

Erie County Technical School

DACUM
for
Natural Resources and Environmental Sciences

September 13, 14, 2005

Facilitated by

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Erie County Technical School
Natural Resources and Environmental Sciences
Proposed Duty and Task List

Employability Business Skills

1. Demonstrate positive attitudes promoting teamwork
2. Display organizational skills
3. Make a decision using the decision-making process
4. Display desirable working skills
5. Work through adversity, handle conflicts
6. Improve listening skills
7. Demonstrate good morals, honesty
8. Evaluate aspects of personal appearance or physical traits which may hinder an individual's employability.
9. Demonstrate characteristics of good health
10. Identify reliability traits for the work setting.
11. Identify the basic human needs that play a part in a worker's motivation.
12. Demonstrate an understanding of skills needed for effective relations with fellow employees
13. Demonstrate safety consciousness
14. Demonstrate skills in communicating with others.
15. Communicate effectively with the public
16. Prepare and deliver an oral presentation or speech
17. Demonstrate appropriate, professional behaviors

Business Skills

1. Interact with others to maintain effective relationships with supervisors and employees
2. Layout a weekly schedule of activities
3. Maintain an organized, accurate filing system
4. Develop record-keeping, skills
5. Improve writing skills
6. Write a business letter
7. Participate in panel discussion
8. Participate in committee meeting
9. Set up a budget for a natural resources enterprise
10. Interpret a financial statement
11. Apply the principles of double-entry bookkeeping
12. Make a decision using a decision-making process
13. Complete application forms for business licenses, and state, local and federal forms
14. Complete government tax forms used in business

15. Develop an annual plan
16. Develop a public relations program

Geological Sciences

Investigating Environmental Issues

1. Identify career opportunities in investigating environmental issues
2. Identify soil profiles
3. Determine land capability classes
4. Explain leaching in soils
5. Test soil for water percolation
6. Prepare a land use plan

Protecting the Environment

1. Explore career opportunities in protecting the environment, soil related
2. Define soil in terms of origin and materials content
3. Classify soils by using a soil taxonomy system
4. Collect and analyze samples of soil to identify composition
5. Make nutrient recommendations based on findings
6. Identify procedures for improving the soil
7. Discuss water erosion and its effects on agricultural production.

Using Maps and Orienteering

1. Identify career opportunities in natural resource management
2. Use a compass to orient various location on a map
3. Identify cardinal directions on maps and in the outdoors
4. Identify specified landmarks on a topographic land map
5. Make linear measurements by pacing
6. Reference known landmarks to topographic map and to relief map
7. Identify and describe topographic map, relief map, aerial photography, and infrared photography
8. Interpret various maps for correlation to geographic features
9. Demonstrate ability to read engineers scale in determining distance
10. List the uses of a survey
11. Use triangulation to estimate unknown location from one or more known locations
12. Write ledge and description of plotted land
13. Demonstrate ability to use hand level or engineering level and tape
14. Read a rod and level, calculate slope
15. Use a compass and map to conduct a land navigation exercise
16. Explain the parts of a field map
17. Determine field area of specific plots of land in acres
18. Define GIS (Geographic Information System)

19. Write legal descriptions of a selected plot of land
20. Determine land use from aerial photography
21. Convert English measurement units to metric equivalents and metric equivalents to units

Understanding Watershed Management

1. Identify career opportunities in environmental management, water related
2. Define characteristics of water and the hydrologic cycle
3. Explain groundwater and sources
4. Define water table
5. Define causes of ground water pollution
6. Discuss ways to manage ground water contamination
7. Design and construct a model to illustrate components of the local surface water system
8. Describe the source of water for home and industrial use
9. Discuss current government legislation that relates to water quality
10. Identify major water pollutants and their effects on the environment, including agricultural production
11. Develop a watershed management plan
12. Explain the various methods of water treatment
13. Collect and analyze water samples and examine them for chemical pollutants and biological organisms
14. Discuss effects of water pollution on agricultural production
15. Discuss improving water quality by managing animal waste
16. Explain how urban forests fit into urban ecosystems
17. Participate in investigative activities by collecting field data for agencies
18. Discuss effects of polluted water on animals and humans
19. Explain the relationship between urban forest and air and water quality
20. Define point and non-point pollution
21. Describe ways to control surface water pollution
22. Identify best management practices for various water resource issues
23. Select the best method to control water pollution
24. Make recommendations regarding good sanitation practices and principles
25. Explain the environmental impacts of sedimentation on plants and animals
26. Identify practices to control soil erosion
27. Identify common vegetation materials used for soil conservation
28. Explain how wind erodes soil
29. Explain mechanical erosion controls
30. Design and construct a model to illustrate components of the fluvial system
31. Explain the zones of the lake and habitat of each
32. Define eutrophication and its relationship to nutrient-rich waters
33. Develop a plan to manage a stream or lake to prevent pollution
34. Describe ocean zonation
35. Identify characteristics of the estuarine system
36. Discuss types of ocean water movements

