



Program and Abstracts

THE 15TH INTERNATIONAL INTERDISCIPLINARY
CONFERENCE ON THE ENVIRONMENT

July 8-11, 2009

Daytona Beach, Florida, USA

Organized By

The Interdisciplinary Environmental Association

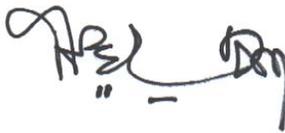
PRESIDENT'S WELCOME

Dear Participant:

On behalf of the Interdisciplinary Environmental Association, I would like to welcome you to Daytona Beach, Florida, and the 15th International Interdisciplinary Conference on the Environment. This year's conference is being held against a backdrop of major environmental challenges, both global and local in character. On the global front, the impact of climate change has made itself felt through the extreme weather patterns being experienced in various regions of the world, while the destruction of the planet's ozone layer continues to threaten all forms of life on earth. On the local front, growing energy and food shortages affect all countries, both developed and developing, but their more serious impacts are being felt most keenly in the latter. It is evident that there is a growing awareness of the significance of these, and other, environmental challenges, and greater efforts are being made, first, to understand them (especially their causes), and, second, to formulate appropriate solutions. Perhaps the greatest challenge that faces us is to promote the international governmental co-operation that is necessary to achieve sustainable development.

For fifteen years, the Interdisciplinary Environmental Association has sought to bring together specialists, practitioners, and concerned citizens from all corners of the world and from all disciplines in the natural and human sciences to exchange ideas and approaches to the myriad environmental problems that confront us. In doing so, we believe that a holistic approach to environmental studies – one that transcends philosophical, political, or disciplinary boundaries – offers the greatest opportunity to understand and solve environmental issues. Accordingly, the program for this conference provides an impressive breadth of coverage of topics that will be discussed over the next few days. If this is a return trip to our conference, we hope you will find us more vital and active. If this is your first participation in our conference, we hope you will find our distinctive interdisciplinary approach to environmental issues both challenging and rewarding. You are encouraged to join the Interdisciplinary Environmental Association and assist us in promoting a more holistic understanding of the causes of – and solutions to – the environmental problems that confront us.

Welcome to Daytona Beach and the 15th International Interdisciplinary Conference on the Environment. We look forward to meeting – and learning from – each of you.



*Anthony B. Lumby
President, 2007-2009*

*The Interdisciplinary Environmental Association
www.ieaonline.org*

CONFERENCE SCHEDULE SUMMARY

| | Tuesday 7 | Wednesday 8 | Thursday 9 | Friday 10 | Saturday 11 | |
|---------|-------------------------------------|---|--|--|---|---------|
| 7:30AM | | Gather & Registration (to 3PM) | Gather and Registration (to 10AM) | Gather | | 7:30AM |
| 8:00 | Field Trip: Wekiva River Canoe Trip | 1) Preparing for Disaster | Conference Brunch | 17) Climate Change | Second IEA Roundtable on Environmental Systemology and Sustainability (By Invitation Only) | 8:00 |
| 8:30 | | | | | | 8:30 |
| 9:00 | | 2) Approaches to Environmental Education I | Keynote Address | 18) Coast and Community Management | | 9:00 |
| 9:30 | | 9:30 | | | | |
| 10:00 | | Break | Presidential Address | 19) Reframing the Economic Questions | | 10:00 |
| 10:30 | | 3) Rural Industry and Response | | | | 10:30 |
| 11:00 | | 4) Changing Public Perception | 11) Landscape and Wilderness | 20) Applying Community Wisdom to Management | | 11:00 |
| 11:30 | | 11:30 | | | | |
| 12:00PM | | Lunch: Florida Barbeque! | 12) New Approaches to Conservation Biology | Lunch on Your Own | | 12:00PM |
| 12:30 | | | | | | 12:30 |
| 1:00 | | 5) Populations and Water | "Lunch": Ice Cream Social! | 21) Open Colloquium: 1 st IEA Roundtable Summary | | 1:00 |
| 1:30 | | | | | | 1:30 |
| 2:00 | | 6) Approaches to Environmental Education II | 13) Politics and the Market | Field Trip: Blue Spring | | 2:00 |
| 2:30 | | | | | | 2:30 |
| 3:00 | | 7) Integrated Management Strategies | 14) Ecotourism and Recreation | 3:00 | | |
| 3:30 | | | | | | 3:30 |
| 4:00 | | 8) Artificial Environments | 15) Waste Management in Developing Areas | 4:00 | | |
| 4:30 | | | | | | 4:30 |
| 5:00 | | 9) Biomass/Ethanol Roundtable | Break, Poster Authors Available | 5:00 | | |
| 5:30 | Break, Poster Authors Available | 5:30 | | | | |
| 6:00 | Dinner on Your Own | Dinner on Your Own | Open (Dinner on Your Own) | 6:00 | | |
| 6:30 | | | | 6:30 | | |
| 7:00 | Social | Business Meeting | 16) Open Colloquium: Visioning the IEA | IEA Advisory Board and Officers' Colloquium: Visioning the IEA | 7:00 | |
| 7:30 | | | | | 7:30 | |
| 8:00 | | 10) Special Presentation: The Sea Turtles of Volusia County | | | | |
| 8:30 | | | | | | |
| 9:00 | | | | | | |

CONFERENCE SCHEDULE

Tuesday July 7

8am – 5pm Canoe Trip to Wekiva State Park

All registered participants should wear comfortable attire for canoeing and bring rain gear and swimsuits. Water is recommended. We will stop for lunch in the area. Meet in the hotel lobby; **vans depart at 8:00 AM.**

Price \$50

7pm – 9pm Informal Social Mixer, Room TBA

Wednesday, July 8

7:30am – 3pm Registration

Room: Foyer

8am – 9:45am Session 1: Preparing for Disaster

Room: Bill France A

Moderator: Daniel Marien, University of Central Florida

Discussant: Susan Gill, Stroud Water Research Center

Richard Young Putting Last Things First: A Comprehensive Plan for Preventing an Ecological Catastrophe

Eric Fitch Interlocking Crises: Arable Land, Fresh Water, Energy, Climate Change

Ganesh Raj Joshi Seismic Hazard in Himalaya and surrounding regions

8am - 9:45am Session 2: Approaches to Environmental Education I

Room: Bill France B

Moderator: Michael Reiter, Bethune-Cookman University

Discussant: Peter Beck, St. Edwards University

Chyrisse Tabone Controversial Issues in an Environmental Science Course: How do Students Respond?

Mary Stark Island Biogeography and Reading the Landscape: Prairie Education through American Literature. Pr. Michael Reiter

9:45am – 10:15am Break

Room: Foyer

10:15am - 12pm Session 3: Rural Industry and Response

Room: Bill France A

Moderator: Susan Baker, NOAA

Discussant: Anthony Lumby, University of the Witwatersrand

Kanyanee Seangkiatiyuth Estimation of NO_x Impact from the Cement Plant Located in the Mountain Areas

Aradhana Mehra Environmental Iodine and Endemic Goitre in the UK-Peak District

Ayman Helal Mansee Enhancing Bioreactor Conditions for Biodegradation of Organophosphorus Compounds

10:15am – 12pm Session 4: Changing Public Perception

Room: Bill France B

Moderator: Kevin Hickey, Assumption College

Discussant: Eric Fitch, Marietta College

M. L. Agrawal Public Perception Based Biological Impacts Assessment for a Highway Development Project

Mai Kuha The prospect of transforming 'organic' and 'sustainable' from a marked alternative to the norm: Lessons from the nonsexist language reform movement

Joel McCormick Applying Environmental Psychology to Parks and Green Spaces: Using Sustainable Methods to Reduce Fear of Crime

12pm – 1:15pm: Barbeque, Florida Style

Room: Poolside Ocean Terrace

1:15pm – 3pm Session 5: Populations and Water

Room: Bill France A

Moderator: Mary Richardson, Athabasca University

Discussant: Demetri Kantarelis, Assumption College

Kamal Alsharif A Comparative Analysis of the Palestinian Territories Technical and Financial Water Resources Management Indicators

Gifty Hadjor Threats to sustainable urban water production: Driving forces of Pollution in the Owabi watershed, Kumasi, Ghana

1:15pm - 3 pm Session 6: Approaches to Environmental Education II

Room: Bill France B

Moderator: Michael Reiter, Bethune-Cookman University

Discussant: Shobha Sriharan, Virginia State University

Richard C. Smardon Developing a National Framework for External Review of Undergraduate Environmental Studies/Environmental Science

Peter Beck Developing Sustainable Campuses: Strategies for Integrating Sustainability into the Academic Curriculum

Chyrisse Tabone Environmental Education Under Assault: Can Instructors Teach Environmental Science Without Fear?

3pm - 4:45 pm Session 7: Integrated Management Strategies

Room: Bill France A

Moderator: Eric Fitch, Marietta College

Discussant: Michael Reiter, Bethune-Cookman University

Ken Hughey Ranking New Zealand River Values – A Novel Approach to Managing the ‘Chalk and Cheese’ Problem

Geoffrey Fouad Derived from a Data Envelopment Analysis (DEA) Examining the Relationship Between Lake Water Quality and Natural Land

Susan Baker Integrated Ecosystem Assessments: A tool for bridging science and ecosystem management

Susan Gill In Support of an Ecosystem Esthetic: promoting carbon-neutral landscape practices by illustrating the links between the carbon and hydrologic cycles

3-4:45 pm Session 8: New Relationships in Artificial Environments

Room: Bill France B

Moderator: Barton Thompson, Albright College

Discussant: Terence Centner, University of Georgia

Charles Simpson Replacing Nature: Artifices, Replicants, and the Dystopian Future

Giancarlo Mangone In Search Of Symbiosis

Shane Epting Questioning Technology's Role in Environmental Ethics: Weak Anthropocentrism Revisited

3-4:45 pm Session 9: Roundtable - Biomass / Ethanol Energy Issues: Can Biomass Power Help Us Alleviate Our Energy Needs and Concerns?

Room: Bill France C

Moderators: Kevin Hickey and Demetri Kantarelis, Assumption College

4:45pm – 5:15pm Break: Poster Authors Available

Room: Foyer

Hanafy Holail Water Quality of Litani River in Lebanon

K. M. Lin Development and evaluation of dust-fall simulation model: dust emission and transport from fugitive particulate sources

Mary Snow Evolution of an Ecological Ethic

Richard Snow The Proof and Processes of Climate Change

5:15pm – 7pm Dinner, on your own

7pm – 8:30pm Business Meeting

Room: Bill France A
All participants are welcome to attend

**8:30pm – 9:30pm Session 10: Special Presentation on The Sea
Turtles of Volusia County**

Speaker: Stacey Bell, County of Volusia

Thursday, July 9

7:30am – 10am Registration

Room: Foyer

8:30am - 11:15am CONFERENCE BRUNCH

Location: Ocean View Room

- 9:15am - 10:30am **Plenary Keynote Address**

Transdisciplinary Science and Adaptive Management to Protect the Northern Everglades

Matthew C. Harwell

Senior Ecologist
Everglades Program Team
U.S. Department of the Interior

- 10:30am - 11:15am **Presidential Address**

Dr. Anthony Lumby, Outgoing President, IEA

Dr. Eric Fitch, Incoming President, IEA

11:15am - 1pm Session 11: Landscape and Wilderness

Room: Bill France A

Moderator: Mai Kuha, Ball State University

Discussant: Barty Thompson, Albright College

Gordon Steinhoff Society and Wilderness

Susan Gill A Brandywine Sense of Place: The Science of Landscape through the World of Art

11:15am - 1pm Session 12: New Approaches to Conservation Biology

Room: Bill France B

Moderator: Demetri Kantarelis, Assumption College

Discussant: Susan Baker, NOAA

Cary Bleasdale A Survey of the Endemic Snail Populations of Blue Spring, Florida in Relation to Potential Drivers Negatively Impacting their Habitat. (Pr. Rashan Moss)

J. Terry Rolfe Hubbell's enduring contribution

Erik Powers The Importance of Prioritizing Foundational Mechanisms in Ecological Restoration

1pm – 2:30pm Ice Cream Social

Room: TBA

2:30pm - 4:15pm Session 13: Politics and the Market

Room: Bill France A

Moderator: Kevin Hickey, Assumption College

Discussant: Charles Simpson, SUNY Plattsburgh

Anthony Lumby International Trade and the Environment:
Is There a Need for the Harmonization of International Environmental Standards?

Terence Centner Legislatures Limit Confinement Conditions for Food Animals in the United States

Daniel Marien Dodge, Compromise, or Ambiguity?: The Role of Dirty Oil from Off-Shore Drilling, Tar Sands, Shale Rocks and Coal Liquefaction in the Democrats' Energy Agenda

2:30pm - 4:15pm Session 14: Ecotourism and Recreation

Room: Bill France B

Moderator: Peter Beck, St. Edwards University
Discussant: Susan Gill, Stroud Water Center

Tinelle Bustam Raising Awareness of Sustainability: The Role of Education in Ecotourism Certification

Nilgün Ayhan Güneroğlu Evaluation of Tea (*Camellia sinensis*) Gardens Potential for Eco-Tourism in South Eastern Black Sea Region

John Jett Boater Compliance with Manatee Speed Zones on the St Johns River

2:30pm - 4:15pm Session 15: Waste Management in Developing Areas

Room: Bill France A

Moderator: Mai Kuha, Ball State University

Discussant: Kevin Hickey, Assumption College

Aminat Awonuga Household Solid Waste Handling and Disposal Methods in Third World Cities: Case of Ibadan Metropolis Environmental and Health Impact

John De Britto Role of Algae in Bioremediation in Saltpans of Thoothukudi in the East Coast of South India

Sam F. Y. Li Occurrence, Fate and Environmental Impact of Pharmaceuticals and Personal Care Products (PPCPs) in Drinking Water

4:15pm – 5:15pm Break: Poster Authors Available

Room: Foyer

Hanafy Holail Water Quality of Litani River in Lebanon

K. M. Lin Development and evaluation of dust-fall simulation model: dust emission and transport from fugitive particulate sources

Mary Snow Evolution of an Ecological Ethic

Richard Snow The Proof and Processes of Climate Change

5:15pm – 7pm Dinner, on your own

7pm - 9pm Session 16: Open Colloquium, IEA Visioning Exercise

Room: Bill France A

Moderator: Members of the IEA Executive Committee and Advisory Board

Friday, July 10

7:30am - 8am Gather

Room: Foyer

8am - 9:45am Session 17: Climate Change

Room: Bill France A

Moderator: Susan Baker, NOAA

Discussant: Kevin Hickey, Assumption College

Eric Fitch What to do when the seas rise: Climate change, sea level rise and the nations of Oceania and the Pacific Rim

Kwaku Apau The extent to which climate change has exacerbated hunger, malaria and floods in sub-Saharan Africa

8am - 9:45am Session 18: Coast and Community Management Issues

Room: Bill France B

Moderator: Shobha Sriharan, Virginia State University

Discussant: Charles Simpson, SUNY Plattsburgh

Nekesha Williams Estimating Soil Loss from Two Coastal Watersheds in Puerto Rico with RUSLE

Abdulaziz Güneroğlu Riverine and Coastal Degredation in South Eastern Black Sea Caused by Pollution

Frederick Bradley Examining the Relationship between RUSLE and In-Stream Water Quality Parameters: A Statistical Approach

9:45am - 11:15am Session 19: Reframing the Economic Questions

Room: Bill France A

Moderator: Terence Centner, The University of Georgia

Discussant: Daniel Marien, University of Central Florida

Paul Barresi The Globe is Not a marketplace: Eco-Systemology, Environmental Sustainability, and the Market Economy Frame

Mary Richardson Circumscribing Regulation: An Ethical Analysis

M. M. Adhikary Paving the Way of Managing the Post-Tsunami Turmoil in the Katchal Island of Andaman & Nicobar

9:45am - 11:15am Session 20: Applying Community Wisdom to Management

Room: Bill France B

Moderator: Will Focht, Oklahoma State University

Discussant: Michael Reiter, Bethune-Cookman University

B. Thompson Community Management, Self-Interest, and Environmental Preservation in the Amazon

Amy Freitag Blue Crabs: Fishery Success Depends on Understanding Culture

Tinelle Bustam Managing Cultural Resources in Our National Parks for the Next 100 Years: Climate Change and Public Support as Modern-Day Challenges

11:15am – 12:30am Lunch, on your own

12:30pm – 2:15pm Session 21: Open Colloquium and Discussion

Environmental Systemology and Sustainability: A Summary of the First Roundtable on Environmental Science and Study

Moderators: Michael Reiter, Bethune-Cookman University

Will Focht, Oklahoma State University

2:15pm - 6pm Field Trip to Blue Spring

All registered participants should wear comfortable attire for sitting and walking. Meet in the hotel lobby.

