

REQUEST FOR PROPOSALS

**TECHNICAL ASSISTANCE FOR THE
ROMANIA: BLACK SEA COASTAL EROSION
CONTROL PROGRAM PHASE I PROJECT**

Submission Deadline: **4:00 PM**
LOCAL TIME
DECEMBER 4, 2007

Submission Place: Ms. Mary-Jeanne Adler
Director
Emergency Situation Management Directorate
Ministry of Environment and Sustainable Development
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SEALED PROPOSALS SHALL BE CLEARLY MARKED AND RECEIVED PRIOR TO THE TIME AND DATE SPECIFIED ABOVE. PROPOSALS RECEIVED AFTER SAID TIME AND DATE WILL NOT BE ACCEPTED OR CONSIDERED.

REQUEST FOR PROPOSALS

SECTION 1:	INTRODUCTION.....	4
1.1	BACKGROUND SUMMARY.....	4
1.2	OBJECTIVE.....	4
1.3	PROPOSALS TO BE SUBMITTED.....	5
1.4	CONTRACT FUNDED BY USTDA.....	5
SECTION 2:	INSTRUCTIONS TO PROPOSERS.....	6
2.1	PROJECT TITLE.....	6
2.2	DEFINITIONS.....	6
2.3	DESK STUDY.....	6
2.4	EXAMINATION OF DOCUMENTS.....	6
2.5	PROJECT FUNDING SOURCE.....	6
2.6	RESPONSIBILITY FOR COSTS.....	7
2.7	TAXES.....	7
2.8	CONFIDENTIALITY.....	7
2.9	ECONOMY OF PROPOSALS.....	7
2.10	SUBSTANTIVE PROPOSALS.....	7
2.11	CONDITIONS REQUIRED FOR PARTICIPATION.....	7
2.12	LANGUAGE OF PROPOSAL.....	8
2.13	PROPOSAL SUBMISSION REQUIREMENTS.....	8
2.14	PACKAGING.....	8
2.15	AUTHORIZED SIGNATURE.....	8
2.16	EFFECTIVE PERIOD OF PROPOSAL.....	9
2.17	EXCEPTIONS.....	9
2.18	OFFEROR QUALIFICATIONS.....	9
2.19	RIGHT TO REJECT PROPOSALS.....	9
2.20	PRIME CONTRACTOR RESPONSIBILITY.....	9
2.21	AWARD.....	9
2.22	COMPLETE SERVICES.....	10
2.23	INVOICING AND PAYMENT.....	10
SECTION 3:	PROPOSAL FORMAT AND CONTENT.....	11
3.1	SECTION 1: INTRODUCTION AND EXECUTIVE SUMMARY.....	11
3.2	SECTION 2: COMPANY INFORMATION.....	11
3.2.1	COMPANY PROFILE.....	11
3.2.2	OFFEROR'S AUTHORIZED NEGOTIATOR.....	12
3.2.3	NEGOTIATION PREREQUISITES.....	12
3.3	SECTION 3: ORGANIZATIONAL STRUCTURE, MANAGEMENT, AND KEY PERSONNEL.....	12
3.4	SECTION 4: TECHNICAL APPROACH AND WORK PLAN.....	13
3.5	SECTION 5: EXPERIENCE AND QUALIFICATIONS.....	13
SECTION 4:	AWARD CRITERIA.....	14

ANNEX 1	FEDBIZOPPS ANNOUNCEMENT
ANNEX 2	BACKGROUND DESK STUDY
ANNEX 3	USTDA NATIONALITY REQUIREMENTS
ANNEX 4	USTDA GRANT AGREEMENT, INCLUDING MANDATORY CONTRACT CLAUSES
ANNEX 5	TERMS OF REFERENCE (FROM USTDA GRANT AGREEMENT)

Section 1: INTRODUCTION

The U.S. Trade and Development Agency (USTDA) has provided a grant to the Romanian Ministry of Environment and Sustainable Development (Grantee) for Technical Assistance on the Phase-I development of a Black Sea Coastal Erosion Control Program (COASTEROSION) project. COASTEROSION's objectives are erosion control and the restoration and protection of the natural resources for sustainable development in the Romanian Black Sea coastal zone. The grant agreement is attached at Annex 4 for reference. The Grantee is soliciting technical proposals from qualified U.S. firms to provide expert consulting services to carry out the Technical Assistance.

1.1 BACKGROUND SUMMARY

The Grantee requested USTDA's assistance in order to design an Integrated Coastal Zone Modeling System (ICZMS) to help monitor and abate erosion along the Black Sea coastline. The main goal of creating an ICZMS is to develop the necessary analytical tools to assess erosion control measures. Key targets for the Grantee are the protection of Danube River Delta wetland, erosion control and prevention at important socioeconomic tourism resorts, and the preservation of a healthy aquatic environment, in compliance with European Union's (EU) Water Framework Directive.

The Grantee established the COASTEROSION program based on the principles of the United States Corps of Engineers Regional Sediment Management (RSM) System. The Grantee gained exposure to the U.S. Army Engineer Research and Development Center (ERDC) and the RSM system during a project sponsored by the U.S. Agency for International Development entitled "Regional Sediment Management Methodology Applied to the Coast of Romania: Demonstration Project and Capacity Building." As a result of this previous project, the Grantee designed a four-phase COASTEROSION program and has requested USTDA Technical Assistance for Phase I of the program. Although the Grantee has previous experience with the ERDC, the ERDC will not compete in any capacity to perform the Technical Assistance for Phase I of the program. A background Desk Study is provided for reference in Annex 2.

1.2 OBJECTIVE

The Romanian Black Sea coastline has experienced significant erosion for several decades. Erosion along the coast limits socioeconomic opportunities and has detrimental impacts on public infrastructure and the environment. To remedy this situation, the Grantee is implementing the COASTEROSION program, Phase I of which involves the development of an ICZMS for the study of potential structural and non-structural coastal erosion control measures. Overall objectives of the COASTEROSION program are the control of erosion as well as the restoration and protection of the natural resources for sustainable development in the Romanian Black Sea coastal zone. The main goal of creating an ICZMS is to develop the necessary analytical tools to assess erosion control measures. Key targets for the Grantee are the protection of Danube River Delta wetland, erosion control and prevention at important socioeconomic tourism resorts, and the preservation of a healthy aquatic environment, in compliance with EU's Water Framework Directive.

Phase I of the COASTEROSION program involves the assessment of the ICZMS spatial data requirements as well as specification of the software and hardware for a spatial data monitoring program and data management system within the context of a Romanian Coastal Zone Geographic Information System (GIS), which will be needed to interface with regional numerical models to implement a RSM similar to the RSM of the U.S. Army ERDC. Additionally, Phase I involves the definition of the overall implementation framework for the COASTEROSION Program and identification of the Romanian institutional support required for its execution. Still further, Phase I includes the preparation of the Terms of Reference (TOR) and cost estimates for Phases II and III of the Program.

1.3 PROPOSALS TO BE SUBMITTED

Technical proposals are solicited from interested and qualified U.S. firms. The administrative and technical requirements as detailed throughout the Request for Proposals (RFP) will apply. Specific proposal format and content requirements are detailed in Section 3.

COST will not be a factor in the evaluation and therefore, cost proposals should not be submitted; upon detailed evaluation of technical proposals, one firm will be selected for contract negotiations. The amount for the negotiated contract has been established by a USTDA grant of U.S. \$385,772.

1.4 CONTRACT FUNDED BY USTDA

The negotiated contract will be funded by USTDA in accordance with the terms and conditions of its grant to the Grantee. The contract must include certain USTDA mandatory clauses relating to nationality, taxes, payment, reporting, and other matters. The USTDA nationality requirements and the USTDA mandatory clauses are attached at Annexes 3 and 4 for reference.

Section 2: INSTRUCTIONS TO PROPOSERS

2.1 PROJECT TITLE

The project is called "Romania: Black Sea Coastal Erosion Control Program Phase I."

2.2 DEFINITIONS

Please note the following definitions of terms as used in this RFP.

The term "Request for Proposals" means this solicitation of a formal technical proposal including qualifications statement.

The term "Offeror" means the U.S. individual, or U.S. firm, including any and all subcontractors, which responds to the RFP and submits a formal proposal and which may or may not be successful in being awarded this procurement.

2.3 DESK STUDY

USTDA sponsored a Desk Study to address technical, financial, sociopolitical, environmental and other aspects of the proposed project. A copy of the Desk Study Final Report is attached at Annex 2 for background information only.

2.4 EXAMINATION OF DOCUMENTS

Offerors should carefully examine this RFP. It will be assumed that Offerors have done such inspection and that through examinations, inquiries and investigation they have become familiarized with local conditions and the nature of problems to be solved during the execution of the Technical Assistance.

Offerors shall address all items as specified in this RFP. Failure to adhere to this format may disqualify an Offeror from further consideration.

Submission of a proposal shall constitute evidence that the Offeror has made all the above mentioned examinations and investigations, and is free of any uncertainty with respect to conditions which would affect the execution, and completion of the Technical Assistance.

2.5 PROJECT FUNDING SOURCE

The Technical Assistance will be funded under a grant from USTDA. The total amount of the grant is not to exceed U.S. \$385,772.

2.6 RESPONSIBILITY FOR COSTS

Offeror shall be fully responsible for all costs incurred in the development and submission of the proposal or any other cost incurred by Offeror prior to issuance of an agreement or contract. Neither USTDA nor the Grantee assumes any contractual obligation as a result of the issuance of this proposal request, the preparation or submission of a proposal by an Offeror, the evaluation of proposals, or final selection.

2.7 TAXES

Offerors should submit proposals which note that in Annex 4, USTDA Mandatory Contract Provisions, USTDA funds are not to be used to pay taxes or duties under the laws of host country.

2.8 CONFIDENTIALITY

The Grantee will use its best efforts to preserve the confidentiality of any business proprietary or confidential information submitted by the Offeror, which is clearly designated as such by the Offeror.

2.9 ECONOMY OF PROPOSALS

Proposal documents should be prepared simply and economically, providing a comprehensive and concise description of the Offeror's capabilities to satisfy the requirements of the RFP. There is no necessity for expensive bindings, colored displays, or other promotional material unless such material is absolutely pertinent to the proposal. Emphasis should be placed on completeness and clarity of content.

2.10 SUBSTANTIVE PROPOSALS

The Offeror shall certify (a) that its proposal is genuine and is not made in the interest of, or on the behalf of, any undisclosed person, firm, or corporation, and is not submitted in conformity with, and agreement of, any undisclosed group, association, organization, or corporation; (b) that it has not directly or indirectly induced or solicited any other Offeror to put in a false proposal; (c) that it has not solicited or induced any other person, firm, or corporation to refrain from submitting a proposal; and (d) that it has not sought by collusion to obtain for himself any advantage over any other Offeror or over the Grantee or USTDA or any employee thereof.

2.11 CONDITIONS REQUIRED FOR PARTICIPATION

Only U.S. firms are eligible to participate in this tender. However, U.S. firms may utilize subcontractors from host country for up to 20 percent of the amount of the USTDA grant. USTDA nationality requirements are detailed in Annex 3.

2.12 LANGUAGE OF PROPOSAL

All proposal documents shall be prepared and submitted in English, and only English.

2.13 PROPOSAL SUBMISSION REQUIREMENTS

The **Cover Letter** in the proposal must be addressed to:

Ms. Mary-Jeanne Adler
Director
Emergency Situation Management Directorate
Ministry of Environment and Sustainable Development
12 Libertatii Blvd.
Sector 2, Bucharest
Romania

Phone: +40-21-316-05-21

Fax: +40-21-316-02-82

An Original and eight (8) copies of your proposal must be received at the above address no later than 4:00 pm Eastern Time, on December 4, 2007.

Proposals may be either sent by mail, overnight courier, or hand-delivered. Whether the proposal is sent by mail, courier or hand-delivered, the Offeror shall be responsible for actual delivery of the proposal to the above address before the deadline. Any proposal received after the deadline will be returned unopened.

Upon timely receipt, all proposals become the property of the Grantee.

2.14 PACKAGING

Each proposal must be sealed to ensure confidentiality of the information. The proposals should be individually wrapped and sealed, and labeled for content including "original" or "copy number x"; the original and eight (8) copies should be collectively wrapped and sealed, and clearly marked for content.

Neither USTDA nor the Grantee will be responsible for premature opening of proposals not properly labeled.

2.15 AUTHORIZED SIGNATURE

The proposal must contain the signature of a duly authorized officer or agent of the Offeror empowered with the right to bind the Offeror.

2.16 EFFECTIVE PERIOD OF PROPOSAL

The proposal shall be binding upon the Offeror for sixty (60) days after the proposal due date, and Offeror may withdraw or modify this proposal at any time prior to the due date upon written request, signed in the same manner and by the same person who signed the original proposal.

2.17 EXCEPTIONS

Firms agree by their response to the RFP announcement to abide by the procedures set forth therein. Material modifications in the TOR or responsibilities of the parties will not be accepted.

Any exceptions in the proposal shall be clearly identified, and shall include the scope of such exception, and its impact, on the procurement. The Grantee shall make final determination as to the responsiveness of such exceptions and their acceptability.

2.18 OFFEROR QUALIFICATIONS

As provided in Section 3, Offerors shall submit evidence that they have relevant past experience and have previously delivered advisory and Technical Assistance services similar to those required in the TOR.

2.19 RIGHT TO REJECT PROPOSALS

The Grantee reserves the right to reject any and all proposals and to accept or reject any or all of the items in the proposal, and to award the contract in whole or in part if it is deemed in the best interest of the Grantee.

