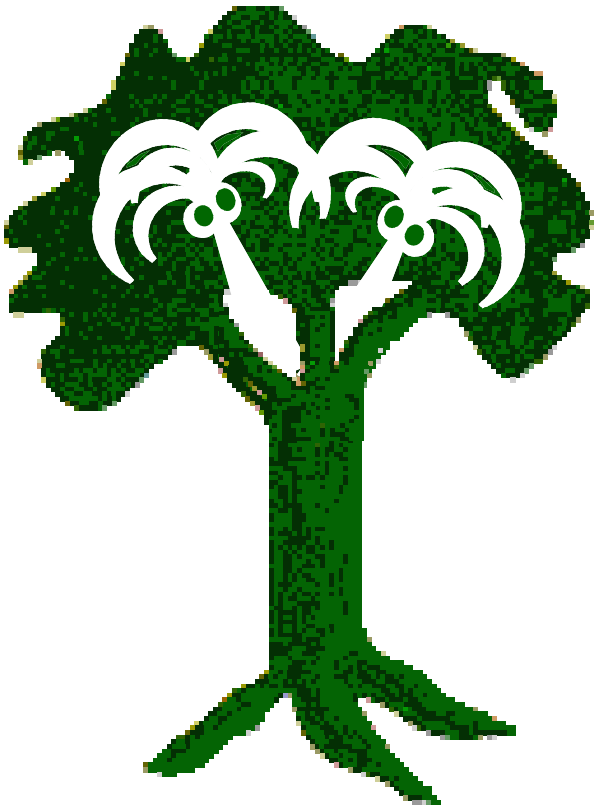

Program And Abstracts

THE 12TH INTERNATIONAL INTERDISCIPLINARY CONFERENCE ON THE ENVIRONMENT

JUNE 22-24, 2006
KONA, HAWAII

Organized By
The Interdisciplinary Environmental Association

WELCOME

Dear Participant:

On behalf of the Interdisciplinary Environmental Association, I would like to welcome you to Kona, Hawaii and the 12th International Interdisciplinary Conference on the Environment. It is only fitting that we meet in such a location, where the beauty of the natural environment is of great economic and cultural importance but often suffers from the dictates of development and livelihood. We look forward to learning more about the local challenges even as we discuss issues from many continents and fields of study. If you look over this program, I am sure that you will be impressed with the breadth of locations and topics awaiting us over the next few days.

Each year we attempt to bring together specialists, practitioners, and interested citizens from all corners of the globe in order to exchange ideas and approaches to the environmental issues that we face. It is an underlying philosophy of this organization and this conference that we have the best chance for success in our attempts to both understand and address environmental topics when we are free to discuss them without limitations to particular philosophies, political boundaries, or disciplinary constraints. If this is a return trip to our conference for you, I hope that you find us more vital and active than you remember. If this is your first IICE conference, I hope that you will find our unusual (even distinctive) approach to environmental work highly challenging and stimulating, and that you will be able to find ways to network with our membership around the globe to mutual benefit. And if you get caught up in what you experience at the IICE, I hope that you will consider joining the Interdisciplinary Environmental Association and becoming a part of the effort we are building.

Good luck in your sessions, I look forward to meeting each of you, and Welcome to Kona and the 12th IICE!

Michael A. Reiter — *President, 2005-2007*

Anthony B. Lumby — *VP and President-Elect*

The Interdisciplinary Environmental Association

www.ieaonline.org

CONFERENCE SCHEDULE SUMMARY

	Wednesday 21	Thursday 22	Friday 23	Saturday 24	
7:30 AM		Registration (to 3PM): Keauhou Center Foyer	Registration (to 10am) Keauhou Center Foyer	Gather Keauhou Foyer	7:30 AM
8:00		Session 1: Agriculture I Keauhou III Session 2: Aquatic Policy Keauhou IV	Session 10: Agriculture III Keauhou III Session 11: Community and Sustainability Keauhou IV	Session 18: Perceptions of Responsibility Keauhou III Session 19: Environmental Health Keauhou IV	8:00
8:30					8:30
9:00					9:00
9:30		Break Keauhou Center Foyer	Break Keauhou Center Foyer		9:30
10:00					10:00
10:30		Session 3: Agriculture II Keauhou III Session 4: Models for Environmental Education Keauhou IV	Session 12: Wetlands, Estuaries I Keauhou III Session 13: American Forests Keauhou IV Session 14: Chemical Pollution Keauhou I	Business Meeting, Keauhou I	10:30
11:00					11:00
11:30				Break Keauhou Foyer	11:30
12:00 PM		Lunch On Your Own	Session 15: Interdisciplinary Research Roundtable Keauhou I		12:00 PM
12:30	Volcano NP Field Trip				12:30
1:00		Session 5: GIS Workshop Keauhou III Session 6: Macroeconomics Keauhou IV Session 7: Regional Policies Keauhou I	Conference Luncheon Keauhou Convention Center Lawn	Place of Refuge Field Trip	1:00
1:30					1:30
2:00					2:00
2:30			Session 16: Wetlands, Estuaries II Keauhou III Session 17: Political Process and Decisions Keauhou IV		2:30
3:00		Session 8: Population, Land Use, & Development Keauhou III Session 9: Biological Development Solutions Keauhou IV			3:00
3:30					3:30
4:00					4:00
4:30		Break, Center Foyer, Poster Authors Available	Break, Center Foyer, Poster Authors Available		4:30
5:00		Keynote 1: William Steiner Keauhou I	Keynote 2: Susan Baker Keauhou I		5:00
5:30					5:30
6:00					6:00
6:30					6:30
7:00	Social Crystal Blue Point				7:00
7:30					7:30

CONFERENCE SCHEDULE

Wednesday, June 21

8:30am – 5pm Field Trip to Volcano National Park

All registered participants should wear hiking attire and bring rain gear. Water is recommended. We will stop for lunch in the area. Meet in the hotel lobby; vans depart at 8:30AM.

7pm – 9pm Informal Social Mixer, Bayview Grounds

Thursday, June 22:

7:30am – 3pm Registration
Keauhou Convention Center Foyer

8am – 9:45am Session 1: Agriculture and the Environment I: Conflicts in the Use of Land
Keauhou III
Moderator: *D. Kershen, University of Oklahoma*
Discussant: *B. Bushell, Musashi Institute of Technology*

J. Becker
Kelo v. City of New London: Trampling on Private Property Rights or Strong Support for States' Rights; Implications for Farmland Preservation Programs

L. Geyer and J. Richardson Jr.
Wind Farms: Windfall or Wipeout?

T. Centner
Advocating a New Anti-Nuisance Law for Undeveloped Lands

8am – 9:45am Session 2: Aquatic Habitat Policy
Keauhou IV
Moderator: *J. Earls, University of South Florida*

Discussant: *E. Fitch, Marietta College*

D. Meadows, E. Lapp, and A. Hellrung
Freshwater Wildlife Assessment and Conservation: An Island State Model from Hawaii

E. Houk
The Economics of Water Transfers for Endangered Species: An Interdisciplinary Approach

J. Tiedemann, S. Taylor, and R. Fiorelli
A Model for Identifying Vulnerable Wetlands and Associated Riparian Areas

9:45am – 10:15am Break
Keauhou Convention Center Foyer

10:15am – 12:00pm Session 3: Agriculture and the Environment II: Environment and Health
Keauhou III
Moderator: *T. Feitshans, North Carolina State University*
Discussant: *M. Shrivastava, Athabasca University*

D. Kershen
Sustainable Intensive Agriculture: High Technology and Environmental Benefits

M. Johnson
Functional Foods and Health: Opportunities for Agriculture

J. Hipp
Obesity Litigation: The Skinny on the Fat

10:15am – 12:00pm Session 4: Models for Environmental Education
Keauhou IV
Moderator: *M. DiBartolomeis, California Department of Health Services*
Discussant: *M. Reiter, Delaware State University*

W. Focht
Competing Paradigms of Disciplinarity: Implications for Environmental Curriculum Design

Barry Barker

Genetics and Geography: Using a Multidisciplinary Approach to Teach College Level Environmental Studies Courses that Incorporate National Geographic Society's Genographic Research Project

B. Bushell and M. Goto
Capacity Building toward a Model of Education for Sustainable Development : A Case Study in Nepal

12:00pm – 1:15pm: Lunch (on your own)

1:15pm – 3pm Session 5:
Workshop: Introduction To GIS Applications in Environmental and Social Sciences Research: Lecture, Demonstration, Discussion & Illustrative Posters
Keauhou III
Moderator: *B. Dixon, University of South Florida, St. Petersburg*

1:15pm – 3pm Session 6: Macroeconomics and Globalization
Keauhou IV
Moderator: *G. Denton, University of Guam*
Discussant: *R. Gorman, Miami University of Ohio*

A Lumby
Macroeconomic Policies and the Environment: The Role of Policy Analysis Matrices (PAM)

T. Hattori
Building the Institutional Capacity for Trade and the Environment

E. Zirabamuzaale
The Effects of Globalization on Biodiversity and Environment:
A Case Study of Uganda

O. Victor
Nigerian Environmental Legislations, Oil Based Violence and Security in the Niger Delta

1:15pm – 3pm Session 7: Regional Policies for Development
Keauhou I
Moderator: *M. Shrivastava, Athabasca University*

Discussant: *M. Reiter, Delaware State University*

C. Amawatana and D. Baker
Environmental Performance Indicators for the Lower Mekong Subregion Development

G. Nwaka
The Urban Poor, the Informal City, and Environmental Health Policy in Nigeria

R. Pati and A. Padhiary
Biopiracy and Sensitive Issues of Environmental Ethics and Indigenous Mechanism of Biodiversity Conservation in Tribal Villages of Bastar: An Anthropological Appraisal

3pm – 4:15pm Session 8: Population, Land Use and Development
Keauhou III

Moderator: *M. Kuha, Ball State University*
Discussant: *S. Gill, University of Pennsylvania*

B. Dixon and J. Earls
Using GIS to Investigate Relationships of Landuse, Population Growth, Soils and FAVA Data to Water Quality in the SWFWMD, West-Central Florida, USA

A. Amissah-Arthur
Legume Revolution in Sub-Saharan Africa: Soybeans, Why, Where and the Environment

E. Houk
Estimating the Effectiveness of Water Conservation Materials in the Absence of Volumetric Water Pricing

3pm – 4:15pm Session 9: Biological Solutions for Development Issues
Keauhou IV

Moderator: *A. Lumby, University of Kwazulu-Natal*
Discussant: *D. Parsons, Sheffield-Hallam University*

A. Jagadeesh
Agricultural Plant-based Agro Industries

S. Kapila and T.Aggarwal
Biomonitoring Traffic Pollution in Chandigarh using Moss Bag Technique

4:15pm - 4:45pm Break: Poster Authors Available
Keauhou Convention Center Foyer

W. S. Kuo and Y. H. Chiang
Solar Photocatalytic Degradation of Carbaryl Rinsate Assisted by Dye Photosensitizer

R. Scarborough, M. Mensinger, B. Wilson, A. Mundel, V. Klemas, D. Leathers, D. Legates, J. Madsen, W. Ritter, and M. Reiter
Monitoring Development Impacts Affecting the Delaware National Estuarine Research Reserve

Carmen M. Sian-Denton and Gary R.W. Denton
Impact of Economic Growth and Urban Development on the Chemical Integrity of Guam's Groundwater Resources

4:45pm – 6:15pm Keynote Speaker 1
Keauhou I

The Changing Paradigm in Hawaiian Agriculture and Natural Resources: New Visions of the Future and the Role of Sustainability

Dr. William W.M. Steiner
Dean, College of Agriculture, Forestry, and Natural Resource Management
University of Hawaii-Hilo

Friday, June 23

7:30am – 10am Registration
Keauhou Convention Center Foyer

8am – 9:45am Session 10: Agriculture and the Environment 3: Governmental Controls
Keauhou III
Moderator: *T. Centner, University of Georgia*
Discussant: *A. Lumby, University of Kwazulu-Natal*

T. Feitshans
A Comparison of Techniques for Preserving Farmland and Forestland

L. Geyer
Land, Value, and the Endangered Species Act

J. Richardson Jr.
Nuisance or NIMBY?: Land Application of Biosolids

8am – 9:45am Session 11: Community and Sustainability, Education, and Involvement
Keauhou IV
Moderator: *I. H. Rhee, Soonchunhyang University*
Discussant: *J. Tiedemann, Monmouth University*

D. Parsons
Issues of Sustainability in Asset-Based Regeneration

Barry Barker
The Biodiversity Bus

H. Bernard, M. Ramsey and C. Vann
The Makai Watch at Ahihi Kina'u Natural Area Reserve, South Maui

9:45am – 10:15am Break
Keauhou Convention Center Foyer

10:15am – 12:00pm Session 12: Wetlands and Estuaries I
Keauhou III
Moderator: *D. Meadows, Hawaii Division of Aquatic Resources*
Discussant: *T. Feitschans, North Carolina State University*