Protecting Woodland Management and Conservation

1. Identify career opportunities in woodland management
2. Explain flood hazard analysis
3. Locate a flood-control structure in a given area
4. Explain how a flood-control structure (dam) functions

Plants Sciences

Horticulture Sciences Managing Pests

1. Identify career opportunities in horticulture sciences
2. Examine career opportunities in the horticulture industry
3. Become a certified private pest license holder
4. Demonstrate understanding of plant taxonomy
5. Analyze plant anatomy and physiology.
6. Identify how environmental factors influence plant growth
7. Identify plant species appropriate to urban development
8. Demonstrate knowledge of tree fertilization
9. Explore plant propagation procedures
10. Explore greenhouse growing practices
11. Identify floriculture crops
12. Describe and determine weed control measures
13. Develop fertilizer schedules
14. Prepare and apply a compost
15. Design landscapes
16. Design interior plantings
17. Construct landscapes
18. Maintain landscapes
19. Identify landscape plants
20. Identify vegetable crops
21. Plan a vegetable garden site
22. Plant and maintain vegetable plantings
23. Identify small fruits
24. Plan a fruit garden
25. Plant and maintain fruit crops
26. Demonstrate understanding of Integrated Pest Management (IPM)
27. Check plants for insects
28. Identify greenhouse and garden pests
29. Interpret pesticide labels
30. Locate and interpret material safety data sheets
31. Follow environmental and personal safety procedures
32. Establish turf
33. Renovate turf
34. Maintain turf
35. Determine necessary lawn equipment and repairs

36. Maintain landscape maintenance equipment
37. Identify characteristics of a watershed
38. Locate watersheds on map
39. Describe types of grasses and weed native to PA with a focus on local species
40. Remove weeds and grasses from flowerbeds
41. Plant annual flowers
42. Protect new plants from direct sunlight
43. Plant flower bulbs

Exploring Urban Forestry

1. Identify career opportunities in urban forestry
2. List and identify benefits of urban forests
3. Describe tree inventory of urban spaces
4. Plant trees appropriate of an urban environment
5. Explain a pruning, fertilization and pest control plan for urban planting
6. Describe unfavorable conditions urban trees
7. Produce Christmas trees, including a plan for delivery to wholesale buyers
8. Explain how urban forest fit into an urban ecosystem
9. Calculate cost of a “new” rehabilitated urban forest

Managing Forest Resources

1. Identify career opportunities in managing forest resources
2. Identify diseases of trees caused by organic pathogens, environment, and insects
3. Develop safety instruction
4. Ability to fell trees according to cutting patterns, using chain saw
5. Planting-establishing a forest
6. Identify the importance of Silviculture
7. Identify the importance of Dendrology
8. Identify trees
9. Differentiate between forest types
10. Identify disease of trees caused by organic pathogens
11. Identify forest insect pests
12. Identify environmentally-caused diseases of trees
13. Develop plan for managing forest insect pests and diseases
14. Describe different methods of harvesting trees
15. Describe disadvantages and advantages of forest harvesting methods
16. Describe methods of forest regeneration
17. Identify new tree care practices
18. Explain basic tree structure and growth
19. Develop a plan for the management of a forest
20. Develop a sustainability plan
21. Identify and name forest products
22. Use various methods of measuring wood and volume

23. Estimate the volume of standing timber on a given tract
24. Determine the value of standing timber
25. Plan logging activities
26. Outline procedures for managing harvesting operations
27. Develop a reclamation plan
28. Design plans to establish forest roads
29. Describe different methods of harvesting trees and determine equipment needed
30. Identify grades of lumber
31. Describe the history of fire and its use as a tool
32. Demonstrate knowledge of fire and safety control measures
33. Describe the location of a forest fire, using Forest Service terminology