2.20 PRIME CONTRACTOR RESPONSIBILITY

Offerors have the option of subcontracting parts of the services they propose. The Offeror's proposal must include a description of any anticipated subcontracting arrangements, including the name, address, and qualifications of consultants and subcontractors. USTDA nationality provisions are set forth in detail in Annex 3. The successful Offeror shall cause appropriate provisions of its contract, including all mandatory USTDA clauses, to be inserted in all subcontracts ensuing to ensure fulfillment of all contractual provisions by subcontractors.

2.21 AWARD

An award resulting from this RFP shall be made to the best qualified Offeror, taking into consideration the evaluation factors set forth herein; however, the right is reserved to reject any and all proposals received and, in all cases, the Grantee will be the judge as to whether a proposal has or has not satisfactorily met the requirements of this RFP.

2.22 COMPLETE SERVICES

The successful Offeror shall be required to (a) furnish all supplies, supervision, transportation, and other execution accessories, services, and facilities; (b) provide and perform all necessary labor; and (c) in accordance with good technical practice, with due diligence, and in accordance with the requirements, stipulations, provisions and conditions of this RFP and the resultant contract, execute and complete all specified work to the satisfaction of the Grantee.

2.23 INVOICING AND PAYMENT

Deliverables under the contract shall be delivered on a schedule to be agreed upon in a contract with the Grantee. The Contractor may submit invoices to the designated Grantee Project Director in accordance with a schedule to be negotiated and included in the contract. Upon approval of each invoice, the Grantee will forward the invoice to USTDA which will process payment to the Contractor. All payments by USTDA under the Grant Agreement will be made in U.S. currency.

Section 3: PROPOSAL FORMAT AND CONTENT

To expedite proposal review and evaluation, and to assure that each proposal receives the same orderly review, all proposals must follow the format described in this section.

Proposal sections and pages shall be appropriately numbered and the proposal shall include a Table of Contents. Offerors are encouraged to submit concise and clear responses to the RFP. Proposals shall contain all elements of information requested without exception. Instructions regarding the required scope and content are given in this section. The Grantee reserves the right to include any part of the selected proposal in the final contract.

The proposal shall consist of a technical proposal only. No cost proposal is required as the value of the USTDA grant is established at U.S. \$385,772.

Offerors shall submit one (1) original and eight (8) copies of the proposal. Proposals received by fax cannot be accepted.

The following sections and content are required for each proposal:

- Transmittal Letter,
- Cover/Title Page,
- Table of Contents,
- Introduction and Executive Summary,
- Company Information,
- Organizational Structure, Management Plan, and Key Personnel,
- Technical Approach and Work Plan,
- Experience and Qualifications, and
- Miscellaneous.

Detailed requirements and directions for the preparation of each section are presented below.

3.1 SECTION 1: INTRODUCTION AND EXECUTIVE SUMMARY

An Executive Summary should be prepared describing the major facts or features of the proposal, including any conclusions, assumptions, and generalized recommendations the Offeror desires to make. Offerors are requested to limit the length of the Executive Summary to no more than five (5) pages.

3.2 SECTION 2: COMPANY INFORMATION

3.2.1 Company Profile

Provide the information listed below relative to the Offeror's firm. If the Offeror is proposing to subcontract some of the proposed work to another firm(s), similar information must be provided

for each subcontractor. Offerors are requested to limit the length of the Company Profile Information to one (1) page per firm.

1. Name of firm and business address, including telephone and fax numbers.
2. Year established (include former firm names and year established, if applicable).
3. Type of ownership and parent company, if any.
4. Project Manager's name, address, telephone and fax number, if different from (1).

3.2.2 Offeror's Authorized Negotiator

Provide name, title, address, telephone and fax number of the Offeror's authorized negotiator. The person cited shall be empowered to make binding commitments for the Offeror and its subcontractors, if any.

3.2.3 Negotiation Prerequisites

1. Discuss any impact of any current or anticipated commitments which may impact the ability of the Offeror or its subcontractors to complete the Technical Assistance as proposed and within the project schedule.
2. Identify any specific information which is needed from the Grantee before commencing contract negotiations.

3.3 SECTION 3: ORGANIZATIONAL STRUCTURE, MANAGEMENT, AND KEY PERSONNEL

Describe the Offeror's proposed project organizational structure. Discuss how the project will be managed including the principal and key staff assignments for this Technical Assistance. Identify the Project Manager who will be the individual responsible for this project. The Project Manager must have the responsibility and authority to act on behalf of the Offeror in matters related to the proposed Technical Assistance.

Provide a listing of personnel (including subcontractors and consultants) to be engaged in the project, either U.S. or local with the following information for key staff: position in the project; pertinent experience, curriculum vitae; other relevant information. If subcontractors are to be used, the organizational relationship between the firms must be described.

A manpower schedule and the level of effort for the project period, by activities and tasks, as detailed under the Work Plan shall be submitted. A statement confirming the availability of the proposed project manager and key staff over the duration of the project must be included in the proposal.

3.4 SECTION 4: TECHNICAL APPROACH AND WORK PLAN

Describe in detail the proposed technical approach and work plan. Discuss the project requirements as perceived by the Offeror. Include a brief narrative of tasks within each activity series. Begin with the information gathering phase and continue through delivery and approval of all required reports.

Prepare a detailed schedule of performance that describes all activities and tasks within the Technical Work Plan, including periodic reporting or review points, incremental delivery dates, and other project milestones.

3.5 SECTION 5: EXPERIENCE AND QUALIFICATIONS

Provide a discussion of the Offeror's experience and qualifications which are relevant to the objectives and TOR for the Technical Assistance. If a subcontractor(s) is being used, similar information must be provided for the prime and each subcontractor firm proposed for the project. Relevant experience and qualifications of key staff proposed shall be provided including letters of commitment from the individuals proposed concerning their availability for contract performance.

As many as possible but not more than six (6) relevant and verifiable project references must be provided, including the following information:

- Project name,
- Name and address of client (indicate if joint venture),
- Client contact person (name/ position/ current phone and fax numbers),
- Period of Contract,
- Description of services provided,
- Dollar amount of Contract, and
- Status and comments.

Offerors are strongly encouraged to include in their experience summary primarily those projects that are similar to or larger in scope than the Technical Assistance as described in this RFP.

Section 4: AWARD CRITERIA

Individual proposals will be initially evaluated by a Procurement Selection Committee of representatives from the Grantee. The Committee will then conduct a final evaluation and completion of ranking of qualified Offerors, and the Grantee shall promptly negotiate a contract with the best qualified Offeror. If a satisfactory contract cannot be negotiated with the best qualified Offeror, negotiations will be formally terminated. Negotiations shall then be undertaken with the second most qualified Offeror and so forth.

The selection of the Contractor will be based on the following criteria:

1. Firm's specific experience related to the assignment – 25 points maximum, of which:
 - Overall experience of the firm (15 points),
 - Overseas experience of the firm (10 points);
2. Adequacy of proposed work plan and methodology in responding to the TOR – 25 points maximum, of which:
 - Knowledge of proposed work and understanding of service (10 points),
 - Appropriateness of proposed methodology and work plan (15 points);
3. Qualifications and competence of the key staff for the assignment – 25 points maximum, of which:
 - Experience of Team Leader in similar projects (5 points),
 - Experience of Oceanographer in similar projects (5 points),
 - Experience of GIS Expert in similar projects (5 points),
 - Experience of IT Engineer in similar projects (5 points),
 - Experience of Personnel with U.S. Ex-Im Bank requirements (5 points);
4. Past Performance – 25 points maximum:
 - Six relevant and verifiable projects (25 points),
 - Five relevant and verifiable projects (20 points),
 - Four relevant and verifiable projects (15 points),
 - Three relevant and verifiable projects (10 points), and
 - Two relevant and verifiable projects (5 points).

Proposals which do not include all requested information may be considered non-responsive.

Price will not be a factor in contractor selection.

ANNEX 1

Ms. Mary-Jeanne Adler, Director, Emergency Situation Management Directorate,
Ministry of Environment and Sustainable Development, 12 Libertatii Blvd., Sector 2,
Bucharest, Romania

Phone: +40-21-316-05-21, Fax: +40-21-316-02-82

R – ROMANIA: BLACK SEA COASTAL EROSION CONTROL PROGRAM PHASE I

POC Evangela Kunene, USTDA, 1000 Wilson Boulevard, Suite 1600, Arlington, VA 22209-3901, Tel: (703) 875-4357, Fax: (703) 875-4009. Romania: Black Sea Coastal Erosion Control Program (COASTEROSION) Phase I. The Grantee invites submission of qualifications and proposal data (collectively referred to as the "Proposal") from interested U.S. firms which are qualified on the basis of experience and capability to provide Technical Assistance with the development of COASTEROSION, whose design and implementation will allow the Government of Romania to assess – and by extension more effectively prevent and/or counteract – the drivers as well as the consequences of erosion along its Black Sea coastline.

In Romania, the Ministry of Environment and Sustainable Development administers national environmental policy, with special emphases accorded those areas that influence economic development and welfare.

The Romanian Black Sea coastline has experienced significant erosion for several decades. Erosion along the coast limits socioeconomic opportunities and has detrimental impacts on public infrastructure and the environment. To remedy this situation, the Grantee is implementing the COASTEROSION program, Phase I of which involves the development of an Integrated Coastal Zone Modeling System (ICZMS) for the study of potential structural and non-structural coastal erosion control measures. Overall objectives of the COASTEROSION program are the control of erosion as well as the restoration and protection of the natural resources for sustainable development in the Romanian Black Sea coastal zone. The main goal of creating an ICZMS is to develop the necessary analytical tools to assess erosion control measures. Key targets for the Grantee are the protection of Danube River Delta wetland, erosion control and prevention at important socioeconomic tourism resorts, and the preservation of a healthy aquatic environment, in compliance with European Union's Water Framework Directive.

Phase I of the COASTEROSION program involves the assessment of the ICZMS spatial data requirements as well as specification of the software and hardware for a spatial data monitoring program and data management system within the context of a Romanian Coastal Zone Geographic Information System (GIS), which will be needed to interface with regional numerical models to implement a regional sand management system (RSM)

similar to the RSM of the U.S. Army Engineer Research and Development Center. Additionally, Phase I involves the definition of the overall implementation framework for the COASTEROSION Program and identification of the Romanian institutional support required for its execution. Still further, Phase I includes the preparation of the Terms of Reference (TOR) and cost estimates for Phases II and III of the Program.

COMPONENTS OF THE TECHNICAL ASSISTANCE

The Grantee requires technical assistance to carry out Phase I of the COASTEROSION Program. The Technical Assistance funded pursuant to this Grant Agreement includes only Phase I work. Component tasks are as follows:

- Task 1: Review of Relevant Reports and Data and Baseline Conditions Report
- Task 2: Integrated Coastal Zone Management System Institutional Framework
- Task 3: Spatial Data Monitoring Stations, GIS and Communication Technology
- Task 4: Preparation of Terms of Reference and Cost Estimate for Phases II and III
- Task 5: Economic Analysis
- Task 6: Financial Analysis
- Task 7: Environmental Analysis
- Task 8: Developmental Impact Analysis
- Task 9: Final Report

The U.S. firm selected will be paid in U.S. dollars from a \$385,772 grant to the Grantee from the U.S. Trade and Development Agency (USTDA).

A detailed Request for Proposals (RFP), which includes requirements for the Proposal, the TOR, and a background desk study report are available from USTDA, at 1000 Wilson Boulevard, Suite 1600, Arlington, VA 22209-3901. To request the RFP in PDF format, please go to: <https://www.ustda.gov/USTDA/FedBizOpps/RFP/rfpform.asp>. Requests for a mailed hardcopy version of the RFP may also be faxed to the IRC, USTDA at 703-875-4009. In the fax, please include your firm's name, contact person, address, and telephone number. Some firms have found that RFP materials sent by U.S. mail do not reach them in time for preparation of an adequate response. Firms that want USTDA to use an overnight delivery service should include the name of the delivery service and your firm's account number in the request for the RFP. Firms that want to send a courier to USTDA to retrieve the RFP should allow one hour after faxing the request to USTDA before scheduling a pick-up. Please note that no telephone requests for the RFP will be honored. Please check your internal fax verification receipt. Because of the large number of RFP requests, USTDA cannot respond to requests for fax verification. Requests for RFPs received before 4:00 PM will be mailed the same day. Requests received after 4:00 PM will be mailed the following day. Please check with your courier and/or mail room before calling USTDA.

Only U.S. firms and individuals may bid on this USTDA financed activity. Interested firms, their subcontractors and employees of all participants must qualify under USTDA's nationality requirements as of the due date for submission of qualifications and proposals and, if selected to carry out the USTDA-financed activity, must continue to meet such

requirements throughout the duration of the USTDA-financed activity. All goods and services to be provided by the selected firm shall have their nationality, source and origin in the U.S. or host country. The U.S. firm may use subcontractors from the host country for up to 20 percent of the USTDA grant amount. Details of USTDA's nationality requirements and mandatory contract clauses are also included in the RFP.

Interested U.S. firms should submit their Proposal in English directly to the Grantee by 4:00 pm Eastern Time on December 4, 2007 at the above address. Evaluation criteria for the Proposal are included in the RFP. Price will not be a factor in contractor selection, and therefore, cost proposals should NOT be submitted. The Grantee reserves the right to reject any and/or all Proposals. The Grantee also reserves the right to contract with the selected firm for subsequent work related to the project. The Grantee is not bound to pay for any costs associated with the preparation and submission of Proposals.