**7pm - 9pm IEA Advisory Board and Officers' Colloquium, IEA
Visioning Exercise**

Room: Bill France A

Moderator: Paul Barresi

Saturday, July 11

**9am – 4pm Second IEA Roundtable on Environmental Systemology
and Sustainability (By Invitation Only)**

Room: Sand Piper

ABSTRACTS

1. KEYNOTE BIOGRAPHIES AND ABSTRACTS (*Presenter/Contact)

Matthew C. Harwell

Senior Ecologist

U.S. Department of Interior's Everglades Program Team

A.R.M. Loxahatchee National Wildlife Refuge

Boynton Beach, FL 33473 USA

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Dr. Matt Harwell, a sixth-generation native Floridian, is a senior ecologist working on issues related to Everglades protection and restoration, with a special interest on the integration of science for purposes of communication with managers and policy makers. He has worked in South Florida for nearly a decade on a diversity of ecosystems including seagrasses in Biscayne Bay, submerged aquatic vegetation in Lake Okeechobee (the second largest freshwater lake wholly contained within the continental United States), and the wetlands of the Arthur R. Marshall Loxahatchee National Wildlife Refuge. He presently serves as the Team Leader for a multidisciplinary monitoring, modeling, and research program examining water quality impacts in the oligotrophic Loxahatchee Refuge. In addition, he chairs an interagency, interdisciplinary team of senior scientists in a structured effort to systematically characterize the health and status of the South Florida ecosystem as part of the overall \$12+ billion Comprehensive Everglades Restoration Plan. He has served as an expert witness on the federal Consent Decree, the Everglades water quality lawsuit that remains the longest active federal environmental lawsuit in the United States. Dr. Harwell earned his B.S. degree in 1994 from the University of South Florida – Tampa and his Ph.D. in Marine Science (in seagrass ecology) in 2000 from the College of William and Mary's Virginia Institute of Marine Science.

Keynote Address:

Transdisciplinary Science and Adaptive Management to Protect the Northern Everglades*

As in many ecosystems, scientific research in the Florida Everglades has evolved from a single-to a multi-disciplinary focus. For more than a decade, extensive efforts have been undertaken to serve up science relevant to planning large-scale ecosystem restorations. However, only recently have integrative ecosystem assessments been initiated to provide managers with the technical information needed to make decisions based on adaptive management. It has become increasingly clearer that, in addition to describing *what* is the status and health of an ecosystem, scientists must understand and describe *why* the status and health is what it is at a given time.

In the northern Everglades, a 58,320 ha wetland (the A.R.M. Loxahatchee National Wildlife Refuge) is circumscribed by 100 km of canals with a direct overbank connection to the marsh, creating a floodplain wetland environment. In this part of the Everglades, more attention is being paid to preservation and conservation efforts than explicit restoration activities. There are unique management challenges in this last remaining soft-water portion of the greater Everglades ecosystem, where water quality and water quantity are dominant drivers. Over the past five years, a team of ecologists, wildlife biologists, hydrologists, water quality experts, and modelers from a number of different agencies have established an integrated monitoring, modeling, and

research program at the Loxahatchee Refuge. A transdisciplinary theme evolved through the development of innovative ways to examine linkages between hydrology, water quality and ecology. Integration of these components has increased scientific understanding of historical conditions, improved our capability to best manage real-time hydrological changes in an adaptive management environment, and supported proactive planning efforts to best protect the resources of the northern Everglades.

* The opinions expressed herein do not necessarily represent those of the U.S. Department of Interior or the United States Government.

2. CONTRIBUTED POSTER PRESENTATIONS (*Presenter/Contact) Alphabetical by Indicated Presenter.

Water Quality of Litani River in Lebanon

Hanafy Holail, Amr El Adwai, Hassan Hammud Dr. Rajaa Fakhoury, and Mahmoud Halablal
Beirut Arab University
Faculty of Science
Beirut, Lebanon
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The physical, chemical and microbiological quality of the Litani River that feeds eventually into Karoun Lake has been evaluated. Two highly polluted sites were noted. One site receives rubbish effluent and untreated sewage waste from many towns and villages. The dissolved oxygen (DO) value was as low as 1 ppm. Other organic pollution indicators values were high. These included sulfite (8.7 ppm) and sulfide (0.63 ppm) indicating anaerobic conversion of organic sulfur by bacteria. Phosphate level was also noticeably high (343 ppm) possibly due to excessive use of fertilizers. The second site also receives untreated municipal sewage and had chemical oxygen demand (COD) value >150ppm. Overall, both sites point to the prevalence of anaerobic conditions causing the liberation of toxic materials and hence affecting the environment. The presence of coliform bacteria (e.g. *Escherichia coli*) in a water sample indicates faecal contamination. Such bacterial counts were up to 4.85×10^2 cells ml^{-1} . These results concluded that the River water was heavily contaminated by sewage and, therefore, is likely to have pathogenic organisms of high risk to human health. The study highlighted the serious consequences associated with the release of untreated industrial chemicals and sewage waste into Litani River. This calls for an immediate halt of waste release and the establishment of treatment plants in strategic places to prevent/reduce any serious future health effects and to protect the environment.

Development and Evaluation of Dust-Fall Simulation Model: Dust Emission and Transport from Fugitive Particulate Sources

K. M. Lin and L. F. W. Chang
Graduate Institute of Environmental Engineering
National Taiwan University
Taipei 106, Taiwan
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Dust fall, solid particles in the air which fall to the ground under the influence of gravity, is a critical factor to realize the polluted consequence for larger particle pollutant. But there are few air quality models which can simulate it so far, the reason is that all the particle pollution sources, including the anthropogenic and natural ones, should be consider simultaneously. In Taiwan, owing to high density population and critical geography characteristic, dust

interjected into the atmosphere through anthropogenic and natural processes are both important sources, but there are few researches covering both these sources in details, especially on the fugitive emissions from wind entrained emission by dried riverbeds and wasted agriculture land. This needs a dynamical emission module to delicately assess the amount of emitted dust loads and the inference of air quality from these sources. Due to lack of soil parameters, like soil moisture and vegetation cover, the module was run in a dry mode. In conclusion, for lower dust concentration, this module is liable to overrate dust level, but its simulation of high dust concentration qualitatively followed the observations very well.

Evolution of an Ecological Ethic

Mary Snow and Richard Snow
Applied Aviation Sciences
Embry-Riddle Aeronautical University
Daytona Beach, FL
snowm@erau.edu

This research outlines the evolution of the western view of the environment. Initially described are the varying perspectives imported by Europeans, and we argue that the perceptions of land ownership, property rights, and the natural world provided the paradigm for the ecological value system that became established in the New World, including the view of nature as a commodity. We also portray the exploitation of the natural world during the Westward Expansion, and the conservation movement that arose partly in response to that exploitation. Finally, we propose that the environmental movement today has an enormous advantage in that we are firmly planted in an Information Age. The personal computer eases participation in the political process by allowing citizens to monitor the status of legislation, the environmental voting records of elected officials, and to send immediate electronic or phone messages to their representatives. The good will of the American people can become the political will of the nation by remaining informed, by diligent support of environmental organizations, and through political activism that reflects an evolving ecological ethic.

The Proof and Processes of Climate Change

Rich and Mary Snow
Applied Aviation Sciences
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Since what we call civilization began some 6000 years ago, the mean temperature of Earth has not varied more than 1°C from the average. The forecast change in temperature of from 1.5 to 4°C (2.7 to 7°F) by 2100 has no equal in the recent history of the planet. Changes in the energy output of the sun, changes in the relative position of the sun and Earth, shifting locations of the continents, mountain building, volcanic eruptions, and changes in atmospheric composition all combine to cause our climate to change. Most of the changes in climate of the past can be explained by a combination of these processes. However, none of these natural changes, individually or collectively, explain the rapid change now taking place on Earth. Now these processes must be considered together with the impact of the human species. The species has grown to such an extent in numbers, and in per capita footprint, that the entire planet is being altered. That this is the case is well demonstrated by the extensive surface changes created by human activity. For instance, it has been known for decades that the human impact in cities is so great that a new set of climatic conditions is created. Now we know that the climate of the entire planet, from pole to pole, is being altered. Such extensive change has the potential to move our planet to a new stage unknown in human history and to change the entire human economic and cultural systems. This research represents an attempt to understand what causes climate change in general and to offer specific proof regarding who is responsible for the current changes taking place.

3. CONTRIBUTED ORAL PRESENTATIONS (*Presenter/Contact)

Alphabetical by Indicated Presenter. Italicized means presenter had to withdraw.

Paving the Way of Managing the Post-Tsunami Turmoil in the Katchal Island of Andaman & Nicobar

*M. M. Adhikary**, *Kausik Pradhan*** and *Sudipta Banerjee****

Faculty of Agriculture
State Agricultural University
India

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The harsh and ruthless natural calamity like Tsunami in several coastal areas needs to be specially emphasized for rehabilitating the ecosystem in affected areas. Tsunami is one of the greatest natural calamities in this period of time, where water wave generated by the disturbance associated with explosive volcanism, seismic activity, resulted destroys several coastal ecosystems very ruthlessly. Amongst them one of the harshly Tsunami affected areas in India is Katchal Island. This island had considerable stock of marine life and was richly fringed by mangroves, coral reefs; sea grasses and sea weed eco-system. Many varieties of fish like sardine, tuna, barracuda, mullet, mackerel, star fish and flying fish; sea animals like shark, dolphins, whales and smaller marine animals like turtle, octopus and crabs were the indigenous marine assets of this particular coastal ecosystem. The course of the Tsunami had destroyed considerably all the structures that it came in contact with, including settlement, boats etc. thus resulting in excessive debris. This debris was then dumped as coastal pollutes and subsequently it polluted the total coastal water and affected greatly the active marine life. The present study had been conducted to assess the divergence and damage caused by Tsunami and to resolve the management strategy of post-Tsunami turmoil in this island, which can be incorporated in the policy for rehabilitation of the Tsunami victims. The study revealed the management strategies of Tsunami damage as removal of mud and silt from reef areas, removal of debris and other materials from ditches and mangroves areas, aforestation of deforested areas including mangroves and resettlement of coastal population in safer zones. After critically intervening the extent of damage, it is recommended that an Integrated Coastal Zone Management Plan (ICZMP) have to be constructed for initiating the restoration of balanced coastal ecology. Moreover, the coastal ecology and economy mainly depend on the marine fisheries. Due to Tsunami the extinction of marine fishes caused a great harm in the coastal ecosystem. The imbalance of coastal eco-system created a great problem and it should be resorted to resolve the problem by rehabilitating the coastal fishes in the particular Katchal Island to reenergize the coastal ecosystem.

Public Perception Based Biological Impacts Assessment for a Highway Development Project

M. L. Agrawal

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B. Maitra

Associate Professor, Department of Civil Engineering,
Indian Institute of Technology, Kharagpur (W.B.), India- 721302.
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Anita Agrawal

Reader, Chemistry Department
Lakhmi Chand Institute of Technology,
Bilaspur (Chhattisgarh), India- 495220

Road infrastructure plays an important role for economic development of a country. Highway development provides an easy access to goods and passenger traffic. However, it may have an adverse affect on the biological attributes (plants, sensitive plants, amphibians, mammals, reptiles and sensitive faunas) of the region due to increase in traffic volume. Assessment of impact on biological attributes is an essential component of environmental impact assessment (EIA) that is required for the planning of all major road projects. A methodology is presented in this paper for the quantification of impact on biological attributes based on the perception of people in the influence area of the project. A questionnaire was developed to collect the perception of public from different sections of the surrounding locality. The variation of impact with distance from highway is also modeled for each biological attribute. The spatial distribution of the impact is considered along with the intensity of impact in estimating impact values for different biological attributes. Aggregation of impacts on biological attributes is demonstrated with reference to a case study by considering the relative weights of different biological attributes.

Coastal shrimp farmer's perception on global climate change: an empirical evidence from Bangladesh

Dewan Ali Ahsan

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Bangladesh is likely to be one of the most vulnerable countries of the world in the event of climate change and sea level rising. It has been predicted that 17% land area of Bangladesh will be disappeared in the end this century. All the coastal area will be heavy affected by sea level rising. Coastal shrimp aquaculture contributes around 30% of world seafood production. Bangladesh is one of the ten largest shrimp producing countries in the world. Unfortunately, the coastal shrimp industries are suspected to very vulnerable to global warming and climate changes. Near about six million coastal shrimp farmers are at stake due to global climate change and sea level rise in Bangladesh. In this regard, it is very important to understand the farmer's perception about global climate change issues to formulate the proper risk management policy. So, the present study explored coastal shrimp farmers' perception on global climate change and data has been collected from Bangladeshi coastal shrimp farmers. We hypothesized that the coastal shrimp farmers' do not have clear perception about the global climate change and the impact of climate change on their agri-business. But our study shows that 90% farmers' are awarded about the global climate change though 41% of the respondents are illiterate and 37% of them are semi literate (educated up to class 5). A large number (71%) of farmers came to know about the global climate change issues from the television which indicates the national and private TV channels are playing significant role to let know the people about the climate change and sea level rise issue. Farmers' have perceived deforestation as the most important reason for global climate change which indicates that they have clear idea about the impact of vegetation in nature. The respondents indicate that depletion of ozone layer is the second most important reason of climate change but according to experts' view ozone layer depletion is not the direct reason of global climate change. 87% farmers think that global climate change has negative impact on their farm business. The respondents believe that outbreaks of shrimp diseases will be more frequent due to climate change and which will cause more production damage. Production losses due to increased storm-surges and increased sea temperature are also perceived as vital harmful events of climate change. However, a significant number of famers (11%) have no idea how global climate change will effect on their business and lives. On the hand, 75% farmers believe that it is possible to control the global change and sea level rise. They perceived that international and national governmental actions are the most important strategies to control the situation. Again, a large number of farmers (22%) have no idea the role of human being to control global climate change and sea level rise. In general, the present study indicates that the coast shrimp farmers' of Bangladesh have very clear idea about the reasons of global climate change and the consequences of the changed environment on their lives though most of them are poor and illiterate.