Biotechnology Foundation

Examining the Role of Biotechnology in Agriculture

1. Identify career opportunities in Bio-technology in agriculture
2. Develop a historic timeline of genetic engineering milestones
3. Discover role of the agrichemicals in Bio-technology
4. Illustrate advances in food science
5. Investigate career related to Bio-Agriculture
6. Explain issues concerning Bio-ethics
7. Identify the impacts bio-technology has on medicine
8. Identify the importance of the genetic information contained in DNA
9. Illustrate examples of products of plant Bio-technology
10. Identify methods of plant breeding
11. Perform tissue culture
12. Understanding techniques for genetic manipulation
13. Explore Bio-controls
14. Explain vaccine (immunology) research and development in relation to genetic engineering
15. Identify plant response systems and components
16. Explain the importance of genome projects
17. Practice quality control and data collection
18. Identify social impacts of genetic engineering
19. Explain the impacts of plant and animal genetic engineering on society
20. Identify microbial applications in agriculture

Animal Sciences

Ecology and Environmental Management

1. Identify careers related to Animal Sciences
2. Identify basic principles of wildlife management
3. Identify basic principles of habitat

4. Design a wildlife management area
5. Develop a plan to provide habitat for animals and bird wildlife species
6. List ways to attract animals birds and insects to a local natural habitat
7. Describe the establishment of a wildlife preserve area
8. Measure wildlife population
9. Identify diseases and parasites in wildlife
10. Develop a recommendations to conduct a wildlife control program
11. Write a plan to manage a stream or lake pond
12. Develop recommendations for maintaining ponds
13. Determine proper stocking rates in ponds
14. Identify environmental conditions for a fish operation and appropriate fish for production

Exploring Bio-chemistry / Bio-technology

1. Identify careers in the Bio-Chemistry
2. Identify careers in the Bio-Technology field
3. Explain the catalyzation process
4. Explain the characteristics and functions of enzymes
5. Identify applications for enzymes in an organism
6. Explain the basic principles of protein utilization in organisms
7. Explain the function of carbohydrates
8. Introduce Bio-Pharming and its impact
9. Introduce the use of Bio-Technology in food production
10. Introduce genetic engineering
11. Introduce examples of products of animal Bio-technology
12. Introduce and explore cloning
13. Define environmental awareness

Forestry, Wildlife and Soil Managing Land Use

1. Identify career opportunities related to managing land use
2. Identify major land uses and their impact on the environment and ecosystem
3. Describe how agriculture and environmental are related /integrated
4. Design a model of a sustainable community
5. Formulate the agricultural land-use section of a comprehensive plan for community development
6. Develop an awareness of how regulatory agencies need to work together
7. Research the accomplishments of an environmental organization or conservationist
8. Describe multiple-use management
9. Identify activities of the conservation and other players' district in a local area
10. Describe urban sprawl and the effects on the environment
11. Identify green space delineation and design using GIS equipment

Water

1. Identify career opportunities in water management
2. Develop water conservation and management plans
3. Analyze information gained from conducting water and soil samples
4. Investigate the water treatment plants, wells, swimming pools and chlorine systems
5. Identify the national foundation of wetland

Understanding Basic Environment Management

1. Define basic terminology related to ecology, environmental sciences, and environmental stability
2. Demonstrate knowledge of the environment, its pollution problems, and possible solutions
3. Describe methods of dealing with conservation problems, planning, and practices
4. Explain the role of bio-diversity in ecosystem stability and effects on species diversity
5. Develop a plan for a local property that includes role of native indigenous Bio-diversity
6. Analyze effects of man's impact on bio-diversity
7. Identify regional environmental problems
8. Develop a plan to use natural methods and systems to solve environmental problems

Protecting the Environment – Air and Noise

1. Identify career potential in the environmental air and noise protection
2. Locate and interpret sources of weather information
3. Describe and identify the sources and effects of pollutants on the environment, both locally and regionally
4. Formulate solutions for dealing with air pollution issues
5. Describe indoor environment issues
6. Identify current air quality tests
7. Perform air quality testing
8. Debate global warming and ozone depletion's possible effects on environment
9. Explain sources and effects of acid rain
10. Explain effect of "greenhouse" gases
11. Using noise levels and loudness ratings, assess sound to determine whether a sound control plan is needed
12. Assess noise level ratings