ANNEX 2

Romania
2007-81021A
Vol. 1

DESK STUDY REPORT

ROMANIA: INTEGRATED COASTAL ZONE MODELING SYSTEM PROJECT

USTDA 2007-81021A

AUG 21 2007

Presented to:

U.S. Trade and Development Agency
Attn.: Ms. Andrea Lupo, Country Manager
1000 Wilson Boulevard, Suite 1600
Arlington, VA 22209-3901
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August 18, 2007



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TABLE OF CONTENTS

TABLE OF CONTENTS	1
Appendices	1
A. EXECUTIVE SUMMARY	2
A.1 Background	2
A.2 FS Proposal	2
A.3 Developmental Priority	3
A.4 Sponsor's Commitment	3
A.5 U.S. Trade and Development Agency Technical Assistance	3
A.6 Implementation Financing	3
A.7 Qualifications of Project Sponsor's Team	4
A.8 FS Terms of Reference	4
A.9 Recommendations	4
B. PROJECT DESCRIPTION	5
B.1 Background	5
B.1 Project Description	6
B.2 COASTEROSION Program Implementation	7
C. PROJECT SPONSOR'S CAPABILITIES AND COMMITMENT	8
D. IMPLEMENTATION FINANCING	8
E. U.S. EXPORT POTENTIAL	9
F. FOREIGN COMPETITION AND MARKET ENTRY ISSUES	11
G. DEVELOPMENTAL IMPACT	11
H. IMPACT ON THE ENVIRONMENT	12
I. IMPACT ON U.S. LABOR	12
J. QUALIFICATIONS	12
K. JUSTIFICATION	13
L. TERMS OF REFERENCE	14
M. RECOMMENDATIONS	14
N. CONTACTS	15

APPENDICES

Appendix 1 MEWM Proposal for Feasibility Study for Black Sea Coastal Erosion Assessment

Appendix 2 Regional Sediment Management Methodology Applied to the Coast of Romania:
Demonstration Project and Capacity Building, Presented to USAID by USAOE
ERDC

Appendix 3 Draft Project Concept: Integrated Coastal Zone Modeling System (ICZMS)

Appendix 4 Terms of Reference

Appendix 5 Budget

Appendix 6 Contacts

A. EXECUTIVE SUMMARY

A.1 Background

Information researched for this study shows that coastal infrastructure built in the late eighteenth hundreds to facilitate navigation at the confluence of the Danube River and the Black Sea has proven detrimental to the long-term socioeconomic wellbeing of Romania.

After decades without an integrated coastal management program, coastal erosion created by man-made coastal infrastructure is threatening Mamaia Beach, a highly important tourist destination. In response to the growing concern about the rapid deterioration of its coastal resources not only at Mamaia Beach, but in other coastal areas, through its Ministry of Environment and Water Management, the Government of Romania is leading an effort aimed at the preparation and implementation of the COASTEROSION Program, an integrated coastal zone management program.

The main objectives of the COASTEROSION Program are the control of erosion along the coastline and restoration and protection of the natural resources for sustainable development in the Romanian Black Sea coastal zone. The main actions aim at the development of analytical tools to assess erosion control measures. Key targets are the Danube River Delta wetland protection, erosion control and prevention at important socioeconomic tourism resorts, and the preservation of a healthy aquatic environment in compliance with European Union Water Framework Directive.

A.2 FS Proposal

The Ministry of Environment and Water Management (Project Sponsor) has requested U.S. Trade and Development Agency's (USTDA) technical assistance for a "Feasibility Study (FS) for Black Sea Coastal Erosion Assessment (COASTEROSION Project)."

The proposed action involves a coastal environment information management system that will support the decision-making process regarding the long-term coastal erosion control goals along the Romanian Black Sea coastline. In its proposal, the project sponsor indicates interest in the study and implementation of a regional sand management system similar to the RSM system developed and operated by the United States Army Engineer Research and Development Center. In order to carry out a regional sand management system similar to the RSM, the program will need to rely on:

1. An integrated coastal zone management system that requires spatial data monitoring.
2. A numerical model for RSM to identify and assess erosion control measures.
3. A feasibility study to select erosion control measures.
4. An implementation program for the coastal erosion control projects.

A.3 Developmental Priority

According to information researched for this Desk Study (DS), the coastal erosion along the Romanian coastline has become a serious drawback to potential socioeconomic development and the coastal degradation trend of the shoreline environment needs to be controlled effectively to avoid a permanent economic loss of a valuable natural resource.

Documentation provided in support of the technical assistance proposal indicates that the project sponsor is committed to the implementation of COASTEROSION program, which it considers necessary to meet its regulatory obligations with the EU regulatory framework.

A.4 Sponsor's Commitment

In the "COASTEROSION project" proposal the project sponsor has indicated the Government of Romania's commitment to coastal erosion protection along its marine environment. The project sponsor stresses its desire to develop and implement a regional sand management program.

A.5 U.S. Trade and Development Agency Technical Assistance

The DS assessment of the project sponsor's proposal indicates that U.S. Trade and Development Agency technical assistance to carry out the activities related to the selection and specification of the technology for establishing the spatial data monitoring system is warranted. The DS estimates the U. S. Trade and Development Agency grant assistance at \$385,772.00.

A.5 U.S. Export Potential

Information generated from a Definitional Mission that assessed the technical requirement of an integrated coastal zone modeling system performed by Chesapeake Analytics show that implementation of the spatial data monitoring system would cost approximately \$19.105 million of which the potential US export is estimated at about \$15 million including consulting service.

Five U.S. manufacturers of instruments for sediment monitoring in coastal zone environments and consulting firms specializing in coastal zone engineering were contacted as part of the DS. All of them indicated interest in participating in the Romanian COASTEROSION Program bidding process.

A.6 Implementation Financing

The DS contacted the U.S. Ex-Im and the World Bank to discuss the financial prospects of the proposed action. Mr. Sudipto Sarkar, World Bank representative contacted to discuss the financial prospects of the proposed action indicated that his institution had other priorities for Romania. He added that the Government of Romania will have to make an official request to review the prospects of the COASTEROSION Program. The DS assessment with regard to

World Bank funding assistance for the proposed action is that it may take high level Romania government involvement for it to become a top priority at the World Bank.

However, the U.S. Ex-Im Bank indicated a potentially high interest in the COASTEROSION Program to the extent that representatives of this institution are willing to initiate conversations with the project sponsor on the details of the prospective projects and financial agreement.

A.7 Qualifications of Project Sponsor's Team

The project sponsor has carried out projects of similar magnitude. The project sponsor has experience executing a contractor selection process that meets U.S. Trade and Development Agency and international guidelines; thus, there is assurance that a reputable consulting firm with ample international experience will be selected to assist with the implementation of the COASTEROSION program.

A.8 FS Terms of Reference

Appendix 4 contains the Terms of Reference for the assessment, selection and preparation of the technical specifications and procurement documents of the spatial data monitoring system.

A.9 Recommendations

The DS concurs with the sponsor's proposal in that the project has significant developmental priorities for socioeconomic and environmental reasons. The project will have important U.S. commercial value if coastal environment monitoring and data communication technology manufactured by US companies are specified and selected to meet the spatial data requirements.

The COASTEROSION Program is likely a target of European companies interested in proving service and coastal environment monitoring technology for this potential large and needed capital investment. Consequently, the proposal documents an investment program that will be subject to significant foreign competition from European companies. Thus, USTDA support addresses foreign competitive elements. The DS recommends USTDA grant assistance for the preparation of the technical specifications and procurements documents of the spatial data monitoring system and related data communication technology.

B. PROJECT DESCRIPTION

B.1 Background

According to several technical articles researched for this report, the main causes of erosion along the Romanian Black Sea coastline are the Sulina jetties and the man-made hydraulic structures within the Danube River watershed. Man-made structures such as dams remove large quantities of sediment and reduce the supply of sediment to the Black Sea creating a sediment deficit. It is reported that from 1858 to 1988 the sediment load decreased from 65 millions to 38 millions tones per year (http://copranet.projects.eucc-d.de/files/000150_EUROSION_Danube_delta.pdf).

The regional trend of longshore sediment transport along the Romanian littoral is from the north to the south. The 8-km long Sulina jetties near the north end of the Danube River delta have a significant impact on the flow of sediment. In fact, technical documents indicate that the longshore transport is controlled by the Sulina jetties which break the southward longshore drift and directs the sediment flow away from the shoreline, thereby depleting the southern littoral cell of sediment. It has been documented that approximately 57% of the coastal line has been eroded and 38% of the remaining coastline is under accretion. As a result, the Romanian Black Sea shoreline has an overall reduced sand supply and suffers from chronic erosion. Erosion along the coast limits the potential of the tourism industry and has a detrimental impact on public infrastructure and the environment.

Erosion problems are specifically noticeable at Mamaia Beach, the most famous beach in the Romanian Black Sea. Mamaia Beach is situated near the southeastern end of Romania, by Constanta (<http://www.cs.auckland.ac.nz/~cristian/elenaweb/constantapics/constantapics-Pages/Image2.html>). Coastal erosion at Mamaia is an example of the potential impact of local infrastructure on regional longshore sediment flow. It is reported that erosion at Mamaia Beach occurs partly because of interference from the Midia harbour extension dikes (5 Km long). The dike deflects the longshore sediment drift offshore to the southeast, bypassing Mamaia Beach, which when added to the low supply of sediment brought by the littoral current discussed above, compounds the potential for erosion at Mamaia Beach. The number of visitors to Mamaia Beach has decreased and a technical report indicates that if beach erosion continues and no action is undertaken to protect it, there is a risk that the beach and resort will disappear in the future. A decrease in business at Mamaia Beach represents an important economic loss especially now that Romania is expecting an influx of tourism from other European countries.

Furthermore, the relevance of coastal erosion along the Romanian coastline should be analyzed in the context of the adoption of the European Union Water Framework Directive (WFD). The implementation of coastal erosion is one of the water management tasks that Romania is facing in compliance with its accession to the European Union (EU)¹.

¹ The Water Framework Directive (2000/60/EC) is a comprehensive piece of legislation that sets out, inter alia, clear quality objectives for all waters in Europe. The Directive provides for a sustainable and integrated management of river basins including binding objectives, clear deadlines, and comprehensive program of measures based on scientific, technical and economic analysis including public information and consultation.

According to our review, a Coastal Erosion Monitoring Program is being carried out by the National Institute for Marine Research and Development "Grigore Antipa" but there is no systematic strategy in place for coastal protection in Romania. In addition, there is limited data available on the waves, currents, and beach morphology with which to conduct coastal engineering projects. Reportedly, a recent study performed with funds from the Japan International Cooperation Agency documents the available data and condition of the coast².

Current efforts have been limited to nourishment and isolated physical structures addressing local problems of coastal erosion and have been ineffective. For example, artificial nourishment of sand has been attempted at Mamaia Beach but the sand material simply washed away in a relative short time (http://copranet.projects.eucc-d.de/files/000151_EUROSION_Mamaia.pdf).

The European Commission recommends the development of an Integrated Coastal Zone Management (ICZM). Subsequently, through its Ministry of Environment and Water Management (MEWM), the Romanian Government is pursuing the resources to carry out both the development and implementation of an ICZM System.

The Romanian Ministry of Environment and Water Management (MEWM) is the national authority in the area of water management and environmental protection. Its main task is to formulate policy, strategies and guidelines. The Water Department is responsible for policy and regulation regarding the implementation of the Water Framework Directive. The National Company Apele Române (NCAR) is responsible for the implementation of policy and regulations.

B.1 Project Description

The proposal presented to the United States Trade and Development Agency (USTDA) by the MEWM entails obtaining U.S. technology for planning and carrying out the implementation of a coastal management program in Romania based on the principles of the United States Corps of Engineers Regional Sediment Management (RSM). Appendix 1 contains the MEMWV proposal. The MEWM proposal is based on the technical information that the U.S. Army Engineer Research and Development Center (ERDC) presented to the U.S. Agency for International Development (USAID) for the technical assistance "Regional Sediment Management Methodology Applied to the Coast of Romania: Demonstration Project and Capacity Building." Appendix 2 contains the ERDC proposal.

The RSM methodology requires oceanographic field data collection to build a numerical model. Numerical models for RSM are used to identify and quantify sediment pathways and patterns of sediment movements. They are also utilized to assess coastal management practices which may preserve the littoral environment. Numerical models for the RSM are the tools used to aid decision-makers in selecting alternatives that minimize or improve impacts on all units of the littoral system. According to technical literature on the RSM system, numerical models support the development of answers to regional sediment pathway questions.

² ECOH Corporation. 2006. The Study on Protection and Rehabilitation of the Southern Romanian Black Sea Shore in Romania. Draft report submitted to the Government of Romania, ECOH Corporation, Tokyo, Japan.

Interested readers are referred to the following website for specific details on the RSM system (http://shoals.sam.usace.army.mil/downloads/Publications/Rosati_et_al_2001FSBPAall.pdf).

Accordingly, the COASTEROSION Program will initially concentrate on the development of an Integrated Coastal Zone Modeling System (ICZMS) for the Romanian Black Sea Coastal Region. The ICZMS will enable the feasibility study on potential structural and non-structural coastal erosion control measures for the Romanian Black Sea coastline. The feasibility study will lead to the selection of specific coastal erosion control actions that will become the projects to be implemented to ameliorate coastal erosion problems.

B.2 COASTEROSION Program Implementation

The implementation of the COASTEROSION Program calls for a four-phase approach. Phase I involves the assessment of the ICZMS spatial data requirements, selection of the software and hardware, the design of the Romanian Coastal Zone GIS and the establishment of the data monitoring program. Additionally, Phase I entails the identification of the Romanian institutional support required. Technical manpower for Phase I will be supplied by an expert company.