Critical Transportation Infrastructure Vulnerable to Natural and Man-Made Disasters: Case-Study

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The paper deals with vulnerability assessment of the Azerbaijan – Russian (AR) Critical Transportation Infrastructure (CTI). This transport corridor is located on a narrow (3-8 km) strip along the Caspian Sea. The width of the corridor and its density is defined by the relief of the region: Caucasian mountains on the west, and the Caspian Sea on the east. Due to various objective and subjective reasons there are a lot of vulnerable points on the corridor. The existing methods of the vulnerability assessment do not allow obtaining reliable results under conditions of multiparametric influence of natural and anthropogenic factors.

In report we offer a new tool for the vulnerability assessment of the environmental/energy security – it is a case study examining the role of remote sensing and geospatial information technologies in CTI protection, specifically in the identification and preservation of AR CTI.

This sector is an important part of the “Silk Way” global infrastructure, the main elements of which are the Baku-Novorossiysk oil pipeline, the Mozdok-Kazimaged gas pipeline, international trunk-railways and highways, high-voltage electric lines, international communication lines, main water and irrigation lines etc. In other words, AR CTI plays extremely important role in economic sustainability of all Eurasia.

The essence of the space information processing based on a spectral brightness of the objects is often incorrect due to spatial changeability of the reflective characteristics of the ground surface classes, which is caused by randomness of geographical and climatic factors. The offered method of space images analysis brings to the forefront an accounting of the context information in the algorithms of pattern recognition. If there is a statistical correlation between contiguous items, it generates a local spatial context. The sources of the context information are located in the image itself, being represented as a set of rules of the spatial organization of the elements at definition of the ground surface objects. Use of methods of the fractal analysis and various Wavelet-transformations allow increasing the accuracy of the space information recognition.

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A Comparative Analysis of the Palestinian Territories Technical and Financial Water Resources Management Indicators

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The research addressed water resources management in the West Bank and Gaza Strip from 1999 to 2002. Despite the fact that both regions are considered part of the Palestinian Territories there are tremendous differences between the West Bank and the Gaza Strip in water resources management. Most municipalities showed a deficit in the water sale in the Gaza Strip compared to the West Bank. The majority of customers owed money to their respective municipalities from 1999 to 2002. The percentage of revenue collections declined in the same four-year period in the West Bank and Gaza Strip. One exception was the Gaza Strip in 2000. Overall, the unit profit for the municipalities was negative for the Gaza Strip and positive for the West Bank in 2001 and 2002. This is an indication of the average for all of the municipalities studied in the West Bank and Gaza Strip regardless of the size of the municipality and the population served. The specific water consumption has been steadily increasing in the Gaza Strip and decreasing in the West Bank. Nevertheless, in both West Bank and Gaza Strip municipalities, the specific water consumption has been than the World Health Organization recommendation of 100 liters per capita per day.

The extent to which climate change has exacerbated hunger, malaria and floods in sub-Saharan Africa

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With the increased incidence of malaria, floods and hunger, the topic open to debate is whether climate change has brought them in its wake. The answer to this question is of interest to sub-Saharan African nations whose economies depend heavily on climate-sensitive sectors (agriculture, pastoralism, fisheries and forestry). Being the least able to adapt to global warming, this region has borne and will continue to bear the brunt of climate change due to their inability to adopt or compensate for it in terms of food imports, investments in healthcare delivery and the successful relocation of migrants. It is the opinion of many people and the conclusion of some investigations that there is discernible evidence that climate changes being accelerated by human activities has increased the incidence of malaria, hunger and floods. Such conclusions are based on studies analyzing the increase or otherwise of the tropospheric temperature, reductions of the polar ice cap, increase in thunderstorms and the statistical increase in extreme weather events in many countries. This study is an examination of data to establish a connection between climate change and the incidence of malaria, floods and hunger and the prognosis. Measures needed by countries in the said region to counteract the negative effects of global warming have also been outlined in this paper. Results indicate that the overall trends regarding malaria and hunger show some consistency but the link between climate change and flooding is not clear cut since there are so many factors contributing to floods.

In this research, data on climatic conditions, food aid deliveries and malaria incidence of a 10 year period (1995-2005) were collated from The African Rainfall Temperature Evaluation System (ARTES), World Food Programme (WFP) and World Health Organization (WHO) respectively.

Household Solid Waste Handling and Disposal Methods in Third World Cities: Case of Ibadan Metropolis Environmental and Health Impact

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Inadequate provision of solid waste management facilities in Third World cities results in indiscriminate and unsanitary environments, which threatens the health of urban residents.. The study reported here examined household-level waste management and disposal methods in the Ibadan Metropolitan Area, Nigeria. The residents of Ibadan currently generate large amount of solid waste, beyond the management capabilities of the existing waste management system. Because the solid waste infrastructure is inadequate, over 80 percent of the populations do not have home collection services. Only 13.5 percent of respondents are served with door-door collection of solid waste, while the rest dispose of their waste at communal collection points, in open spaces, and in waterways. The majority of households store their waste in open containers and plastic bags at home.. Waste storage in the home is associated with the presence of houseflies in the kitchen ($r = .17, p < .0001$). The presence of houseflies in the kitchen during cooking is correlated with the incidence of childhood diarrhoea ($r = .36, p < .0001$). Inadequate solid waste facilities result in indiscriminate burning and burying of solid waste. There is an association between waste burning and the incidence of respiratory health symptoms among adults ($r = .25, p < .0001$) and children ($r = .22, p < .05$). Poor handling and disposal of waste are major causes of environmental pollution, which creates breeding grounds for pathogenic organisms, and the spread of infectious diseases. Improving access to solid waste collection facilities and services will help achieve sound environmental health in Ibadan.

Evaluation of Tea (*Camellia sinensis*) Gardens Potential for Eco-Tourism in South Eastern Black Sea Region

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Tea is one of the most important industrial plant product in Turkey and very critical income source for living in South Eastern Black Sea. Due to high population growth and inaccurate landuse planning, tea gardens faces an unwanted fragmentation and economic losses are rising. Moreover, Tea cultivated gardens are essential link between coastal and mountain ecosystems in this region and their maintenance are very crucial for landscape ecology. To reduce the fragmentation of the tea cultivation areas and find a new income tool, tea gardens can be modified and replanned to serve for international tourism. In this study tourism potential of South Eastern Black Sea Tea Gardens were surveyed by using questionnaire with landowners and local inhabitants. Early, results are very encouraging for this spectacular region. Some other infrastructure issues such as accommodation, transportation regarding tourism potential were also stressed. Ease of combination different types of holiday facilities in the region adds positive value for this project. Furthermore, specially designed tea gardens show high visual amenity which is another important issue in terms of landscape design concept.

**Integrated Ecosystem Assessments:
A tool for bridging science and ecosystem management**

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Balancing multiple and potentially competing uses requires managing at the ecosystem level. Ecosystem management, in turn, requires understanding the goals or desired uses for the ecosystem, understanding how the multitude of potential uses affect each other, and finally managing to optimize among ecosystem goals. A scientifically based tool that integrates what we know about the human and non-human dimensions of the ecosystem could assist in the goal setting process, in determining ecosystem health, and in predicting how proposed uses will affect ecosystem health and the costs and benefits associated with those changes. This tool is the Integrated Ecosystem Assessment (IEA). IEAs formally bridge science and management, applying the best existing scientific information to provide an improved scientific basis for managing competing uses for the holistic benefit of an ecosystem. They can drive a paradigm shift from considering impacts of a single use in isolation to considering how a collection of proposed uses will affect each other. This talk applies an IEA framework to a hypothetical ecosystem to demonstrate its utility in addressing how three competing human uses will affect the system's health. The process begins with identifying an overarching question, in this case: *Is Ecosystem X healthy?* The IEA approach provides, for the first time, basic decision making tools to support an ecosystem approach to management. It is a process and a product that results in managers and regulators having the scientific know-how and political will to restore and maintain coastal ecosystems so that they support desired functions and uses.

**The Globe is Not a marketplace: Eco-Systemology, Environmental Sustainability, and the Market Economy
Frame**

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Frames are the cognitive devices that enable human beings to organize and interpret experience by answering the questions, "What is going on here?" and, implicitly, "What should be the response?" Most social scientists credit sociologist Erving Goffman with inventing the concept, but Goffman credited Gregory Bateson with using the term in a similar way. By answering the questions, "What is going on here?" and, implicitly, "What should be the response?", frames perform both descriptive and prescriptive functions. They also serve as focusing mechanisms,

directing our attention toward some aspects of experience and away from others, and implying the appropriateness of some response options and the inappropriateness of others. Many frames are metaphorical concepts, which students of linguistics and cognitive psychology have recognized are the basis for much of human thought. Every metaphor has two components. The *subject* is the phenomenon to which the metaphor is intended to impart meaning. The *referent* is invoked to supply that meaning. By linking the subject and the referent, a metaphor suggests that the attributes of or relationships that involve the referent are also attributes of or relationships that involve the subject. As frames, metaphorical concepts answer the questions, "What is going on here?" and, "What should be the response here?" (with respect to the subject), with, "The same as what was going on there" and, "The same as the response was there" (by reference to the referent). The policy sciences in the United States have come to be dominated by a market economy frame, in which the policy-making process is framed metaphorically as an economic system driven by the transactions of rational, self-interested, autonomous individuals. Policies are merely the aggregate expression of individual self-interests, which the frame assumes as given. Even proponents of sustainability have adopted the market economy frame, despite the derivation of the sustainability concept from the concept of sustainable development, which emerged in the 1980s as a reaction to the pernicious effects of neoliberal economic theory as the dominant force in development theory and practice since the end of World War II. One of the most serious flaws of the market economy frame is its neglect of ideology and culture as important factors in the policy-making process. This paper explores the dominance of the market economy frame in the study and practice of environmental policy-making, and proposes frame transformation as a solution to its neglect of ideology and culture. From a sustainability perspective, the result would be an eco-systemology of the policy-making process, in which the dynamic interaction of all factors of relevance to the environmental sustainability of public policies would be taken into account.

Developing Sustainable Campuses: Strategies for Integrating Sustainability into the Academic Curriculum

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Over the past decade, universities throughout the country have made significant advances in implementing sustainability initiatives in campus operations. Paradoxically however, despite the importance of teaching and research in developing solutions, recent evidence suggests the academic sector has lagged far behind campus operations when it comes to environmental performance and sustainability. Although degree programs and course offerings in environmental fields continue to increase, less than 5% of colleges require all students to gain exposure to sustainability in the general education curriculum and students are less likely to be environmentally literate when they graduate than their predecessors (Coyle et al., 2008). This paper examines some of the reasons underlying this discrepancy and explores strategies and best practices from universities throughout the nation for creating curriculum opportunities for all students to acquire an understanding of environmental sustainability concepts. Results of a curriculum inventory at St. Edward's University are compared to national results and suggest that despite the limited opportunities available, students support greater exposure to sustainability in their education.

Climate Change and its Impact on Nepalese Agriculture

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Exponential growth of CO₂ and other greenhouse gasses in the atmosphere is causing climate change. It affects agriculture, forestry, human health, biodiversity, snow cover and aquatic to mountain ecosystems. Changes in

climatic factors like temperature, solar radiation and precipitation have potentials to influence crop production. Despite many efforts possible on combating impacts of climate change, there are still difficulties in Nepalese agriculture. With an average of 0.06°C/year, a rise in temperature from 1975 to 2006 by 1.8°C has been recorded in the country. Problem of frequent drought, severe floods, landslides and mixed type of effects in agricultural crops have been experienced in Nepal because of climate change. Study done on CO₂ enrichment technology at Khumaltar revealed that the yield of rice and wheat increased by 26.6% and 18.4% due to double CO₂, 17.1% and 8.6% due to increase in temperature respectively. A crop simulation model (DSSAT) to study the effects of CO₂, temperature and rain in NARC showed positive effect in yield of rice and wheat in all regions, but negative effect in maize especially in Terai. In Nepalese agriculture, the time has come for the authorities to find out adaptive measures to mitigate the effects to reduce untold natural calamities and miseries due to recent erratic weather pattern.

Implementation Results of the Curriculum of the Soil Science School

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Soil Science School Project has been put forward by the collaboration between Agriculture Faculty and the Faculty of Educational Science of Ankara University within the framework of “TUBITAK stand by Programme for Science and Societal projects”. Project was initiated in June 2007 and aimed at getting fourth class elementary school students become acquainted with soil and raising awareness of the importance of soil and its conservation. Curriculum developed is active learning and activity – based, and student – centered in kind. Curriculum involves activities which require the use of skills such as searching, inquiring, questioning, and problem solving building relation so that students can develop positive attitude towards science and environment. The content of Soil Science School comprises basic questions such as “What is soil? , why is it important?, what are minerals and rocks?, how do soil form?, what are soil properties?, what are the relations of soils with living organisms?, what is soil erosion?, what are the results of soil erosion?” The objective of this research is to introduce curriculum developed for ‘ Soil Science School Project’ and to share findings obtained from the implementation carried out in this framework. In this paper, the content and main outputs of the curriculum, activities of teaching learning and assessment evaluation have been introduced. Evaluation forms for educational activities, student questionnaire, knowledge test and analyses of collected data have also been submitted. 200 students participated to pilot implementation, the main involved 208 elementary school students. This paper has treated of main implementation process merely. General assessment of finding obtained from the project revealed a significant difference between pre – test and post test results delivered from Soil Science School Knowledge Test. The difference was in favor of post test results. This suggests that the foreseen outputs of the projects have been devoted to students. Student’s responses to questionnaire also show that students got utmost benefit from the curriculum. Student questionnaire, assessment form of educational activities which are other data collecting means are being analyzed. These analyzes will be treated of in the main paper.

A Survey of the Endemic Snail Populations of Blue Spring, Florida in Relation to Potential Drivers Negatively Impacting their Habitat

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By virtue of its historic overall quality, relative isolation, and continuous outflow, Blue Spring in Orange City FL has become home to the endemic Blue Spring Hydrobe (*Aphaostracon asthenes*) and Blue Spring Pygmy Siltsnail

(*Floridobia parva*). Both are threatened species and are candidates for federal listing with some evidence of vulnerability but with limited data to justify listing. We have recently performed surveys of the snails' densities and abundance, and results to date indicate that the populations have lower densities and narrower distributions compared to similar surveys performed in 1992-1993. Standard area substrate and filamentous samples were taken via snorkeling, and the snail populations evaluated and counted by eye and with hand lenses and microscopes. Potential explanations for our observations include a lack of the snails' apparent preferred habitat (long algal filaments) and inhibition of the development of new refuge areas for the snails. Factors hindering the development of long filament habitat appear to include impacts from visitors' recreational use of the spring run, the increase in manatee numbers over recent years, and the recent introduction of exotic species such as the Vermiculated Sailfin Catfish (*Pterygoplichthys disjunctivus*). Other potential factors compounding the stress to the system include chemical changes to the waters of Blue Spring and the St. John's River from direct spilling or dumping, runoff and flow rate changes from land use in the recharge basin, and/or seepage of chemicals into the groundwater source for Blue Spring. Considering these, we seek to understand how the drivers have impacted Blue Spring and its rare snail populations.