B. Kaiser and K. Burnett
Economic Impacts of Coqui Frogs in Hawaii

E. Fitch
The Critical Margin: Population and Development on the Coastal Margin - Impacts and Alternatives

G. Denton and C. Sian-Denton
Unsightly Algal Blooms in Tumon Bay, Guam's Premier Tourist Location: Possible Connection to Hotel Landscaping Activities

10:15am – 12:00pm Session 13: American Forests from Concept to Restoration
Keauhou IV
Moderator: *B. Gibson, University of Hawaii*
Discussant: *M. Reiter, Delaware State University*

S. Gill, B. Riebling, J. Theophano
Multidisciplinary Lenses on Nature

A. Journet and K. Conway
Restoring Tropical Moist Forest in Northwestern Costa Rica

G. Liu, J. Allen, C. Campbell, and L. Brudnak
Forest Fire and Environment -- Using Self-Built Hyperspectral Library as a Powerful Tool for Instruction of Prescribed Forest Fires

10:15am – 12:00pm Session 14: Chemical Pollution and Solutions
Keauhou I
Moderator: *B. Bushell, Musashi Institute of Technology*
Discussant: *M. Shrivastava, Athabasca University*

S. Forkapić, I. Bikit, D. Mrđa, J. Slivka, M. Vesković, N. Todorović, E. Hulber
Indoor Radon in Rural Dwellings of the South-Pannonian Region

M. O. Kadiri and M. Enoma
Comparative Assessment of the Effect of Water Soluble Fractions of Fuel Oils on Microalgae

Igor Peternel, Sanja Papic and Natalija Koprivanac
Comparison of Several Advanced Oxidation Processes for Reactive Dye Photodegradation

Hyun Kyoung Ahn, In Hyoung Rhee, Hyun Jun Jung
Environmental Regulation and Removal of COD and N with the Adoption of ETA in PWR

12pm – 1pm Session 15: Roundtable: Interdisciplinary Environmental Research Challenges and Opportunities
Keauhou I
Moderator: *M. Shrivastava*

1pm – 2:30pm: Conference Luncheon

Keauhou Convention Center Lawn

2:30pm – 4:15pm Session 16: Wetlands and Estuaries II
Keauhou III

Moderator: *D. Meadows, Hawaii Division of Aquatic Resources*
Discussant: *D. Kershen, University of Oklahoma*

M. Reiter, D. Pokrajac, and G. Abbe
Shock and Chaotic Behavior in the Maryland Population of Chesapeake Bay Blue Crabs: Recovery or Harvest Pressure?

G. Steinhoff
Communication and the Aesthetic Appreciation of Wetlands

I. Prejbeanu, C. Rada, and C. Lascu
Danube Delta: An Avian Paradise

2:30pm – 4:15pm Session 17: Political Process and Environmental Decision Making
Keauhou IV

Moderator: *D. Parsons, Sheffield-Hallam University*
Discussant: *R. Gorman, Miami University of Ohio*

R. Young
Life After Death: A Political Strategy for Saving Our Planet's Environment

M. DiBartolomeis
The Role of Environmental Justice in Developing New Chemical Policy

K. Tzoumis
The Status of the Quality of Draft Environmental Impact Statements in the United States: An Update

4:15pm - 4:45pm Break: Poster Authors Available
Keauhou Convention Center Foyer

W. S. Kuo and Y. H. Chiang
Solar Photocatalytic Degradation of Carbaryl Rinsate Assisted by Dye Photosensitizer

R. Scarborough, M. Mensinger, B. Wilson, A. Mundel, V. Klemas, D. Leathers, D. Legates, J. Madsen, W. Ritter, and M. Reiter

Monitoring Development Impacts Affecting the Delaware National Estuarine Research Reserve

Carmen M. Sian-Denton and Gary R.W. Denton
Impact of Economic Growth and Urban Development on the Chemical Integrity of Guam's Groundwater Resources

4:45pm – 6:15pm Keynote Speaker 2
Keauhou I

Communications: Integral to Ecosystem Sustainability

Dr. Susan Baker
Coordinator for Outreach and Education
National Centers for Coastal Ocean Science
National Oceanic and Atmospheric Administration

Saturday, June 24

7:30am - 8am Gather
Keauhou Convention Center Foyer

8am – 9:45am Session 18: Popular and Religious Perceptions of Environmental Responsibility
Keauhou III
Moderator: I. Rhee, Soonchunhyang University
Discussant: *S. Gill, University of Pennsylvania*

D. Patterson
The Biblical Basis for Environmental Stewardship

E. Fitch
New Heavens and New Earth: Debating Values in Public Forum and Christian Responses to the Environmental Issues

M. Kuha
Belief Revision: Empirical Data, Theoretical Models, and Implications for Communicating with the Public about Environmental Issues

8am – 9:45am Session 19: Environmental Health
Keauhou IV
Moderator: *R. Gorman, Miami University of Ohio*
Discussant: *A. Lumby, University of Kwazulu-Natal*

M. DiBartolomeis
Pesticide Regulation: Thinking Outside the Box

I. Bikit, S.Forkapić, D.Mrdja, M.Vesković, J.Slivka, Ž.Mihaljev, Željko Ćupić
Low-level Gamma Spectroscopy Measurements of Radium and Cesium in Lucerne (*Medicago sativa*)

V. Jennings and M. Reiter
Environmental Stressors and Cancer in Delaware

J. Tiedemann, S. Souza, and S. DeLorenzo
Linking Land Use to Pathogen Impairments in Coastal Watersheds

9:45am – 11:15am Business Meeting
Keauhou I
All participants are welcome to attend.

11:15am – 11:45am Break
Keauhou I

11:45am – 5pm Field Trip to Place of Refuge

All registered participants should wear hiking attire and bring rain gear. Bring snorkeling gear if you wish to snorkel after the tour. Meet in the hotel lobby.

ABSTRACTS

1. KEYNOTE BIOGRAPHIES AND ABSTRACTS

Dr. William W.M. Steiner
Dean, College of Agriculture, Forestry, and Natural Resource Management
University of Hawaii-Hilo

Dr. Bill Steiner holds a bachelors degree in Zoology, a USDA Graduate School Masters equivalency in Systems Engineering and a Ph.D. in Genetics. He has over 30 years of experience in conducting population biology and ecological genetics research at the University of Illinois, Champaign-Urbana, the University of Missouri-Columbia, and the University of Hawaii. He has held research and administrative positions in the USDA Agricultural Research Service and the U.S. Geological Survey, retiring as Director of the Pacific Island Ecosystems Research Center in 2005 to take his current position as Dean of CAFNRM at UHH. The main thrust of his career currently is to take the College in the direction of sustainability for agricultural practices and natural resource issues for Hawaii and the Pacific Rim countries the College and UHH serves.

Thursday's Keynote Address

The Changing Paradigm in Hawaiian Agriculture and Natural Resources: New Visions of the Future and the Role of Sustainability

Recent challenges to economic stability in Hawai`i may be portends of the future. The continuing expectation that society as we know it can continue to function as it has in the past do not fit with predictions based on reaching peak oil production within the next 5 – 15 years. This asynchronicity has the potential to cause sudden, catastrophic and world-changing paradigm shifts in virtually every aspect of our personal, cultural and economic lives. Change in the way business is conducted is critical to how our society will survive, as is the way change is wrought. Therein lay potential answers to natural resource problems, food production issues for the 21st century, and even world economic stability. Hawai`i serves as a case in point; preparation must begin now and includes close examination of food resource availability, food distribution systems, the role of our remaining natural resources, policies, and cultural approaches. Island systems may serve as critical models of what to expect, how to monitor change, and how to respond as energy and products derived from oil gives way to alternative, less expensive and more sustainable approaches. These changes will drive corresponding shifts in job and manpower training, but predicting how economic adjustment can come about will require integrated approaches.

Dr. Susan Baker

Coordinator for Outreach and Education
National Centers for Coastal Ocean Science
National Oceanic and Atmospheric Administration

Dr. Susan Baker holds a bachelors degree in zoology, a masters degree in environmental biology, and a Ph.D. in marine-estuarine-environmental sciences. She has over 20 years experience conducting marine mammal research, primarily on obtaining population biological information in order to solve management problems. She also taught biology at George Washington University for over 18 years. She has since "come in from the field" and currently works at the National Oceanic and Atmospheric Administration (NOAA) National Centers for Coastal Ocean Science as the Coordinator for Outreach and Education. At NOAA her main responsibility is to strengthen environmental stewardship through outreach and education.

Friday's Keynote Address

Communications: Integral to Ecosystem Sustainability

Communications, in the broadest sense, are extremely important to the maintenance of ecosystem health and must be a integral part of all ecosystem management efforts. The scientific community has a poor history of making science relevant and understandable to the public. Scientists can communicate with other scientists with ease, but that is not usually the case with the public. Science and the environment are highly relevant to everyday life. However environmental issues, such as fisheries declines, climate change, and coastal hazards, impact the economy, jobs, public health, and safety. But scientists, who are the experts on how declining ecosystem health may impact the public, do not typically frame or discuss results in a manner that can be understood by the public. Furthermore, within the scientific community there is the perception that there is no value in performing public outreach. Outreach and communications are most often considered as an afterthought, not as an integral component of scientific research efforts to resolve environmental issues. This has to change. Example case studies will be presented where communication programs were crucial to successfully resolving environmental issues.

2. PRESENTATION ABSTRACTS

Environmental Regulation and Removal of COD and N with the Adoption of ETA in PWR

Hyun Kyoung Ahn, In Hyoung Rhee, Hyun Jun Jung
Soonchunhyang University
Korea

The Korean PWR plants replaced ammonia with ethanolamine as a secondary side pH control agent to minimize the sludge production in the moisture drain and heater drain systems and the sludge transport into steam generator. The increase of pH in the secondary system water decreased the sludge deposit in steam generator and prolonged the runtime of ion exchange beds in the condensate polishing plant. The extended lifetime of ion exchange resin led to the reduction in the amount of regenerant used and regeneration waste produced. However the concentration of chemical oxygen demand and nitrogen in the regeneration waste was elevated due to the physico-chemical property of ethanolamine.

The PWR nuclear power plants did not meet intermittently the criterion of release allowance for contaminants and the standard of discharge water quality for wastewater, especially for COD and N. Before the adoption of ethanolamine, the wastewater did not contain the prevailing sources except ammonia so that the existing wastewater treatment plant does not need to include the removal processes. The former pH control agent, ammonia, did not remain in the liquid phase because it is highly volatile. The discharge standard for wastewater is supposed to be strict for COD and T-N: 30 and 60 ppm until 2007, 20 and 40 ppm from 2008 to 2012, 10 and 20 ppm after 2013m respectively. One ppm of ethanolamine is tantamount to 2.36 ppm of COD and 0.23 ppm of N. The treatment technology may be classified as physical, chemical and biological ways. Ethanolamine can be stripped into gas as a function of temperature and solution pH, and oxidized into carbon dioxide and nitrogen gases by electro-chemical and biological oxidation. The electrolysis was hard to meet the regulation standard due to the possible production of nitrate and was expensive to achieve the complete breakdown. Therefore the combined physical, chemical, and biological process may be the best way to meet the discharge standard of COD and N.

Environmental Performance Indicators for the Lower Mekong Subregion Development

Chonchinee Amawatana and Doug Baker
Faculty of Built Environment and Engineering
Queensland University of Technology
Queensland, Australia

Complicated environmental systems need to be applied with competent environmental management tools. The application of environmental performance indicators (EPIs) has received increasing attention by both governments and corporations as a tool for capturing and incorporating the performance of global, national and local decision making in complex environmental scenarios. However, at the regional scale, there is a gap in the application of EPIs, and their application at this scale has not been well understood and defined. This is due to a limited theoretical foundation and insufficient data to support what is needed for a concrete and useful set of regional environmental indicators. The regional scale is important because it can bound natural ecosystem which often transcend national boundaries. A case study is used to study the Lower Mekong Subregion (LMS), where four riparian Southeast Asia countries namely, Lao PDR, Thailand, Cambodia, and Vietnam share the Lower Mekong River. The research will examine a framework that identifies decision support processes and criteria in order to develop acceptable and appropriate environmental performance indicators for the Lower Mekong Subregion. This will be achieved through an integration of evaluative and exploratory research. This research evaluates the application of environmental performance indicators at the regional level through using methodologies that cover qualitative data

analysis, quantitative decision support systems, and cross-national analysis. In addition, global and national indicators will be examined for application and relation to the regional context.