Phase II entails obtaining and deploying the hardware and software technology for the acquisition of spatial data and related information needed to create the numerical models for RSM. It also includes setting up the Geographic Information System (GIS) required to address spatial data input, management and data analysis requirements of the RSM. Spatial data required by the RSM GIS includes hydrographic and topographic survey data, aerial and oblique photography, dredge material record, digital nautical charts, and generic GIS information. The RSM GIS serves as the link between engineering analyses and regional numerical models. Phase II also involves establishing the analytical models that will provide the means for evaluating coastal management alternatives for erosion control.

As part of a USTDA Definitional Mission, Chesapeake Analytics prepared a Draft Project Concept (DPC) for the ICZMS, see Appendix 3. The Chesapeake Analytics DPC offers a cost estimate for Phase II, the hardware, software and related technology needed to setup the oceanographic instrumentation along the Romanian Black Sea littoral. The DPC proposed by Chesapeake Analytics also includes the operational elements for collecting field data and establishing a regional analytical model for assessing current and improved coastal conditions. Chesapeake Analytics estimates the cost of establishing and implementing the ICZMS to support the data needs and technical analysis of the FS at \$19.105 million dollars. The estimated budget does not include the cost of the Romanian professional counterpart and associated institutional support to house, maintain and operate the ICZMS modeling center.

Phase III consists of the actual feasibility study and Phase IV involves the implementation of the coastal erosion control projects. The initial budget for the implementation of the erosion control measures that will derive from the FS is estimated by MEWM at \$150 million dollars. The MEWM initial estimate does not include potential infrastructure work at the Sulina Jetties and the actual capital required for coastal erosion control would likely be higher. This desk study infers that the Government of Romania (GOR) has requested USTDA technical assistance to carry out Phase I. Furthermore, it is understood that the GOR plans to implement the remaining three phases with financial assistance from multilateral lending institutions such as the Ex-Im Bank, European Bank for Reconstruction and Development and the World Bank.

C. PROJECT SPONSOR'S CAPABILITIES AND COMMITMENT

The project sponsor is the Romanian Ministry of Environment and Water Management (MEWM). As pointed out above, MEWM is the environmental and water resources protection public authority at the national level. MEWM has been the recipient of USTDA technical assistance for several important projects including the DESWAT project and a recent grant for developing a plan to modernize its network of environmental laboratories. The DESWAT project was a multimillion capital investment carried out by U.S. companies and financed by the Ex-Im Bank.

With the recent accession of Romania to the European Union (EU), the MEWM has increased its responsibilities regarding enforcement of a larger body of environmental regulations. The ICZMS represents the fulfillment of a commitment acquired as part of its EU membership. Reference is made to the Chesapeake Analytics' Draft Project Concept in Appendix 3 where MEWM commitment to implement the EU Water Framework Directive and Coastal Zone Management in the transitional and coastal waters of Romania is also discussed.

The background information provided by USTDA includes a proposal from U.S. Army Engineer Research and Development Center (ERDC) to the U.S. Agency for International Development (USAID). This proposal shows that the Government of Romania has been pursuing U.S. technical assistance for the study and implementation of the ICZMS. USAID is no longer operating in Romania and the ERDC technical assistance did not materialize.

Mary-Jeanne Adler, a senior officer of the MEWM, who was instrumental in the study and implementation of the DESWAT project, has indicated interest in USTDA technical assistance for the study of the ICZMS. In her communications with USTDA, Ms. Adler has expressed MEWM's existing commitment to the ICZMS, feasibility study and the implementation of capital investment projects that may generate from it. In addition, the proposal presented to USTDA by the MEWM indicates a commitment to pursuing funds for the implementation of the proposed action. The DS recommends that the Project Sponsor commits to providing office space and local transportation for the Technical Assistance Contractor.

D. IMPLEMENTATION FINANCING

As indicated in the Section B.2 ICZMS implementation, the project involves four separate phases. Phase I entails the overall project planning and the identification of the institutional resources needed to carry out all phases of the project. It also entails the identification, assessment and preparation of the technical specifications of the technology needed for the collection of the spatial data and the preparation of the Terms of Reference and cost estimate for Phases II and III. Phase I is the type of technical assistance that may be attractive to international trade development agencies because it features an inherent commercial factor. Hence, USTDA technical assistance for Phase I may be warranted.

Phase II involves setting up the institutional organization for the implementation of the project and the acquisition and deployment of the technology needed to collect the spatial data, the establishment of the GIS capability, building of the numerical model and the systematic data collection effort. Phase II will also entail the refinement of the Terms of Reference of Phase III,

the feasibility study of the erosion control measures to be implemented as part of the COASTEROSION Program. The preliminary estimate for the implementation of Phase II is \$19.105 million dollars.

Once Phase II has produced the analytical data needed for the study of structural and non-structural measures to control erosion along the Romanian Black Sea coastline, then Phase III (feasibility studies) will be carried out. Phase III will generate feasibility options for ameliorating the coastal erosion problems documented in Section B.1. Phase IV entails the final design and the implementation of the coastal erosion control projects.

The project sponsor has estimated the preliminary cost of the implementation of the coastal erosion control measures at \$150 million dollars. This figure, however, was estimated without considering the cost of improving littoral infrastructure work at the Sulina Jetties; thus, the cost of Phase IV is potentially higher than the current estimate. Nonetheless, the project sponsor has indicated willingness to carry out the necessary efforts to find a financing source for the implementation of the COASTEROSION Program.

The desk study investigated the potential interest of the U.S. Export Import Bank (Ex-Im Bank) and the World Bank in providing financial support for the implementation of the COASTEROSION Program. According to discussions with Mr. Craig O'Connor, the Ex-Im Bank Account Officer for Romania, the Ex-Im Bank is interested in providing financial support for projects in the environmental sector in Romania. Mr. O'Connor and his fellow Ex-Im Bank officers are receptive to discuss with the MEWM the funding prospects of Phases II, III and IV of the COASTEROSION Program. The DS discussed the COASTEROSION Program with Mr. Sudipto Sarkar, a senior official of the World Bank with the Romania country program. Mr. Sarkar indicated that the World Bank has not been requested funding for the proposed action and in all likelihood funding for the COASTEROSION program will not be available in the near future.

E. U.S. EXPORT POTENTIAL

The assembly of all components of the coastal monitoring equipment including remote sensing equipment, in-situ monitoring equipment, communication infrastructure, specialized software and hardware and related technology required by the Romanian ICZMS is an undertaking that requires the type of proven expertise offered by U.S. communication and high tech industry. Consequently, the DS agrees with the assessment of Chesapeake Analytics in that implementation and operation of the ICZMS requires the type of proven analytical and coastal zone monitoring technology manufactured in the U.S. The DS also agrees with the fact that most of the technology needed for Phase II of the COASTEROSION Program would be imported and that the U.S. is a leading supplier of this type of technology. The volume of U.S. export potential (technology and services) was preliminarily estimated by Chesapeake Analytics at approximately \$17.20 million dollars (90 percent of the \$19.105 million dollars required for Phase II), see table below.

COASTEROSION Program Phase II Preliminary Budget - Integrated Coastal Zone Modeling System (ICZMS) Preliminary Project Budget¹	
Project Element	Budget Estimate
Spatial Data Collection	\$ 2,938,000
Establish Geographic Information System (GIS)	\$ 950,000
Develop Conceptual Model	\$ 175,000
Establish Coastal Modeling and Monitoring Center	\$ 1,350,000
Establish Large Scale Coastal Model	\$ 1,600,000
Coastal Monitoring Instrument Array	\$ 875,000
Establish Sectoral Coastal Model	\$ 2,750,000
Sectoral Monitoring and Verification	\$ 500,000
Danube River Delta Model	\$ 1,650,000
Danube River Monitoring Package	\$ 360,000
Additional Sectoral Models (1 per year for 2 years)	\$ 1,925,000
Shoreline Evolution - Spatial Data Updates, Two Years	\$ 1,322,100
Technical Support to Operations, Two Years	\$ 2,500,000
Training	\$ 210,000
Total Estimated Project Cost	\$ 19,105,100

¹: The preliminary budget for the implementation of the ICZMS totals \$19.105 million over the initial three-years of operations, excluding the cost of Romanian scientists and staff, and the operating and maintenance costs of the modeling center facility.

Based on the Chesapeake Analytics' technology assessment shown above, the DS estimates the U.S. export potential related to the supply of equipment, software and hardware and the integration of the components of the coastal monitoring systems at approximately \$5.4 million dollars. This figure originates from the procurement of approximately \$6.0 million dollars in service, hardware and software produced in the U.S.

It is practical to assume that over 80 percent of the engineering expertise required for implementing the GIS system and the analytical models would be supplied by U.S. companies. Consequently, the DS estimates in \$7.2 million dollars the U.S. export potential in engineering and scientific expertise for the GIS and analytical modeling.

Setting up the facility for housing the communication and modeling center will call for highly skilled engineering services needed for the design of the data acquisition and communication systems. Similarly, the design and manufacturing of the hardware will require the direct involvement of U.S. manufacturers. Thus, the DS estimates the U.S. export potential associated with setting up the Coastal Monitoring and Modeling Center and the technical support for its operation at \$2.4 million dollars, which is equivalent to 60 percent of the estimated \$4.0 million dollars capital investment. Based on the figures above, the DS estimates that Phase II U.S. export potential ranges from \$12 to \$18 million dollars.

The DS contacted several suppliers of U.S. coastal engineering services and equipment necessary for the Romania ICZMS to assess their interest in the project. All of the businesses contacted responded positively and expressed interest in reviewing the bidding documents that may originate from the USTDA technical assistance. The following is the list of US Businesses contacted as part of the DS:

- D&A Instrument Company
- Dynamic Solutions, LLC
- ENSR/AECOM
- Sequoia Scientific
- Teledyne RD Instruments USA

F. FOREIGN COMPETITION AND MARKET ENTRY ISSUES

While the DS agrees with Chesapeake Analytics in that firms and research institutes from Holland and Denmark are strong competitors in coastal management practices and technologies, the DS would like to add that the U.S. may offer information technology not readily available from other countries in the world. In fact, one of the main advantages of the U.S. firms and manufacturers regarding the implementation of the Romanian ICZMS is the ample and readily available IT options for the delivery of the service and spatial data collection technology.

Nonetheless, the Romanian ICZMS is commercially attractive due to the potential size of the capital investment. EU countries such as Denmark have been providing technical assistance related to the subject matter. For instance, the Danish Hydraulic Institute has been involved in the formulation of groundwater flow and floodplain hydrology models for the Danubian lowland region, which has been a joint effort of a Danish-Dutch consortium financially supported by the EU.

Given the magnitude of the capital investment and the traditionally strong competitive commercial efforts of the European community, there may be European foreign competition interested in participating in the development of the ICZMS. Therefore, the competitive nature of the project is considered high. However, U.S. technology and engineering services may have greater appeal than that of EU countries because of the long and successful history of engineering and telecommunication accomplishments of the U.S. In fact, it appears that the project sponsor is highly interested in a RSM system similar to the one developed by the U.S. Corps of Engineers.

For these reasons, ICZMS technology procurements would tend to favor U.S. products over European products. This tendency should continue as long as the U.S. keeps a strong presence in Romania and provides incentives for the participation of U.S. companies in the economic development of Romania.

G. DEVELOPMENTAL IMPACT

As discussed in Section B.1 Background, the economic wellbeing of the most important Black Sea resort in Romania is threatened by a condition associated with deficient ocean resources management. As documented elsewhere in this report, the proposal for technical assistance presented by MEWM documents a program that, if implemented, will provide scientific information to make decisions regarding the course of actions needed to abate coastal erosion trends along the coastline of Romania. Coastal erosion has become a serious socioeconomic problem with negative long-term implications.

The COASTEROSION Program is geared toward providing safeguard measures necessary to ameliorate current coastal erosion conditions, which in the end translate to improved economic opportunities and intrinsic environmental benefits. In addition, the ICZMS offers positive developmental impacts related to human capacity building.

H. IMPACT ON THE ENVIRONMENT

Should the proposed project be implemented, it would provide substantial positive socioeconomic and environmental impacts. A reduction in coastal erosion will contribute to the protection of aquatic habitats and the marine environment.

The implementation of the COASTEROSION Program could generate temporary water quality impacts. These could occur during project implementation due to the installation of instrumentation and construction of related infrastructure. The environmental impacts associated with the implementation phase of the project could be avoided or mitigated using standard construction management and pollution prevention techniques.

The project implementation should not have impacts on river or sea water uses. Other uses such as commercial fishing and industrial activities should remain unobstructed throughout the life of the project.

I. IMPACT ON U.S. LABOR

The implementation of the proposed project would create new demand for U.S. made high-tech equipment and services. Expansion of the current volume of export could increase employment in the U.S. It does not appear that U.S. based manufacturers or service providers would need to relocate outside the U.S. to serve the demands created by projects generated from the proposal. Technical personnel from the U.S. would have to travel to Romania in order to meet the requirements of the project. The overall impact on jobs in the U.S. would be positive, as there would be a new demand for U.S. equipment and services.