Examining the Relationship between RUSLE and In-Stream Water Quality Parameters: A Statistical Approach

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The effects of terrestrial environments acting as a sediment source have been widely studied. In addition, the presence of such sediment as a nonpoint source of pollution in aquatic sinks has also received much consideration. This study intends to examine such a source-sink association in the Manatee Watershed located on Florida's southwest coast. Data for sediment yield for the watershed was derived from the Revised Universal Soils Loss Equation (RUSLE). RUSLE factors including: slope, precipitation, landuse/landcover, and soil erodability were used to calculate soil erosion potential on a cell-by-cell basis. Historical water quality data such as Total Suspended Solids (TSS) and color (when available) were used to link the source-sink relationships to the sediment yield. Ordinary Least Squares (OLS) regression analysis was conducted to examine the relationship between soil erosion, sediment yield and TSS. The research was conducted using integrated GIS approach including interpolation (Krigging) and OLS. OLS analysis was conducted using 3 sets of water quality data: 1) site specific measured data, 2) Krigged spatial data (estimated) and 3) randomly generated point data from Krigged surface. Two sets of land data (to model potential sediment yield) were used: 1) randomly generated point data from the cell-based RUSLE model and 2) area-based RUSLE values for the riparian zone. The results show that the predicted accuracy varied from model to model.

Managing Cultural Resources in Our National Parks for the Next 100 Years: Climate Change and Public Support as Modern-Say Challenges

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Contemporary issues confronting cultural resource management within the National Park Service (NPS) result in challenges to preservation and restoration. In particular, climate change affecting ecosystem dynamics and minimal public support for cultural resources influence strategies of cultural resource management. Such challenges to preservation and restoration of these resources may lead to permanent loss of historical understanding and landscape meanings associated with cultural resources; thus understanding the role of contemporary challenges to cultural

resource management is crucial for perpetuation of such resources. The purpose of this paper is to provide insight into contemporary cultural resource management issues and recommend strategies for future management consideration. Modern-day challenges to cultural resource management will be examined through inquiry of two case studies. Specifically, climate change and resultant natural hazards is apparent at Mount Rainier National Park. Recession of glaciers and ice melts with atypical seasonality has resulted in unpredictable mud flows and glacial flooding that place cultural resources at this site in jeopardy. In addition, minimal public support for cultural resources is a prominent issue with debilitating effects on cultural resources. This is evident at Indiana Dunes National Lakeshore where the almost forgotten Chicago World's Fair Century of Progress Homes are in dire need of restoration; however such preservation is limited by financial struggles. These examinations will illuminate specific challenges faced by NPS managers as well as current applied approaches to address these issues. In addition, recommendations for future management consideration will be discussed. Specifically, inclusion of traditional knowledge as well as hazard preparedness to address climate change challenges will be expounded. In addition, the role of public-private partnerships, enhancing archival collections, and interpretation to address public support for cultural resources will be presented. Sharing such information will provide insight to protected area managers across geographic scales and elucidate strategies for addressing such issues.

Raising Awareness of Sustainability: The Role of Education in Ecotourism Certification

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Ecotourism is a growing international tourism trend with unique demands on natural, cultural, and human resources. To ensure operations manage sustainably across environmental, socio-cultural, and economic dimensions, ecotourism certification programs implement operating standards. However, failure to raise visitor and local resident awareness on the importance of such practices may result in sustainability efforts becoming mere top-down policies and not the building blocks of a shared philosophy. Thus, the purpose of this study was to examine international certified and non-certified ecotourism operators' online promotion of educational values and practices to understand differences in efforts to raise awareness of sustainability. This study employed content analysis principles for data collection (Kaid & Wadsworth, 1989) and mixed methods analysis. Stratified systematic sampling techniques and utilization of pre-established criteria rendered sampling of 29.9% (227/759) of the population. Data were analyzed using domain analysis (Hatch, 2002) and logistic regression. The results suggest certified and non-certified ecotourism operators value education; however, educational practices to raise awareness of sustainability are inconsequential in predicting certification status. In particular, certified operators valued "education opportunities" while non-certified operators utilized education to "raise awareness." Additionally, practices to raise visitor and resident awareness were a significant predictor of certification status; however, R^2 values illustrate the negligibility of this result and suggest the influence of other ecotourism offerings holding more meaning in predicting certification status. Furthermore, the predictability of certification status based on educational offerings diverged with certified operators providing nature-based learning and non-certified offering culture-based learning. These findings question the merits of ecotourism certification program strategies for marketing standards of education and the relevance of education as a sustainability principle in certification. Education remains a critical element to ensure sustainability of ecotourism operators as well as a keystone of a shared philosophy between operators, visitors, and residents.

Legislatures Limit Confinement Conditions for Food Animals in the United States

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Livestock being produced for food are part of a multi-billion dollar industry in the United States. Legislatures have enacted laws governing health and environmental issues to ascertain that production meets socially desired standards. In the past seven years, ethical considerations have led five states to enact legislation concerning animal confinement. Florida enacted the first initiative concerning sow gestation cages. By 2008, California voters redefined not only acceptable dimensions for sow cages, but also for all farm animals, including chickens, and veal calves. This paper analyzes the legislative initiatives from Florida, Colorado, Oregon, Arizona, and California, and the effects they will have on industry and across state lines. Moreover, the legislation may lend support to new marketing efforts to brand meat products with attributes concerning confinement and other environmental attributes.

Sustainable travel and ecotourism in the Hawaiian Islands

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Tourism accounts for about a quarter of the State of Hawai'i's economy and nearly a third of its labor force. Hawai'i faces soaring energy costs, water shortages and degradation of native habitats, which are increasing the public's sensitivity to its economic dependence on tourism. While ecotourism would seem to be a niche market in which Hawai'i could leverage a leadership position, local participation to date, media representations, and collaborative research by University of Hawai'i at Manoa faculty and students indicate that the Hawaiian Islands have not achieved a potential leadership role for the promotion of sustainable travel. This presentation provides an overview of the results from a literature review, a content analysis of local media, including newspapers and websites, and the proceedings of stakeholder workshops on the islands of Oahu and Maui to discuss the current status of ecotourism practice and research. A proposed research agenda aims to assist Hawai'i and other tourist destinations looking to better understand and encourage sustainable development as a means of economic diversification and environmental conservation.

Options for beneficial re-use of drill cuttings in african developing countries – case study exploration area 2 of tullow uganda operations (pty) limited

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The African continent offers new unexplored and untapped onshore potential for the declining global oil and gas industry. However, with this new potential comes new challenges in the management of drill cuttings and waste fluids which together make up over 90% of all drilling waste. Nearly half of all African sub-Saharan nations are yet to establish full environmental management systems complete with effective legislation and institutions, Uganda is one such nation. Based on international case studies in water based mud (WBM) drill cuttings waste management, this paper proposes that such waste when proven non-toxic, can actually be reused beneficially to support development and poverty alleviation initiatives in Uganda through providing; daily landfill capping in municipal solid waste management, fertilizers in agriculture modernization, improved rural accessibility through better feeder road surfacing and cheaper brick making for improved construction alternatives. The paper also highlights the waste management hierarchy and alternative non-reuse cuttings disposal options such as; burial, land-filling, land-spreading, reinjection and incineration. The paper is unique in that it provides useful insights to government regulating agencies on how drill cuttings are managed globally, while also benchmarks Ugandan oil and gas industrial practices to internationally acceptable practices in WBM cuttings disposal and reuse.

Role of Algae in Bioremediation in Saltpans of Thoothukudi in the East Coast of South India

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Thoothukkudi is an industrial coastal town in the east coast of south India. It is also one of the major salt producing centers in the country. The coastal area and the sea are polluted due to urbanization, industrialization, domestic and commercial activities. Enormous volume of sea water is used in the saltpans for the production of salt and so a systematic investigation is necessary for knowing the status of water quality that is used in salt pans. Heavy metals are regarded as serious contaminants because of their environmental persistence, toxicity even at low concentrations and ability to be incorporated into the food web. Algae, the biomonitors, can accumulate the heavy metals and hence control water pollution. Among the various algae, Blue green algae form a microbial mat at the bottom, which can act as a soft tissue and effectively alter the property of surface structures of the sediments in the saltpans. An investigation was made to assess the impact of algae present in salt pans in absorbing the heavy metals. The heavy metal concentrations were analyzed at four stations and the rate of accumulation of heavy metals in algae in salt pans was also analyzed. It was observed that the concentration of Zinc is high among the heavy metals assessed. 17 Cyanophyceae, 6 Chlorophyceae and 22 Bacillariophyceae were identified in the saltpans and *Dunaliella salina* is found to be heavy metal tolerant species and so it can be used in saltpans as bioremediator.

Land and Soil (Earth) in the Holy Quran: How to protect and Maintain It?

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Attempt will be made in this paper to discuss land and soil (earth) in the light of the Holy Qur'an as well as its role in making a healthy environment by protecting and maintaining the land and soil (earth). The land and soil are considered as essential things for making a healthy environment. According to the Qur'an, the religious duties of man are not only to feed the poor but also to avoid polluting the environment. In other words, what is appreciable in the eyes of God is not only to be kind to human beings, but also to soil and land, air, water, plant, trees and animals, etc. The land and soil have a common characteristic, namely: they may be of continuous benefit to mankind if used wisely. The discussion on this issue will present a timely reminder in relation to the attitude of man towards land and soil (earth). The Holy Qur'an says: "A sign for them is the Earth that is dead: We do give it life and produce grain therefrom, of which ye do eat. And We produce therein orchards, with date-palms and grapes, and We cause springs to gush forth therein: that they may enjoy the fruit of this (artistry): it was not their hands that made this: will they not then give thanks? (Al-Qur'an, Chapter Yasin (36): 33-35).

Environmental Ethics: An Islamic Approach

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Islam plays an important role in preservation of the quality of a precious environment. This is because, according to Islam, not only Allah (s.w.t) has absolute sovereignty over man's life and death, but man has no dominion over his own life or non-human life. Man cannot act as owner over the environmental elements. This is one of the ultimate objectives of Islamic law that is to create a healthy environment. Each individual Muslim as well as Muslim community must honestly strive to develop and maintain a healthy environment. In this paper, attempts will be made to highlight the contribution of Islamic ethical discipline (adab) in protection of environment. In order to fit our discussion with the purpose of our central theme, that is, protection against environmental pollution according to Islamic ethics, it is necessary to discuss the Islamic concepts of al-mizan (balance) and man of adab. This is because they are among the important principles, which teach us how to behave and how to deal with the environment. We hope that the research will present a timely reminder in relation to the attitude of man towards his natural environment. Each individual must honestly strive to develop and maintain a healthy environment.

Human Influence on Coastal Ecosystem Management

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Populations of the majority of fish species showed drastic reduction over the past five decades in west coast of India. We conducted an intensive study of Aghanashini estuary for water quality and fish diversity in west coast of India. Total 108 fish species were confirmed. Coastal ecosystems are impacted by many stressors and are continually subjected to threats from multiple stresses imposed mostly by human activities predominantly as a result of increased population growth in India. The most significant categories of threats derive from water pollution from numerous sources including thermal effluents, heavy metals, oil, sewage, pesticides, pulp mills, habitat loss and degradation: overexploitation: eutrophication and misguided human perceptions. Wide array of prohibited fishing methods are rampant by using of insecticides as poisons, destruction and modification of habitats, dynamiting, using chemical and herbal poisons. Due to deteriorated water quality from anthropogenic activities fish diversity has drastically reduced. Pragmatic monitoring and prediction capabilities must also be built to provide further confidence that human impacts are being minimized. There is a need to develop a framework to integrate biodiversity effects methods with risk assessment methodology. Such integration will improve the basis for risk-based assessment of coastal health. To protect estuary and coastal ecosystems and the health of communities effectively, management infrastructure requires the tools and resources necessary to detect damage to estuary and coastal ecosystems and their components, identify causative agents, impose remedial action, and demonstrate that measures have been effective.

Thermodynamic and equilibrium study of Acid Blue 9 removal process over flower wastes

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Synthetic dyes are very challenging pollutants in wastewater treatment, due to its toxicity and high visibility. For their treatment, physicochemical and biological means have been probed. However, the physicochemical ones are often expensive and toxic sludge generating. Likewise, large scale becomes a difficult issue in biological treatments. In this study, flower stems were used as low cost adsorbents for the removal of acid blue 9 in solution, as an alternative of process integration. The effect of pH, adsorbent dosage, initial dye concentration and temperature over removal efficiency, were evaluated in batch systems. 90% dye removal was found at a pH 2. Complete removals were observed using 0.12 g of adsorbent and an initial dye concentration of 14mg/L. The equilibrium of the process showed a better fit to Freundlich isotherm, obtaining a maximum specific adsorption capacity of 3mg of adsorbed

dye/g of adsorbent. Thermodynamic studies revealed a value of -1,697 KJ/mol for Gibbs free energy, 0,007 KJ/mol K for entropy and 1,69KJ/mol for enthalpy, indicating an endothermic and spontaneous nature of the process. This study proves the potential of biosorption as an innovative and efficient process for the removal of complex molecules, as well as a practical example of integration process in flower industry.

Questioning Technology's Role in Environmental Ethics: Weak Anthropocentrism Revisited

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Philosophy of technology and environmental ethics have mostly been practiced as separate disciplines, only engaging each other in conversation sporadically when some pressing issue brings them together. Problems arise because, on the one hand, they are often intertwined, and on the other hand, they lack common ground for conversation. Philosophy of technology does not offer any schematic system of classification that allows us to build positions that are amiable towards environmental ethics. Yet, environmental ethics has many positions that are compatible with philosophy of technology. I argue that weak anthropocentrism suggests the possibility for a synthesis. Weak anthropocentrism is the view, defined very loosely, that humankind is the prime ethical focus around which a systematic approach to the environment must be built and yet the environment might deserve consideration. This position allows us to approach problems in technology as they relate to the environment because technology is strictly a human-centered affair. If we can make the claim that technology has embedded values, then we can agree that technologies have environmental values embedded in them, too. After all, human values have embedded environmental values. Even if the values embedded in technology do not mirror an image of environmental concern, nonetheless, they are a system of values, and they need questioning. The following discussion details how technologies more-or-less fall into one of two categories: technologies that are considerate of the environment and those that are not. I argue that we should favor the former in all of our technological undertakings because they respect nature's integrity, which is beneficial for a human-centered ethic. What is more, it is argued here that humankind can and should promote technologies that respect nature's integrity through research, development, and policy.