Legume Revolution in Sub-Saharan Africa: Soybeans, Why, Where and the Environment

Dr. Abigail Amissah-Arthur
Department of Geography, Geology and the Environment
Slippery Rock University
Slippery Rock, Pennsylvania 16057

Soybean has had the highest growth of all the legumes in sub-Saharan Africa due to the increasing adoption of the crop by small holder farmers in a diverse array of systems that range from monocropping to intercropping. However, for Soybean production to expand further, the first challenge is to define the environment and the dominant farming system within which the Soybeans could be grown in order to develop suitable genotypes and target appropriate production packages. Nigeria, Africa's most populous country is the largest producer of Soybeans, a crop that has been described as being near perfect for the country. Hence this study uses Nigeria as a case study to illustrate the potential of geographic information systems linked to biophysical models and data bases to achieve a characterization of crop environments. The analyses showed that large areas in Nigeria (777,700km^2) are suitable in terms of cloud cover, temperature and photoperiod. However, rainfall exerts major control in assessing Soybean suitability, since only 334,900km^2 land area receives the required soybean growth cycle rainfall. In comparison with the present potential situation, projected rainfall declines of 100mm, 200mm and 300mm may lead to 1.1, 3.1, and 4.7% increase in Suitable areas for the crop and a 0.1,3.6, and 4.7% decrease in the Very Suitable areas, respectively and to an overall shift in areas suitable for Soybean from latitude 7-13^{0}N to 9-12^{0}N. The total potential area calculated for Soybean in this study is substantially greater than the actual total area currently under soybean production. For Soybean to lead to a legume revolution on the continent more areas need to be brought under its production.

The Biodiversity Bus

Barry Barker
Environmental Science and Geography
Nova Southeastern University
Fort Lauderdale Florida

The Biodiversity Bus is a mobile field laboratory delivering multidisciplinary instruction to South Florida Middle School Students. Using Biodiversity as a theme, the BioBus incorporates biology, water chemistry, geography, GIS systems, digital photography, and sociology to deliver the message that "all life is interconnected" and interdependent upon the physical environment. In trial runs, it has gained great support within the Broward County School District. The model can be applied anywhere.

Genetics and Geography: Using a Multidisciplinary Approach to Teach College Level Environmental Studies Courses that Incorporate National Geographic Society's Genographic Research Project

Barry Barker
Environmental Science and Geography
Nova Southeastern University
Fort Lauderdale, Florida

National Geographic Society's Genographic Research Project headed by Dr. Spencer Wells provides overwhelming scientific evidence that all modern humans are genetically connected to a small group of African Bushmen some 60,000 years ago. The study further documents the migrations of humans around the world and their interaction with the world around them. From an environmental perspective, this study forms a provocative look a man's impact upon the environment for 2,000 generations. These concepts have been incorporated into a college level course that builds learning on Environmental Science, Genetics, Biodiversity, Culture, and Human Geography.

Kelo v. City of New London: Trampling on Private Property Rights or Strong Support for States' Rights; Implications for Farmland Preservation Programs

John C. Becker
Professor, Agricultural Economics and Law
The Pennsylvania State University
University Park, Pennsylvania 16802

Despite the attention it is given and the emotion it draws from what some fear is its application, the U.S. Supreme Court decision in *Kelo v. City of New London* is a decision about the authority of federal courts to review actions of state governments and state agencies that affect property interests. Government authority to "take" private property is clear, but the parameters of this authority are subject to interpretation. While the Constitution describes takings in simple terms, the meaning of the Constitutional pronouncement is less clear. When can a proposed "taking" involve a public use? Can the language of the Constitution be applied to a context that was never considered when the Constitution was adopted? How should courts, and people, struggle to apply Constitutional provisions to circumstances that could not have been considered when the Constitution was written? Can a state adopt any public project, such as farmland preservation for example, and exercise eminent domain authority if such projects directly benefit private owners and the public only indirectly? These questions raise issues about whether Constitutional requirements should be viewed literally to adhere to the intent of its authors, or is the meaning of it terms evolving with social, economic and political change taking place within "American society." Understanding the foundations that support the decision is a study in understanding the role of separation of power among the branches of government and states' rights.

The Makai Watch at Ahihi Kina'u Natural Area Reserve, South Maui

Hannah Bernard, Matt Ramsey and Cheryl Vann
Hawai'i Wildlife Fund
Paia, Maui, Hawaii

A unique partnership between non-governmental organizations, community groups and the state Department of Land and Natural Resources was begun to enhance management and stewardship of nearshore areas in Hawai'i. The Natural Area Reserve of Ahihi Kina'u was added to the Makai Watch program two years ago and has been successful in monitoring biological and human impacts on this sensitive site. An education station at the mouth of the Reserve provides information on protecting archeological and natural resources to visitors and two Rangers patrol the area working closely with the DLNR's DOCARE program. This program has become a model for other Makai Watch programs of the state.

Low-level Gamma Spectroscopy Measurements of Radium and Cesium in Lucerne (*Medicago sativa*)

I.Bikit, S.Forkapić, D.Mrdja, M.Vesković, J.Slivka
Department of Physics
University of Novi Sad
Trg Dositeja Obradovica 4, 21 000
Novi Sad, Serbia and Montenegro

Ž.Mihaljev
Scientific Veterinary Institute
Rumenački put 20, 21000 Novi Sad
Serbia and Montenegro

Željko Ćupić
Research Institute for Reproduction
A.I. and Embryo Transfer Temerin
Industrijska zona bb, 21235 Temerin
Serbia and Montenegro

Nineteen years after the Chernobyl nuclear accident, activity concentration of ^{137} Cs still could be detected in food and soil samples in Central and Eastern Europe. In this paper the radiation levels of radium and cesium in lucerne, also known as alfalfa will be presented. It is a perennial plant with a deep root system and it is widely grown throughout the world as forage for cattle. The samples of lucerne were taken from twelve different locations in Vojvodina in the summer period July – September 2004. The samples were specially dried on the air and after that ground, powdered and mineralized by method of dry burning on the temperature of 450ºC. Gamma spectrometry measurements of the ash were performed by means of actively shielded germanium detector with maximal background reduction. For ^{137} Cs mBq/kg order of magnitude detection limits were achieved.

Capacity Building toward a Model of Education for Sustainable Development : A Case Study in Nepal

Brenda Bushell and Masayuki Goto
Faculty of Environmental and Information Studies,
Musashi Institute of Technology
Yokohama, Japan

The establishment of the Decade of Education for Sustainable Development (2005-2015) highlights the role of education as a tool in achieving sustainability. The Decade aims to promote education as the basis for sustainable human society, and to strengthen international cooperation toward the development of innovative programs and practices of education for sustainable development. (Pigozzi, 2003, p.1). Already in developed countries, governments and businesses are partnering to develop goals, policies and action plans for sustainable development on which educators can base educational content. However in many developing countries, no such system exists. Thresholds for basic education are low and economies are often limited to resource extraction, hindering development options and plans for a sustainable future. Such is the case of Nepal, one of the least developed countries in the world.

Based on the concept of organizational capacity-building, this paper reports on the process and outcomes of an environmental project that dovetails communities and educational systems in Nepal with the aim of developing a model of education for sustainable development. Conducted jointly by university professors

and students from Japan and Nepal, the project involves fieldwork related to the management of urban waste in the capital Kathmandu.

The paper will begin by positioning Nepal in terms of the cross-sector issues and challenges impeding sustainability. Then, through discussion of findings from data gathered through questionnaires, it will illustrate the process of capacity-building and the mobilization of social capital as a way to leverage sustainable development. The paper will conclude with achievements, implications and limitations of this ongoing project, and make suggestions for others interested in similar partnerships that underpin the development of education for sustainable development.

Advocating a New Anti-Nuisance Law for Undeveloped Lands

Terence J. Centner
The University of Georgia
Athens, Georgia 30602

Objectionable activities being conducted in rural areas may lead to nuisance lawsuits to stop them. The cessation of activities on these undeveloped lands is sometimes detrimental to the continued economic viability of agricultural pursuits. As a result, some of our nation's lands are unnecessarily being lost to development. Because positive attributes of undeveloped areas are undervalued, we might lend support to owners of these lands in the form of a more forceful defense against nuisance lawsuits. Drawing upon a civic-societal economy, a new anti-nuisance paradigm is proposed. The anti-nuisance paradigm is intended to lead to greater protection for farmlands and natural resources.

Unsightly Algal Blooms in Tumon Bay, Guam's Premier Tourist Location: Possible Connection to Hotel Landscaping Activities

Gary R.W. Denton
Water & Environmental Research Institute
University of Guam
Mangilao, Guam

Carmen Sian-Denton
Guam Waterworks Authority
P.O. Box 3010
Hågatña, Guam

Reactive P levels approaching 500 µg/l were detected in surface runoff from the gardens of one of Guam's leading hotels. The runoff coursed its way into a nearby retention pond located on a peninsula separating Tumon Bay from Agana Bay, on the northwest side of the island. Emergent groundwater seeps and springs in Agana Bay (9 intertidal sites, mostly 50-100 m apart) yielded reactive P concentrations ranging from 12.7-30.6 µg/l with the highest level occurring closest to the hotel, at the northern end of the bay. Tumon Bay is considerably more commercialized than Agana Bay and is bordered by a number of first-class hotels. Many of the hotels have beautifully landscaped gardens that require constant care and attention and receive regular applications of chemical fertilizers. Levels of reactive P in groundwater intruding into Tumon Bay ranged from 1.3-31.9 µg/l (70 intertidal sites, ~100 m apart). Intertidal blooms of the filamentous green alga, *Enteromorpha clathrata,* while commonplace in Agana Bay, are especially prolific in Tumon Bay. Hoteliers, who view the alga as unsightly and a very real threat to tourism, spend some considerable time and money removing it from the beach on a daily basis. The blooms of *E. clathrata* have

long been associated with high nitrate levels naturally present in Guam's groundwater (2-3 mg/l as nitrate-N). Anecdotal evidence, linking increased algal abundance with commercial development in Tumon Bay, suggests other factors may also be important. An increase in the ambient availability of P as a result of hotel landscaping activities is considered here, and discussed in light of reactive P levels found in groundwater from production wells located inland of Tumon Bay hotels.

The Role of Environmental Justice in Developing New Chemical Policy

Michael J. DiBartolomeis
Occupational Health Branch
California Department of Health Services
Richmond, California 94804

The term "environmental justice" describes both a grassroots social movement as well as a particular set of public and environmental health policy issues. Environmental justice means that all persons, regardless of race or social status, have the right to a clean and healthy environment in which to live, work, and play. However, in the past 25 years studies indicate that, to various degrees, persons of color and low income are frequently and disproportionately subject to multiple hazards and inadequate enforcement of environmental and occupational health laws. Advocates cite several guiding principles for incorporating environmental justice into environmental decision-making, including: public participation is inviolate, the public has the "right-to-know," subpopulations bearing disproportionate risk must be emphasized, cumulative impacts should drive risk assessment, and the use of preventive and precautionary approaches is preferred. One major obstacle to achieving environmental justice is that the regulation and control of chemical manufacturing, use, and release in the U.S. is based upon legislation passed into law 30 or more years ago. Although amendments have been incorporated through the years, these are merely minor adjustments applied to address specific inadequacies as they arise. The Environmental Protection Agency estimates that there are over 100,000 chemicals in commercial use of which approximately 75,000 are inventoried. For over 66,000 of these (88 percent), we know very little about the toxicology and environmental fate. This gap in knowledge has prompted international dialogue in recent years examining existing environmental decision-making frameworks and proposing changes in chemical regulation policy. This paper examines how initiatives based on the principles of environmental justice, such as California's right-to-know law "Proposition 65" have influenced environmental decision-making to date and identifies additional measures necessary to achieve the goals of the movement in the development of new chemical policies.

Pesticide Regulation: Thinking Outside the Box

Michael J. DiBartolomeis
Richmond, California 94804

Chemical pesticides are designed and manufactured with the explicit goal of killing insects, small mammals, plants, and fungi. Unfortunately, most if not all chemical pesticides can cause harm not only to the targeted "pests," but also non-target species, including people. As a class, pesticides are arguably the best studied and most heavily regulated chemicals in the United States. The Federal Fungicide, Insecticide, and Rodenticide Act (FIFRA) requires the Environmental Protection Agency to review health effects information submitted on each pesticide and regulate them accordingly. In addition, some states such as California have passed laws requiring parallel review and regulation -- and often go further in implementing environmental and worker health protective standards than the federal government. How effective is this system of checks and balances and are there alternative actions that can be taken to better protect public health and environment from chemical pesticides? To illustrate the scientific and policy gaps in the current regulatory scheme, we will review the registration and use history of fumigants such as

methyl bromide, methylisothiocyanate, and 1,3-dichlorpropene, which are some of the most toxic chemicals available for controlling pest infestations. The use of voluntary human subjects studies to support pesticide registration will also be discussed in an ethical context. In the near term, the best way to stimulate agriculture and protect the environment is to implement sustainable methods of integrated pest management, including the development of safer alternatives to chemical pesticides, that significantly reduce the release of toxic substances into the environment. Promoting and establishing collaboration, partnerships, and public involvement are key to developing innovative short- and long-term "win-win" solutions to pest management practices that not only result in the preservation of public health and the environment, but enhance the quality of life for farmers and society as a whole.

