run Watershed Association:** Under the supervision of Dr. Frank Kuserk, three students conducted an ecological assessment of the watershed, provided a written report and presented workshops to educate members on how to monitor conditions. Moravian students are involved in an ongoing macroinvertebrate assessment, additional coliform monitoring, and water quality monitoring to further determine the health of Fry's Run and assess further protective measures that may be needed. The Association is an independent non-profit organization dedicated to protecting, preserving and improving the quality of the water and land in the Fry's Run Watershed, a tributary to the Delaware River.

**Lehigh Gap Nature Center:** Dr. Diane Husic is on the board of directors. For the past three years, the college has offered professional development workshops on environmental topics (air pollution, climate change, alternate energy) for K-12 teachers at the Center. These standards-based workshops include PA Department of Education Act 48 credit opportunities. The Lehigh Gap Nature Center is a non-profit conservation organization located at the foot of the Kittatinny

Ridge. Their mission is to preserve wildlife and habitat through conservation, education, and research for the benefit of the earth and all its inhabitants.

**Wildlands Conservancy:** Moravian College students volunteered for the Little Lehigh Stream Bank Fencing, Habitat Improvement and Riparian Buffer Improvement Project. The College frequently invites the Conservancy to host meetings on campus. Wildlands Conservancy is a non-profit, member-supported organization that has been dedicated to land preservation, river restoration, trail development and environmental stewardship through education for the past thirty-five years. The Conservancy fulfills its mission through proactive education and advocacy programs, various land-protection and stewardship strategies, science-informed water quality and ecological restoration projects, comprehensive community-planning efforts, and greenway and recreational-trail development. To date, over 46,000 acres of open space have been preserved, numerous stream-restoration projects have been completed, new and innovative educational programs have been established, and several watershed-management plans have been completed.

**EcoMom Alliance, Lehigh Valley Chapter:** Professor Kerri Mullen is an active member. EcoMom Alliance is a not-for-profit global organization inspiring and empowering thousands of women through education and community action to help reduce the climate crisis and create an environmentally, socially and economically sustainable future.

**Moravian College** is incorporated under the laws of the Commonwealth of Pennsylvania. It is accredited by the Middle States Association of Colleges and Schools and approved for professional preparation by the American Chemical Society, by the Department of Education of the Commonwealth of Pennsylvania (teacher education), and by the National Association of Schools of Music. Moravian is also a member of the American Council on Education, the National Association of Independent Colleges and Universities, the Pennsylvania Association of Colleges and Universities, and the Council of Independent Colleges, Universities of Pennsylvania and the Lehigh Valley Association of Independent Colleges.

## **Attachments**

- Moravian College by-laws and articles of incorporation
- 501(c)(3) certificate
- FY07/08 Annual Report
- Publications relating to the convention process