Climate Change and Salt Water Intrusion: Bangladesh Perspective

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Climate Change has already started to hit the Bangladesh coastal areas. The sea level along the Bangladesh coast is rising at about 3 millimeters a year, and the sea surface temperature is also showing a rising trend. The salty sea water intrusion and its disastrous effects in landscape, ecology and human health already created wide-scale agony amongst the inhabitants of Bangladesh coastal belts. Bhamia is a sea-shore village of Bangladesh situated adjacent to Patenge beach in Southern port city and district of Chittagong. The Global warming has a taste in this village. It is the taste of salt. Only a few years ago, water from the local pond was fresh and sweet. That quenched a habitant of the village Samit Biswas family's thirst and cleansed their bodies. But drinking a cupful now leaves a briny flavor in his mouth. Tiny white crystals sprout on Biswas' skin after he bathes and his harvests started shrinking as saline levels in the water went up. To cope, he followed the example of many of his neighbors and switched over to shrimp farming, a way to take advantage of the salty water washing over the fields. While the shift has enabled some villagers to survive, it has also created other headaches. Residents report an increase in health problems such as diarrhea, skin diseases and dysentery. The salty water has also choked many of the palm and date trees that once lent a fecund beauty to the sun-baked landscape.

Interlocking Crises: Arable Land, Fresh Water, Energy, Climate Change

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Speculation on solutions to global resource crises runs strongly through the academic press and the general news media: peak (oil) energy, fresh water depletion, soil/arable land loss, ozone depletion, global warming, global dimming, etc. What is often missed is the linkages between many of these problems. Commoner's First Law of Ecology is ignored. Solutions to one crisis rely increasing on exploitation of one of the other resources often exacerbating other environmental problems. For example, contemplation on energy and transition from fossil fuels often leads to biofuels, but biofuels especially those based on corn, soybeans and other food crops leads to soil depletion. Increasing food resources often involves increasing use of scarce water resources, oil and natural gas for fuel and chemicals (fertilizers, pesticides, etc.), and the soil itself. Solutions for increasing water resource availability involve taking water away from agricultural use. Other solutions for making "new" water resources especially reverse osmosis desalinization rely on relatively cheap, plentiful energy resources. This study will examine from a national and global standpoint what some of the more critical questions in this nexus of crises and what the implications are for creating solutions.

What to do when the seas rise: Climate change, sea level rise and the nations of Oceania and the Pacific Rim

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Globally, sea level is rising. Consensus holds that there's linkage to climate change. Whether demonstrated or not, sea level rise has been independently verified as occurring and accelerating. The coastal zones of most countries are areas of critical habitat, high primary productivity, and fragile geographies constantly in struggle against the sea. Coasts are also prime human habitat and locations for most global metropolitan centers, and highest population concentrations. In coastal countries which have a significant hinterlands, planning discussions generally revolve around what can be done to physically prevent loss of lands to the sea and/or where to retreat above the "rising tide". But, what if there wasn't higher ground? Many nations' topography are such that a rise of one meter results in the loss of most habitable land, and/or which makes what remains extremely susceptible to storm events. Vietnam and Bangladesh are being confronted with the loss of much of their habitable lands in less than 50 years if the rate of sea level rise follows the current consensus projections, and more recent data seems to indicate that sea level rise is accelerating. Kiribati and the Maldives have already lost islands to the sea. Nauru has to mine out its phosphate resources to fund an exodus. Niue, though unaffected by sea level rise, has lost most of its population due to related economic and environmental impacts. Even Australia will feel the effects; 95% of Australia's population lives within 60 km. of their coasts. Their interior is becoming progressively drier with climate change. Squeezed by this wet/dry dynamic, they watch another wave arise. In Oceania and around the Pacific Rim, questions are asked regarding a new Oceanic diaspora. Ecogeeks (environmental refugees) are already a recognized demographic phenomenon. Where will ecogeeks from these regions migrate once the sea overcomes their livelihoods? What can nations and international organizations do to help? With "refugia" like the U.S.A. and Australia tightening immigration policies, are there solutions?

Water Management Recommendations Derived from a Data Envelopment Analysis (DEA) Examining the Relationship Between Lake Water Quality and Natural Land

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The purpose of this research paper is to describe the water management recommendations derived from a DEA examining the relationship between lake water quality and natural land. The paper will briefly discuss DEA, a performance measurement tool typically applied in economic assessments, and the applied DEA methodology. After a description of the methodology and literature review, results from the study will be provided. Results revealed trends describing the interaction of nutrient loads, natural land area, and DEA lake performance ratings. In the context of this paper, lake performance is synonymous with lake water quality, specifically nutrient concentrations. Trends revealed by the DEA indicate that increased nutrient loads and decreased natural land area diminish lake performance. It was also identified that nutrient loads typically declined for lakes surrounded by more natural land. Recommendations derived from the DEA integrate water quality improvement tactics supported by an assemblage of disciplines. Natural land preservation presents itself as the most obvious strategy to protect water resources. The discussion of natural land preservation explores the legal channels available for conserving land based on water quality. Other land management techniques recognized for reducing nutrient loads such as wetland mitigation are then described. Water quality Best Management Practices (BMPs) are also recommended to reduce nutrient loads. BMPs developed by a variety of disciplines such as sociology, geography, environmental engineering and science, and hydrology are recommended to curb nutrient loads. Recommendations based on altering culturally engrained behaviors that contribute to diminished water quality are also suggested. The applied methodology and subsequent recommendations represent an interdisciplinary approach to identifying and resolving a water quality problem. Proposed recommendations are intended to improve water quality through an integrated application of techniques developed by a range of disciplines.

Blue Crabs: Fishery Success Depends on Understanding Culture

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Blue crab fisheries represent a large part of the culture of the mid-Atlantic states and an important economic opportunity. Their population is historically variable, a process not yet understood and explained by science. The traditional explanation offered by fishermen is often one of God's will, providing a bit of insight into the culture of blue crab fishery communities. Management strategies need to be sympathetic to this culture or the community will not find legitimacy in the regulations and likely not follow them. However, this cultural aspect of management is not always a hindrance in management; the close ties and dependence on the fishery make the community a source of information, monitoring, and creative policy suggestions. This study examines the policy framework and culture in the Pamlico Sound, NC already in place in order to address to new environmental threats to the fishery and estuary health. These threats include some familiar, such as overfishing, but also some new, such as chronic toxicity from pesticides and pharmaceuticals.

A Brandywine Sense of Place: The Science of Landscape through the World of Art

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Why do we relate to some landscapes and not others? What makes a particular place special? Landscapes are a function of their geology, climate, topography, soil, water, vegetation and fauna. Topography dictates the flow of surface and ground water, which, in turn shape the land surface. People are also an integral part of forming the

landscape, as the towns, buildings, roads, and pastures they create have become essential parts of the places we observe. Yet we may not realize how much our images of particular landscapes stem from those who depict them in artistic images. Such painters as Turner, Constable, Church and three generations of Wyeths captured not only images of the places they painted but their essence - the sense of place. Artists capture the shapes, tones, light and color that show the beauty of a location and evoke the emotional connection we feel for it. But there is more to a landscape than its beauty and more to understanding it than visual interpretation. And so, scientists describe the geology, hydrology and ecology that inform our knowledge of the natural history and current condition of the landscape. Taken together, the work of the artist and the scientist provides a deeper understanding and appreciation of the landscapes that we love. Yet for centuries, these two disciplines – art and science – have spoken different languages and over time their ability to communicate with each other has waned, oftentimes to the point where they do not speak to each other. The truth is, however, that artists and scientists share many characteristics. Both must be acute observers of their surroundings; both must pay close attention to detail as they design and execute their projects; and, most importantly, both must approach their work with flexibility, mental agility and creativity. The worldviews of art and science are not in conflict. They complement each other – and to truly understand the natural world, we need to embrace both. For three generations, the Wyeth family has been living and painting the landscapes of the Brandywine Valley in southeastern Pennsylvania and northern Delaware. For the past 40 years, the Stroud Water Research Center (SWRC) has been researching the water that forms and reflects the landscape in this region. In a unique collaboration, Jamie Wyeth and the SWRC have joined together to use both art and science to provide a deeper understanding of the Brandywine Valley. This paper seeks to document this collaboration by illustrating how viewing a landscape and its constituent parts through multiple lenses can enhance the understanding of unique environments. It will further investigate how the understanding of other landscapes can be enhanced by combining the perspectives of both visual arts and environmental sciences. Using this method to educate others will help create a greater appreciation of their watershed (landscape), as they come to more fully understand their sense of place.

In Support of an Ecosystem Esthetic: promoting carbon-neutral landscape practices by illustrating the links between the carbon and hydrologic cycles

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Humans have always had a deep emotional attachment to land. We yearn for the familiarity of home and select vacation destinations for their scenic beauty. This attachment to land often drives behavior. National and regional identities are forged and wars are fought over control of land. Our intimate relationship with the landscapes we occupy, however, can produce quite varied results. Do we live lightly on the land as stewards of the environment, or alter it to suit our needs and desires? The concept of humans as masters of their domain forms the foundation of much environmental degradation. Yet such powerful links between human values and environmental quality may also be enlisted to serve the cause of environmental stewardship, such as articulated by Leopold's Conservation Esthetic. Viewing Conservation Esthetics from a watershed perspective has led us to the Ecosystem Esthetic concept wherein energy flow and hydrology become fundamental components of land use decisions. Interestingly, in many areas we have grown more attached to our altered landscapes than to natural ones. We now prefer the image of turf grass lawns free of forbs over an untended woodlot; favor the view of "amber waves of grain" to that of native, tall-grass prairie; and find bucolic scenes of livestock standing in the stream as quaint reminders of our agrarian past. But human activities alter the landscapes to which we are so attached in ways that are not commonly understood, often with unintended negative consequences. For example, replacing forests with lawns and impervious surfaces alters the flow paths that storm waters take to streams and narrows stream channels. The cumulative effects of land development, changes the quantity and quality of stream waters, increase both the frequency and severity of flooding while reducing baseflows, incises stream channels, increases sediment loads and water temperatures, and deleteriously affects the structure and function of aquatic ecosystems. The Ecosystem Esthetic concept that we propose links changes in land-use and land-management practices at the local and regional scales to the increased contribution of terrestrial organic C to stream and river ecosystems. This framework places the global carbon cycle

at the center of landscape decisions and discussion challenges how esthetic preferences form and affect those decisions.

In the post-World War II years, the large-scale migration of people from urban centers into new, suburban developments began, resulting in the growing obsession that Americans have with their lawns. Lawns are now the norm in suburban and even exurban settings. However, it is not only the application of fertilizers and pesticides that make lawns the locus of adverse effects on water, but also the increase storm-water runoff from lawns themselves. Planners have predicted a 79% increase in the amount of developed land in the United States by the year 2025, nearly doubling the total developed area. Numerous studies have demonstrated the link between increased suburban development, changes in water quality, and increased runoff and adverse effects to both the carbon and hydrologic cycles. Although, increased urbanization may be inevitable, the way in which we elect to execute that development is not. We think of esthetics simply as personal preferences. However, they reflect our social and cultural values. Is it possible to alter them? It is possible for esthetics preferences to change, but to do so requires linking esthetics to other social values. In the case of an Ecosystem Esthetic, this will require linking ecosystem processes that result in water run-off to the mobilization of organic carbon and further, to current landscape practices. Public acceptance also requires presenting carbon-neutral alternatives that are pleasing in terms of the artistic design components of composition, color, and texture and will tap into the growing public demand for solutions that decrease human impacts on the global carbon cycle and emphasize the use of native vegetation.

Riverine and Coastal Degredation in South Eastern Black Sea Caused by Pollution

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Environmental degradation of coastal waters in South Eastern Black Sea is mainly caused by transportation and deposition of antropogenic waste resulting from river outflows. Despite environmental regulations protect the coastal regions pollution remains serious problem in this region. Due to geomorphologic properties the region has many basins with scattered settlement which triggers dry solid waste load on stream network which turns to accumulation of marine litter. Meterologic peculiarities are also important in this region in terms of flood timing and frequency. This study is on monitoring major stream drainage basins and reduction rate of visual amenities. Totally, 15 streams were surveyed to show environmental threats regarding wildlife. Main problems are stressed and possible solutions and implications are given to reduce pollution problem in coastal areas. Man made alterations of coastal areas are also evaluated in terms of aquatic living resources and pollution.

Threats to sustainable urban water production: Driving forces of Pollution in the Owabi watershed, Kumasi, Ghana

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This study was undertaken to identify the driving forces and sources of pollution in the Owabi watershed in the Ashanti Region of Ghana. This watershed houses the Owabi Wildlife Sanctuary and Ghana Water Company's Owabi Headworks which produces about 4.2 million litres of treated water for the Kumasi Metropolis and its environs. An inventory of all the major streams or rivers contributing water into the Owabi reservoir and all possible sources of pollution into the rivers was undertaken. Questionnaires were administered to the communities living in the watershed to gather information on the anthropogenic activities in the catchment. A desk study was undertaken as well as interviews with major institutions that are stakeholders in the management of the watershed. The Owabi reservoir is fed by the Owabi River which has tributaries that flow through densely populated areas, farmlands, and industrial areas. The pollutants are mainly organic from household waste and also chemicals from Auto Mechanics at the Suame Magazine and some farmers. The findings also indicate a lack of capacity, institutional co-operation, good planning and effective policy direction in the management of the watershed. This has resulted in the negligence of the threat that pollution of rivers in the Owabi watershed poses for the sustainable production of affordable, treated water. Communities in the watershed are expanding rapidly without any careful planning with the inhabitants seeing any stream as a means of waste disposal. Lands around waterways are either sold for housing development or demarcated as a refuse dump.

Can Biomass Power help us alleviate our energy needs and concerns? A Roundtable Discussion

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According to the Russel Gold (Wall Street Journal, 6/1/09, page A4), "U.S. energy forecasters predict that by 2030, biomass will generate 4.55% of the kilowatts consumed in the U.S., versus 2.5% for wind, with solar coming in behind both - though all three will trail the more established power sources of hydroelectric, nuclear, coal and natural gas." Although solar power and wind power are taking root in various regions in the USA, other places are turning to biomass (trees and grass) for producing renewable energy. Biomass power plants have been proliferating (booming) in the US: what are the implications of the boom for electric utilities? Greenhouse gases and carbon neutrality? The planting of specific crops? Ethanol and all the negatives / positives associated with it? Energy independence?

More accurate climate models for better prediction -- the case of the PRECIS model in West Africa

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In West Africa the climate has seen some of the most dramatic changes but it is also a region where climate models carry the greatest level of uncertainty. Designing an accurate climate model can be tricky. In many cases, while the models may be relatively accurate at the global level, they show important discrepancies compared to reality when applied at a smaller scale. Selecting the correct climate model therefore requires careful data comparison and analysis. In the case of West Africa, the few climate models that have been applied to the region so far have, for example, widely underestimated the rainfall amount. Predicting future trends based on observations is not an easy task. Rain occurs in West Africa in small mesoscale range for the global models. The solution is to use nested models - regional climate models linked to the global climate models. However, only a few regional climate models

have been applied to the West African region so far and all have underestimated rainfall amounts in the subsahelian countries of the region. In order to find a more realistic climate model, I have worked on validating the PRECIS model over West Africa. This study focuses on the ability of the PRECIS model to capture the mean climate characteristic of West Africa. The results of this study will be used to build a future climate change scenarios over West Africa. The results have been positive: the annual rainfall over the three test countries, Burkina Faso, Ghana and Mali, is only slightly overestimated by the PRECIS model compared to what was observed in the field, and rainfall in Southern Ghana is slightly underestimated. Furthermore, the regional annual cycle of rainfall and heavy rainfall locations are well captured.