Introduction To GIS Applications in Environmental and Social Sciences Research: Lecture, Demonstration, Discussion & Illustrative Posters

Barnali Dixon
Geospatial Analytics Lab
Environmental Science, Policy & Geography
University of South Florida
St. Petersburg, Florida 33701

The immense complexity of data becoming widely available has left researchers with a formidable task in determining several things: 1) what data to use, 2) how to use it and 3) how to most accurately and powerfully display it to the public and stakeholders to accurately communicate results. A Geographic Information System (GIS) is a way to analyze many types of information and display results spatially. This resource provides endless use to any science that deals with spatially heterogeneous data. Relevance can be found in fields from criminology to marketing to environmental science. More and more people are seeing the results of some level of GIS in their daily lives and it is important to introduce what this technology can do for different fields of study.

This session will be made up of a beginning lecture on the background and basics of GIS, followed by a demonstration of various applications of GIS using appropriate data across multiple disciplines. Next, there will be an open discussion period for attendees to pose questions regarding how GIS may be able to work for them or other topics of their interest. Lastly there will be multiple posters of varying topics of research the Geo-Spatial Analytics Lab at the University of South Florida St. Petersburg has performed to display just some of the opportunities for application offered by GIS.

Using GIS to Investigate Relationships of Landuse, Population Growth, Soils and FAVA Data to Water Quality in the SWFWMD, West-Central Florida, USA

Barnali Dixon
Julie Earls
Geospatial Analytics Lab
Environmental Science, Policy & Geography
University of South Florida
St. Petersburg, FL 33701

There are many pressures on water resources. Industrial, agricultural and urban development over the years has impacted water quality in the state of Florida unfavorably. Deterioration of groundwater quality, a major resource for fresh water, is a major concern for long-term sustainable growth and, therefore, the state's economy. The study area, Southwest Florida Water Management District (SWFWMD) of Florida contains one of the nation's fastest growing metropolitan areas. Although landuse changes as a result of population growth is inevitable, we can still try to understand the relationship among landuse change,

population growth and environmental dynamics. The objectives of this study were: to explore if there is a spatial relationship exists among NO_3 and Bromacil contamination and critical physical/environmental variables and 2) to create a dataset that will be the basis for future study. This study chose to use NO_3 as an overall assessment of urban impact (whether through agriculture or fertilizer/pesticides for lawn maintenance, etc) and further, used Bromacil as an indicator of pesticide movement through the soil to groundwater, as transport pathways are assumed to be different from that of NO_3. This was accomplished by studying landuse (1988 and 1999), population (1990s and 2000s), soils, groundwater quality data (1990 and 2000) and Floridan Aquifer Vulnerability Assessment (FAVA). Preliminary results show that contaminated wells were associated with urban and agricultural landuse and sandy soils with high permeability. Preliminary results show that contaminated wells were associated with urban and agricultural landuse and sandy soils with high permeability. No significant relationship between population and groundwater quality exists for NO_3 and Bromacil contaminated wells. Further, no significant relationships were found between FAVA and actual well contamination.

A Comparison of Techniques for Preserving Farmland and Forestland

Theodore A. Feitshans
Extension Specialist
Department of Agricultural and Resource Economics
North Carolina State University
Raleigh, North Carolina 27695

Techniques for preserving farmland and forestland may be classified as restrictions on alternative uses, measures to reduce the cost structure of agriculture and forestry, measures to enhance income from agriculture and forestry, and systematic programs to preserve infrastructure critical to agriculture and forestry. This paper compares measures in each of these categories and demonstrates that no government whose voters have directed it to protect agriculture and forestry can afford to ignore techniques available under any of these categories. Restrictions on alternative land uses include zoning, conservation easements, and urban growth boundaries. Measures to reduce the cost structure of agriculture and forestry include preferential tax treatment and cost-share for adoption of conserving production practices. Measures to enhance income include direct income support, supply restrictions, and a wide variety of marketing and business assistance. Systematic programs include a variety of agricultural district programs and planning measures.

In this paper selected measures are compared in terms of the strengths and weaknesses of each. The discussion, in this paper, illustrates that successful programs to preserve farmland and forestland include a variety of techniques. Use of a variety of techniques allows the strengths of one technique to offset the weaknesses of another technique. Use of a combination of techniques allows for flexible programs that make agriculture and forestry profitable. Profitability is essential to providing the incentives to private landowners that are necessary to maintain land in agricultural and forest uses. As markets for agricultural and forest products become increasingly global and competitive, finding a mix of techniques that allow landowners to respond to these pressures is one of the greatest challenges facing programs designed to preserve farmland and forestland.

The Critical Margin: Population and Development on the Coastal Margin - Impacts and Alternatives

Eric J. Fitch
Marietta College
Marietta, OH 45750

Human population impacts are not spread evenly across the landscape. Globally, ~37% of the human population lives within 100 kilometers (~62 miles) of a coast or shore; over half of the world's population lives within 200 kilometers. Average population density on the coast is double that of the much larger interior, and taking into account the vast stretches of uninhabited arctic and antarctic coasts realized population density is many multiples of that in much of the world. Both overall population growth and migration are accelerating the process to the point that the 3 billion people that live in proximity to the coast could double to 6 billion in less than 25 years. The impacts on coasts and coastal ecosystems are generally negative with degradation of biological systems, increases in levels of pollution and shoreline loss, and reduction in the level of food production in the coastal zone and near shore seas but a few of the more visible losses. Despite the obvious consequences, relatively little is being done to manage these impacts. Coastal Zone and Integrated Coastal Management, where they have been tried, have had some effect, but it may be too little, too late. As climate change alters both coastal weather patterns and perhaps even ocean currents, greater and greater numbers of people are putting themselves in harms way. This paper will examine some of the larger trends in coastal population dynamics, demonstrated and potential impacts on coastal resources and what can and should be done in the medium and long term to protect both human lives and property and the fragile coasts themselves. Special attention will be paid to the experience of the American Gulf Coast in the aftermath of Hurricanes Katrina and Rita.

New Heavens and New Earth: Debating Values in Public Forum and Christian Responses to the Environmental Issues

Eric J. Fitch
Marietta College
Marietta, OH 45750

Demonization of Environmentalism by conservative critics, both secular and religious, has been an aspect of the "values" strategy of American politics over the last thirty years. Whereas at one time Conservation, Preservation and Environmentalism were considered bi-partisan issues, in more recent times a wedge has been successfully driven between many Conservatives and the Environmental movement. This schism did not occur accidentally but as part of a deliberate strategy pushed by a coalition of political, social and religious Conservatives. This paper explores what caused many Americans to move away from voting Green and supporting Green policies on religious grounds and how Progressive Christians are responding to this social and political phenomenon.

Competing Paradigms of Disciplinarity: Implications for Environmental Curriculum Design

Will Focht
Director, Environmental Institute
Oklahoma State University
Stillwater, Oklahoma 74078

The Council of Environmental Deans and Directors (CEDD) commissioned a study of its members' views on environmental program curricula in higher education. Using Q methodology, three perspectives are identified. Relying on a Stonehenge metaphor, these perspectives are labeled "monolithic" (preference for a common core curriculum anchored in the natural sciences), "columnar" (preference for curricula anchored in a single discipline but the choice of discipline can vary from one institution to another and from one individual to another), and "spanning" (preference for cross-disciplinary curricula that focus on systems). All three perspectives converge on a desire to concentrate environmental curricula on the

interface between humans and nature. The study demonstrates that consensus does not exist on the definition of core competencies that should be included in a curriculum. More fundamentally, the study finds that consensus does not exist on the meanings of terms such as interdisciplinary. The lack of agreement on terminology hinders communication, which hampers attempts to forge consensus on environmental program curricula. The concomitant lack of shared identity threatens field coherence, increases vulnerability to challenges from those in traditional disciplines, creates confusion among students and employers, and undermines professional credibility.

The paper begins with a brief review of the results of the CEDD study and argues that the lack of consensus on core competencies stems from two major areas of disagreement: disciplinary depth versus breadth and confusion about disciplinary terminology. Next, the paper offers prescriptions for the definitions of disciplinary constructions such as unidisciplinary, multidisciplinary, interdisciplinary, transdisciplinary, and metadisciplinary. The paper concludes with an approach to environmental curriculum design that transcends traditional arguments over breadth versus depth by envisioning curricular design as a three-dimensional construct.

Indoor Radon in Rural Dwellings of the South-Pannonian Region

S. Forkapić, I. Bikit, D. Mrđa, J. Slivka, M. Vesković, N. Todorović
Department of Physics
University of Novi Sad
Novi Sad, Serbia and Montenegro,

E. Hulber
Radosys Co., Ltd.
Vegyész u. 17-25. H-1116
Budapest, Hungary

The results of indoor radon survey in a typical South Pannonian Province Vojvodina (Serbia and Montenegro) are presented. The sampling strategy was oriented towards suburban and urban regions in the Province. For the dwellings typical for such regions the mean annual radon activity concentration of 101 Bq/m^3 is measured (1000 measurements). This result leads to the annual dose estimate of 5.7 mSv/year which is above the recommended action limit of ICRP. For urban dwellings in Novi Sad (Province capital) the annual mean value of 54 Bq/m^3 (220 measurements) is obtained. By comparison of these two results it is concluded that radon surveys based on measurements in urban environment may seriously underestimate the radon related health risk. The elevated radon levels could not be explained by elevated uranium levels of surface soil.

Land, Value and the Endangered Species Act

L. Leon Geyer
Department of Agricultural and Applied Economics
Virginia Tech
Blacksburg, VA, USA

Exempting isolated wetlands from Clean Water Act may remove habit for 250 species. Five percent of all these listed species are at risk because of the Supreme Court interpretation of Clean Water Act. This paper will explore alternative ways to encourage private preservation of isolated wetlands as habitats for endangered and other species. Coupled with exurban development and the reduction in land because of such development, the paper will explore ways to use economics and institutions to encourage the

maintenance and expansion of sites for endangered and other aquatic life, both plants and animals. Development puts permanent restrictions on species habitat. Timber, livestock, and crop agriculture often provide periods and cycles of recovery.

The Army Corps of Engineers and the Environmental Protection Agency have abandoned an effort to develop a rule that would clarify which wetlands they regulate, instead, leaving the definition up to regional corps offices and the courts. Two new cases on point are expected to be heard by the Supreme Court this year. The resolution and impact of the cases will be reviewed. The paper will outline local, state and federal action that could remove the issue from the courts and preserve intra state wetlands for their environmental use. Tax tools, land use, purchase and rent options will be reviewed.

Wind Farms: Windfall or Wipeout?

L. Leon Geyer and Jesse J. Richardson, Jr.
Department of Agricultural and Applied Economics
Virginia Tech
Blacksburg, VA, USA

Humans have relied on wind-generated power for hundreds of years. However, the bucolic visions of traditional windmills have been replaced by large commercial wind turbines. Although wind energy avoids much of the environmental damage caused by traditional fossil fuels, questions remain. Opponents allege that wind turbines pose a threat to wildlife, including bats and migratory birds. Neighbors fear that wind farms will reduce property values. Perhaps most importantly, nearby landowners dread the impact of wind farms on their viewsheds.

Highly contentious disputes have erupted across the world, from Highland County, Virginia to Oorton, England, over the location of windmills to generate electricity. Although divergent in cultures and geography, the themes remain the same.

This paper examines the benefits offered and problems posed by commercial wind farms. In addition to exploring the costs and benefits, the paper examines whether wind farms can help farmers stay on the land by providing much needed profits. The problematic issue of subsidies to wind farms is also analyzed. The approach to wind farms in the United States is compared and contrasted with the treatment in other countries. The paper concludes that the complaints against wind farms are largely unfounded and that the real issue centers on aesthetics. However, the question of whether wind-generated energy can be produced efficiently and profitably without government subsidy remains a troublesome issue.

Multidisciplinary Lenses on Nature

Susan Gill, Barbara Riebling, Janet Theophano
Earth and Environmental Science
University of Pennsylvania
Philadelphia, Pennsylvania 19104

What is a tree, a mountain, a river? They are all recognized elements of the natural environment, but, do we all share the same visions of them? Each person views nature through a unique lens formed by education, personal experience, and culture. In fact, this diversity of viewpoint is played out repeatedly as we debate many of the major issues of our time. Are the tropical rain forests the lungs of the planet, necessary for its health, or are they jungles, hearts of darkness, to be dominated and tamed? Are mountains sacred spaces to be left untouched, or are they valuable repositories of mineral resources to be recovered for our use? Is the Arctic National Wildlife Refuge the last vestige of a unique ecosystem overlying an

insignificant amount of oil, or a frozen wasteland underlain by sufficient reserves of fossil fuels to promote our national energy independence? Are these genuine dichotomies, or simply reductionist statements that conceal some fundamental, shared values?

The underlying assumptions that produce these conflicts over the natural world are sometimes difficult to identify, and harder still to trace to their origins. Most of us are unaware of how our own views developed, let alone those of others with whom we disagree. The social sciences and humanities have methods that can assist us to investigate and appreciate these multiple perspectives. As environmental researchers, educators and students, it is useful to understand both the existence and origins of these different lenses, as they often affect, and can also inform, our work. Dueling viewpoints frequently influence public policy debates in unpredictable ways, as debate deteriorates into polarization, and polarization encourages demagoguery.

