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Proposal to Study Economic and Environmental Benefits of Reducing Soil Erosion in Albania

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ON SOCIAL STRUCTURE,
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UNIVERSITY OF WISCONSIN —
MADISON

PROPOSAL TO STUDY ECONOMIC AND ENVIRONMENTAL BENEFITS OF REDUCING SOIL EROSION IN ALBANIA

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PROPOSAL TO STUDY ECONOMIC AND ENVIRONMENTAL BENEFITS OF REDUCING SOIL EROSION IN ALBANIA

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1. INTRODUCTION

Soil erosion and associated nonpoint pollution are critical problems affecting the economic welfare, food security, and public health of Albania. Nearly 60 million tons of sediment are deposited by Albanian rivers into the Adriatic Sea each year. This translates into a national average soil erosion rate of 27.2 tons per hectare per year, which is more than twice the level of "tolerable" erosion established by many countries. This also means that an average of 2.3 mm of valuable topsoil are lost to the ocean each year. Accompanying the topsoil are agrochemicals such as pesticides and fertilizers as well as industrial pollutants, which are transported to reservoirs, rivers, lakes, and the ocean, thereby causing a degradation in water quality.

Natural levels of erosion are high in Albania because of steep slopes (the average slope is 27 percent), high rates of rainfall (the average yearly rainfall for the country is 1,500 mm), and highly erodible soils (due to low levels of organic matter and high levels of silt and clay). However, the levels of soil erosion have increased historically because of terracing steep, highly erodible slopes, uncontrolled and illegal deforestation, and overgrazing of pastureland.

The economic consequences of soil erosion in Albania are great. The loss of topsoil has reduced the yields of arable crops (largely wheat, corn, and rice), forage, fruit trees, and vineyards that are vital to Albania's food security. Many of the country's 630 reservoirs are becoming filled with sediment, which lowers their storage capacity, damages turbines producing hydroelectric power, and may eventually lead to catastrophic flooding. The removal of sediments from reservoirs or construction of new reservoirs are costly enterprises that Albania cannot afford. Sediment has accumulated in drainage channels of reclaimed coastal land, causing flooding, accumulation of salts in the soils, and reduced agricultural productivity.

The environmental consequences of soil erosion include not only a loss in biological sustainability and diversity but also a decline in water quality and fish and wildlife habitats.

Pollutants from agricultural, municipal, and industrial activities that accompany the sediment may also threaten human health.

Although most Albanian private landowners and policymakers are aware of soil erosion, there are few quantitative data on the extent and magnitude of the problem, the most cost-effective control measures that can be applied to the diverse Albanian landscapes, and the economic consequences of soil erosion. For these reasons, a study of the economic and environmental benefits of soil erosion control should be undertaken immediately in Albania.

2. OBJECTIVES

The objectives of the proposed study include:

1) to quantify the magnitude of soil erosion and its effects on water quality at three levels of intensity: site-specific, watershed, and the nation as a whole;
2) to identify high-risk areas for immediate soil erosion control using a geographic information system;
3) to create a public awareness program that uses soil erosion control as an example of land protection in Albania;
4) to monitor the effectiveness of soil erosion control on discharge of sediments into the Adriatic Sea using remote sensing; and
5) to determine the economic benefits of soil erosion control.

3. METHODOLOGY

The following methods will be used to successfully complete the study.

3.1 MONITORING SOIL EROSION

The magnitude of soil erosion will be determined at three scales: site-specific, watershed, and national. On a site-specific scale, soil erosion will be measured by collecting runoff and suspended sediment monthly from runoff plots (four replications) established at 21 sites. The sites will be selected from districts featuring moderate, significant, and critical levels of soil erosion. The sites also will be selected according to factors identified in the Universal Soil Loss Equation as contributing to soil erosion, including slope steepness (<25 percent, 25–40 percent, and >40 percent), broad climatic zone (Mediterranean flat, Mediterranean hilly, Mediterranean submountainous, and Mediterranean mountainous), soil erodibility (very heavy clay, heavy clay, moderate clay, light, and sandy), cropping factor (wheat, maize, improved pasture, unimproved pasture, oak forest, olive trees, grape vineyards), and management practice (cultivated and minimum tillage).

Annual soil erosion rate will be determined from the amount of suspended sediment in the runoff summed from monthly collections. The suspended sediment will be analyzed for humus content, available soil nutrients (nitrogen, phosphorus, potassium), calcium carbonate, and the amount of sand, silt, and clay. The solutions will be analyzed for turbidity, pH, and electrical conductivity (that is, total dissolved salts). Selected samples (about 5 percent) will be analyzed for

pesticides, biological oxygen demand, and heavy metals (copper, cadmium, zinc, and lead). This work will be done by the Forest and Pastures Research Institute (FPI), the Institute for the Design of Water Works (WWI), Hydrometeorology Institute (HI), and Land Research Institute (LRI).