Ranking New Zealand river values – a novel approach to managing the ‘chalk and cheese’ problem

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Regional councils have the task of sustainably managing rivers and their flows in New Zealand. In trying to achieve this task they face enormous challenges including the need to allocate flows amongst often highly disparate in- (e.g., angling, kayaking, native fish and birds) and out-of-river (e.g., irrigation and hydro energy) values/needs. To aid in this task these councils need to know which rivers or parts of rivers are relatively more or less important on national, regional and local bases, for particular values. Given limited information availability for many values, and no overarching policy or decision framework, this task becomes even more challenging. In this paper I report on a government funded (and less than 1-year long) project which has developed a multi-criteria and expert panel based approach to standardise a methodology which is then applied to a wide range of values to produces lists of rivers by value according to their national, regional and local importance. The methodology is described and example applications to salmonid angling and birdlife given. The need to ‘buy-in’ multi- and, ultimately, interdisciplinary participation is emphasised as well as a range of ongoing implementation challenges.

Boater Compliance with Manatee Speed Zones on the St Johns River

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In Florida, the endangered West Indian Manatee (*Trichechus manatus latirostris*) is negatively impacted by a variety of factors, although watercraft strikes are the single greatest cause of manatee mortality. To facilitate recovery of the species, the Federal Manatee Recovery Plan focuses on reducing watercraft-induced mortality through boat speed regulatory zones, educational programming, and other interventions. Manatee protection in Florida by means of manatee speed zones remains a controversial issue and compliance within these zones has generally been shown to be poor. Although waterway markers are standardized to communicate proper boating behavior, vessel operators report a high degree of signage, and hence behavioral, ambiguity. Educational outreach regarding manatee conservation and boat operation has also been shown to be mostly unsuccessful. Confounding the issue, vessel compliance/non-compliance within conservation zones is highly site-specific, though little is known of what this site specificity means to the overall goal of manatee protection. Analogously, highway planners and terrestrial law enforcement employ a variety of traffic-calming techniques in crash-prone areas, several of which could be considered for use in critical manatee habitat. This study examined vessel speeds (n=1669) in one idle and one slow speed manatee zone on the St. Johns River near DeLand, Florida in summer and fall of 2006. Additionally, hull registration numbers of observed watercraft were used to facilitate a mail survey for evaluating self-reported compliance and boater assessment of on-water signage. Compliance varied by site, vessel length and presence of law enforcement, and although most respondents self-reported full compliance with speed zones, full compliance

was exhibited by only 45% of observed vessels. Furthermore, boaters' assessment of on-water signage suggests that either existing signage needs to be improved, or different modalities evaluated for their effectiveness.

Collaborative Teaching and Ecological Literacy

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Abstract: After examining Walt Whitman's "This Compost" in the context of the whole of Leaves of Grass, we see how this poem is an example of nature as teacher for the American nation recovering from the carnage of the Civil War. In order to understand the literal idea of the symbolic compost, we describe the scientific process and interpretation as the students explore it in a series of brief laboratory exercises devoted to the actual process of leaf litter decomposition and application of decomposition products to growing wild rye plants. Combining both science and literature enriches an understanding of the actual ecological process of organic decay. The beneficial aspect of compost to plant growth is synonymous with Whitman's renewal for the individual, the local environment, and for the entire American nation after the Civil War.

Reading the Landscape: Prairie Education through American Literature

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How can studying prairie ecology and natural history help with reading American literature based on a landscape that is no longer widely available? How can studying the literature help in prairie restoration? Literature from the various western perspectives describes prairie ecosystems and their eradication for farmland. Many contemporary readers and some PhDs in literature lack the knowledge of the natural world that is present in the narrative of these earlier authors. Interdisciplinary collaboration can help readers understand the metaphors inspired by the lost landscape. In Iowa and neighboring prairie states many efforts have been undertaken to create public awareness of what was lost and to provide roadside and larger prairie restorations. Still mainstream Iowa and America in general have been slow to realize the importance of prairie. As a teacher of environmental literature and nature writing and an Iowan, Mary had never seen a prairie and had much to learn about the "vista" so many authors described. We needed a reader who knew the tallgrass prairie. Stephen Johnson, whose PhD is in Plant Ecology from Kansas State University agreed to help us understand the landscape described in the literature. For instance, so that we could visualize the Iowa landscape before the steel plow was invented in 1837-40 (Weaver 172), Stephen showed us slides of the vast Konza prairie, near Manhattan, Kansas which survived because its rocky soil inhibited even the steel plow. Stephen's photographs and research experience on Konza Prairie Research Natural Area (now Konza Prairie Biological Station) are particularly significant as Konza is a long term biological research area where the vista was saved. Konza Prairie is 3,487 hectares of nearly virgin prairie—with only some parts significantly grazed (Knapp et al. 7). Diversity prevails in a healthy prairie: researchers have found 529 species of plants on Konza (80). It was on Konza that Stephen studied the effects of fire on prairie cordgrass (*Spartina pectinata*), diversity of spiders in wetlands, and the effects of fire on a prairie orchid (*Spiranthes vernalis*).

After some background on prairie natural history, we continue the prairie unit with a chronological approach, tracing the changes in the prairie landscape as reflected in the literature by authors such as Lewis and Clark, George Caitlin, Washington Irving, William Cullen Bryant, Walt Whitman, Willa Cather and Aldo Leopold. We also include contemporary works such as biologist Daniel Botkin's *Our Natural History: The Lessons of Lewis and Clark*. Botkin retraces the tracks of the expedition and the prairies of Spirit Mound; he also emphasizes America's need for prairie and an understanding of its natural history. We culminate the unit with poems and music ("Broken Ground"

written for Iowa's Sesquicentennial in 1996) which describes the loss of the prairies in 150 years. Now one-tenth of one percent remains in a state that was once 85 percent tallgrass prairie. In addition to addressing regionalism and the local color associated with the prairie landscape, we mention the reading process and how background or a disciplinary lens shapes meaning. The literature can be a catalyst for approaching "environmental literacy" through the humanities (Orr 86). As John Elder writes "Rather than assuming that science and the humanities must remain forever discrete, environmental education needs more boldly to inhabit the ecotone where they join and commingle, where something new may evolve" Introduction to *Stories from the land* 8). Joining prairie education with the works of American authors can help in understanding the literature and give readers glimpses of this greatly diminished ecosystem. Reciprocally, the literature can inspire readers to respect and perhaps even restore prairie to what Walt Whitman calls these "prairie states" (*Leaves* 402).

Seismic Hazard in Himalaya and surrounding regions

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The Himalaya, one of the most seismically active mountain ranges of the world, evolved as a result of the collision between Indian and Eurasian landmass ca 50 Ma ago. The Himalaya has been the locus of some of the world's devastating earthquakes during the last century. A detail analysis of geological investigations and seismic studies clearly suggest that the Himalayan arc is accumulating significant amount of stress/strain along the basal décollement which will be released through the possible future great earthquake ($M > 8$). Seismic hazard map of south Asia further indicate that the Himalaya region located in high to very high hazard zone where most probability to occurrence of one or more great earthquake within a 100 years. The frequent moderate and major earthquakes pose great hazards to human life and infrastructure in the Himalaya and surrounding regions. At present, about 50 million people are at risk from future Himalayan great earthquakes, most of them live in towns and villages in the southern front of Himalaya known as the Ganges plain. The big capital cities of India, Nepal, Bhutan, Bangladesh, and Pakistan as well as other major cities with more than a million inhabitants and billion's of property are vulnerable to damage from possible great Himalayan earthquakes. Therefore, appropriate long-term strategy for public awareness as well as enforcement of infrastructure code to mitigate the hazard should be essential for sustainable development for the region.

The prospect of transforming 'organic' and 'sustainable' from a marked alternative to the norm: Lessons from the nonsexist language reform movement

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On the surface, any increase in the amount of talk about organic items and sustainable approaches may seem purely beneficial, but our language use also signals a problem: *organic* and *sustainable*, as words and as conceptual items, signal categories that stand out due to their contrast with the norm, the default: food that is not necessarily organic, activities that are not necessarily sustainable. This is called **markedness**: *organic* and *sustainable* are marked alternatives. One of the criteria for markedness that they meet is referring to fewer types of entities than the unmarked options do. For example, if we have two organic apples and one that is not, we can say *Here are three apples* (because the unmarked *apple* can refer to both types of entities), but not *Here are three organic apples*. As a result of other characteristics, marked variants are also less frequent: fewer than 3% of instances of nouns synonymous with *food* are modified by *organic* in two commonly analyzed text collections. Could *organic* and *sustainable* become the norm? Changes in markedness do occur, reflecting cultural changes. The introduction of e-mail brought the term *snail mail*, showing that the previously unmarked category of paper correspondence is now

marked. Similarly, the Tenejapa Tzeltel of Mexico extended their indigenous word for *deer* to refer to sheep, and then modified it into a term translatable as *wild sheep* to refer to deer. Feminist language reform is even more relevant as a precedent for an attempt to change markedness (e.g. objecting to *woman doctor* on the grounds that female doctors should not be a marked category) for promoting social change. There are complications to address: research shows that adopting nonsexist language does not necessarily change how people think; also, the goals of feminist language reform and green language reform are not parallel.

Occurrence, Fate and Environmental Impact of Pharmaceuticals and Personal Care Products (PPCPs) in Drinking Water

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In recent years there has been growing concern over emerging pollutants such as pharmaceuticals and personal care products (PPCPs) in water sources. These emerging pollutants include many commonly used drugs, such as antibiotics, anti-depressants, birth control pills, seizure medication, cancer treatments, pain killers, tranquilizers and cholesterol-lowering compounds. In addition to drug companies, hospitals and clinics, other major sources of these chemicals include improperly disposed unused medicines and human excreta containing incompletely metabolized medicines. Farm animals are also sources of pharmaceuticals entering the environment, due to the increasing use of hormones, antibiotics and veterinary medicines. In addition, personal care products are increasingly being detected in water. These chemicals include active ingredients or preservatives in cosmetics, toiletries, fragrances, as well as sun screen agents.

Upon entering into the environment, these emerging pollutants undergo different chemical and biochemical processes, such as biodegradation, and chemical and photochemical degradation, which generally result in their degradation in the environment. However, it has been found that some of the chemical or biochemical processes may lead to products that exhibit different environmental behavior and ecotoxicological profile as the original pollutants. In some cases, the reaction products may exhibit greater toxicity, or are more persistent in the environment than their corresponding parent compounds. Furthermore many of these chemicals are not removed effectively by conventional sewage or water treatment facilities, and eventually end up in drinking water supplies. Currently there is a lack of understanding of the risks posed by chronic exposure to trace concentrations of pharmaceuticals and PPCPs to humans and wildlife. One group of drugs which have caused particular concern are the ones which have the potential of interfering with hormone production, i.e. endocrine disrupting compounds. These chemicals have been found to cause a variety of endocrine-related effects in fish and wildlife, including deformities and embryo mortality in birds and fish, impaired reproduction and development in fish, abnormal reproduction in snails, depressed thyroid and immune functions in fish-eating birds, and feminization of fish near municipal effluent outlets. Another group of pharmaceuticals of growing concern are antibiotics released into waterways. The reason is that their release into the environment may result in disease-causing bacteria to become immune to treatment, and consequently drug-resistant diseases may develop. To fully determine and understand the occurrence, fate and environmental impact of pharmaceuticals and PPCPs, we conduct interdisciplinary and integrative collaborative research involving experts from many fields, including chemistry, biology, environmental sciences, and water management organizations and authorities.

International Trade and the Environment: Is There a Need for the Harmonization of International Environmental Standards?

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When attention is focussed on the relationship between the growth of international trade and the environment, there has been much research and discussion around the well-known 'Environmental Kuznets Curve' hypothesis: that as developing countries experience enhanced economic growth through international trade, income per capita will rise, and a 'turning point' is reached whereafter environmental degradation will decline because (a) the change in the composition effects of international trade will result in 'cleaner' industries/services; and (b) the higher income per capita will provide a greater ability to pay to support a greater willingness to pay for environmental protection (backed by appropriate national and international environmental policies).

While this hypothesis has been challenged, especially in the area of transboundary environmental problems, we still need to explore the implication of this hypothesis for the harmonization of international environmental standards. One view is that held by the so-called 'technological optimists' who argue that environmental regulation in a free trade environment stimulates innovation, productivity growth and the development of a stronger competitive position. In this scenario, the harmonization of international environmental standards now is regarded as unnecessary. An alternative view held by those labelled as 'technological pessimists' is that environmental protection costs are significant in natural resource-intensive and pollution-intensive industries, which encourage industrial growth for export in countries with 'lax' environmental policies. In this scenario, the harmonization of environmental standards now is essential in order to avoid a 'race to the bottom.'

This paper will provide a critical review of the relationship between international trade and the environment, and assess whether the international harmonization of environmental standards ought to be a component part of any attempt to regulate the flow of international trade.

Bio-diesel-An eco-friendly alternative to fossil fuels

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Due to increase in population density and rapid economic development, particularly in developing countries like India, there has been huge increase in energy demand. The depletion of world petroleum reserves, the instability of petroleum sources, recent increase in petroleum prices and uncertainties concerning petroleum availability have generated interest in renewable sources of energy. Bio-diesel is a promising non toxic and biodegradable renewable fuel comprised of mono-alkyl esters of long chain fatty acids, which is produced by a catalytic trans-esterification reaction of vegetable oils with short-chain alcohols. Bio-diesel has become an interesting alternative to diesel engines, because it has similar properties to the traditional fossil diesel fuel and may thus substitute diesel fuel with none or very minor engine modification. It is environmentally friendly, non toxic, The cost compares well when compared to other alternative fuels. Bio-diesel can be used in neat form or blended with petroleum diesel for use in diesel engines. Methanol has been the most commonly used alcohol in the commercial production of bio-diesel. In the present study bio-diesel was prepared using various vegetable oils such as rapeseed oil, groundnut oil, coconut oil, and neem oil. Various properties of biodiesel such as viscosity, specific gravity, cloud point, pour point, flash point, heat value were also determined. Experiments were not successful with neem oil and coconut oil. Soybean Methyl ester was closest to a practical bio-diesel as seen from its properties. Though groundnut Methyl Ester is quite suitable but it has a flash point of 222 °C which is higher than the specified limits. The viscosities of the all the three

esters were found to be quite suitable to function in an I.C engine and almost that of petroleum diesel. Rapeseed Methyl Ester is most inferior among the three for heat values though all the three have heat values less than that of petroleum diesel. As far as cloud and pour points are concerned all the three esters can function quite well in cold weather. Though petroleum diesel is quite superior in this context as compared to biodiesel yet Bio-diesel has been gaining worldwide popularity as an alternative energy resource because of its ecofriendly nature.