J. QUALIFICATIONS

In its proposal, the MEWM documents that the COASTAEROSION Program would be implemented with the participation of coastal engineering experts and scientists, which suggests that project sponsor is interested in an experienced professional team from the U.S. Therefore, it is inferred that the qualifications of the companies selected for work on the COASTEROSION Program and specifically in the development of the ICZMS will have demonstrated experience and the required capability. The suggested selection criteria for the firm and team that will execute the USTDA grant assistance is the following:

1. Firms' specific experience related to the assignment: 25 points maximum

- 1.1 Overall experience of the firm: 15 points

- 1.2 Overseas experience of the firm: 10 points
2. Adequacy of proposed work plan and methodology in responding to the TOR: 25 points maximum
 - 2.1 Knowledge of proposed work and understanding of service: 10 points
 - 2.2 Appropriateness of proposed methodology and workplan: 15 points
3. Qualifications and competence of the key staff for the assignment: 25 points maximum
 - 3.1 Experience of Team Leader in similar projects: 5 points
 - 3.2 Experience of Oceanographer in similar projects: 5 points
 - 3.3 Experience of GIS Expert in similar projects: 5 points
 - 3.4 Experience of IT Engineer in similar projects: 5 points
 - 3.5 Personnel knowledge / experience with U.S. Ex-Im Bank requirements: 5 points
4. Past performance: 25 points maximum
 - 4.1 Six relevant and verifiable projects: 25 points
 - 4.2 Five relevant and verifiable projects: 20 points
 - 4.3 Four relevant and verifiable projects: 15 points
 - 4.4 Three relevant and verifiable projects: 10 points
 - 4.5 Two relevant and verifiable projects: 5 points

K. JUSTIFICATION

The DS finds ground for the justification of USTDA grant assistance for implementation of Phase I of the COASTEROSION Program for the following reasons:

1. The subsequent phases (Phases II, III and IV) of the proposed action are likely candidates for receiving implementation financing from the U.S. Ex-Im Bank, which would facilitate the participation of U.S. companies.
2. The ICZMS has a positive developmental impact in terms of its support of the long-term socioeconomic and environmental goals in Romania.
3. The capital investment needed for the acquisition of technology manufactured in the U.S. represents an opportunity for US product sales and services. Although the planning level US Exports/USTDA Technical Assistance ratio for Phase I is estimated at only 38, there is a potential for increasing U.S. exports during the implementation of the subsequent phases. In fact, the project sponsor will need to hire an expert company for the implementation of Phases II, III and IV.
4. The ICZMS is the sponsor's developmental priority as it provides the technological means to meet its functional responsibilities in the host country and its commitment to the EU.

5. The ICZMS project promotes US exports and increases labor occupation and sustainable economic growth in the US and Romania.
6. USTDA grant assistance is likely to generate support for U.S. companies that face strong competition from EU and Japanese companies receiving subsidies and other aid from their governments.
7. There are no indications that the project sponsor will deviate from an openly contested procurement process that provides equal opportunity to U.S. companies.

TDA funding would prevent foreign government from providing grant assistance for the development of the ICZMS. It would also strengthen the U.S. position as one of Romania's top economic partners. In addition, implementation of the project would stimulate economic growth and foreign trade that would benefit the U.S. and Romania. It would also contribute and support the emergence and consolidation of the global economy in which the U.S. is a major participant.

L. TERMS OF REFERENCE

The objective and work to be performed by the prospective technical assistance is documented in the terms of reference (TOR) presented in Appendix 4. The duration of the technical assistance should not exceed six calendar months.

Appendix 5 contains the budget for the recommended technical assistance. This has been prepared in accordance with the required USTDA guidelines and format. The DS recommends that the USTDA funding for Phase I of the ICZMS project be \$ 385,772.00.

M. RECOMMENDATIONS

The DS recommends that consideration be given to implementation of the COASTEROSION Program in the following four phases:

1. Phase I. Assessment of ICZMS Spatial Data Requirements, Preparation of TOR for Phase II and III.
2. Phase II. Acquisition and Deployment of Hardware and Software Technology for the Acquisition of Spatial Data and Related information needed to formulate Numerical Models.
3. Phase III. Feasibility Study on Potential Alternatives for Coastal Erosion Control.
4. Phase IV. Erosion Control Measures Implementation.

The DS has investigated and found that the technical assistance request meets the USTDA funding criteria. The DS has documented a project that is of importance to the project sponsor's host country. The project sponsor has indicated its intention to finance projects that may be generated from the proposed COASTEROSION Program and the Ex-Im Bank expressed a

relatively high interest in assisting with financial support for the proposed action. The Ex-Im Bank specifically indicated its interest in starting discussions with the Government of Romania about the possibility of funding the COASTEROSION Program.

The DS supports the funding of the technical assistance for Phase I because of the potential magnitude of the capital investment in technology and engineering services from U.S. companies. In addition, the technical assistance would involve U.S. companies in a project that will generate clear socioeconomic and environment quality gains.

N. CONTACTS

The list of key individuals and organizations contacted is presented in Appendix 6.

Appendix 1

**MEWM Proposal for Feasibility Study for Black Sea Coastal Erosion
Assessment**

Appendix 1
MEWM Proposal for Feasibility Study for Black Sea Coastal Erosion Assessment

A. Project title: "COASTEROSION Project" - Feasibility study for Black Sea Coastal Erosion Assessment

B. Project description and background

The government of Romania joined the European Union. As part of pos-joining actions, Romania has to fulfill is improving the coast to meet environmental requirements. Enhancement of its coast first of all will improve environmental conditions, will protect properties and urban areas endangered by the coast erosion and in parallel will attract tourism and promote a free-market system, all requirements of the EU. This proposal describes a study program aimed to transfer U.S. technology and planning methodology for Regional Sediment Management (RSM) to the coast of Romania. Two principles of RSM are that: (1) the coast is a sand-sharing system, so that modifications along one segment of the coast is expected to bring consequences to neighboring sections, and (2) management of multiple individual projects can benefit from coordination among all them to minimize overall cost, better protect the environment, and promote long-term sustainability of the coastal system.

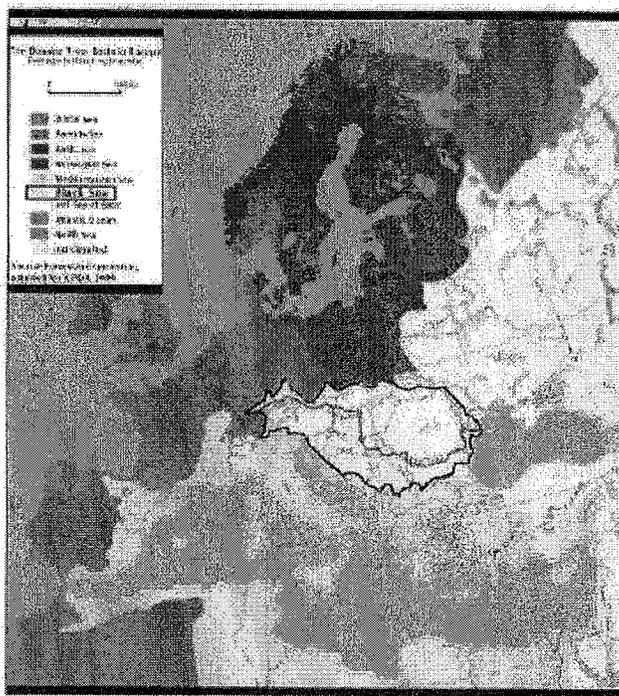


Figure 1. The Danube River – Black Sea System in Europe

The **Danube River – Black Sea System** is a part of the Danube River Basin District, as it was recently defined by the International Commission for the Protection of the Danube River (ICPDR, 2004) (Figure 1), in accordance to the general principles of the European Water Framework Directive (WFD, 2000/60/EC).

The Danube River – Black Sea System comprises the following main geographic and hydrographic units:

- The Black Sea, with its western Romanian Coast,
- The Lower Danube River, which discharges into the Black Sea via three arms: the Chilia, Sulina and Sf.Gheorghe; it includes the major tributaries flowing down from the Romanian territory,
- The Danube Delta, which is the second largest wetland and protected area in Europe, and
- The terrestrial Romanian area, which is the Dobrogea region lying between the Danube River, Danube Delta and Black Sea,

as shown in Figure 2.

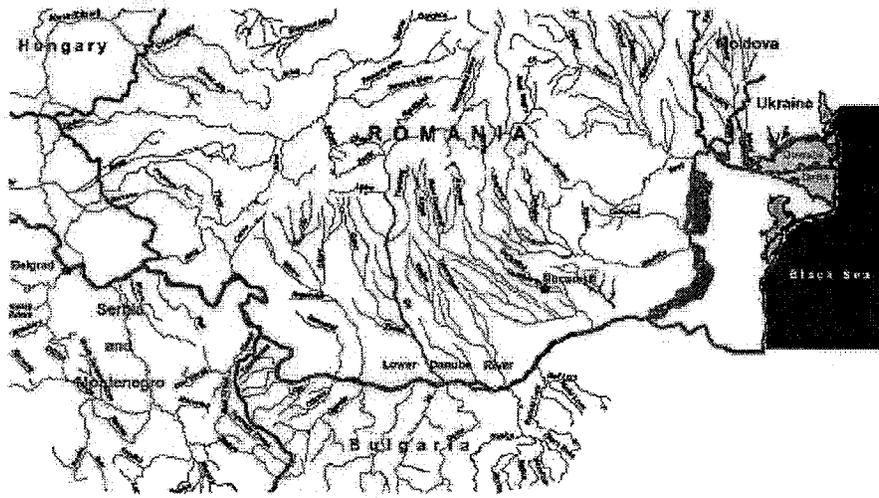


Figure 2. The Danube River – Black Sea System

Managing Black Sea coastal areas in interaction with the Danube River, as an entire system, means taking into account quite a number of different needs: preserving environment and landscape, guaranteeing access from land and sea for tourism, commerce, etc. The practical problem of managing coastal areas is made even more difficult by the multiplicity of actors (both institutional and not), by the pressure of emergencies and their impact on public opinion, by the practical interests involved, etc.). In fact, COASTEROSION Project arises from the intention to make urgent intervention needs live together with a wide and rigorous vision of the problem. As a consequence of such premises, the COASTEROSION Project intends to be developed simultaneously along two lines:

- a "horizontal" *integration* line along which is needed developing actions aimed at defining and developing *guidelines for coastal management* based on a *land-sea integrated view of coastal areas special referring to erosion processes*;

- a "vertical" *intervention* line along which will be developed, with the general approach and attitude described above, actions on *specific coastal areas* aimed at maintaining from the start connection with *concrete territorial problems regarding erosion aspects*. The first need is planning the protection actions for the Danube Delta Reserved and mainly for the eroded seashore, affecting the deltaic territories, as well as the Razelm-Sinoe lagoon system ecosystems.

The project essentially originates from merging of two different streams of activity on the problem of protecting the coastal areas: on one hand work devoted to the protection of specific areas (often stimulated by "emergencies" of erosion process), on the other, initiatives aimed at developing general (at least at national level) standards for the assessment of the "state of the coast", its evolution, the causes of such evolution.

The problem of protecting (in particular from coastal erosion) is dramatic in several coastal areas of the Black Sea, specifically, in the regions of Romanian coastal area. Designing adequate infrastructures and proposing measures for coastal erosion protection are the main tasks of the COASTEROSION Feasibility Study. Environmental study should be provided for the proposed measures, minimizing ecological conditions depreciation.

COASTEROSION for the mentioned sector is estimated at \$ 150 million and the project is part of Romanian strategy for integrated coastal area management, referring at special measures for erosion assessment.

• Proposal

The Romanian Black Sea Coast, of about 245-km long, is located in the Western Black Sea, between Ukraine in North and Bulgaria in South. It is developed from Musura Bay (where the Chilia Arm of the Danube River discharges into the sea) to Vama Veche Town (near the Romanian-Bulgarian border). The sector between Musura Bay and Midia is subject of the proposed project.

The Romanian Black Sea Coast is not a very much-populated region of the country, but it is well developed from agricultural (fruit and vegetable farming), industrial (chemistry, oil refinery, shipping, metallurgy, fishing) and tourist points of view. Besides Constanta and Mangalia, which are the largest cities hosting major harbors and shipyards, other smaller towns (Sulina, Sf.Gheorghe, Navodari) are located in the area.

The Danube River discharges into the Black Sea by three arms: Chilia, Sulina and Sf.Gheorghe is an average annual water flow rate of 6200-6500 m³/s and a sediment transport rate of 750-1000 kg/s (up to 20 million tons per annum); the Danube River is the second largest river in Europe and a major navigable waterway.

In the Danube River mouths areas, the Danube Delta is created as a low wetland, with unique flora and fauna; it became a major protected natural reservation in Europe.

The Danube-Black Sea Canal discharges into the Black Sea by two arms: Poarta Alba-Constanta and Poarta Alba-Midia Navodari. It was completed in 1987 for navigation, water supply and irrigation.

Several small streams and rivers discharge directly into the Black Sea, as well as some littoral lakes that are linked to the sea or located in its proximity (the Razelm-Sinoe lagoon system).

In present times, marine and terrestrial environment of the Romanian Black Sea Coast is strongly affected by a large number of natural factors and anthropogenic pressures.

Important morphological coastal processes occurred during last few decades, with large zones of coastal erosion and/or alluvial deposition. They occurred due to:

- the general and local climate changes,
- the modification of local hydrological regime (with prolonged dry seasons) and marine regime (with higher waves and stronger currents),
- the severe reduction of sediment transport rate in the Danube River and its main tributaries (by retention works), and
- the negative effects of various engineering works (dykes and jetties) completed in the region.

