

Environmental Quality and Stewardship

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V(A). Planned Program (Summary)

1. Name of the Planned Program

Environmental Quality and Stewardship

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
101	Appraisal of Soil Resources			20%	
102	Soil, Plant, Water, Nutrient Relationships			15%	
133	Pollution Prevention and Mitigation			30%	
403	Waste Disposal, Recycling, and Reuse			20%	
605	Natural Resource and Environmental Economics			15%	
	Total			100%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2007	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	6.7	0.0
Actual	0.0	0.0	5.8	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	419266	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	578469	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	502942	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Conduct research; publish/present results

Research to support preservation of West Virginia's soil, water, forest and wildlife resources is a high priority in the West Virginia Station. The focus of our research is on protecting soil and water quality while developing economically effective and environmentally sustainable management practices for agriculture, forestry and other points of interaction of man and environment. Contamination of soil and eventually ground water with acid mine drainage from abandoned mines, and from more recent surface mining, is a growing state concern. Research is being conducted to characterize the nature and scope of these problems and to develop effective and cost effective remediation programs.

The development of environmentally sustainable practices for managing farms and forests is an important component of overall Station goals to position state producers to compete more effectively in organic or "green" markets and to preserve West Virginia lands, forests, wildlife, soil and water resources for future generations.

Developing optimum methods for the restoration of environmentally compromised areas of soil and water is a primary emphasis of Station research. Focus areas include restoration of surface mine sites, areas adjacent to newly constructed and older state highways, impacted state streams and waterways, and areas compromised by agricultural and forest industry waste and activity.

Research in 2007 evaluated legal requirements for reclaiming surfaced mined areas by comparing alternative topsoil applications (legally required) and various degrees of surface compaction on the growth of 11 hardwood species. Results showed little to no impact from alternative topsoil applications but significant differences in survival and growth with differences in extent of surface compaction (with non-compacted areas being superior). A companion project is evaluating the effectiveness of current mitigation practices and natural ecological succession in recovering lost aquatic ecosystem functions on reclaimed mine sites. Similar legal requirements for native plant establishment along newly constructed and older reclaimed highway sites were evaluated by comparing alternative methods of planting native species. Results showed little to no effects of fertilizer treatments to 300 kg/ha of 10-20-10 but significant impacts from surface preparation were observed. In newly seeded areas, seeding native species with non-native yielded only about 25% coverage for native grasses after two years. In reclaimed areas, it was necessary to disturb (till) existing non-native plants in order to achieve meaningful native populations within two years. In a separate study, data are being collected on populations of amphibians, birds and invertebrates, as well as information on vegetation, water quality and soils in mitigated and natural wetlands, in order to determine the success of restored and created wetlands.

Poultry litter is a primary agricultural waste in West Virginia and several studies are aimed at minimizing its impact on water quality. One study is comparing costs and benefits for alternative methods of utilizing excess manure in the Chesapeake Bay drainage area. Mathematical programming is being used to compare land application (farm or forest) with composting, pelletization and use for the generation of electricity. A second study is a feasibility and cost effectiveness analysis of a waste to energy system utilizing poultry litter as a fuel and a fixed-bed gasifier as a medium to convert litter to energy. Finally, an economic analysis of off-farm transport of poultry litter from areas of excess to areas of nutrient deficiency is being conducted to determine both economic and environmental consequences of the program. Supporting studies are analyzing rep-PCR fingerprints of 600 E. coli isolates from animal wastes to test the hypothesis of differences in fingerprint patterns related to source. Results support the presence of multiple E. coli strains among the various animals and suggest that distinct strains are obtained based on production practices employed.

Virtually all Station soil and water quality research is based on results from on-going soil survey work. One focus area in on-going work is the use of digital soil mapping techniques to represent soil-forming factors for the purpose of quantitatively modeling the distribution of soil properties. Results to date have shown that the distribution of surface and subsurface rock fragments can be successfully modeled while other physical and morphological properties (e.g., soil particle size, carbon content, depth to depletion, extractable Al and Fe) were much more difficult to predict accurately. A second study is examining water table fluctuations at sites where soil morphology and observed or inferred hydrology do not agree. A specific application has been to study the preferential flow of phosphorus through undisturbed soil profiles of three state benchmark soils. Soil dye staining showed preferential flow across all test sites with variation influenced by skeletal soils and the presence of argillic horizons, fragipans and lithologic discontinuities, with increased staining above each of these interfaces.

2. Brief description of the target audience

Commercial producers and foresters, managers, consultants, policy makers, governmental regulators.

V(E). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons (contacts) reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
Plan	0	0	0	0
2007	0	0	0	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year Target

Plan: 0

2007: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan			
2007	0	4	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

Refereed, scientific manuscripts

Year	Target	Actual
2007	4	8

Output #2

Output Measure

Science-based articles for lay audiences

Year	Target	Actual
2007	4	0

Output #3

Output Measure

Presentations of research results

Year	Target	Actual
2007	5	5

V(G). State Defined Outcomes

O No.	Outcome Name
1	Map Phosphorus Adsorption Capacity for West Virginia soils - %
2	Knowledge of soil properties (pH, bulk density, electrical conductivity, etc.) required to grow native species on disturbed land - # new species
3	Increased use of poultry litter in turf grass culture- %

Outcome #1

1. Outcome Measures

Not reporting on this Outcome for this Annual Report

2. Associated Institution Types

3a. Outcome Type:

3b. Quantitative Outcome

Year	Quantitative Target	Actual
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3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
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V(H). Planned Program (External Factors)

External factors which affected outcomes

Other (Limited state collection of data related to environmental conditions)

Brief Explanation

None of the state defined outcome measures for this program are, or will be routinely measured in the future. These outcomes have been replaced in the Plan of Work with "Percent of state streams classified as 'impaired'" and "Percent of impaired streams impaired due to agricultural or forest production practices". We believe these reflect long-term success or failure of the program and plans exist for their measurement.

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

Before-After (before and after program)

Evaluation Results

None beyond those needed to measure outcomes

Key Items of Evaluation

Differences in rep-PCR fingerprint results for strains of E. coli suggest bacterial tracking may be considerably more specific than previously thought.

Variation in P flow rates through alternative soil types, structures, etc. can have significant meaning for interpretation of soil vs. water content of P at given times.