Ecology and Environmental Management. Environmental Protecting

1. Identify career opportunities in environment protection
2. Investigate the relationships between recreation and the environment
3. Explore the effects of light pollution on the environment

Basic Environmental Science Concepts

1. Identify careers in Environmental Sciences
1. Identify invasive species in plants and animals and their impact on the environment
3. Identify invasive species in our region and develop a plan of action working with experts to develop
4. Investigate and compare effects of dynamic changes to the environment
5. Explain principles and processes of Ecological Succession
6. Explain energy transfer
7. Describe the logistics of population growth of humans/animals/plants
8. Design a closed environment as an example of an ecosystem
9. Participate in Environthon
10. Develop a plan for participating in the Envirothon
11. Communicate environmentally-sound practices to others

Natural Resources Management

1. Identify career opportunities in natural resource management
2. Compare the ways various media groups report on environmental issues
2. Discuss the development of environmental awareness and conservation trends
3. Discuss what can be done in the next five years to combat environmental problems
4. Explain how technology has been used to combat pollution problems
5. Building “Green”
6. Using Green Space Concepts in building and planning of facilities
7. Investigate and identify existing facilities constructed with Green Building Practices
8. Develop a presentation on “Green Building” Techniques
9. Compare costs of traditional building techniques with “Green Building” methods
10. Calculate energy savings realized through “Green Building”

Energy

Identify careers as they relate to energy
Identify the basic energy principles and origins of energy
Discuss forms of energy usable to humans
Evaluate energy and use patterns in specific local situations
Describe how various energy sources are obtained, processed, and distributed and used

Outline energy production trends in the United States and worldwide
 Explain problems associated with production, processing, distribution and use of various energy sources
 Discuss alternative sources of energy
 Develop an energy management plan for an individual and a community
 Develop energy point of use assessment
 Develop an energy management plan for a business
 Identify regulatory programs dealing with energy
 Develop a tracking system to identify energy usage
 Identify processes used in purchasing energy
 Develop programs to reduce the use of energy
 Describe alternative technologies for producing energy
 Compare distributive generation and off-grid systems
 Describe lead-rating systems

Waste Management

1. Identify careers related to waste management
2. Conduct a study to describe solid waste sources in home, school, farm and community
3. Identify most common solid waste forms (paper, aluminum, glass and plastics)
4. Research industrial product design techniques for reducing waste and negative effects on the environment
5. Develop a plan for recycling reduction programs for the classroom and for the home
6. Identify methods and elements necessary for a compost
7. Determine biological activity in various solid and liquid wastes
8. Outline systems for hazardous waste disposal
9. Develop a plan for recycling program in a community
10. Identify common methods of waste removal
11. Describe effects of sewage over-flow problems on water quality
12. Explain a sewage plant and disposal system and most common methods of waste disposal
13. Describe natural methods for sewage disposal
14. Design a home septic system
15. Explain the processes carried out in a sewage plant
16. Explain a sewage disposal system
17. Describe and design for a management operation landfill

Recreational Parks/ Green Space Management

1. Identify careers that relate to recreational parks/green space management
2. Describe the balance between development of recreational areas and resource protection
3. Explore civil service job descriptions and requirements
4. Identify major components of state and local recreation areas

5. Describe low-impact developmental & operational techniques for parks
6. Assist in the formulation and development of Interpretive Education Program Services
7. Develop a program to lead people indoor and outdoor recreation activities
8. Design recreational enterprise
9. Develop rules of campground and recreational areas
10. Inspect recreational areas
11. Develop a plan for cleaning and sanitizing buildings
12. Identify and plan the financial backing needed for a recreational facility
13. Write a sales contract
14. Demonstrate knowledge of various state, local and federal laws pertaining to the operation of public facilities
15. Discuss procedures of maintaining security and preventing accidents
16. Plan security programs for recreational enterprise
17. Demonstrate ability to apprehend violators and take appropriate action
18. Explain procedure for preparing cases for prosecution
19. Advise other on navigational methods
20. Describe the procedure involved in promoting, organizing, and conducting a hunting and/or fishing expedition
21. Design special features including a skeet range, rifle and pistol area and archery range
22. Plan sled and snowmobile areas