Many authors have addressed the multifaceted nature of environmental perception from a cultural-studies perspective. However, the scientific community has been largely mute on this issue. It is now time for scientists to enter the conversation. What is needed is a truly multi-disciplinary discussion that, while not privileging one discipline over another, reflects the most rigorous science available, as well as the most current views from the humanities and social sciences.

Building the Institutional Capacity for Trade and the Environment

Takashi Hattori
Consulting Fellow
Research Institute of Economy, Trade and Industry
Singapore

For the past decades, trade and the environment has been identified as the inter-sectional policy area which needs to find a better understanding among various stakeholders both from developed and developing countries, both from trade experts and environmentalists. In the 1990s, globalization with freer trade and capital flows fueled the debate but did not get much progress of how to treat the issue in such circumstances.

Institutions to deal with trade and the environment have been developed over the decades. However, capacity of international organizations and international treaties to handle the issue has limited.

WTO/GATT has been the core institution for establishing the rule-making for trade and the environment. However, DDA has not succeeded in getting consensus on further developing the rules on the issue. NAFTA was the locus of the early debate. And some of recent FTAs also include the clause related to trade and the environment.

UN, including UNEP and CSD, has also attempted to get a wider understanding of the issue. Although it is reiterated that trade and the environment are mutually supportive, the concept has not got further development in implementation of particular policies. Enhancing synergies between MEAs and WTO has not fully materialized.

International organizations have their strength and weakness in dealing with the issue, based on their organizational goals, structures, and decision-making procedures. This paper examines how such characteristics of international organizations hurt chances to advance for solving the divide. And it considers how to increase institutional capacity of international organizations regarding the issue.

Obesity Litigation: The Skinny on the Fat

Janie Simms Hipp
University of Arkansas
Fayetteville, Arkansas USA

A comprehensive discussion regarding pending and settled court cases involving obesity litigation and the growing public awareness of obesity as a major health issue, both in terms of its cost to society and its cost to the individual. The paper will focus on the claims presented in filed and threatened lawsuits and the claims presented in various public forums. The paper will specifically frame the legal arguments and the science involved in obesity related litigation and will offer observations concerning this new wave of policy by litigation. Examination of how these issues are transforming in international legal settings will also be offered.

Estimating the Effectiveness of Water Conservation Materials in the Absence of Volumetric Water Pricing

Eric Houk
Department of Economics
California State University, Stanislaus
Turlock, California 95382

Water shortages and the conflict between residential and environmental water users are increasing as the world's population continues to grow. California's rapid population growth is estimated to result in water shortages of around 2.4 to 6.2 million acre-feet annually by the year 2020. Although numerous endangered species in California are already being threatened by inadequate water supplies, many of the public utility systems are not providing their residents with any incentives for conserving water. That is, they are not using water meters to measure and charge households according to the volume of water that they use. Instead, they are simply charging a flat fee for their water service. This type of non-volumetric water pricing system provides no financial incentive for water conservation. As a result, household water use is typically much higher in the absence of volumetric water pricing. Several studies have estimated the effectiveness of water metering as a method to reduce water usage by households. However, opponents to water metering argue that it is not fair to manage water demand by pricing water in a way that might make it too expensive for some households to afford. Opponents also site how the substantial cost associated with the installation and maintenance of water meters may preclude it from being a cost-effective alternative. In areas where the decision has been made to forgo water meters, alternative approaches for promoting water conservation must be evaluated. This paper evaluates the effectiveness of distributing several water conservation materials to households within a city that is currently charging a flat fee for water. The results of the study will help public utility managers improve their water conservation efforts and allow them to have a better understanding of how water meters may play a role in their water conservation efforts.

The Economics of Water Transfers for Endangered Species: An Interdisciplinary Approach

Eric Houk
Department of Economics
California State University, Stanislaus
Turlock, California 95382

As water supplies become inadequate to meet all of the demands, the conflicts between different water users increase. Although population growth has been responsible for many of these conflicts, water shortages associated with endangered species habitat may be having the greatest impact upon current water users. All of the major river basins in the world are faced with the challenges of integrating the water requirements of plant and animal species into their current water allocation schemes. The allocation of water within the U.S. has been developed under a system of water rights. In the western U.S. this system is dominated by the Prior Appropriation Doctrine, which allocates water according to the initial date of water use. This system of granting priority based upon the date of water use instead of the value of the water use is unlikely to have resulted in an initial allocation that achieves economic efficiency. That is, society could benefit if water was reallocated from existing low valued uses to potentially higher valued uses. Although the Prior Appropriation Doctrine allows for voluntary water transfers to occur, the intricacy of these transfers and the incentives associated with them may obstruct the flow of water between uses. Specifically, it is unlikely that the current system will provide an adequate supply of water for threatened and endangered species. This paper examines the economics of how water transfers from lower valued uses to instream flows for protecting endangered species can benefit society. The paper focuses upon the need for this analysis to be interdisciplinary in nature in order to appropriately address the biology, hydrology, and economic aspects of the potential water transfer scenarios.

Agricultural Plant-based Agro Industries

A. Jagadeesh
Nayudamma Centre for Development Alternatives
Nawabpet, Nellore 524 002,
Andhra Pradesh, India

Past experience has clearly shown that rural industrialization is not setting up large industries in rural areas. We are also fed up with the opiate that rural development is synonymous with agricultural development. True, rural people live on land and agricultural development is a must. But it is not enough. Agriculture should have a nexus with industry. In food crops, the proportion of agricultural residues to the food obtained for human consumption is approximately 1.5 to 1 for roots and tubers; 2 to 1 for cereal grains; 6 to 1 for oil seeds and 10 to 1 for sugar crops.

Leaf to root concept

Every part of the agricultural plant must become a raw material for industries. For example, several industries may be set up around paddy plant. Straw may be used for making card boards, wrapping paper, roof thatch; bed for mushrooms, apart from animal fodder. Paddy husk may be used as fuel and the resultant ash for producing sodium silicate, solar grade silica, silica sol, ceramic materials and refractories and cement like products. It can also be used for making particle boards, activated carbon, furfural, fillers and extenders, fire resistant compositions. Paddy husk is used by brick manufacture, for mulching, soil reclamation and as filler in fertilizer industry and animal feed. Rice bran is extracted for oil for edible and non-edible purposes like soaps, detergents, paints etc. The deoiled rice bran contains 20 – 22% protein and used as animal fodder. Rice as such is used for food and several food products for use in beer, wine and several starch – based industries. Similarly 25 industries could be started around sugar cane; 7 to 12 industries around cotton and groundnut etc.

Several products can be made from Annona Squamosa (Sugar Apple), Agave (Americana), Water Hyacinth. Various byproducts from the plants and their industrial uses discussed in the paper.

Environmental Stressors and Cancer in Delaware

Viniece Jennings and Michael Reiter
Department of Agriculture and Natural Resources
Delaware State University
Dover, Delaware 19901-2277

A 2004 study by the Delaware Department of Public Health noted a high incidence and mortality rate for cancer in the state. The major types of cancer that were indicated in the study (lung, colon, and breast cancers) may be correlated to particular pollutants from agricultural and industrial sources. Considerable attention has been focused on sources such as pesticide use, Superfund sites and air quality. Since these sources are not necessarily uniformly distributed in the state, I attempted to determine if there is a relationship between the number of known industrial and agricultural sources of carcinogenic pollutants in Delaware by county and the incidence and mortality rates for the associated cancers. Using EPA records, I located the sources of pollutants in Kent, Sussex, and New Castle counties associated with the three most common types of cancer in Delaware and attempted to determine if the incidence is correlated with the number and/or production capacity of the pollutant sources in the county. Thus far, strong correlations have been observed between the number of Superfund sites and the incidence and mortality rates of breast and prostrate cancer. While an inconclusive relationship was found with colorectal cancer, no relationship was indicated with lung cancer. A potential reason for these results could be the mechanism of contamination from Superfund sites (via soil and water mediums) that are not well suited for distributing causative agents for lung cancer. This analysis will be used to perform the initial assessment of health disparities and the welfare of communities of concern regarding environmental justice and equity.

From Fragmentation to Integration: Water Management Reform in China

Min Jiang
Centre of Environmental Law
Macquarie University
Sydney, Australia

Although China has a large water resource endowment on an absolute level, ranking in the top five in total water resources among the countries in the world, it experiences the severe water shortage compounded by water pollution due to its large number of population and the rapid economic growth. The water crisis of China has become a key constraint to the sustainable economic and social development so that China cannot afford to mismanage its extremely limited water resources any longer. However, its current water management system works less competently. In this system, water and groundwater, water quality and water quantity, urban water and rural water, water supply and drainage, all of these water-related responsibilities are separately shared by different governmental agencies. Furthermore, because the river basin organizations are fairly weak in regulating force, China's inter-provincial rivers and lakes tend to be managed by administrative units in those basins. This management pattern fails to protect already stressed water resources from further degradation; rather, it contributes to making the situation worse by its fragmentation and ineffective coordination among multiple departments and provinces. Therefore, integrating this present system at state, basin and local levels is given a priority on the agenda of China's water policy reform. This paper begins with a review of institutional arrangements of China's water management, in which both legal framework and administrative institutions concerning water resources issues will be examined. Then the paper analyzes the conflicts among the different water-related authorities derived from fragmentation, followed by a discussion of current obstacles to integration in the context of ongoing reform. At last, based on the previous analysis, the paper explores how to overcome these obstacles and implement the more holistic and integrated water management in China.

Functional Foods and Health: Opportunities for Agriculture

Mary Ann Johnson
University of Georgia
Athens, GA, USA

An Expert Panel from the Institute of Food Technologists defines functional foods as foods and food components that provide a health benefit beyond basic nutrition. Conventional foods; fortified, enriched or enhanced foods; and dietary supplements are included. They provide essential nutrients often beyond the quantities necessary for health and/or may provide other biologically active components with beneficial health or physiological effects. Dietary supplements are included in the definition because they can be a delivery vehicle for bioactive components. The regulatory distinctions among conventional foods, dietary supplements and drugs in the United States pose marketing challenges for foods with health benefits, such as whole grains foods that can lower blood cholesterol and help control blood sugar. The demand for such products with proven health benefits will continue to grow with the aging of world population and the shifting health care paradigm toward a greater emphasis on personal responsibility for health, healthy eating, physical activity, and self-management of chronic conditions. Consumers along the continuum of disease, from health maintenance to disease treatment, can benefit from functional foods. Chronic disorders that are prevalent and costly, such as diabetes, heart disease, cancer, osteoporosis and osteoarthritis, will create demands for foods and dietary supplements with health benefits. However, the marketing of the health benefits of such foods must be truthful and not misleading. With continued research, functional foods can become an important part of health maintenance and management of many chronic conditions, which will improve health and quality of life.

Restoring Tropical Moist Forest in Northwestern Costa Rica

Alan Journet
Department of Biology and Environmental Science Program

Kathleen Conway
Department of Elementary, Early and Special Education

Southeast Missouri State University
Cape Girardeau, Missouri 63701

Throughout Central America, the tropical moist forest life zone has suffered extensive to deforestation since the 1950s. Typical of the entire region, the private preserve Los Inocentes Lodge (http://www.losinocenteslodge.com/) located in northwestern Costa Rica was converted from forest to pasture in the 1950s and 1960s. Within the last decade, management has converted the ranch from cattle to a tourist lodge. Concurrently, there has been an interest in promoting the recovery of the abandoned cattle pastures to a composition reflecting what was present prior to deforestation.

We will discuss a project that we have been undertaking at Los Inocentes designed to promote forest recovery that involves the plantation of figs (*Ficus* spp.) of local origin which, we hypothesize, will serve s recruitment foci enhancing the return to the pasture of species typical of the tropical moist forest.

Comparative Assessment of the Effect of Water Soluble Fractions of Fuel Oils on Microalgae

M. O. Kadiri and M. Enoma
Department of Botany
University of Benin

Benin City Nigeria 300001

A laboratory study of the effect of water soluble fractions (WSF) of petroleum products (diesel, kerosene and petrol), on two test microalgae – *Selenastrum capricornutum* and *Eudorina elegans* was conducted in the laboratory for 14 days using various concentrations of 0%, 5, 10%, 15% and 20%. The growth response was measured spectrophotometrically using optical density at 680nm. The study revealed that growth at the various concentrations were generally comparable to control and were more or less stimulative especially in diesel and kerosene with minimal inhibition observed in *Eudorina elegans*. There was growth stimulation of *Selenastrum capricornutum* in all the three fuel oils whereas *Eudorina elegans* was stimulated only in kerosene

Economic Impacts of Coqui Frogs in Hawaii

Brooks Kaiser
Department of Economics
Gettysburg College
Gettysburg, Pennsylvania 17325

Kimberly Burnett
Department of Economics
University of Hawaii at Manoa
Honolulu, Hawaii 96822

Coqui frogs (*Eleutherodactylus coqui*) were accidentally introduced to the island of Hawaii or Maui through the movement of plant material from the Caribbean or Florida in the late 1980s, and have since expanded to four islands. The male frogs are notorious for their loud mating call that resonates through the evening hours in many locations, resulting in complaints to state and federal authorities. Without significant predation, the species is attaining densities well beyond its native range. Recently, public complaints have reached such a level that public and private entities hypothesize that properties located near or around coqui populations are experiencing a decline in value, as people wish to distance themselves from the calls. In this paper, we examine this hypothesis through a hedonic pricing model, and quantify the decline in property values on the island of Hawaii as a function of economic and environmental variables.