In Search Of Symbiosis

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The design approach of integrating bioorganic and natural processes with the infrastructural functions of the built environment sustains a healthier environment that educates inhabitants about the quantity of their resource consumption and develops an understanding and appreciation for the ecological processes necessary for sustaining life through a multi-sensory engaging constructed landscape. The resultant built environment operates with significantly less resource demand and enhances the natural environment through the addition of nutrients, rather than the current practices of resource depletion and pollution. This task will be pursued through the programmatic framework of an innovative office building situated within a residential network in Tacoma Park, Washington D.C, and follow the innovative Cisco Telepresence office building concept. The focus will be on the design, integration, and implementation of the program spaces and water distribution, collection, filtration, and storage infrastructure with regards to providing maximum thermally optimal occupied spaces throughout the year. This is achieved through the potential for interrelation of a cave ecosystem with a greenhouse, supplemented with gradient space. The primary focus is the relationship of these systems to the occupancy of the building, evaluating the effects of these factors on each other, and determining opportunities to propose new types and levels of interaction and relationship between these systems. Additional facets which were undertaken were agricultural production, passive energy generation, minimization of the embodied energy footprint of materials and structure, and collecting, filtering, and storing surrounding community greywater and storm water. Throughout the course of the research it was determined that the integration of water collection, storage, filtration, and distribution did not have a direct impact on the form or organization of the building. This system can be integrated in a plethora of ways to various spatial/programmatic strategies. As well, both the greenhouse and cave spaces were optimal for different programs, notably cave spaces can be utilized for maximum contrast environments for digital projection, work, and conference environments; while naturally daylit greenhouse and gradient spaces provide optimal collaboration and lounge spaces. The overall conclusion was that varied spatial environments in regards to thermal, visual, and acoustic qualities provide a more cohesive, adaptable, and efficient work environment that allows for a broader and more optimal range of work, while performing at maximum efficiency and serving as a community and environmental asset. This develops a gradient between built and natural environments, through co-habitation and blurring of these environs.

Enhancing Bioreactor Conditions for Biodegradation of Organophosphorus Compounds

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The optimizing conditions for tested organophosphorus pesticides biodegradation using an immobilized CBD–OPH fusion enzyme system and enhancing biodegradability by current bioreactors are the main objectives of the current research. When constructed a column bioreactor, the immobilized fusion enzyme was able to completely degrade Paraoxon at flow rate 0.4ml/min while, the degradation percent dropped to about 50% by raising the flow rate to 4ml/min. The pH optimum for bioreactor was 8.0 for enzymatic degradation of Paraoxon and methyl-parathion, and the degradation rate was slower in lower pH level in comparison with alkaline levels. Moreover, 0.1 mM of both tested compounds was the optimum concentration that could be run to the bioreactor and achieve the maximum column efficiency. The bioreactor column was able to rapidly degrade tested compounds at 20°C but its degradation ability was sharply reduced at 5°C. For enhancing the degradation percent of methyl parathion, the circulation system was elevated after 24 hrs of incubation at tested temperatures, especially at 35 °C that reaches to ~92%. So, the CBD–OPH was still active in biodegradation of tested OP pesticides for 45 days from column construction under its optimum conditions. The circulating system of methyl parathion using continuous flow through the bioreactor column could enhance its biodegradation at 0 time and 45 days of bioreactor column construction.

**Dodge, Compromise, or Ambiguity?
The Role of Off-Shore Oil, Shale Rocks, Coal Liquefaction
And Tar Sands in the Democrats' Energy Agenda**

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This paper surveys the recent stances of Democratic Congressional leaders and of President, Obama on four especially polluting or hazardous sources of oil: off-shore extraction, Colorado shale rock, Alberta tar sand, and coal liquefaction. The extraction of oil from these four sources is considerably more polluting or risky in a number of ways than that of conventional crude drawn from the ground. At first glance the Democrats' sometimes permissive stances in these four specific areas appear at variance with the party's generally green agenda in energy policy. The paper first reviews the environmental impacts and risks associated with oil extraction from the four sources cited above. The paper then scrutinizes the statements of President Obama, the relevant administrative measures, the statements and voting behavior of key Democratic leaders in Congress (Speaker, Senate majority leader, members of the relevant legislative committees: House Energy and Commerce Committee and Senate Energy and Natural Resources Committee). Statements and legislative voting behavior in the Congress are situated in their context and related to less public measures such as administrative decisions. The paper concludes that the Democrats' stance on offshore drilling is a tactical dodge, meant to deflect Republican campaign pressure, and is not likely to lead to expanded offshore drilling in the future. Democrats are also poised to block Republican attempts to mine oil from the Colorado shale rocks. Policy stances and decisions on coal liquefaction are more ambiguous. Only future decisions will indicate whether or not Democrats are seriously interested in expanding this oil source. The Democrats' stance on tar sands will definitely facilitate further extraction. Concern for climate protection is here compromised by considerations of national security and the ability to artificially blame another jurisdiction for the additional greenhouse gas emissions entailed in the production of oil entirely destined to the U.S. market.

**Applying Environmental Psychology to Parks and Green Spaces:
Using Sustainable Methods to Reduce Fear of Crime**

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Over the last twenty years there has been a growing body of research investigating the relationship between the environment and fear of crime. However, none of this research has investigated the relationship between park director's knowledge of Crime Prevention Through Environmental Design (CPTED) and their implementation of sustainable practices to reduce fear of crime. A web based survey was e-mailed to all 270 park directors in Florida. The return rate was 33%. Descriptive statistics were calculated for the agency background, perceived knowledge of CPTED principles and openness to training, CPTED risk management strategies employed in their parks and perceptions of incivilities in parks nationwide. Empirical studies have asserted that fear of crime has a direct link to reduced park usage. (Loukaitous-Sideris & Eck, 2007; & Gomez et. al. 2004) Parents have reported that they are less likely to take their children to parks to engage in physical activities because they had concerns related to the safety of community parks. (Gomez et. al., 2004) Therefore, sustainable methods to ensure safety and environmental harmony must be developed. The purpose of this study was to assess the knowledge of and attitudes towards CPTED of the decision makers of municipal park and recreation departments in Florida. CPTED is a cost effective way of helping to reduce crime and fear of crime in our parks. The findings of this study suggest that park directors are interested in continued training in these techniques for themselves and their personnel. Further this study gives researchers insight into the practices currently being used in the field and perceptions of problems in parks nationwide.

Environmental iodine and endemic goitre in the UK-Peak District

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As an essential micronutrient for human health, the deficiency or excess of iodine in the human diet can result in a series of mental and physical disabilities such as goitre, impaired mental function, or cretinism, collectively referred to as Iodine Deficiency Disorders (IDD). In the UK-Peak District, endemic goitre was prevalent in the population for many centuries until it declined from the 1930s. Although a few biogeochemical studies were carried out to determine the genesis of goitre in the area, these were sporadic in nature, and the cause(s) of this disease in the area remained largely unexplained. The present study aims to investigate the role of environmental iodine to assess the cause(s) of goitre in the area through studies on iodine bioavailability, uptake into the food chain, and human exposure assessment. Replicate samples of soil, surface water, rain water and vegetation were collected from the UK-Peak District and analysed for their total and soil-bioavailable content. Human exposure assessment of iodine from the soils was carried out by the Physiologically Based Extraction Test (PBET). Results of the study showed that the iodine content in the soils of the UK-Peak District were comparable to the world mean values and within the range reported for England, Wales and Scotland. Iodine bioavailability was found to be low, for example 1-4% of the soil iodine was water-soluble, and ~40% was present in the residual phase. The mean distribution of iodine within the plant followed the order root >> aerial plant parts. The PBET results suggested that 5-20% of iodine in the ingested soil is likely to be bioaccessible. In conclusion, the goitre problem of the UK-Peak District population in the past is likely to be linked to low environmental iodine bioavailability and bioaccessibility and also on people's dependence on locally grown food at the time.

The Importance of Prioritizing Foundational Mechanisms in Ecological Restoration

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In complex ecosystems, strategies for restoration can become equally complicated. Our tendency to want to predict and establish performance targets for the charismatic megafauna which populate the higher trophic levels of an ecosystem may reduce our ability to actually implement restoration plans. Predictions made about the responses of these organisms are likely to be subject to a relatively large amount of uncertainty which is difficult to quantify. In contrast, bottom-up restoration strategies not only simplify planning, but they recognize that basal ecological mechanisms are what define ecosystems. Conceptual models can help to identify the hierarchically nested nature of complex systems. Strategies should then be developed to restore or maintain dominant, large-scale, slow-moving variables. These strategies can be applied to all systems – ecological, economic, and social. Two case-studies are offered – Everglades restoration and economic recovery. The Everglades restoration program still struggles with defining restoration success, and setting restoration goals. Widespread subsidence of peat soils that has occurred at the interface of the Everglades Agricultural Area and Water Conservation Area 3 can be interpreted as a major loss of ecological capital, and increases the risk of irrevocably altering the sheetflow connection between the Kissimmee River, Lake Okeechobee Basin, and the River of Grass. Restoration of flows to resume peat soil accretion in this area is an important contributing factor to the resilience of the system. Success will be defined by a resilient ecosystem that is capable of adapting to a changing climate and rising sea-level instead of a system subject to increasing risk of catastrophic collapse. The problem confronting natural resource managers in the Everglades is analogous to the question of whether economic policy makers in Washington D.C. should be focusing on restoring the Dow Jones or the fundamentals of capitalism.

Water resources and impact of pollutant on aquatic environment and cropping system in the regions of Indian sub-continent

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In the eastern India have chains of rivers, tributaries, canals, oxbow lakes, ponds which makes numerous wetlands of varying sizes and depths (deep, semi-deep and temporary). These wetlands including coastal ecosystem plays a pivotal role in rural agriculture and farm-fisheries due to sharing of reasonable area proximity to urban surroundings for generous production system and income generating for its wider use under New and Old Alluvial zone of this sub-continent. But the stability of the ecosystem of these regions is oftenly subjected to varying degrees of stresses, emission of pollutant materials and degradation caused by different man-made activities (urbanization, industrialization, lacking of awareness, dumping of garbage, prolong siltation, sedimentation, heavy metal deposition etc.) and natural factors (occasional floods, natural disasters etc.). In the study, intensity of emissions (particulate matter) in representative soil (pH, organic carbon, CEC, available S and NO_3^- -N) and water (pH, BOD, COD, turbidity, conductivity, SO_4^{2-} S, Cl^- , NO_3^- , Cd and F) of varying water bodies in the zones was studied in respect to water quality and soil properties. Contrary, integrated wetland management programmes were undertaken suited to bio-diversity of the zone-specific for generous productivity and upliftment of rural economy as well, as the mounting pressure of this area poses a threat to the ecosystem and makes it vulnerable for their normal life support. This paper also deals with the holistic management programmes in depth on management of fisheries, fish-cum-aquatic food crops and unique approach of watershed plans were formulated integrately for upright production system, which exhibited economic outturn due to wide use of these natural resources as well without any further degradation. Comparative advantages of mixed farming system (GMP, NP & B-C ratio) than monocropped gained to its sustainable manner that reflected greatly in the upliftment of rural economy of the regions as a whole, which are inextricably linked with the ecosystem.

**Environmental Systemology and Sustainability:
A Summary of the First Roundtable on Environmental Science and Study**

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In January of 2009, members of IEA, CEDD, NAAEE, and several environmental programs organized a roundtable at Bethune-Cookman University for the purpose of moving forward the discussions on interdisciplinary environmental education held at recent IICE conferences and other venues. The agenda involved issues of identity, name, core competencies, program structure, and certification for environmental programs in the United States (with the potential for an international effort in the future). Discussions at the roundtable lead to consensus on a number of important topics which have become the basis for proposals arising from the workshop. Workshop attendees agreed that both specialist and more holistic approaches are needed to address environmental issues, and that interdisciplinary environmental education sought to provide the later. Discussions of terminology in the environmental education domain lead to consensus that the human-nature interface is the focus of the field with a holistic endpoint being the ultimate goal, though more reductionist approaches could be part of an ultimately holistic program. There was support for the concept of sustainability as the overarching paradigm of the domain, defined as the maintenance of healthy and resilient systems at the human-nature interface through balanced and adaptive stewardship of resources to provide long-term improvement in the human condition. The roundtable thus proposed that this academic domain be given the name Environmental Systemology and Sustainability (ESS), identified as a supradisciplinary field whose goal is to understand and preserve the health and integrity of the interface between human and natural systems. Participants concluded that interdisciplinary and supradisciplinary program designs

were part of this domain, with pluridisciplinary approaches being a transition phase from lower levels of integration (unidisciplinary, transdisciplinary) to where the field sought to be. The roundtable also reached consensus on a set of 12 skills, 11 knowledge areas, and 1 experience type that should be considered core competencies for ESS programs and their students. These proposals will be offered as a starting point for discussion and acceptance in more inclusive roundtables in the near future, including an invited forum at this conference.

Circumscribing Regulation: An Ethical Analysis

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In Canada, environmental regulation is circumscribed by several directives, framework documents and guidelines such as “The Cabinet Directive on Streamlining Regulation,” the “Canadian Cost-Benefit Analysis Guide,” and “Assessing, Selecting and Implementing Instruments for Government Action,” that instruct the ministries of Health and the Environment how to discharge their legal obligations to protect human health and the environment. The central agency that oversees regulation in the broad sense, the Treasury Board Secretariat, favours legal instruments other than legally-binding regulation, such as voluntary initiatives, economic instruments, and involving a variety of actors in “distributive governance” schemes. It will be argued in this paper that the considerations the Treasury Board requires the ministries to take into account in assessing and selecting governance instruments, such as cost-benefit analysis using discounting of future benefits, and an analysis of the degree to which various instruments constrain individual liberty, limit the ministries’ ability to enact effective environmental regulation, and thus to fulfill their obligations to prevent harm to current and future generations. The argument will be made using the risk management plans for toxic chemicals published to date as part of the Chemicals Management Plan as an example. It will be shown further that the Canadian approach to regulation mirrors that of the United States under the Office of Information and Regulatory Affairs (OIRA) in the United States Office of Management and Budget, and that while that the REACH regime for chemicals management in the European Union may be superior in some respects, it suffers from many of the same constraints as the North American regulatory system.

Hubbell’s enduring contribution

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Central to conservation biology is the need to study population structure and how this influences community change among several species within a defined space and beyond. This paper reviews Stephen Hubbell’s 2001 seminal introduction of the unified neutral theory of biodiversity and considers how pivotal it has been to further exploration in community ecology. Prior to 2001 the contrary notion of niche organization was firmly entrenched within the framing of local and regional evolution; today, it remains very popular. For this reason it is important to consider how Hubbell’s divergent notion created a “state of creative ferment” among community ecologists (Holt 2006:531). The question addressed here is whether or not the scope and treatment of his empirical evidence adequately defended this theoretical development and if key subsequent applications reinforced his view, disputed it, or allowed for some coexistence between neutral and niche theories. The approach taken here first highlights Hubbell’s neutral theory of biodiversity then differentiates it from traditional niche doctrine. It moves on to consider how Hubbell’s widely cited empirical work prompted productive debate with relevancy in terms of its dialectic strength, multi-tiered ecological applicability and methodological advancement of empirical work through mathematical modeling.