Enforcement Regulations Legal

1. Identify careers related to the legal aspects of natural resources
2. Investigate environmental ethics
3. Explore the social impact of environmental quality management and environmental justice
4. Identify local, state, and national problems and issues concerning the environment
5. Describe the ethical, legal and social impacts of biomedicine
6. Identify laws that regulate public access
7. Demonstrate a knowledge of federal, state and local laws, rules and regulations related to USDA and PADA
8. Demonstrate knowledge of federal, state and local laws and regulations related to environmental protection
9. Interpret Occupational Safety and Health Act Regulations as they apply to a Natural Resource Enterprise
10. Describe the work of the Environmental Protection Agency
11. Demonstrate knowledge of compliance with federal and state laws on hunting, fishing and boating operations
12. Interpret state, local and federal laws pertaining to wildlife.
13. Follow state and national regulations regarding agriculture
14. Discuss Pennsylvania erosion and sediment law

15. Describe the main points, importance and advantages/disadvantages of the Endangered Species Act
16. Explain the differences between endangered, and threatened species of wildlife, waterfowl and birds
17. Research an American endangered species, describing its progress since being named an endangered species
18. Describe the impact of the national Environmental Protection Act, with emphasis on the Environmental Impact Statement
19. Discuss the Safe Water Act
20. Define environmental programs: EPA, USDA, PATA and others

**Natural Resources and Environmental Sciences Prioritized Sequential Order for
Subject Material to be Presented to Students**

- 1. Geological Sciences**
- 2. Plant Sciences**
- 3. Animal Sciences**
- 4. Environmental Awareness**
- 5. Energy**
- 6. Waste Management**
- 7. Enforcement – Regulations –Legal**

**Careers that would be available in the Natural Resources and Environmental
Sciences arena.**

Landscape Architect	Golf Course Maintenance
2	2
Green Mountain Assistance	Landscape Maintenance
2	2
Landscape Contracting	Turf Field Maintenance
2	2
Pesticide Application	Organic Garden
1,2,3,4,7	2
Water Recycling	Water Management
1,6,4,7	1,6,4,7
Wildlife Conservation	Logging
2,3,7	2,7
Foresters	Forest Technician
2,3,4,7	2,3,4,7
Conservation Officer	Wildlife Biologist
1,2,3,4,7	1,2,3,4,7
Working with Invasive Plants	Environmental Research
2,7	1,2,3,4,6,7
Teach about the Environment	Out Reach Education
All	all
Engineering	Tree Care Salesman
1,2,3,4,5,6	2,4,7
Utility Tree Inspector	Safety Coordinator
2,4,7	4,7

Utility Forester 2,4,7

Sustainability

- **Energy Renewable**
 - **Energy Solar**
- 4,5,6,7**

Conservation Consultants
all

Environmental Consultant
all

Mining Minerals

- **Well Tenders**
 - **Gas Drillers**
 - **Drilling Management**
 - **Heavy Equipment Operation**
 - **Service Crews**
 - **Well Cleaner**
 - **Geologist**
 - **Watershed Clean Up**
 - **Pipe Fitters**
 - **Welders**
- 1,4,7**

Eco Tourism

2,3,4,7,

Eco Marketing

2,3,4,7

Aqua Culture 1,2,4,6,7

Chemical Area

4,6,7

Integrated Pest Management

2,3,4,7

Green Building

- **Engineer**
 - **Installer**
 - **Construction**
 - **Landscape Architect**
- 1,2,3,4,5,6,7**

Truck Drivers

7

Eco Recreation

2,3,4,7

Dairy Farming

2,3,4,6,7

Green House Business

- **Nursery**
 - **Hydroponics**
 - **Propagator**
 - **Field Forman Nurseries**
 - **Marketing**
 - **Soil Conservation**
 - **Micro Biologist**
 - **Environmental Lab Technician**
 - **Agronomy**
- 2,4,7**

Animal Husbandry

2,3

Wildlife Management

1,2,3,4,7

Erosion and Sediment Control

1,2,4,6,7

Forestry

- **Timber Sales**
- **Sustainability**
- **Wild Life Preservation**
- **Arborist for City Forestry**
- **Urban Foresters**
- **Forest Certification**