About 20-25% of the total coastline length was degraded by erosion; the shoreline withdrew towards the inland (at a rate of 3 to 6 m per annum) and the beach surface was reduced by 60% (at a rate of 45 to 85 ha per annum). Large amount of alluvia augmented the existing sand deposits at the river mouth and new deposits were developed. Therefore, a large number of engineering structures and buildings in the area were damaged and threatened by destruction. The deficit of sandy supply by the Danube causes main part of the coastal erosion.

The deltaic coast in the Northern sector was 95 km affected by erosion (Sulina, Căruș Portita) and 35 km by excessive sand deposition (Sacalin Island), while in the Southern sector severe degradations were recorded (at Mamaia, Constanta, Eforie).

Marine water eutrophication phenomena occur frequently in the region, with high proliferation of algae (in summer seasons) that affects the quality of waters and the status of shore and tourist beaches.

Taking into account the complexity of the conditions of the Black Sea Romanian coast the Feasibility Study should address at the following aspects:

1. Developing international standards for the definition of a "state of the coast" useful for the territorial planning and management, engineering, insurance, etc., of the processes (both on land and at sea) that determine the coastal state through the land-sea interaction, of the processes (both natural and human) that determine the evolution (dynamics) of the coastal state.
2. Proposing an efficient monitoring system for the state of the coast and its evolution, efficient techniques for the protection of endangered coastal areas and the reconstruction of damaged ones for Misura Bay-Midia sector corresponding of the protected area for the Danube Delta reserve.
3. Proposing erosion assessment measures and for coastal rehabilitation, including corresponding economical and ecologic impact analysis.
4. Developing and diffusing an integrated culture of land-sea interaction in coastal areas for their preservation and management and guidelines to be adopted by public institutions for the protection of the coast.

The initial estimated budget for the implementation of the erosion assessment measures in COASTEROSION project, Misura Bay-Midia sector is of approximate 150 millions USD.

• Development Priority

In accordance with Romania's efforts to implement the EU standards in the water resources field -specifically WFD - *COAST EROSION Project is in line with the national strategy regarding Black Sea.*

Ministry of Environment and Water Management intend to implement this project in three stages:

- in the first stage the proposed measures will be immediately set up for the protection of high erosion risk coastal areas;
- in the second stage will be established rigorous and reliable standards for the assessment of the state of the coast and its evolution and their adoption by public authorities in the context of general guidelines for coast protection;
- the third stage will be dedicated to develop an integrated land-sea view of coastal areas and instructional activities based on it.

C. Proposal motivation

Coastal protection and the integrated coastal zone management is one of the main issues of the EU Water Framework Directive (WFD) implementation in Romania.

D. General objectives

The government of Romania joined the European Union. As part of post-joining actions, Romania has to fulfill its improving the coast to meet environmental requirements. Enhancement of its coast first of all will improve environmental conditions, will protect properties and urban areas endangered by the coast erosion and in parallel will attract tourism and promote a free-market system, all requirements of the EU. This proposal describes a study program aimed to transfer U.S. technology and planning methodology for Regional Sediment Management (RSM) to the coast of Romania. Two principles of RSM are that: (1) the coast is a sand-sharing system, so that modifications along one segment of the coast is expected to bring consequences to neighboring sections, and (2) management of multiple individual projects can benefit from coordination among all them to minimize overall cost, better protect the environment, and promote long-term sustainability of the coastal system.

The coastal morphology of the northern portion (from Mamaia north) is dominated by the Danube River Delta, characterized by eroding sandy beaches at some locations and sand spits, and the southern part is characterized by rocky cliffs. This proposal primarily concerns the northern part, although RSM concepts can be applied to manage any coast. The Danube Delta is the largest wetland in Europe and home to approximately 300 species of birds and 90 species of fish.

The regional trend of longshore sediment transport is to the south, and the potential rate can exceed 200,000 m³/year because of the highly oblique waves generated over a long fetch for northerly wind in the Black Sea¹. Hydropower and flood-control works on the Danube River have overall reduced sand supply to the coast, which is now suffering from chronic erosion. Construction of ports and other coastal structures has blocked sand from down-drift beaches, causing local erosion. The Black Sea has no significant astronomical tide, and sea level rise is small. The main cause of erosion is cutoff of sediment supply by from the Danube Delta and local

¹ Giosan, L., Bokuniewicz, H.J., Panin, and N., Postolache, 1999. Longshore Sediment Transport Pattern along the Romanian Danube Delta Coast. *Journal of Coastal Research*, 15(4), 859-871.

blockage of sand. There is limited data available on the waves, currents, and beach morphology with which to conduct coastal engineering projects. A recent study performed under funding by the Japan International Cooperation Agency has documented the available data and condition of the coast².

Chronic erosion along the coast of Romania limits the tourism industry and is also a concern for maintenance of public infrastructure. The government of Romania has applied for admission to the EU, and rehabilitation of the coast is considered as one means for demonstrating a free-market economy. Beach construction and modern sand management are means of promoting tourism and protecting the inhabitants, environment, and public infrastructure.

E. Outputs/Expected results

The present document refers to the "*Feasibility study concerning coastal area management for erosion assessment*" in the hot spot areas and analysis of a set of proposal for short term and medium term for erosion assessment and seashore conservation. Economical analyses of implementing the proposed measures for the Romanian coastal area will be analyzed in parallel with the specific solutions proposed for the hot spot areas.

It is proposed that a Regional Sediment Management (RSM) approach be taken and applied in a demonstration project to develop functional designs for a selected area that would hold potential for major economic and environmental coastal rehabilitation. It is suggested preliminarily that the area of the Misura Bay-Midia sector.

A traditional coastal engineering approach is to consider projects individually, without concern for the neighboring coast and recognition of a sand-sharing system. RSM is a strategy of managing sediment (in this case – sand) to benefit a region that will contain several individual projects and natural and engineered sediment sources and sinks. RSM has the potential for saving overall cost, promotes use of natural processes to solve engineering problems, and improves the environment. Two principles of RSM are that: (1) the coast is a sand-sharing system, so that modifications along one segment of the coast is expected to bring consequences to neighboring sections, and (2) management of multiple individual projects can benefit from coordination among them to minimize overall cost, better protect the environment, and promote long-term sustainability of the coastal system. The U.S. Army Corps of Engineers (USACE) has pioneered in development and implementation of RSM, producing technical guidance documents and RSM-oriented predictive analysis tools for managing the coast.

It is proposed that an RSM demonstration project be conducted for a selected section of the Romanian coast. Field data will be collected in support of engineering functional design, in collaboration with local universities and Romanian Government agencies. Criteria will be developed with which to evaluate proposed alternative designs. The criteria and alternatives will include both rehabilitation of the target coast and consideration of the adjacent beaches and navigation channels. USACE numerical modeling technology, which is available to private industry of the United States, will be applied in this proof of concept. An example of such a model is Cascade, which is capable of representing longshore transport over a wide area and including a large number of processes (Figure 3).

² ECOH Corporation. 2006. The Study on Protection and Rehabilitation of the Southern Romanian Black Sea Shore in Romania. Draft report submitted to the Government of Romania, ECOH Corporation, Tokyo, Japan.

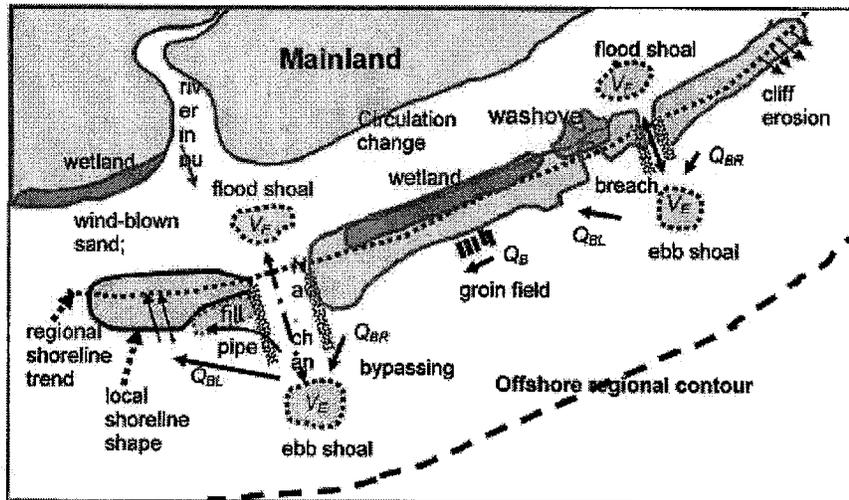


Figure 3. Sketch of processes that can be represented in the Cascade model.

The coastal rehabilitation and shore-protection alternatives will be developed with the aim of providing the widest possible choice of feasible solutions, from which recommendations for final design can be made by optimization of the selected alternative. A key feature, however, is that the project be an integral part of the sand-sharing system. Thus, for example, the goal may not be to retain 100 percent of the sand provided to the project, but share it through natural processes with the adjacent beaches, so that the project does not cause or at least reduced erosion to the neighboring coastal segments.

The FS should respond to the following main tasks.

F. Tasks and Terms of References

The main task of the Feasibility Study using the US TDA support is to elaborate solutions for the coastal erosion protection in front of the Danube Delta Reserve.

According to the above-mentioned main results the following activities should be carried out.

<i>Feasibility Study tasks</i>
1. Preparation of an adequate monitoring programs for water quality, sediment transport and erosion dynamics, identifying adequate sites and the adequate methods for erosion assessment and of the improvement brought by the new designed infrastructure and of the coastal integrated area management.
1.1. Inventory of the hot spots for erosion process
1.2. Engineering investigation
1.3. Monitoring design and field measurements planning

2. Preliminary design
3. Modeling the proposed infrastructures for long time influence estimation
4. Selection of most friendly environmental solution
5. Feasibility Study of the proposed solutions
5.1. Economical evaluation of proposed solutions.
5.2. Priority ranking and phasing execution plan
6. Environmental Impact Assessment for the designed solutions
7. Detailed design for implementing the identified solution
8. Coastal zone management solution debating with the stakeholders, public and coastal zone management authority and responsible institutions – environmental impact debate.

Note: The activities and ToRs will be completed using the experience of USAID consultants to get the needed finance for the feasibility study.

H. Timeframe

Taking into account that this is a high priority project the following implementation calendar is considered:

- Elaboration of the Feasibility study, by end of 2007;
- Public debate and environmental permit - mid 2008;
- Tailoring site solutions and implementing the investment in conformity of the identified priorities of COASTEROSION Project detailed design – second part of 2008
- Project implementation 2008-2011.

For specific details please see the annexes.

J. Implementing the feasibility study results

Romania is very committed to implement the feasibility study recommendations all over the country, using American technology.

Romania's commitment for implementing COASTEROSION was highlighted within the "justification" section.

This activity will be in line with the provisions of national and international documents that Romania issued/ratified, such as:

- Romanian Law for Waters;
- Romanian Law for Environmental Protection;
- Romanian Strategy for Water Management;
- Romanian Strategy for European Union Accession;
- International Convention for the Protection of the Danube River Basin (referring to the Danube Delta in this case);
- International Convention for the Protection of the Black Sea.

The project will be implemented based on the financial resources provided both by the Ministry of Environment and Water Management. The MEWM envisage making a loan from US Ex Im Bank of World Bank, for which the Ministry of Finance would provide the sovereign guarantee.

The beneficiaries of the COASTEROSION Project are Constanta Water Directorate and local authorities under the coordination of the MEWM.

K. Project financing

The estimated budget for the implementation of this project is 150 millions USD.

The beneficiaries of the project will be Constanta Water Directorate and local authorities within the area (Tulcea and Constantza Counties). The Ministry of Environment and Water Management will be responsible for obtaining the agreement of the Ministry of Finance to obligate the funds within the Romanian National Budget.

The project will be implemented based on the financial resources provided by the Ministry of Environment and Water Management. Ministry of Environment and Water Management envisages requesting a loan from the World Bank for which Ministry of Finance will provide sovereign guarantee.

This project could also be eligible for financing under the EU cohesion financing instruments, World Bank's Romanian Country Assistance Strategy, EBRD and EIB specific programs.

L. Environmental Impact

The implementation of this project will have an important environmental impact in the development phase due to the construction works. Project implementation could have negative impact on ecosystems if inadequate solutions will be design. This is the reason of phasing the design depending of the modeling solutions (physical coastal infrastructure modeling and long term simulation).

M. US Export potential

US Export will be regarding the technology transfer and acquirement of the monitoring equipment.

Implementation

The USACE will work collaboratively with local agencies and institutions, both on management and technical functions, in developing the knowledge and capability to implement an RSM approach for the coast of Romania. The objective is to provide training at a specific site from which the capacity of Romania will be developed to apply the methodology to the entire coast. This effort would also foster and support the development of such a capacity across the broader Black Sea region.

Estimated Time and Cost

It is envisioned that this will be a 2-year project that includes visits to the site by U.S. staff as well as study stays by Romanian staff at the ERDC, Coastal and Hydraulics Laboratory. Year I will

concern transfer of RSM concepts, selection of a demonstration project site, field data collection, and initial setup of predictive models. Year 2 will concern development of evaluation criteria, development of alternatives, and optimization of the preferred alternative.