Biomonitoring Traffic Pollution in Chandigarh using Moss Bag Technique

S. Kapila and T.Aggarwal
Department of Botany
Panjab University
Chandigarh, India

Since the mosses have unique ability to accumulate elements from the atmosphere, the Moss bag technique has been presently employed to assess Lead pollution caused by fast increasing vehicular traffic in Chandigarh, the city beautiful. Two pleurocarpic, ectohydric mosses Entodon concinnus and Herpetineuron toccoae were collected from Kasauli(Western Himalaya).Two gms of cleaned, acid treated moss was filled in $10cm^2$ bags of nylon mesh. The moss bags were hanged at seven sites in different sectors of the city for exposure to atmosphere. At fortnightly intervals (for two months), the moss bags were removed from each site and the moss analysed for Lead content by Atomic Absorption Spectrophotometer after acid digestion in HNO_3+70%$HClO_4$; 3:1.Statistically, Lead accumulation by the moss bags was found to be significant for

different sites as well as for different number of exposure days ($p<0.001$ to $p<0.05$). Both the studied mosses proved to be remarkably efficient in absorption of Lead from air,though E.concinnus (max.50.3ppm) was a better accumulator than H.toccoae (max.34.4ppm).

Moss bags at SiteVI in Industrial Area-I showed maximum Lead accumulation due to a Paint factory near it, heavy vehicular traffic on the road connecting Chandigarh and satellite town Panchkula as well as emissions from other Industrial Units. SiteVII falling in VIP area, with least vehicular traffic showed least accumulation of Lead by both the mosses (33.2ppm and 20.4ppm respectively), but still significantly removed from the atmosphere by these plants. Similarly, other studied sites exhibited different levels of pollution as indicated by variable Lead uptake by both the mosses. Thus, mosses can very well be used as pollution monitors practically. Topiaries of mosses decoratively installed at pollution sites, Round about (traffic points) so designed to have favourable niche for moss growth and the moss sticks used for potted climbers can check air pollution in a cheap and eco-friendly way.

Sustainable Intensive Agriculture: High Technology and Environmental Benefits

Drew L. Kershen
Earl Sneed Centennial Professor of Law
University of Oklahoma College of Law
Norman, Oklahoma 73019

In the coming decades, agriculture faces two significant challenges. Agriculture must increase productivity to insure food security for the world. Human population, presently six billion, will increase to about nine billion by 2050. Agriculture must produce sufficient food for people. But as agriculture increases production, agriculture should also set an even more humane goal -- ending chronic malnutrition and hunger. Second, as agriculture increases productivity for food security, agriculture must also reduce its environmental impact. Agriculture must increase its productivity per land unit to protect the forests, waters, and biodiversity of the earth. Without increased productivity per land unit, human beings are likely to plow under these resources in the quest for food security. Moreover, while agriculture increases its productivity per land unit, agriculture must do so in a manner that reduces pollution – erosion, pesticides, fertilizers – into the surrounding environment.

While these two challenges – food security and environmental impact – present substantial difficulties individually and together, sustainable intensive agriculture offers hope regarding both. Sustainable intensive agriculture can meet these two challenges by developing and using high technology for increased productivity while protecting the environment.

This presentation will discuss high technologies that qualify as sustainable intensive agriculture. These high technologies arise from modern biology and modern plant breeding utilizing both conventional and transgenic techniques. Specifically, this presentation will focus on two developments:

• Low-phytate grains for animal feeds controlling excess phosphorous in animal wastes while simultaneously increasing animal health and gain for monogastric animals (fish, poultry, and swine);

• Transgenic crops (herbicide-tolerant and insect-resistant crops) compatible with no-till agriculture controlling erosion and pesticide runoff without a reduction in crop yield.

Belief Revision: Empirical Data, Theoretical Models, and Implications for Communicating with the Public about Environmental Issues

Mai Kuha
Department of English

Ball State University
Muncie, Indiana 47306

In her keynote presentation at this conference, Susan Baker makes the case for communicating with the public in an accessible way about environmental issues. Clearly, this is crucial: if environmental scientists do not make themselves understood, how can information lead to action?

However, every day we meet people who do understand at least some environmental problems, yet do not change their world view and behavior. Fairly well-informed people can live unsustainably. Often, the first explanation that occurs to us for this illogical behavior is that people are lazy and selfish. If this is indeed the reason, it follows that the most effective way to communicate about environmental problems may involve inducing intense fear about imminent disaster. But what if laziness and selfishness do not fully explain why people fail to take environmental warnings on board? In that case, frightening the public may backfire.

This paper synthesizes data and models from several disciplines about how individuals in their social contexts consider new information and decide whether to adopt a new belief. These explanations lead to ideas that we should investigate further about how to approach effective communication.

Ochsner and Lieberman (2001) provide an overview of the emerging field of social cognitive neuroscience. Empirical research in experimental psychology informs us about specific factors that shape how an individual resolves a conflict between pieces of information (Politzer and Carles 2001, among others). Social network theory describes the relationship between innovation diffusion and individuals' roles in their networks (Durrington et al. 2000, among others). Cognitive dissonance theory (Lieberman et al. 2001, among others) and ecopsychology (Macy 1995) suggest deeper reasons for belief perseverance that are particularly relevant to environmental issues.

Solar Photocatalytic Degradation of Carbaryl Rinsate Assisted by Dye Photosensitizer

W. S. Kuo and Y. H. Chiang
Department of Safety, Health, and Environmental Engineering
National United University
Miao-Li, Taiwan 360

The widespread use of pesticide throughout the agricultural industry has resulted in mixed impacts. On one hand, utilization of pesticide produces an enormous increase in agricultural productivity. On the other hand, because of their hazardous nature, the waste and rinsate from spray and storage equipment have been considered as one of the major threats to the environment. Their occurrence has given rise to a challenging natural resources management problem and, at the same time, has provided a source of motivation for many scientific initiatives. In this study, carbaryl (a carbamate insecticide) rinsate was treated by a novel technology - dye photosensitizer (methylene blue (MB) or rose Bengal (RB)) assisted solar photocatalysis. The major advantage of this technology is to employ effectively natural solar light instead of artificial lamps as irradiation source, leading to a considerable decrease in operation cost. Results showed that an increased mineralization and toxicity reduction efficiency for carbaryl rinsate was achieved by adding dye into solar photocatalytic system. Among the conditions studied, adding 1×10^{-6} M of MB, which corresponding to 1 % of the initial concentration of carbaryl rinsate in the system, renders the most effective degradation of carbaryl. As a result, a carbaryl removal percentage of 66.2 %, a mineralization efficiency of 26.2 %, and a toxicity reduction of 44.6 % could be achieved. On the strength of results obtained in this study, it was believed that the solar photocatalysis along with the aid of a dye

photosensitizer, such as MB or RB, was a greatly feasible approach for pollution control of the pesticide rinsate.

Forest Fire and Environment -- Using Self-Built Hyperspectral Library as a Powerful Tool for Instruction of Prescribed Forest Fires

Guoxiang Liu, Jeff Allen, Craig Campbell
Strom Thurmond Institute
Clemson University
Clemson, South Carolina 29634-0125

Lucy Brudnak
USDA Forest Service Southern Research Station
Clemson, South Carolina 29634

Forest fires have produced catastrophes that threaten human life, exterminate rare species, destroy valuable property, emit huge amount of carbon dioxide and choking haze causing widespread health and environmental problems. Forest fires are usually ignited by lightning under the particular conditions. One of the most critical conditions is heavy accumulations of fuel loading which include dead wood and under canopy thickets. In certain cases the Forest Management Authorities and Park Service of Appalachian Mountains are intentionally igniting closely-controlled fires to reduce heavy accumulations of dead wood and thickets and to accomplish resource management and safety needs. This method is called prescribed fires. Through prescribed fire can temporarily reduce air quality, but usually to a much lesser degree than wildfire. Prescribed fires are preceded by manual removal of some trees and thickets, construction of fire lines, and close coordination with local firefighting organizations. The under canopy thickets ericaceous species Rhododendron (*Rhododendron maximum*) excessively cumulates forest fuel loads and strongly affects prescribed fire behavior. Mapping of Rhododendron distribution in the Southern Appalachian Mountains is filled with challenges because of the vast areas and remote terrain. This study uses Self-Built Hyperspectral Library as a powerful tool for detecting and mapping of this under canopy thickets. A map of Rhododendron distribution covering 30 square miles of study area was produced. The results will much benefit instruction of prescribed Forest Fires.

Macroeconomic Policies and the Environment:
The Role of Policy Analysis Matrices (PAM)

Anthony B Lumby
University of KwaZulu-Natal
South Africa

Given the fact that the application of economic principles to environmental issues focuses primarily on neoclassical microeconomics, there is a tendency to overlook the role of macroeconomic policies in shaping environmental policy. Broadly speaking, three well-known analytical instruments have been developed to ascertain the impact of macroeconomic policies on the environment: policy analysis matrices (PAM); computable general equilibrium modeling (CGE); and environmental accounting.

This paper focuses attention on the first of these. It outlines the relatively simple three-step procedure of developing matrices to (a) identify the key environmental issues; (b) provide information on quantitative or qualitative indicators of environmental damage; and (c) identify the underlying economic causes and their relationship to existing (or planned) macroeconomic policies. In order to demonstrate the practical

applicability of PAM, this paper concludes with a brief review of a case-study in which policy analysis matrices were developed for Swaziland.

Freshwater Wildlife Assessment and Conservation:
An Island State Model from Hawaii

Dwayne Meadows, Eko Lapp, and Amy Hellrung
Hawaii Division of Aquatic Resources
Honolulu, Hawaii 96813

Hawaii has a unique freshwater fauna with a high proportion of endemic species, a large number of which have diadromous life cycles with adults living and spawning in freshwater and larvae developing in the ocean. Stream morphology also differs from continental areas in that we have hundreds of small watersheds consisting of short, steep-gradient, and low order streams, many with terminal waterfalls. Freshwater wildlife conservation in Hawaii is the responsibility of a number of government agencies. The Hawaii Division of Aquatic Resources (DAR) manages the take and access of species along with many conservation programs. The Commission on Water Resources Management (CWRM) is responsible for setting instream flow standards that determine the quantity of water available to wildlife. The Department of Health is responsible for water quality issues. Recently these agencies have begun collaborating to correlate their databases and GIS watershed delineations. DAR and the Water Commission are collaborating on assessing and ranking streams to prevent further water withdrawals some priority watersheds (CWRM), and to develop a network of Freshwater Fishery Replenishment Areas (DAR). Seven ranking criteria including biological, hydrological, and watershed level data were scored and ranked for all possible watersheds using all available data. This paper will discuss this process as a model for other island states and nations.

The Urban Poor, the Informal City, and Environmental Health Policy in Nigeria

Geoffrey I. Nwaka
Abia State University
Ututu, Nigeria

Poverty alleviation dominates the international development agenda of the 21st century outlined in the Millennium Development Goals. The main policy challenge addressed by the paper is how to support and regulate the urban informal sector in a way to promote shelter and livelihood for the poor, and at the same time ensure a safe, healthy and socially acceptable environment; how to ensure that the struggle against urban poverty and slum dwelling does not result in blaming the victims, and in a campaign against the urban poor and slum dwellers themselves. The paper argues that human development ought to be at the centre of the quest for urban sustainability in Africa. While acknowledging the importance of the "green agenda" to protect natural resources and ecosystems in order to ensure long term global sustainability, the paper maintains that greater priority ought to be given to the "brown agenda' that addresses the health and development concerns of the poor. This way, we can build cities that are inclusive, socially equitable and environmentally sound

The paper examines how urban poverty and the informal city have developed in Nigeria over the last 50 years; the extent to which government policies and programmes have helped or constrained the poor, and how the urban slums and irregular settlements can be upgraded and progressively integrated into the urban mainstream. It considers how housing and planning codes, standards and regulations inherited from the discriminatory policies and the segregation practices of the colonial period have continued to inhibit the access of the poor to affordable housing and tenure security; how the inadequate provision of water,

sanitation and waste management has led to the spread of a wide variety of water-borne and filth-relalted disease.

The concluding section considers the essential elements of a strategy to improve the informal sector and the conditions of the poor, drawing insights from the UN-sponsored conferences of the 1990s, especially the Habitat Agenda of the Istanbul City Summit, Agenda 21 of the Rio Earth Summit, and such other global initiatives as WHO's Healthy Cities Programme, the World Bank's Cities Alliance for Cities Without Slums, and the UN-Habitat's Global Campaign for Urban Good Governance, and for Secure Tenure. It also considers the roles which state and local authorities, the international development community and the urban poor themselves could play in a collaborative effort to build safer, healthier, more inclusive and more equitable cities.