1,2,3,4,7

Land Surveyors

1,4,7

Fish Biologist

1,2,3,4,7

Land Managers

1,2,3,4,7

Horticulturist

2,4,7

Food Processing

4,6,7

Environmental Consultant

- **Accounting**
- **Lawyer**

4,7

Geo Chemist

1,2,3

Geologist

- **Goal**
- **Oil**
- **Gas**

1,7

Mining Engineer

1,7

Reservoir Management

1,4,5,7

Specializing in Environmental Education Utilization of Pulp Wood

2,5,6,7

Organic Fruit and Vegetable Growing

2,4,7

Recycling Buildings for Architectural Antiques

6,7

Equine Studies

3

Certified Crop Technician

2,7

Environment Engineering

1,2,3,4,7

CAD, Drafting

7

Benthic Ecologist

1,2,3,4,7

Soil Biologist

1,2,3,4,7

Wetland Declination

1,2,3,4,7

Green Industry

all

Environmental Chemist

1,2,3,4

Hydro geologies

1,2,7

Gas Transportation

4,5,7

Veterinary Assistant

3,7

PA Certified Horticulturist

2,4,7

PA Certified Nursery Associate
2,4,7

GIS-GPS Technician
all

Fisheries Biologist
1,2,3,4,6,7

Food Production
2,4,6,7

Fruit and Vegetable growers
2,4,6,7

Certified Arborist – International 2,4,7

PA Certified Landscaper
2,4,7

Botanist
1,2,4,7

Wineries
2,4,6,7

Wildlife Conservation Officer
2,3,4,7

Certified crop advisor
2,4,7

Agricultural Mechanics – Machine
Operators 6,7

**Equipment and Supplies Recommended for the Natural Resources and
Environmental Sciences Program at the Erie County Technical School**

Computer Projectors
Computers
Printers
Internet Access
Software for Topographic Maps (MapTec)
GPS Units
Autoclave
Rototiller
pH Meters
Dissolved O₂ Meters
CO₂ Meters
Wind Meters
Solar Panels
Air Quality Testing Equipment
Hand Levels
Tripods
Textbooks
USDA Soils Books
Fruit Trees
Pruning Tools
Model Greenhouse
Potting Materials
Microbiological Kits
Maps
Brunton Compasses
Safety Glasses
Hard Hats
Water Sample Test Kits
Clipboards
Tapes
Flagging/Ribbon
Soil Test Kits
Soil Augers
Buckets
Shovels
Nets
Sediment Samplers
Water Level Tapes

**Participant list for the September 13, 14, 2005 DACUM Workshops Held for the
Proposed Natural Resources and Environmental Sciences Program**

Crotsley, Miranda
Environmental Education Specialist Supervisor
Presque Isle State Park (DCNR)
301 Peninsula Drive, Suite 1
Erie, PA 16505
One year experience as an Environmental Education Specialist Supervisor
Two years experience as an Environmental Education Specialist

Dahlkemper, Charles L.
Retired Founder
Dahlkemper Landscape, Architect-Contractors
5240 Schrimper Road
Erie, PA 16510
50 years experience in current position

Frederick J Dunn
Substitute Instructor E.C.T.S.
9275 Blue Mooh Road
Wattsburg, PA 16442, retired US Naval Officer
Five years experience as a substitute instructor

Erdman, Tom
Service Forester
DCNT Bureau of Forestry
12723 Rt. 19 Box, 801
Waterford, PA 16441
20 years experience in current position

Hansen, John
Principal Erie County Technical School
8500 Oliver Road
Erie, PA 16509
First year experience as the Principal

McUmbler, Guy
Sustainability Coordinator
PA Department of Environmental Protection
230 Chestnut Street
Meadville, PA 16335
4 years experience in current position and 23 years with DEP

Senko, Regis F.
Information Education Supervisor, PA Game Commission
PA Game Commission NW Region Franklin, PA.
P.O. Box 31
Franklin, PA 16323
10 years experience in current position and 23 years with the agency

Waltz, Michael, D.
Sr. Project Manager
Environmental Remediation and Recovery INC.
5719 Route GN
Edinboro, PA 16412
19 years experience in current position

Erie County Technical School

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April 28, 2005

Facilitated by

Lance J. Hummer
Workforce Development Coordinator
Northwest Pennsylvania Industrial Resource Center

What are some of the Careers that would be available in the Natural Resources and Environmental Sciences arena?

