# Natural Resources and Environment

Natural Resources and Environment

## V(A). Planned Program (Summary)

### 1. Name of the Planned Program

Natural Resources and Environment

## V(B). Program Knowledge Area(s)

### 1. Program Knowledge Areas and Percentage

| KA Code | Knowledge Area | %1862 Extension | %1890 Extension | %1862 Research | %1890 Research |
|---|---|---|---|---|---|
| 102 | Soil, Plant, Water, Nutrient Relationships | | | 28% | |
| 104 | Protect Soil from Harmful Effects of Natural Elements | | | 9% | |
| 111 | Conservation and Efficient Use of Water | | | 5% | |
| 112 | Watershed Protection and Management | | | 5% | |
| 123 | Management and Sustainability of Forest Resources | | | 5% | |
| 132 | Weather and Climate | | | 5% | |
| 133 | Pollution Prevention and Mitigation | | | 38% | |
| 136 | Conservation of Biological Diversity | | | 5% | |
| | **Total** | | | 100% | |

## V(C). Planned Program (Inputs)

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

| Year: 2008 | Extension | | Research | |
|---|---|---|---|---|
| | 1862 | 1890 | 1862 | 1890 |
| Plan | 0.0 | 0.0 | 8.7 | 0.0 |
| Actual | 0.0 | 0.0 | 11.5 | 0.0 |

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

| Extension | | Research | |
|---|---|---|---|
| Smith-Lever 3b & 3c<br>0 | 1890 Extension<br>0 | Hatch<br>177706 | Evans-Allen<br>0 |
| 1862 Matching<br>0 | 1890 Matching<br>0 | 1862 Matching<br>566071 | 1890 Matching<br>0 |
| 1862 All Other<br>0 | 1890 All Other<br>0 | 1862 All Other<br>201770 | 1890 All Other<br>0 |

## V(D). Planned Program (Activity)

### 1. Brief description of the Activity

A major goal of this research program is the development of sustainable practices for watershed protection and management. Water quality research has continued with work already begun on the characterization of the chemical and biological status of the most important watersheds of Puerto Rico. Another project aims to reduce the environmental impact of waste-water of coffee processing systems in watersheds. This study is producing baseline data that will enhance our understanding of the pollution generated by this agricultural activity, and is allowing researchers to formulate alternatives to address water quality problems related to the traditional and ecological coffee wet-processing. Research on the performance of cover anaerobic lagoons for energy, nutrient and carbon recycling continues on its experimental phase. Preliminary results suggest, however, that both incoming and lagoon biological oxygen demand are low for effective biogas production. Studies to quantify off-field nutrient losses in runoff from tropical agroecosystems, and factors influencing their transport, are also being conducted. They complement other research activities aimed at determining the best management practices for dairy manure management. Soil erosion and nutrient transport research continued with studies on the following topics: soil management practices to minimize problems of poorly drained upland soils, evaluation of micronutrient behavior in highly weathered soils, and the evaluation of synthetic materials and ground cover germplasm for erosion control.

Research on biodiversity and conservation, and threats to agriculture and natural ecosystems was also conducted during last year. Studies in progress include a project to protect native and endangered cacti in Puerto Rican dry forests from a new invasive mealybug. Another project is assessing the regeneration of native and introduced species in the dry forest in response to multiple disturbances (fires, hurricanes, dominance by exotic tree). The findings from this latter one are changing the understanding of other scientists, forest managers, citizens, and government officials about the natural regeneration methods of the tropical dry forest.

### 2. Brief description of the target audience

Extension Specialists and professionals, government partners, producers, consumers, and environmental groups.

## 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 |
| 2008 | 0 | 0 | 0 | 0 |

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

**Patent Applications Submitted**

| Year | Target |
|---|---|
| **Plan:** | 0 |
| 2008: | 0 |

**Patents listed**

### 3. Publications (Standard General Output Measure)

**Number of Peer Reviewed Publications**

| | Extension | Research | Total |
|---|---|---|---|
| **Plan** | 0 | 4 | |
| 2008 | 0 | 8 | 8 |

## V(F). State Defined Outputs

**Output Target**

**Output #1**

**Output Measure**

Oral or poster presentations in professional scientific society meetings resulting from program activities

| Year | Target | Actual |
|---|---|---|
| 2008 | 10 | 22 |

**Output #2**

**Output Measure**

Number of Peer Reviewed publications.

| Year | Target | Actual |
|---|---|---|
| 2008 | 4 | 8 |

**Output #3**

**Output Measure**

Number of trainings, research demonstration activities and meetings with stakeholders to discuss research results and priorities.

| Year | Target | Actual |
|---|---|---|
| 2008 | 2 | 17 |

**Output #4**

**Output Measure**

Number of graduate students completing a MS degree and submitting theses under research projects in this program

| Year | Target | Actual |
|---|---|---|
| 2008 | 2 | 8 |

## V(G). State Defined Outcomes

| O No. | Outcome Name |
|---|---|
| 1 | Number of stakeholders gaining knowledge on natural resources conservation and management, microirrigation scheduling, and other soil enhancement and water conservation practices |
| 2 | Number of farmers adopting microirrigation management practices |
| 3 | Number of persons adopting practices that prevent biodiversity threats and losses |
| 4 | Number of farmers adopting methods to increase soil organic matter content |
| 5 | Number of farmers reporting increased water use efficiency in their farms |
| 6 | Number of persons that adopted practices to improve water resources. |
| 7 | Number of watersheds for which a Total Maximum Daily Load (TMDL) for nutrients have been developed |

Natural Resources and Environment
**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 |
|---|---|---|

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|

## V(H). Planned Program (External Factors)

**External factors which affected outcomes**

Competing Programmatic Challenges
Other (Lack of reliable mechanisms to assess the program's impact)

**Brief Explanation**

This program encompasses several research groups efforts and it is difficult to document outcomes and adoption of management practices in all of them. We believe that many indicators are numerically larger than the conservative estimate offered, but at present lack concrete evidence of this.

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

**1. Evaluation Studies Planned**

Before-After (before and after program)
Other ()

**Evaluation Results**

{No Data Entered}

**Key Items of Evaluation**

{No Data Entered}