Issues of Sustainability in Asset-Based Regeneration

David Parsons
School of Economics and Development
Sheffield Hallam University
Sheffield, S1 1WB
England

This paper examines issues of sustainability through a case study of a property project to construct a business development centre in Sheffield in the UK. It describes how the scheme incorporates sustainable characteristics from social, economic and environmental perspectives and critically analyses the key issues arising.

The project is the development of a Business Centre of some 66,000 sq ft (6,203 sq m) net lettable space. The Centre provides business accommodation mainly for small and medium sized enterprises. Sheffield is within the South Yorkshire Area designated for funding from the European Economic Community under Objective 1 to promote economic development and job creation. Grant assistance has been provided from this source and from the UK government.

The Centre acts an incubator assisting the formation and growth of new businesses by providing physical space and in-house management support for new and existing firms. Social sustainability is incorporated through the use of asset based regeneration. This concerns the use of the rental income from the centre by the Manor and Castle Development Trust (MCDT) which is a not for profit company whose remit is the social and economic regeneration of one of the most deprived areas of the region in southern Sheffield. Social initiatives promoted by MCDT include community health programmes, childcare projects and assistance for a range of voluntary groups.

The scheme contributes to the sustainability of the local economy by providing accommodation for new start up and growing business enterprises. Previous studies had suggested that the lack of such premises was hindering the prospects for economic growth.

Environmental sustainability is incorporated into the design of the building through features to minimise energy use and to promote other environmental benefits.

Biopiracy and Sensitive Issues of Environmental Ethics and Indigenous Mechanism of Biodiversity Conservation in Tribal Villages of Bastar: An Anthropological Appraisal

R. N. Pati
Senior Anthropologist
IK Foundation of India

Bhubaneswar, Orissa, India

Alekh Padhiary
Director, SCERT Unit-IV
Bhubaneswar, Orissa, India.

The biological resources in the indigenous territories of Chhattisgarh consist of various natural sources of agricultural, medicinal, ecological, veterinary and cosmological potencies which ensure equilibrium between local environment and social health of the tribal communities inhabiting in the forest villages. The forest dwelling tribes interact with plant and animal diversity in a natural supportive way. The biological resources influence the customary practices, cultural resources and local knowledge systems not only among Gond and Halba communities but also among other indigenous communities. The above cultural practices, both customary and non-customary, prevalent among Gond and Halba tribes of Chhattisgarh are not only inherited territorially but also continue to evolve under influence of individual innovations and local environment. The deficiencies in careful customization of these cultural practices restrict opportunities for innovation and reproduction of these practices. The circulation and reproduction of natural and social environment and local system of production are followed by these cultural practices which constitute potential substrates of local cultural resources. The process of globalisation has threatened not only protection of intellectual property rights (IPR) of these tribal innovators but also protection of cultural and biological resources of these indigenous communities. The reproduction of the cultural knowledge and practices for commercial application has not been appropriately explored because they need to be synthesized, reduced, standardized and miniaturized for mass reproduction and distribution based on scientific research and integration of local knowledge in mainstream of scientific exploration. The limitations have provided vast opportunities to big players for hijacking the intellectual property rights (IPR) of community over cultural and biological resources of this nascent State. The biopiracy activities by corporate houses spreads like wildfire. The intellectual and cultural property rights of these tribal healers and innovators have been violated adversely. Very often the development planners overlook rules, roles of these communities as regard to identification of plants and habitat of plants, methods of planting and extracting medicinal components guided by traditional knowledge system.

The Biblical Basis for Environmental Stewardship

David Patterson
Judaic Studies
The University of Memphis
Memphis, Tennessee 38152

Just as the Bible is the most ancient basis for much of our thinking about human values, so is it the basis for how we understand the value of our environment. From a biblical perspective, environmental stewardship is rooted in a covenant between the Creator and the human being who is a partner in the act of creation. While some may suppose that the issue of stewardship is a modern one, in the biblical tradition it is as old as creation itself.

The proposed paper will show that the commandment to rule the earth is in fact a commandment to sanctify the earth (see Genesis 1:27-28). The responsibility that defines stewardship entails an orientation toward something higher that oneself, toward *another*, both human and Divine, for the sake of whom we take on the stewardship of the earth. The commandment to rule over the earth, then, implies a prohibition against profiteering, exploitation, and other enterprises that treat the earth as if it were merely the raw material we tap to suit our personal desires. From a biblical perspective, we are commanded to take the stuff of nature and draw from it everything from bread for the hungry to medicine for the sick. Therefore, it is argued, the care we show toward the earth is connected to the kindness we show toward others—and both relations are commanded.

Thus the paper first shows how an understanding of stewardship grounded in the biblical tradition adds clarity to our thinking about the earth we rule over. Then, it considers the implications for our responsibility for creation. At stake in this endeavor is not only a care for the environment but also a basic understanding of the sanctity of the human being.

Comparison of Several Advanced Oxidation Processes for Reactive Dye Photodegradation

Igor Peternel, Sanja Papic and Natalija Koprivanac

University of Zagreb
Department of Polymer Engineering and Organic Chemical Technology
Zagreb, Croatia

Chemical treatment such as Advanced Oxidation Processes (AOPs) seem to be very useful for treating wastewaters containing organic dyes. AOPs are defined as the processes that involve highly reactive species, particularly hydroxyl radicals in sufficient quantities to oxidize the majority of complex organic chemicals in the water effluents. Hydroxyl radicals are the most important oxidants due to their high reactivity and unselectivity towards organic compounds. UV based AOPs as well as photocatalysis systems such as combination of a semiconductor (TiO_2, ZnO, etc.) with UV irradiation, are widely used to decompose organic pollutants in industrial wastewater and groundwater. Solid particles, synthetic zeolites (HY, NH_4ZSM5) used in this study are micro porous crystalline materials with well-defined structures and with strong ability to act as catalysts for chemical reactions which take place within the internal cavities The aim of this study was to investigate application of UV/H_2O_2/O_3, UV/Fenton and UV/TiO_2 processes for the degradation and mineralization of reactive azo dye C.I. Reactive Red 45. The primary objective was to determine the optimal condition for each process. Influence of zeolites (HY, NH_4ZSM5) on the process efficiency was also investigated.

Total process efficiency was estimated on the basis of total organic carbon (TOC) and spectrophotometric (UV/VIS) measurements. Partial mineralization extents obtained after a one-hour treatment followed the increasing order: UV/TiO_2 < UV/H_2O_2/O_3 <UV/Fenton while complete mineralization was obtained by UV/H_2O_2/O_3 and UV/Fenton processes.

Danube Delta: An Avian Paradise

Ileana Prejbeanu
University of Medicine and Pharmacy
Craiova, Romania

Cornelia Rada
Romanian Academy
Center of Anthropological Research,
Bucharest, Romania

Casian Lascu
University of Medicine and Pharmacy
Craiova, Romania

The Danube is the 15th longest river on earth (2858 km). It springs in the Black Forest Mountains, crosses Europe from north-west to south-east, passes through four capitals and flows into the Black Sea through a delta. Lying in the south-eastern part of Romania, the Danube Delta is the 21st biggest in the world - an area

of 2681 km^2 which grows with about 40 m^2 every year due to the alluvia brought by the river. It is a natural paradise with a remarkable variety of species - more than 1200 species of plants/trees and the richest ornithological and ichthyologic fauna in Europe (more than 300 species of birds, among them the biggest pelicans colony on the continent and more than 100 species of fish, including Danube herring and sturgeon – caviar producers).

The Danube Delta is the newest Romanian relief, protected against "the industrialization progress". However, since the end of the 19^{th} century, humans have exerted destroying influences on the habitat because of the works for navigation, forestry, agriculture, reed operation, fishing and shooting of harmful considered species. In 1990 UNESCO assigned the Danube Delta the status of "reservation of the biosphere" – a nature preserving modality which excludes neither the human presence nor the traditional ways of using natural resources.

The Danube Delta is the region where the first case of avian influenza on poultry was reported in Romania on October 7, 2005. Most probably the virus was brought by migrating wild birds coming from Russia and Kazakhstan. Until February 17, 2006 avian influenza expanded into 7 of the 40 counties of Romania; there were 31 registered centers of disease, 25 of them being already closed by then.

Shock and Chaotic Behavior in the Maryland Population of Chesapeake Bay Blue Crabs: Recovery or Harvest Pressure?

Michael Reiter
Department of Agriculture and Natural Resources
Delaware State University
Dover, Delaware 19901-2277

Dragoljub Pokrajac
Department of Computer and Information Systems
Delaware State University
Dover, Delaware 19901-2277

George Abbe
Estuarine Research Center
Morgan State University
St. Leonard, Maryland 20685

The Atlantic Blue Crab (*Callinectes sapidus*) plays a major ecological, sociological, and economic role from the mid-Atlantic to South America, particularly in Chesapeake Bay and the surrounding region. The economics associated with their harvest (estimated in the U.S. at roughly $150 million dollars per year), combined with land development around the bay, exposes the population to significant pressures from both pollution and harvesting such that population numbers have been in decline in recent years. An analysis of one of the largest data sets in existence, obtained from crab pot harvests in the western Chesapeake Bay (Calvert County, Maryland) from 1968-2004, shows that the data contains several population "shocks" and exhibits strong periodic behavior of approximately 5 years or 10-13 years. Multivariate models using lags matching the strongest periodicity for each variable allowed us to mimic the behavior of the variables in the training data (years 1968-1999) very well (r^2 of 0.74 or greater), but attempts to use these models to satisfactorily predict the validation data set (years 2000-2004) were largely unsuccessful, particularly for those variables most closely related to harvest pressure (legal sized males/females and catch per unit effort for males/females). The periodicity and internal predictability combined with a lack of future predictability is an indication of chaotic behavior in this Blue Crab data set. While recovery from the population shocks may account for this result, our ability to model the training data (shocks and all) plus the failure to predict the variables most closely related to harvest may indicate a significant impact from harvest pressure on the population of legal-sized crabs in the western Chesapeake. The overall decline in numbers, the inability to

predict future numbers, and indications that the greatest impact may be on legal-sized individuals are a cause for concern and deserve further study.

Nuisance or NIMBY? Land Application of Biosolids

Jesse J. Richardson, Jr.
Virginia Tech, Blacksburg, VA, USA

The land application of biosolids generates much controversy, particularly among those residing near the land application site. However, land application is a generally accepted agricultural practice. Supporters of the practice allege that opponents fall into the ANot in My Back Yard@ category. The United States Environmental Protection Agency supports proper land application of biosolids, but much scientific uncertainty still exists.

In the United States, local, state and federal officials struggle over the question of which level of government should regulate biosolids. The present state of regulation in the United States is summarized and compared to practices in Europe and other areas of the world. This examination includes a discussion of the level of appropriate regulatory control: local, regional or nationwide.

Finally, the paper analyzes land application of biosolids against traditional nuisance standards and discusses whether land application of biosolids is a nuisance or not. The paper concludes with policy recommendations on ways to minimize conflict amongst landowners with respect to land application of biosolids, as well as suggested levels of regulatory control.

Monitoring Development Impacts Affecting the Delaware National Estuarine Research Reserve

R. Scarborough, M. Mensinger, B. Wilson, A. Mundel
Delaware National Estuarine Research Reserve
Dover Delaware

V. Klemas, D. Leathers, D. Legates, J. Madsen, W. Ritter
University of Delaware
Newark Delaware

M. Reiter
Delaware State University
Dover, Delaware

The Blackbird Creek component of the Delaware National Estuarine Research Reserve (DNERR), which was established in one of the most pristine watersheds in Delaware, is under increasing development pressure. Historically the watershed along with most of southern New Castle County was dominated by farmland, forests, and marshland. Currently due to infrastructure improvements over the last 5 years the area has become desirable for numerous bedroom communities. To evaluate the effects of these land use changes on estuarine health, the DNERR and its partners have undertaken a wide range of monitoring projects to provide baseline data and to establish a data collection network to chart impacts of land use change on the watershed.

Roundtable on Interdisciplinary Environmental Research: Challenges and Opportunities

Meenal Shrivastava (Facilitator)

Centere for Global and Social Analysis
Athabasca University
Edmonton, Alberta
Canada

Environmental research topics overlap with fields as diverse as biology, economics, politics, geography, to gender studies. Extreme disciplinary boundaries are crossed not only across Physical Sciences and Social Sciences, but also within these broad disciplines. In fact often it is much more difficult to straddle the divides within these disciplines. Given the nature and scope of environmental issues, such overlaps are a necessity in Environmental Studies – for instance, a political economist exploring the gender dimension of the use of market instruments for environmental management using econometric analysis. However, everything in what is loosely referred to as Environmental Studies continues to be contested in terms of the epistemology, the methodology and the pedagogy.