Year 1: \$400,000

Year 2: \$300,000

Appendix 2

**Regional Sediment Management Methodology
Applied to the Coast of Romania:
Demonstration Project and Capacity Building**

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**Regional Sediment Management Methodology
Applied to the Coast of Romania:
Demonstration Project and Capacity Building**

Submitted to:

US Agency for International Development

Submitted by:

U.S. Army Engineer Research and Development Center
Coastal and Hydraulics Laboratory
3909 Halls Ferry Road
Vicksburg, MS 39180

29 August 2006

**Regional Sediment Management Methodology
Applied to the Coast of Romania: Demonstration Project
and Capacity Building**

Synopsis: The government of Romania has applied to join the European Union. As part of preparations, Romania is improving the coast to meet environmental requirements. Enhancement of its coast will attract tourism and promote a free-market system, a requirement of the EU. This proposal describes a study program aimed to transfer U.S. technology and planning methodology for Regional Sediment Management (RSM) to the coast of Romania. Two principles of RSM are that: (1) the coast is a sand-sharing system, so that modifications along one segment of the coast is expected to bring consequences to neighboring sections, and (2) management of multiple individual projects can benefit from coordination among all them to minimize overall cost, better protect the environment, and promote long-term sustainability of the coastal system.

Introduction to the Romanian Coast

The Romanian coast, Figure 1, faces the Black Sea and is approximately 240 km long. The coastal morphology of the northern portion (from Mamaia north) is dominated by the Danube River Delta, characterized by eroding sandy beaches at some locations and sand spits, and the southern part is characterized by rocky cliffs. This proposal primarily concerns the northern part, although RSM concepts can be applied to manage any coast. The Danube Delta is the largest wetland in Europe and home to approximately 300 species of birds and 90 species of fish.

The regional trend of longshore sediment transport is to the south, and the potential rate can exceed 200,000 m³/year because of the highly oblique waves generated over a long fetch for northerly wind in the Black Sea¹. Hydropower and flood-control works on the Danube River have overall reduced sand supply to the coast, which is now suffering from chronic erosion. Construction of ports and other coastal structures has blocked sand from down-drift beaches, causing local erosion. The Black Sea has no significant astronomical tide, and sea level rise is small. The main cause of erosion is cutoff of sediment supply by from the Danube Delta and local blockage of sand. There is limited data available on the waves, currents, and beach morphology with which to conduct coastal engineering projects. A recent study performed under funding by the Japan International Cooperation Agency has documented the available data and condition of the coast².

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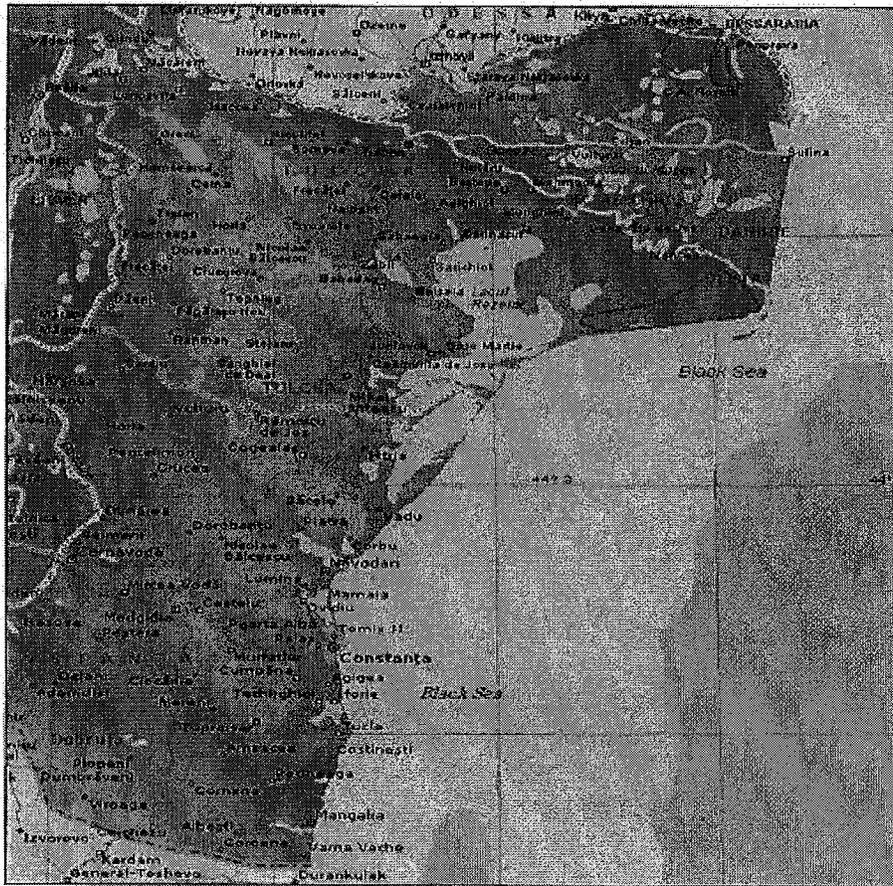


Figure 1. Location map for coast of Romania and Danube River Delta.

Technical Approach

It is proposed that a Regional Sediment Management (RSM) approach be taken and applied in a demonstration project to develop functional designs for a selected area that would hold potential for major economic and environmental coastal rehabilitation. It is suggested preliminarily that the area of Mamaia, the coastal hotel district, be considered because of the existence of tourism industry, hotels, and proximity to Constanta.

A traditional coastal engineering approach is to consider projects individually, without concern for the neighboring coast and recognition of a sand-sharing system. RSM is a strategy of managing sediment (in this case – sand) to benefit a region that will contain several individual

projects and natural and engineered sediment sources and sinks. RSM has the potential for saving overall cost, promotes use of natural processes to solve engineering problems, and improves the environment. Two principles of RSM are that: (1) the coast is a sand-sharing system, so that modifications along one segment of the coast is expected to bring consequences to neighboring sections, and (2) management of multiple individual projects can benefit from coordination among them to minimize overall cost, better protect the environment, and promote long-term sustainability of the coastal system. The U.S. Army Corps of Engineers (USACE) has pioneered in development and implementation of RSM, producing technical guidance documents and RSM-oriented predictive analysis tools for managing the coast.

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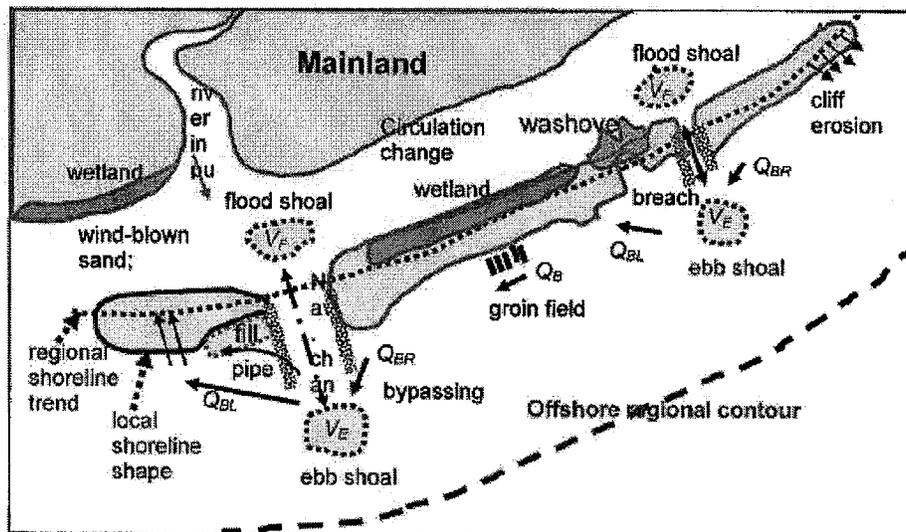


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The USACE will work collaboratively with local agencies and institutions, both on management and technical functions, in developing the knowledge and capability to implement an RSM approach for the coast of Romania. The objective is to provide training at a specific site from which the capacity of Romania will be developed to apply the methodology to the entire coast. This effort would also foster and support the development of such a capacity across the broader Black Sea region.

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It is envisioned that this will be a 2-year project that includes visits to the site by U.S. staff as well as study stays by Romanian staff at the ERDC, Coastal and Hydraulics Laboratory. Year 1 will concern transfer of RSM concepts, selection of a demonstration project site, field data collection, and initial setup of predictive models. Year 2 will concern development of evaluation criteria, development of alternatives, and optimization of the preferred alternative.

Year 1: \$400,000

Year 2: \$300,000

Appendix 3

DRAFT PROJECT CONCEPT:

Integrated Coastal Zone Modeling System (ICZMS)

Appendix 3

DRAFT PROJECT CONCEPT:

Integrated Coastal Zone Modeling System (ICZMS)

DISCLAIMER: This project concept for an integrated monitoring and modeling system for Romania's Black Sea coastal zone was produced by consultants at Chesapeake Analytics in the performance of a Definitional Mission on behalf of USTDA. The authors are not coastal erosion experts or hydraulic engineers. This project concept is in a preliminary draft form, it should be reviewed by the Romanian government for factual accuracy. The project concept requires significant additional elaboration, and should be reviewed by accredited professionals in the fields of coastal management, hydraulic engineering, wave and hydraulic modeling, sediment transport, mapping and geospatial analysis. Optimally, a US firm with extensive expertise in the subject matter should participate in the project proposal's further development.

Background

The marine and terrestrial environment of the Romanian Black Sea Coast is strongly affected by a number of natural factors and anthropogenic pressures. Important morphological coastal processes have occurred during the last few decades, with large zones of coastal erosion and/or alluvial deposition. The causes of these processes include:

- local climate variations;
- changes in the local hydrological regime, with prolonged dry seasons;
- changes in the marine regime, with higher waves and stronger currents;
- a severe reduction of the sediment transport rate in the Danube River and its main tributaries, caused by retention works; and
- the negative effects of various constructed engineering works such as dykes and jetties.

The Danube River - Black Sea System is a part of the Danube River Basin District, as it was recently defined by the International Commission for the Protection of the Danube River (ICPDR, 2004), in accordance to the general principles of the European Water Framework Directive (WFD, 2000/60/EC). This system comprises the following main geographic and hydrographic units:

- The Black Sea, with its western Romanian Coast;
- The Lower Danube River, which discharges into the Black Sea via three arms: the Chilia, Sulina and Sf. Gheorghe; it includes the major tributaries flowing down through Romania;
- The Danube Delta, which is the second largest wetland and protected area in Europe; and
- The terrestrial Romanian area, which is the Dobrogea region lying between the Danube River, Danube Delta and Black Sea.

The deficit of sand supply from the Danube appears to be the main cause of Romania's coastal erosion. Some 20-25% of the total coastline length has been degraded by erosion; and the shoreline has receded at a rate of 3 to 6 meters per year. The beach surface has been reduced by 60%, a loss of 45 to 85 hectares per year. Large amount of alluvia have settled upon the existing sand deposits at the river mouth, and new deposits have emerged. As a result, a large number of engineering structures and buildings in the area have been damaged and threatened with destruction. The deltaic coast in the Northern sector has 95 kilometers affected by erosion, near Sulina, Gura and Portita. At the same time 35 kilometers of the north are plagued by excessive sand deposition such as at Sacalin Island. In the Southern sector severe degradation has been recorded at Mamaia, Constanta, and Eforie.

The southern part of Mamaia Beach is subject to the severest erosion. Without countermeasures against beach erosion, the shoreline is expected to retreat by an average 70 meters per year over the next twenty years; sandy beaches will disappear and some beach-front hotels will be susceptible to the danger of collapse. Many cliffs are being eroded by wave abrasion at their base and on the upper levels due to the rise of the ground water table during heavy rains. The northeastern part of Constanța City and the shoreline of Eforie City both have houses and buildings near the edges of the cliffs. These cliffs are eroding at an average rate of about 0.6 meter per year.

One of the environmental issues of concern on the coast is eutrophication, caused mostly by pollutants. Marine water eutrophication phenomena occur frequently in the region, with proliferation of algae and algal blooms in summer seasons that affects the quality of waters and the status of shore and tourist beaches. A primary cause of the phenomenon is thought to be run-off of phosphates and nitrates from near-shore agriculture.

Studies have shown that the coastal erosion is the result of a combination of factors - both natural and human induced - that operate on different scales. Among the most important factors are: winds and waves, near shore currents, relative sea level rise and slope processes. Human induced factors of coastal erosion include: coastal engineering, land claim, water management works, dragging, vegetation clearing, and other factors. Coastal erosion has three types of impacts:

- loss of land with economic and social value;
- destruction of natural sea defenses;
- undermining of constructed sea defenses.

A strategic and proactive approach to coastal erosion is needed for the sustainable development of vulnerable Romanian Black Sea coastal zones and the protection of the littoral environment. The tourism industry is dependent upon a significant part of the deteriorating coastline, particularly in the southern part of the Constanța port. In this area the quality of the beaches cannot sustain further development. Recent construction works near the shoreline and on the beach have caused further deterioration.

The Romanian government authorities charged with the stewardship of the Black Sea coastal zone are under pressure to alleviate the coastal erosion and to protect and even enhance the beach tourist industry, all while protecting and restoring the natural environment. Furthermore, Romania's Ministry of the Environment and Water Management is committed to the implementation of the EU Water Framework Directive (WFD) and Integrated Coastal Zone Management (ICZM) in the transitional and coastal waters in Romania.

The erosion problem is well identified, and specific remedial civil construction works have been designed, such as in Mamaia Sud and Eforie Nord in the JICA/ECOH Study. However, MEWM is hesitant to implement these works, because of the risk that the physical intervention merely shifts the erosion along the coast, or has other surprising results. Romania lacks an integrated model of its coastal zone, a model that could show the interactions of the natural and built environment, and be used to plan development, design erosion prevention measures, and to protect and restore the natural environment. MEWM therefore proposes to implement an Integrated Coastal Zone Modeling System (ICZMS). The ICZMS system is urgently required in order to:

- Integrate in one system all the information needed for planning and managing the coastal zone;
- Capture the current State-of-the-Coast;
- Understand the dynamics and trends that are driving changes along the coast;

- Have an integrated numeric, physics-based model of Romania's entire estuarine, deltaic and littoral zone;
- Provide an ability to model the physical processes affecting the coastline, to plan restoration and simulate the wide-area effects of physical interventions prior to their construction;
- Provide information vital for planning, land-use policies and zoning development in the coastal zone;
- Characterize the natural environment and the negative influences on it, so as to enable environmental protection and restoration.