To measure the rate of erosion on a watershed level, 30 reservoirs will be selected from the 10 major rivers of Albania. Sediment cores will be collected to the base of the reservoir and sedimentation rate will be determined from the amount of sediment and the time of construction of the reservoir. Selected samples will be taken from different levels of the cores for analysis of heavy metals and pesticides. This work will be carried out by WWI, HI, and LRI.

The overall rate of erosion for Albania will be monitored by collecting monthly samples from the 10 major rivers, including the Drini, Fani, Mati, Ishmi, Erzeni, Shkumbini, Osumi, Devolli, Semani, and Vjosa. The particulate and dissolved constituents will be analyzed similarly as on erosion monitoring plots. This work will be done by HI, WWI and LRI.

3.2 HIGH-RISK AREAS OF SOIL EROSION

The areas of significant and critical soil erosion (that is, that exceed the level of "tolerable" erosion) will be determined from remote sensing. The site-specific erosion measurements will provide the "ground truth." The data will be analyzed using a geographic information system (GIS), such as ARC-INFO, and displayed on 1:50:000 district maps.

Specific kinds of soil erosion control practices will be applied to site-specific plots in high-risk areas and their effectiveness will be determined by monitoring sediment yield. Examples of soil erosion control practices to be employed include conservation tillage, use of grassed waterways, controlled grazing, and buffer strips between crops. This work will be done by the FPI, LRI, and the Agricultural Universities of Tirana and Korçe. The remote sensing and GIS components of the project will be done by the Ministry of Agriculture and Food's Soil and Water Directorate and Forest and Livestock Directorate.

3.3 ENVIRONMENTAL AWARENESS PROGRAM

The level of public environmental awareness in Albania is comparatively low because environmental education has not been a part of the elementary and high school curricula and there is a lack of printed information on the concepts of environmental science in Albania. We will use the issue of soil erosion to demonstrate the importance of the principles of land protection to the quality of life in Albania. These efforts will be coordinated by the Public Relations section of the Ministry of Health, Committee on Environmental Protection. Several of the site-specific soil erosion sites will be used as demonstration studies in cooperation with the Agricultural Universities of Tirana and Korçe, technical agriculture schools, local *komuna* and schools, and private farmers. Leaflets dealing with the issue of soil erosion will be created by the FPI and LRI and distributed by the EC-PHARE Agricultural Development Programme (Extension Coordinator). Arrangements will be made to have a video made by Mr. Thoma Tola for showing on Albanian television.

3.4 LAND INFORMATION SYSTEM MONITORING

The effectiveness of soil erosion control measures at the national level will be demonstrated by examining the sediment discharge plume at the mouths of each of the eight major rivers draining

into the Adriatic using remote sensing. This work will be done by the cooperative efforts of the Institute for the Design of Water Works, Hydrometeorology Institute, and the Land and Forestry Directorates.

3.5 ECONOMIC BENEFITS OF SOIL EROSION CONTROL

During this time of governmental transition, there are many demands on Albania's limited financial resources. To illustrate the effectiveness of soil erosion control, a cost/benefit analysis will be made. This analysis will balance the cost of soil erosion control against the benefits of soil erosion control, including soil sustainability, reservoir and drainage channel longevity, and preservation of fish and wildlife habitat, tourism, and human health. This work will be done by the MOAF Statistics and Agricultural Finance sections and the Ministry of Construction and Tourism.

4. ANTICIPATED SIGNIFICANCE AND PRODUCTS

During the previous administration, there was little cooperation among administrative units, such as ministries or institutes. Despite the fact that the scientific personnel within these units are technically competent, there has been little "cross-fertilization" among these units. Much of the administrative planning and actual research has been conducted by foreign consultants. Accordingly, the goal of this research is to utilize the expertise of Albanian scientists within the research institutes and universities and administrators within the directorates, coupled with advice from various national and international governmental and nongovernmental agencies. The proposed work is significant in that it complements the existing EU-PHARE work on a national water strategy and a national waste disposal strategy for Albania. The proposed work is the first comprehensive study of the significance of soil erosion on the economic welfare and human health of Albania. The proposed study not only identifies the high-risk areas, but also assigns a soil erosion control practice and provides a state-of-the-art monitoring approach to judge the effectiveness of the soil erosion control practices. A land-information system approach is offered to monitor the effects of these practices on soil erosion control. Finally, a cost/benefit analysis will demonstrate that soil erosion control is not only beneficial to the environment, but also is significant in protecting Albania's food security and the health and welfare of its citizens.