Landscape Architect
Golf Course Maintenance
Green Mountain Assistance
Landscape Maintenance
Landscape Contracting
Turf Field Maintenance
Pesticide Application
Organic Garden
Water Recycling
Water Management
Wildlife Conservation
Logging
Foresters
Forest Technician
Conservation Officer
Wildlife Biologist
Working with Invasive Plants
Environmental Research
Teach about the Environment
Out Reach Education
Engineering
Tree Care Salesman
Utility Tree Inspector
Safety Coordinator
Utility Forester
Green Building

- **Engineer**
- **Installer**
- **Construction**
- **Landscape Architect**

Sustainability

- **Energy Renewable**
- **Energy Solar**

Conservation Consultants
Truck Drivers
Environmental Consultant
Mining Minerals

- **Well Tenders**
- **Gas Drillers**
- **Drilling Management**
- **Heavy Equipment Operation**
- **Service Crews**
- **Well Cleaner**

- Geologist
- Watershed Clean Up
- Pipe Fitters
- Welders

Eco Tourism

Eco Recreation

Eco Marketing

Dairy Farming

Aqua Culture

Green House Business

- Nursery
- Hydroponics
- Propagator
- Field Forman Nurseries
- Marketing
- Soil Conservation
- Micro Biologist
- Environmental Lab Technician
- Agronomy

Chemical Area

Animal Husbandry

Integrated Pest Management

Wildlife Management

Erosion and Sediment Control

Environment Engineering

Forestry

- Timber Sales
- Sustainability
- Wild Life Preservation
- Arborist for City Forestry
- Urban Foresters
- Forest Certification

Land Surveyors

CAD, Drafting

Fish Biologist

Benthic Ecologist

Land Managers

Soil Biologist

Horticulturist

Wetland Declination

Food Processing

Green Industry

Environmental Consultant

- Accounting
- Lawyer

Geo Chemist
Environmental Chemist
Geologist

- **Goal**
- **Oil**
- **Gas**

Mining Engineer
Hydrogeologies
Reservoir Management
Gas Transportation
Specializing in Environmental Education
Utilization of Pulp Wood
Organic Fruit and Vegetable Growing
Recycling Buildings for Architectural Antiques
Equine Studies
Veterinary Assistant
Certified Crop Technician
PA Certified Horticulturist
PA Certified Nursery Associate
PA Certified Landscaper
GIS-GPS Technician
Botanist
Fisheries Biologist
Wineries
Food Production
Wildlife Conservation Officer
Fruit and Vegetable growers
Certified crop advisor
Certified Arborist – International
Agricultural Mechanics – Machine Operators

Career Clusters

Plant Science

- **Agronomy**
- **Dendrology**
- **Horticulture**
- **Silva Culture**
- **Commercial Food Production**
- **Botany**
- **Invasive Plant**

Animal Science

- **Fish Wildlife**
- **Aqua Culture**
- **Biologist**
- **Invasive Species**

Geological Sciences

- **Soil**
- **Water Hydrology**
- **Hydrogeology**
- **Geology**
- **Soil Science**
- **Environmental Education**
- **Waste Management**
- **Conservation**
- **Enforcement / Regulations / Legal**
- **Water Resources**
- **Environmental Trade Technology**
- **Energy**

Waste Management

- **Recycling**
- **Landfill Management**
- **Hazardous Waste**
- **Reclamation**
- **Gray Water**
- **Brown Fields**

Environmental Education

- **Conservation**
- **Communication**
- **Tourism**
- **Green Technology**

- **Business Management**
- **Environmental Trade Education**

Enforcement – Regulation – Legal

- **Environmental Law**
- **Regulatory Enforcement**
- **Best Management Practices**
- **Governmental Agencies**

Energy

- **Nuclear**
- **Bio Fuels**
- **Alternative Fuels**

Natural Resources and Environmental Sciences

Prioritized Sequential Order

For Subject Material to be Presented to Students

5. Geological Sciences

- Soil
- Water Hydrology
- Hydrogeology
- Geology

6. Plant Sciences

- Botany
- Agronomy
- Dendrology
- Horticulture
- Silva Culture
- Commercial Food Production
- Invasives

7. Animal Sciences

- Fish, Wildlife, Aquaculture
- Biology
- Zoology
- Equine, Domestic
- Animal Husbandry
- Entomology
- Invasives

8. Environmental Awareness

- Conservation
- Communication
- Marketing
- Tourism
- Green Technology
- Business Management

9. Energy

- **Bio Fuels**
- **Alternative Energy**

10. Waste Management

- **Recycling**
- **Gray Water**
- **Landfill Management**
- **Brown Fields**
- **Hazardous Waste**
- **Reclamation**

11. Enforcement – Regulations -Legal

Participant List for DACUM Workshop Held on April 28, 2005

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