Since this conference brings together researchers with a vast variety of disciplinary, thematic, and geographical area specializations, the aim of this roundtable is to provide an open ended forum to scholars in the field of environmental research to discuss their approach to this inherent cross cutting of disciplines and themes in their research.

Impact of Economic Growth and Urban Development on the Chemical Integrity of Guam's Groundwater Resources

Carmen M. Sian-Denton[a] and Gary R.W. Denton[b]
[a]*Guam Waterworks Authority, P.O. Box 3010, Hågatña, Guam 96932*
[b]*Water and Environmental Research Institute, University of Guam, Mangilao, Guam 96913*

Guam has one of the finest limestone aquifers in the world. Located in the northern half of the island, this vital underground resource supplies island residents with about 80% of their drinking water needs. The population of Guam has gradually increased since WWII and currently hovers around 150,000. The majority of island inhabitants live in the northern half of the island where significant economic growth and urban development has occurred over the last two decades. The US military has also occupied large tracts of land in this region for the past 60 years. The risks of groundwater contamination are, therefore, very real considering the population density in northern Guam and the rapid recharge rates to the underlying aquifer. Since April 1996, Guam Waterworks Authority (GWA) has monitored the island's drinking water resources annually for all contaminants listed under the US Safe Drinking Water Act. Over 100 wells and two surface water sources are analyzed on a quarterly basis, and approximately 5500 water samples have been tested to date. So far, 99.7% of all groundwater samples examined have been in compliance with US EPA safe drinking water standards, with primary contaminant concentrations being either non-detectable or below 'Maximum Contaminant Level' (MCL). Less than 1% of samples showed contaminant levels between 50-100% MCL. Those out of compliance were from five wells with separate exceedences for chlordane, ethylene dibromide, nitrate tetrachloroethylene and trichloroethylene respectively. MCL was exceeded by less than a factor of three in all cases. All surface waters monitored were consistently in compliance for all contaminants except turbidity, which occasionally exceeded MCL during wet weather. The data gathered thus far are summarized with special reference to contaminants close to or exceeding MCL. Current strategies adopted by GWA to remediate contaminated drinking water wells, or protect those under threat, are also highlighted.

Communication and the Aesthetic Appreciation of Wetlands

Gordon Steinhoff

Department of Languages, Philosophy, and Speech Communication
Utah State University
Logan, Utah 84322-0720

In this paper I discuss several examples of wetlands in the United States that are relatively well known and are considered beautiful. I attempt to discover what it is about these wetlands that allows and encourages aesthetic appreciation. In my examples, each wetland has been placed into a special cultural context. The "story" of each wetland is communicated to the public through Internet Web sites, brochures, a visitor center, information exhibits, guided tours, etc. The story of the wetland is provided in an effort to convince the public that the wetland is distinctive, worthy of aesthetic appreciation and protection. This is the feature that allows and encourages aesthetic appreciation: effective communication of the story of the wetland. The story of each wetland includes natural history as well as an account of human interactions with the wetland. I will argue that for many wetlands in the United States, knowledge of human interactions with them is essential for appropriate aesthetic appreciation of them. I will also argue for this cynical conclusion: within the United States aesthetic appreciation of wetlands is achieved only by placing them into this kind of cultural context. Unfortunately, as wetlands are placed into the proper cultural context, their "wildness" is lost.

A Model for Identifying Vulnerable Wetlands and Associated Riparian Areas

John Tiedemann
Director, Monmouth University Center for Coastal Watershed Management
West Long Branch, New Jersey 07764

Steve Taylor
Monmouth University Policy Studies Program
West Long Branch, New Jersey 07764

Robert Fiorelli
Birdsall Engineering, Inc.
Eatontown, New Jersey 07724

Identifying vulnerable wetland and riparian areas in a watershed is a key strategy in protecting these valuable habitats. Fortunately, spatial land management tools like the Geographic Information System (GIS) are available to make the job of understanding natural features and resource attributes of the landscape much easier.

Utilizing GIS technology, we developed and tested a technique to identify wetland and riparian areas in a watershed that should be considered ecologically important and worthy of conservation, restoration, or improved management. Mapped land features were incorporated into a computational model to produce a Conservation Priority Index (CPI) and a Restoration Priority Index (RPI). The CPI ranks the relative importance of wetland and riparian parcels in terms of their need for conservation because they contain highly erodible soils, groundwater interchange areas, floodplains, threatened or endangered species habitat, steep slopes and are in close proximity to open space. The RPI focuses on modified lands such as croplands, pastures, and residential development containing similar characteristics to the CPI and ranks areas in need of restoration resulting from existing impacts or, in some cases, protection from potential future impacts.

A pilot project applied the GIS model to the Shark River Estuary in New Jersey. The model identified a diversity of priority conservation or restoration sites in the watershed. Inspection of a number of these sites confirmed that existing conditions were consistent with the mapped units of the model and that the wetlands and associated riparian areas are vulnerable to disturbance. Based on these results, the computational model was found to be accurate in identifying vulnerable wetlands and riparian areas in need

of conservation or restoration. Therefore, this model provides local communities with a tool for managing the landscape and deploying conservation and restoration strategies that protect water quality, provide natural habitats for native wildlife, and improve aesthetics.

Linking Land Use to Pathogen Impairments in Coastal Watersheds

John Tiedemann
Director, Monmouth University Center for Coastal Watershed Management
West Long Branch, New Jersey 07764

Stephen Souza
President, Princeton Hydro LLC
Ringoes, New Jersey

Suzanne DeLorenzo
Monmouth University Center for Coastal Watershed Management
W. Long Branch, New Jersey 07764

Bacterial pollution of coastal waters including streams, rivers, estuaries and the oceans is a worldwide problem of concern. Fecal pollution poses a health hazard, closes beaches, and restricts recreational and commercial shellfishing activity.

Traditional water quality monitoring programs analyzing bacterial contamination in waterways involve testing for total and fecal coliform levels. While not pathogens themselves, elevated levels of coliform bacteria can indicate the presence of waterborne pathogens and these data can be used to identify "hot spots" in need of more detailed investigation. However, monitoring of coliforms cannot be used to identify specific sources of bacterial pollution.

Determining if fecal bacteria originate from human or other sources requires use of innovative techniques known collectively as Microbial Source Tracking (MST). A variety of MST methodologies have demonstrated value for discriminating sources contributing fecal bacteria to a waterbody. Once the source of the pollution is identified through implementation of MST studies, be it human, domestic animal, wild animal, waterfowl or other avian species, best management practices (BMPs) can be developed to remediate watershed fecal pollution.

In order to develop effective best management practices, land use within the watershed must be analyzed and locations responsible for the contaminant inputs identified. Completion of this level of analysis relies on the integration of available water quality data, watershed specific MST data, and existing mapped land use and land cover information using a Geographic Information Systems (GIS) platform. The objective is to geographically identify the likely sources for the measured bacterial contamination that facilitate development of correct best management practices or combination of best management practices for the control of these specific contaminant sources.

The Status of the Quality of Draft Environmental Impact Statements in the United States: An Update

Kelly Tzoumis
Director, Public Policy Studies Program
DePaul University
Chicago, Illinois 60614

Has the understanding of environmental impacts from major government projects improved over time? One answer to this research question comes from the analysis of studies conducted by the federal government in the United States under the National Environmental Policy Act of 1970. As part of this policy, all federal agencies produce draft environmental impact statements (DEISs) prior to any major federal action. In addition, the Clean Air Act of 1970 (Section 309) requires the rating of each DEIS for both the quality of information and impact to the environment of the proposed project. DEIS scores (N=22,757) were obtained from the US Environmental Protection Agency for these two ratings from the start of the DEIS requirements in 1970 to 2004 to determine if scores were improving over time by agency. The results showed that the quality of information did not improve over time and most agencies were still having difficulty in achieving the best performance on both ratings. In fact, when disaggregating the data into agency ratings over time, the results showed that those agencies that produced the greatest number of DEISs did not show improvement in preparing the document or proposing projects with less environmental impacts. Based on the findings, it appears that significant problems with the preparation of DEIS documents continues today even by the agencies who are the largest generator of these studies. This research updates a previous study conducted in with data from 1970-1997. It shows a consistent trend that continues for government agencies to propose projects that have significant environmental impacts. These same agencies are also not providing the highest quality of information for the basis of their decisions. Some recommendations are made for preparing better documents using training across field offices within in agency as well as for EPA and the Council on Environmental Quality to provide more guidance on how to achieve better DEIS ratings.

Nigerian Environmental Legislations, Oil Based Violence and Security in the Niger Delta

Ojakorotu Victor
School of Politics
University of Kwazulu-Natal
Pietermaritzburg, South Africa

The Niger Delta, one of the world's largest wetlands and the site of most of Nigeria's biodiversity, is also the area where large proportions of Nigeria's oil reserves are found. The area is the main oil-producing region in the country thus generating more than 80% of national revenue. Paradoxically, the Niger Delta has been an enclave of youth militancy and unmitigated violence on a large scale. It is widely held that the people of the Niger Delta have been disempowered and disinherited of their land through the instrumentality of legislations such as the Land Use Act, Lands (Title Vesting, etc) Act, and some sections of the Petroleum Act. These legislations vest ownership and control of lands, (navigable) waters, and the resources found therein in the hands of the Federal or State Government. Environmental activists in the region argue that these legislations stifle local initiatives at protecting the environment. Community agitations about the abolition of these legislations and the reluctance of the government to accede to such requests have all intensified the activism for resource control, protests, brigandage and violence. Therefore, this paper will examine the Nigerian environmental legislations in relations to the plight of the oil bearing communities, the state response to the local people clamour for revision of these laws and its impact on the region development.

Life After Death: A Political Strategy for Saving Our Planet's Environment

Richard Young
History, Political Science, and Environmental Studies
Seattle University
Seattle, Washington 98122-1090

In "The Death of Environmentalism," Shellenberger and Nordhaus argue that the environmental movement needs to transcend its focus on "policy literalism" and formulate a strategic vision and political strategy appropriate to the contemporary human condition. In response to this challenge, my paper presents a description of the interconnected educational, political, and public policy strategies that are needed.

Environmentalists need to embrace a concerted public education campaign that argues: (1) environmental health is foundational to economic well-being; (2) the contemporary global ecological crisis could prove catastrophic; (3) the base cause of this problem is human pollution; (4) global corporate capitalism cannot solve this problem, but instead worsens it; (5) we have the scientific and technical knowledge to prevent an ecological catastrophe; (6) comprehensive and effective governmental action is required; (7) the ecological crisis can be dealt with successfully without extreme costs or sacrificing our fundamental values and institutions; and (8) we need to shift from short-term, self-interested thinking to a long-term perspective premised on self-interest rightly understood.

Environmentalists already agree on these principles, but they need to be clearly, boldly, and repetitiously communicated to the general public. In addition, environmentalists must make environmentalism a component of a *comprehensive* public policy vision, and they must work within the Democratic Party to do so. This vision entails shifting the global economy to what Hawken calls "natural capitalism." This strategy is politically feasible because the contemporary *laissez faire* global economy is in need of fundamental reform. To prevent both ecological and economic disaster, a global shift to natural capitalism needs to be accompanied with a parallel transition from supply side to demand side economics. This would not only save the environment, but it would also promote the growing purchasing power and employment of all the world's peoples.

The Effects of Globalization on Biodiversity and Environment: A Case Study of Uganda

Emmanuel Kakooza Zirabamuzaale
Public Relations Officer -PRO
Agency for Environment and Wetland (AEW) Uganda
Kampala, Uganda

Globalization is primarily an economic system where raw materials, manufactured goods, financial transactions and intellectual property flow "freely" across international borders. As globalization continues to grow strong, languages, cultures and the various forms of natural resources usage in countries and communities have been relatively homogenized. Sad though, to note, despite its growing strength, the pervasive effects of this economic strategy have been poorly understood, mainly because most of its impacts are indirect in nature. This is particularly true of Environment and Natural Resources.

The spread of globalization is so rapid and comprehensive that its effects are being felt in the small and remote human communities and natural areas of the world and Uganda in this case. Respect is given to the most fragile ecosystems mainly, wetlands, water, forests and mountains among others. This is not to exclude the related or directly linked sectors like agriculture and tourism. Worst of all, this system of globalization has resulted into environmental consequences some of effects are too costly to reverse.

Globalization has led to loss of genetic diversity in agriculture. A profound reduction of diversity in food plants, tree crops, vegetables and gains is already on course in the country -Uganda. The impact also extends to wild relatives of plants. Many of these wild plants and species are sharply decreasing because of development, conversion, herbicide usage, grazing and introduction of foreign species to mention but a few. Environmental costs of globalization leading to water, soil and air pollution have markedly increased as global trade increases, exhaustion of renewable and non renewable and global climatic changes.

As of now especially in Uganda, no body knows all the biodiversity and environmental effects of globalization. This paper shall labor as much as possible to explore the effects so as to show the world how much globalization has affected Uganda's biodiversity and environment.

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