5. PROJECT ORGANIZATION AND SCHEDULE

The project will be coordinated by an agency to be designated by the LPAP Working Group. Much of the research will be undertaken by institutes within the Ministry of Agriculture (Land Research Institute, Forestry and Pasture Research Institute, and Institute for the Design of Water Works), the Academy of Science's Hydrometeorology Institute, and the Agricultural Universities of Tirana and Korçe. The public education work could be coordinated by the CEP Public Awareness with the assistance of EC-PHARE Agricultural Development Programme (Extension Coordinator). The research and public education components of the project could benefit from an Advisory Panel composed of members from the Ministry of Research, National Council of Water, the Immovable Property Registration System (IPRS) PMU, USAID Support for Agricultural Restructuring in

Albania (SARA), Volunteers for Overseas Cooperative Assistance (VOCA), and the International Fertilizer Development Center (IFDC).

The study will require three years to complete. This first draft of the proposal will be reviewed by the various institutes involved in the study. The proposal will be refined during subsequent meetings of LPAP Working Group during July and August 1995.

The work will begin with the identification of sites for measuring runoff and soil erosion and reservoirs for sediment accumulation and the installation of collectors on the ten rivers.

Monitoring of river discharge via remote sensing will begin in January 1998 and continue through 1999. The formal public education program will begin in the spring of 1998 with the establishment of demonstration sites and the distribution of leaflets on soil erosion control. During the third and final year of the project, the areas of high risk to erosion will be identified using remote sensing, and maps will be prepared using GIS. Similarly, the discharge of sediments will be monitored using remote sensing. A cost/benefit analysis will be conducted during the third year by a special group. A video will be prepared by an Albanian cinematographer, Mr. Thoma Tola, for showing on national television and in the elementary and high school systems.

6. INSTITUTIONAL CAPABILITIES

The proposed work will require some institutional strengthening. For example, the Land Research Institute will need funding for upgrading their laboratory facilities. The Land and Forestry Directorates will need remote sensing and GIS capabilities. Additional computers will be required by the Land Research, Forest and Pasture Research, and Hydrometeorology Institutes and the Institute for the Design of Water Works. The Committee on Environmental Preservation Public Relations section has limited funding to coordinate the environmental awareness and public education components of the proposed work.

7. BUDGET

The Land Protection Working Group will develop a budget not to exceed $2 million (U.S. dollars) over the next two months using the work sheets that follow.

7.1 BUDGET WORK SHEET #1

TASK	TIME FRAME	AGENCY*	COST (LEKS)
Identify soil erosion plots	1/97–4/97	LRI	
	1/97–4/97	FRI	
	1/97–4/97	WWI	
Select reservoirs for sedimentation	1/97–4/97	WWI	
	1/97–4/97	HI	
Monitor site-specific soil erosion	4/97–12/99	LRI	
	4/97–12/99	FRI	
Collect and analyze sediment from reservoirs	4/97–12/97	WWI	
	4/97-12/97	HI	
	4/97-12/97	LRI	
Monitor river discharge	4/97-12/97	WWI	
	4/97-12/97	HI	
	4/97-12/97	LRI	
	4/97-12/97	LD	
Identification of high-risk areas	1/99–12/99	FRI	
	1/99–12/99	LRI	
	1/99–12/99	AT	
	1/99–12/99	AK	
	1/99–12/99	LD	
	1/99–12/99	FD	
Environmental assessment program	1/98–12/99	CEP-PA	
	1/98–12/99	FPI	
	1/98–12/99	LRI	
	1/98–12/99	AT	
Environmental assessment program	1/98–12/99	AK	
	6/99–12/99	Video	
Land Information System	1/98–12/99	HI	
	1/98–12/99	LD	
	1/98–12/99	FD	
Economic analysis	1/99–12/99	———, MoCT	

* LRI = Land Research Institute, FPI = Forestry & Pastures Institute, HI = Hydrometeorology Institute, WWI = Institute for the Design of Water Works, LD = MOAF Land Directorate, AT = Agricultural University of Tirana, AK = Agricultural University of Korçe, FD = Forestry Directorate, CEP-PA = Committee on Environmental Protection-Public Relations, MoCT = Ministry of Construction and Tourism.

7.2 BUDGET WORK SHEET #2

Name of Institute _____

BUDGET ITEM	TASK 1*	TASK 2	TASK 3	TASK 4
Salary/wages	_____	_____	_____	_____
Part-time labor	_____	_____	_____	_____
Supplies	_____	_____	_____	_____
Travel	_____	_____	_____	_____
Capital items (>$1000)	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____
Total budget request	_____	_____	_____	_____

* Please indicate which tasks for which you are including a budget such as establishment of soil erosion plots, selection of reservoirs, monitoring soil erosion plots, collection of sediments from reservoirs, monitoring river discharge, analysis of sediment and water samples, identification of high-risk areas, environmental assessment, land information system, economic analysis, and so forth.