Estimation of NO_x Impact from the Cement Plant Located in the Mountain Areas

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Nitrogen oxides (NO_x) cause a wide variety of health and environmental impacts, for example, smog, acid rain and climate change through its role on ozone production and formation of secondary aerosol served as cloud condensation nuclei in many areas. The major source of NO_x production is fuel combustion such as coals and oil, this work then focuses on studying the dispersion of nitrogen oxides (NO_x) in the atmosphere around a key cement plant, situated about 100 km northeast of Bangkok, Thailand. This cement plant is located on the mountain areas and uses coals as a major fuel. The impacts of NO_x emissions are estimated in order to find the most suitable way to control the air pollution. This work employs both measuring and modeling analyses, based on two Gaussian models: AERMOD (plume) and CALPUFF (puff). The NO_x (as NO₂) emission were sampled from the six stacks by the U.S. EPA method 7. The hourly average concentrations of NO₂ within the distance of 10 km from the cement plant were measured for a week time period every six months at 12 receptors by chemiluminescence method. The emission rates of NO_x from 6 stacks are found to be between 80-280 g/s. The 1-h avg concentration of NO₂ measured at 12 receptors ranges between 2-181 micrograms per cubic metre, which although remain not exceeding Thailand ambient NO₂ standard value of 320 microgram per cubic metre, it is close to WHO guideline (200 microgram per cubic metre), and thus later on could have adverse impact on human health. Based on the simulated results, both AERMOD and CALPUFF can fairly well predict the NO_x contributions of the cement's stacks in the mountain areas. However, in order to find out the total carrying capacity, other emission sources will need to be included as the model inputs.

Replacing Nature: Artifices, Replicants, and the Dystopian Future

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The technological ability of humans to construct substitutes for the living components of nature plus the advantages derived from their use—efficiency in the production of goods and services; enhancement of sensory awareness; the projection of coercive force; and monopoly control over sectors of the environment—are such that we can expect that elites will increasingly turn to technological analogues as substitutes for living entities. A living entity has species-specific architecture: morphology, inner structure, chemistry, DNA, and characteristic life course. It reflects the environmental field within which it originated. As distinct from artifices, it has what might be called species-specific desire to survive and reproduce that encodes its autonomous perspective on the environmental field. But the gap between natural beings and artificial mechanisms is closing. Utilizing programmed instructions and miniaturized components, entities entirely or partially fabricated from mechanical or chemical parts can read and respond to their environment, inventory their internal systems, and respond to threats. Some may be engineered to draw energy directly from their environment while those with recombinant DNA may reproduce and colonize entire environmental niches. But the design of wholly or partially artificial entities is such that they remain projections of those who fashion them.

The dangers associated with launching simulacrum into nature are only beginning to be appreciated. Robotic labor thought to liberate human workers has often displaced it. Organisms re-engineered to for enhanced production of food and fiber may displace or contaminate those that humans presently rely upon; designed for sterility, they will consolidate the control of the food supply in fewer hands. Militarized drones and crawling robots, in some cases

mimicking insects, can turn the environment itself into a hostile zone for their targets. As pets, care givers, and sexual partners, they destroy the social solidarity upon which the human species depends. This paper surveys recent advances in robotics to summarize their present state and samples the more prescient science fiction literature to suggest their possibilities. It discusses the dangers associated with such technology when in isolation from responsible social control.

Developing a National Framework for External Review of Undergraduate Environmental Studies/Environmental Science

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Since the National Association of Environmental Professionals (NAEP) struggles with academic certification in the 1980's - and with academic programs of excellence - there has been little recent activity. It is the author's position that we need a model process for self-study and external review that can be utilized by environmental studies programs across the country. This same process could be "blessed by NAEP" - specifically in terms of outcomes and professional skill development objectives. Thus instead of a rigid certification process - we could have a framework that meets NAEP needs as well as academic program external review needs. Recent experiences with a review of a Texas and California Environmental Studies/Environmental Science Program and New York State Environmental Studies programs will be discussed as examples for this process.

Society and Wilderness

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Howard Zahniser is not well known, even among environmentalists. Zahniser was executive secretary of the Wilderness Society from 1945 until his death in 1964. During this time the Society grew to become one of the nation's most important environmental organizations. Zahniser was a passionate advocate of wilderness. He wrote the early drafts of the Wilderness Act, and much of his language remains in the final version signed by President Johnson in 1964. Zahniser testified before Congress and delivered numerous speeches in support of the Act. Within the Act, wilderness is defined as "an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain" (16 USC 1121, section 2(c)). Zahniser realized that wilderness areas may show signs of human influence, but he believed wilderness areas should be generally untrammeled by man, meaning unconstrained or unfettered. The definition continues: a wilderness is "an area of Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions ..." (16 USC 1121, section 2(c)). It can be argued, however, that many designated wilderness areas in the United States have lost their primeval character and influence. As Zahniser feared would happen, they have become essentially large gardens. Wilderness Management has become a distinct practice and academic discipline, with textbooks, journals, conferences, and graduate programs. Many wilderness areas are extensively managed for a variety of human uses, including livestock grazing, hunting, fishing, backpacking, and camping. Popular fishing lakes are stocked with fish. Invasive or exotic plant species are eradicated through use of herbicides. Campsites are developed with fireplaces, tent pads, toilets, shelters, and stock-holding facilities (Hendee and Dawson, 2002, p. 434). Fires are suppressed or allowed to burn in an attempt to mimic a natural fire cycle. Insect pests are controlled. Wilderness managers seek to maintain what they consider to be "natural conditions" as much as possible, as they attempt to provide to the public high quality wilderness experiences. Wilderness areas cannot fairly be described as "untrammeled by man." Wilderness managers argue

that such practices are required in order to meet the intent of the Wilderness Act and to protect wilderness areas from the heavy use many of them receive. They admit that managed wilderness areas are no longer truly wilderness. According to one text: a designated, managed wilderness is, in a very important sense, a contradiction in terms. It could even be said that any area that is proclaimed wilderness and managed as such is not wilderness by these very acts. ...The only wilderness true to the etymological roots of the word is that which humans do not influence in any way whatsoever. (Hendee and Dawson, 2002, p. 31). With such extensive management, true wilderness is not maintained. "The best that can be hoped for," the text continues: is a chance to be in beautiful and comparatively natural country, away from roads, relatively alone, and dependent, in the short run, on one's own resources for comfort and survival. (p. 32)

In this paper I wish to explore the discrepancy between the ideal of wilderness expressed by Zahniser and incorporated into the Wilderness Act, and the idea of "managed wilderness" that has been used to shape many wilderness areas. But I wish to argue, following ideas from Mark Sagoff, that it is through management that wilderness is transformed into a "place" and so comes to have real value within our society. Through management, wilderness is "cultivated" in special ways. It becomes a site where certain human needs are satisfied and memories are created. Borrowing words from Sagoff, managed wilderness functions "as a center of felt value because human needs, cultural and social as well as biological, are satisfied in it" (2008, p. 166). Managers argue that wilderness areas must be managed because they are so heavily used. They are loved. I believe the converse relationship holds as well. Wilderness areas (for example, the John Muir Wilderness) are highly valued within our Society, and are protected, because they have been cultivated in special ways to satisfy human needs. For this reason that is, I think, sociological, management may actually be the salvation of wilderness.

Controversial Issues in an Environmental Science Course: How do Students Respond?

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This qualitative study described non-science majors' responses to environmental cases studies and news events embedded in an introductory level environmental science course. A phenomenological approach was used for this descriptive emergent design study. Sixty-six participants were enrolled in a 12-week course, structured to reflect science education reform principals, at a liberal arts college. Examples of environmental issues included the CHEERS pesticide study on children; use of depleted uranium in military conflicts; a homeowner's plastic lawn; and local cases of environmental racism. According to the emergent model, a controversial issue must have an element of *injustice* to affect a student's moral code or value system, thus, provoking feelings of cognitive dissonance. An environmental issue may be deemed *controversial* if the injustice exhibits elements of inequality, absence of freedom, or intentional affliction or abuse. To reduce the dissonance, some students sought participation in environmentally-friendly practices beyond the classroom.

Environmental Education Under Assault: Can Instructors Teach Environmental Science Without Fear?

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Environmental science has evolved into a politically charged science branded as "controversial" in the media and academic circles. Instructors may be fearful to discuss certain environmental topics in an academic setting for fear of possible retribution (i.e., Academic Freedom issues) or accusations of instructional bias. Some college instructors may feel compelled to delete topics from the curriculum. Diluting the curriculum shields students from the opportunity to discuss compelling arguments, deal with complex scientific and value-laden issues, and develop critical thinking skills in a safe, academic setting.

Community Management, Self-Interest, and Environmental Preservation in the Amazon

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In parts of the developing world, there have been calls for more control of relatively undeveloped lands by indigenous people. Supporters for this community-based approach believe that land stewardship will result in more sustainable practices, and that benefits from land use will be more equitably distributed among the local people. We examine these assumptions based on observations from a community-managed reserve in the Peruvian Amazon. We discuss ecological and social implications of community management on resource extraction (fishing, hunting, timber). Our findings indicate that self-interested motivations have the potential to create less than adequate environmental protection, however, each situation is unique, and accurate assessments on reserve success must include a range of variables. Differences among community reserve members can play a significant role in adherence to regulations. Outside organizations can have significant positive or negative consequences depending on their motivations and authority. In spite of the potential negative effects of self-interests, community reserve members are far more likely to uphold their own self-perpetuated rules, and this may create overall positive outcomes in terms of environmental preservation. Agricultural practices have the potential to be a significant problem but in our case appear stable and therefore present no real threat to the preserve. The analysis examines agricultural practices, the configuration of agricultural fields, total crop area, crop type, and proximity to villages and the reserve boundary. We conclude that community management is beneficial in some situations and for some objectives such as more equitable distribution, however, it is unclear that community management will reliably promote environmental preservation. This depends on the specific ecological and sociological conditions, the needs of the indigenous peoples, and their relations with outsiders. Assessment must occur on a case by case basis with the understanding that the people will usually make decisions that will benefit themselves.

The Biomisation Method and Software for Reconstruction of Bioecological Limits in Holocene

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In the connection with the unfavorable future climatic changes forecast in Ukraine it is of particular importance to gain more detailed information about the paleovegetation of the regions of Ukraine during the nearest analogues of the present global warming. To obtain the values of paleoecological parameters the software "EcoRec" based on the biomisation method was developed. It allows to convert palynological data into paleoecological parameters. The "EcoRec" consists of separate units: the main unit (handle and calculation), the database files, the units of database operations and the unit of the results output. The system allows to enter the pollen data on an examined cutting into special forms in the dialog mode, to carry out step-by-step computation of values in question (the sum of pollen grains, percentage of pollen grains of each plant, PFT score, biom scores and the final biom) and to view results in a separate text file on the completion of a current stage of the calculations. Using the "EcoRec" new information about the plant functional types and biomes for the time periods of 6000±300 BP and 1000±60 BP based on generalization of the pollen data, obtained for the first time at the North – eastern part of the Black Sea area and the data on the 7 radiocarbon dated cuttings from Ukraine, was gained. The values of the lowest and the highest mean summer temperatures, lowest and the highest mean winter temperatures and the minimal and maximal values of the index of moisture availability (the necessary and sufficient criteria of bioclimatic limits) have been obtained. The identifications of the biomes let us reconstruct the transformation of the vegetation in the middle and late Holocene and evaluate bioclimatic limits in different regions of Ukraine.

Estimating Soil Loss From Two Coastal Watersheds in Puerto Rico with RUSLE

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Accelerated soil erosion is a major environmental problem worldwide. Increased urban development, agriculture and cultivation practices create increased runoff and erosion from watersheds. The loss of topsoil from the landscape increases sediment loading to adjacent aquatic systems, which is transported downstream. The implications of high sediment loading to downstream environments such as estuaries is a source of concern for coastal managers because of the potential for pollutants to enter into these sensitive ecosystem via adsorption to these sediments. This research compares the sediment loss from two watersheds (one on north-eastern coast and other along south-central coastline) on the island of Puerto Rico. The Revised Universal Soil Loss Equation (RUSLE) was applied to both watersheds. This research hypothesizes that the watershed located on the north-east coast will experience higher sediment loss when compared to the other study watershed since the former watershed receives a higher amount of rainfall and land use distribution. Results from this study will improve methodologies for identifying erosion prone areas, potentially leading to better management practices.

Indigenous knowledge, natural resource management and population control in Guizhou -a case from Zhanli village in Southeast Guizhou, China

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Indigenous knowledge is regarded by policy makers as backward knowledge and it is rare for them to include in the policies. This paper addresses the issue about indigenous knowledge and sustainable natural resource management in Dong village in China. It documents Dong people in Zhanli village who use traditional knowledge in resource management and in population control, including traditional natural resource management practices, traditional medicinal knowledge and village regulations in Zhanli village in Southeast Guizhou Province. The results show that Zhanli people have formulated a systematic knowledge and tried their best way to utilize this indigenous knowledge in managing the natural resource and in keeping the stable population to make them live in a sustainable way. Indigenous knowledge plays an important role in managing the limited natural resources and keeping the population stable in a very good condition in Zhanli village. The Zhanli people have better life than nearby villages because of reasonable utilization of natural resources. Zhanli people use indigenous knowledge to manage natural resources and use traditional herb medicine to control the population very well even before Chinese family planning. Village regulation terms including resources management and population control are very effective because its dissemination methods are easily to be accepted by every people, which influence villagers' awareness in natural resources management and population control very well. Women are the main actors in using indigenous knowledge in weaving and medicinal knowledge in population control and this kind of knowledge is passed by women mostly. The inheritance of this kind of traditional knowledge is decreasing because of the interventions from outside, especially after the massive migration in rural China. Indigenous knowledge plays an important role in the sustainable development of Zhanli village, which give implications for development practitioners and policy makers

to think about to involve indigenous knowledge in development interventions and policies for sustainable development.

**Putting Last Things First:
A Comprehensive Plan for Preventing an Ecological Catastrophe**

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Barack Obama's election is symbolic of the dramatic change that is occurring regarding environmental policies. Mainstream public intellectuals who command large audiences, like Thomas Friedman, Joseph Stiglitz, and Jeffrey Sachs, have included the global environmental crisis as one of the problems that must be solved for us to have a viable global economy. Programs such as cap and trade and the Apollo Project are gaining momentum, and these initiatives are greeted with sympathetic interest by members of the Obama administration, Congress, and the general public. However, we believe that these developments are leading to a false confidence that significant progress is being made to prevent global overshoot and collapse. Our survey of proposed environmental policies and the evolving scientific consensus regarding the planet's environmental health has led us to the disturbing conclusion that unless there is a dramatic public policy paradigm shift, the process of environmental degradation will proceed at a faster rate than the implementation of environmental policy reforms, leading to a growing net increase in the destruction of the planet's delicate ecosystems. We label this process the "irony of environmental incrementalism": the belief that steady progress in the passage and implementation of "green" public policies will prevent ecological catastrophe. The fallacy of this approach is that it assumes that environmental problems are constant when in fact they are increasing at a rate faster than the implementation of current strategies aimed at their solution. To resolve this dilemma, we argue that a comprehensive and workable public policy strategy is needed to prevent a global ecological meltdown. The approach is to begin with a realistic estimate of how much time we have to avoid a global environmental catastrophe and then to design the public policies for the prevention of it and the rate at which they need to be implemented. In other words, the strategy is *not* to design public policy based on assumptions of what is perceived as politically feasible, but to base them on what is ecologically necessary and *then* worry about the marketing strategy necessary for their adoption and implementation. What we propose is a "green tax" that would be far more radical and comprehensive than what is currently assumed by the term. We believe that during the coming decade, our proposal will become politically viable as the public sees that the current generation of policy reforms is not keeping up with the accelerating rate of environmental degradation.

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Dr. Kimberly D. S. Reiter
Conference Chair