The Romanian Black Sea Coast

The Romanian Black Sea Coast, 245 kilometers long, is located in the Western Black Sea, between Ukraine in North and Bulgaria in South. It reaches from Musura Bay where the Chilia Arm of the Danube River discharges into the sea, to the town of Vama Veche near the Romanian-Bulgarian border. The coastal area is not densely populated, but it is well developed for agricultural (fruit and vegetable farming), industrial (chemicals, oil refineries, shipping, metal works, fishing) and tourist uses. Constanta and Mangalia are the largest coastal cities, hosting major harbors and shipyards. Other smaller towns (Sulina, Sf. Gheorghe, Navodari), rural villages and summer resorts (Mamaia, Eforie, Neptun, Olimp, Venus, Mangalia) are located on the Romanian coast.

The Danube River is the second largest river in Europe and a major navigable waterway. The Danube discharges into the Black Sea by three arms: Chilia, Sulina and Sf. Gheorghe. The river has an average annual water flow rate of 6200-6500 m³/s and sediment transport rate of 750-1000 kg/s, amounting to 20 million tons per year. In the Danube River mouth area, the Danube Delta is created as a low wetland, with unique flora and fauna; it is one of the major protected natural reserves in Europe. The Danube-Black Sea Canal discharges into the Black Sea by two arms: Poarta Alba-Constanta and Poarta Alba-Midia Navodari. It was completed in 1987 for navigation, water supply and irrigation. Several small streams and rivers discharge directly into the Black Sea, as well as some littoral lakes that are either linked to the sea or located in its proximity such as the Razelm-Sinoe lagoon system, Mangalia, Mamaia and many other small lakes.

Project Details

Romania's Black Sea coastal area, in interaction with the Danube River, forms a system which should be managed in an integrated, comprehensive way. Integrated Coastal Zone Management requires preservation or restoration of the environment and landscape, and the guarantee of access to quality coastal area for tourism and commerce. The practical problem of managing coastal areas is made more difficult by the interests and stakeholders involved, and by the pressures of emergencies and their impact on public opinion. The Integrated Coastal Zone Modeling System (ICZMS) project's objective is to support the critical information needs that will allow the development of a broad plan and vision that can guide coastal intervention and management. ICZMS's objectives are:

- Provide critical information support to integrated coastal planning and management projects, and support the development of guidelines for coastal management based on an integrated land-sea view of coastal areas, with special attention to coastal erosion processes;
- Provide modeling, simulation and informational support for the design and development of specific interventions and construction for coastal sectors aimed at combating erosion; and
- ICZMS will form the technical core of the Romanian strategy for Integrated Coastal Zone Management.

The project seeks to provide a single system that can support both the coastal management and planning process and the planning and design of physical construction works aimed at halting or reversing coastal erosion. The ICZMS must represent the interactions of the complex ensemble of natural marine, terrestrial, atmospheric processes that determine the "state" of coastal areas, and model the systemic effects of both natural and anthropogenic changes. For the preservation and management of the coastal zone, it is of vital importance to be able to detect trends in the coast's state as well as to identify the nature and origin of the trends. The planning and design of structural and management interventions requires a robust modeling ability to simulate the outcomes of specific construction designs prior to implementation. The designs need relevant spatial information of the surrounding areas in order to take into account economic and social interests and environmental factors. In the ICZMS, the Ministry of Environment and Water Management will gain an integrated land-sea view of coastal areas.

The ICZMS project will proceed in three phases:

Phase I – Establishment of a Romanian Coastal Zone Model and Monitoring Center

- Collect detailed mapping and geographic information for the littoral and near-coastal land areas, and establish a comprehensive Romanian Coastal Zone Geographic Information System (RCZGIS) that will represent the State-of-the-Coast.
- Develop a conceptual model for the coastal erosion processes, considering the Romanian coast as a whole system, and then develop and implement a robust large-scale numeric model of the entire coastal area, taking into account currents, wave action, and Danube River sediment deposition processes.
- Establish a Romanian Coastal Zone Modeling and Monitoring Center. Over the past few years, the Romanian Marine Research Institute, Constanta (RMRI), has conducted studies of hydrology, geomorphology, biology and the impact of increasing pollution upon the Black Sea. These studies will provide valuable input into the ICZMS, and they are natural hosts for the Center.

Phase II – Initial Operations

- Establish an array of coastal monitoring measurement stations that will calibrate the large-scale model and detect dynamics and trends in the coastal zone;
- Establish a sector numeric erosion model for a high-risk coastal area, e.g. Mamaia;
- Establish a numeric model for sediment transport for the coastal Danube;
- Develop a set of portable measurement instrument packages that can be deployed to support the fine-gridded sector model and the Danube model. Deploy permanent monitoring equipment to Danube outflow elements;
- Conduct training of the center's staff and train operators for the GIS and the models.

Phase III – Ongoing Activities

- Update the spatial data for the GIS, to track dynamics and trends and build the historical record;
- Extend the sector model to additional high-risk beach areas;
- Staff and run the Romanian Coastal Zone Model and Monitoring Center in a normal permanent mode of operations.

Elements of the ICZMS

Integrated Coastal Zone Modeling System (ICZMS) Project Elements	
Element	Description
Spatial Data Collection for Romanian Coastal Zone GIS	<ul style="list-style-type: none"> - Collect high-resolution multi-spectral satellite imagery, in stereo, and extract a 5-meter digital elevation model (DEM) for a 30 km coastal buffer zone - Collect Stereo Aerial Photography and Ground Control for the near-coastal area, estimated at 2500 sq. km., at 15 cm resolution, establish a high resolution DTM, hydrographically correct using break-lines - Collect bathymetry to 100 meter depth, using appropriate techniques, i.e. soundings and side-scan sonar in Danube estuarine zone, LIDAR bathymetry for shallow coastal areas, i.e. the US Army Corps of Engineers' Scanning Hydrographic Operational Airborne LIDAR Survey (SHOALS) system, soundings, etc. - Extract as vectors all natural and man-made hydrological features along the coast from aerial photography and bathymetric interpretation
Establish Geographic Information System (RCZGIS)	<ul style="list-style-type: none"> - Establish a GIS schema and database for inland coastal areas, shore and adjacent sea areas, allowing for future storage of time-series of hydrological measurements, wave characteristics and sediment information. The GIS must be capable of supporting multi-temporal data that can represent and analyze the dynamic coastal morphology, allowing trend and change analysis - Collect appropriate existing digital spatial data from other sources and government agencies as appropriate - Populate the GIS database with an initial comprehensive set of data that represents the state of the Romanian coastal zone at the moment of deployment, as a point of reference and historical record
Develop Conceptual Model	<ul style="list-style-type: none"> - Produce a conceptual physical model of coastal erosion forcing factors for the Romanian Black Sea Coast, including current, wave action, and Danube River sediment contribution
Establish Romanian Coastal Zone Modeling and Monitoring Center	<ul style="list-style-type: none"> - Establish a computing and science center for coastal monitoring - Install GIS/mapping equipment, graphic workstations and significant computing power and data storage and management facilities to run the numerical models and sustain the GIS - Establish a communications function to capture signals from telemetry/radios on remote monitoring instrumentation, convert and store the data in the RCZGIS - Perhaps the Center could be located at the National Institute for Marine Research and Development in Constanta (RMRI)
Establish Large Scale Coastal Model	<ul style="list-style-type: none"> - Establish a large scale numerical hydrological model for the entire Romanian coast (i.e. ECOM Estuarine, Coastal and Ocean Model, a 3D ocean circulation model) - Establish numeric physics-based wave model (i.e. SWAN Simulating Waves Near-shore)
Coastal Monitoring Instrument Array	<ul style="list-style-type: none"> - Establish continuous monitoring stations at 7 locations/sectors to support the large scale coastal model - Collect data on water currents, wave height and direction, sediment and meteorological data, and water quality - Sensor Package would include instruments such as: <ul style="list-style-type: none"> o ADCP Acoustic Doppler Current Profiler o Water Surface Elevation Hydraulic Pressure Sensor o OBS Optical Backscatter Sensor for turbidity and suspended solid concentration o LISST Laser In-Situ Scattering and Transmissometer from Sequoia Instruments – a Laser Vertical Profiler for particle size and turbidity o Wind velocity and direction, precipitation o Radio telemetry
Establish Sectoral	<ul style="list-style-type: none"> - Establish sectoral (i.e. 5-10 km of coastline length) 3D hydrological model for a

Integrated Coastal Zone Modeling System (ICZMS) Project Elements	
Element	Description
Coastal Model	<ul style="list-style-type: none"> - high-risk area of the Romanian coast (i.e. ECOM), fine gridded model - Establish wave model (i.e. SWAN) - Establish Sediment Transport Model <ul style="list-style-type: none"> o Sediment Transport Model – i.e. ECOMSED outside surf zone, suspended and bed-load o Beach Evolution Model – i.e. GENESIS long-shore transport model o Cross beach model – i.e. SBEACH profile model
Sectoral Monitoring and Verification	<ul style="list-style-type: none"> - Deploy four portable instrument clusters with capability similar to the Coastal Monitoring System Array for model calibration and validation - Bed level sensors for continuous measurements of the sediment-water interface, including bed-load and suspended load transport, instruments for particle size and fall velocity, bed-material sampling, measurement of wet bulk density
Danube River Delta Model	<ul style="list-style-type: none"> - Establish a sector 3D numeric hydrological/wave/sediment transport model for the Danube River estuarine/deltaic zone
Danube River Monitoring Package	<ul style="list-style-type: none"> - Deploy instrumentation for the permanent monitoring of the 3 mouths of the Danube River - Continuous collection of flow rate, water quality, sediment type, suspended and bed-load, distribution and movement, stage height
Additional Sector Models	<ul style="list-style-type: none"> - Establish sector models for other high-risk portions of the Romanian Black Sea coast. Add one sector per year as needed. Deploy portable monitoring instruments for calibration and validation.
Spatial Data Updates, Two Years	<ul style="list-style-type: none"> - Capture coastal dynamics and shoreline evolution with updated aerial photography and shallow-water bathymetry (i.e. LIDAR) for the beaches and immediate coastal areas
Technical Support to Operations, Two Years	<ul style="list-style-type: none"> - The coastal monitoring and modeling system will need continuous technical and scientific support.
Training	<ul style="list-style-type: none"> - Train Romanian scientists on all numeric models, GIS, and instrument deployment and data collection and integration

The preliminary budget for the implementation of the ICZMS totals \$19 million over the initial three-years of operations, excluding the cost of Romanian scientists and staff, and the operating and maintenance costs of the modeling center facility. Details of the budget are provided in the table below.

Preliminary Budget - Integrated Coastal Zone Modeling System (ICZMS) Preliminary Project Budget	
Project Element	Budget Estimate
Spatial Data Collection	\$ 2,938,000
Establish Geographic Information System (GIS)	\$ 950,000
Develop Conceptual Model	\$ 175,000
Establish Coastal Modeling and Monitoring Center	\$ 1,350,000
Establish Large Scale Coastal Model	\$ 1,600,000
Coastal Monitoring Instrument Array	\$ 875,000
Establish Sectoral Coastal Model	\$ 2,750,000
Sectoral Monitoring and Verification	\$ 500,000
Danube River Delta Model	\$ 1,650,000
Danube River Monitoring Package	\$ 360,000
Additional Sectoral Models (1 per year for 2 years)	\$ 1,925,000
Shoreline Evolution - Spatial Data Updates, Two Years	\$ 1,322,100
Technical Support to Operations, Two Years	\$ 2,500,000
Training	\$ 210,000
Total Estimated Project Cost	\$ 19,105,100

Development Priority

In accordance with Romania's efforts to implement the EU *acquis-communautaire* in the water resources field, specifically the Water Framework Directive (WFD), the ICZMS Project is in line with the national strategy regarding the Black Sea. Coastal protection and the integrated coastal zone management is one of the main issues of the EU WFD implementation in Romania. Furthermore, the project is consistent with the provisions of national and international documents that Romania has issued or ratified, such as:

- Romanian Law for Waters;
- Romanian Law for Environmental Protection;
- Romanian Strategy for Water Management;
- Romanian Strategy for European Union Accession;
- International Convention for the Protection of the Danube River Basin (referring to the Danube Delta);
- International Convention for the Protection of the Black Sea.

Project Finance

The estimated budget for the implementation of ICZMS is \$19 million. Industry experts consulted generally agreed that the project's scope would exceed \$10 million. A careful scoping of the project could bring the project's cost to the \$12-14 million range. The project will be implemented based on the financial resources provided by the MEWM. MEWM envisages requesting a loan from the US Ex-Im Bank for which the Ministry of Finance will provide a sovereign guarantee. This project could also be eligible for financing under the EU cohesion financing instruments, the World Bank's Romanian Country Assistance Strategy, EBRD and EIB specific programs.

Environmental Impact

Implementation of the Coastal Erosion project would provide substantial improvements to Romania's ability to manage its coastal environment. The project primarily consists of monitoring equipment, IT, and hydrological modeling science. ICZMS would not construct civil works directly, and as a result it would have no direct negative impact on the Black Sea or the Danube River and its tributaries. However, the system could be used to plan the installation of reefs, protective structures, and other types of construction that would have an impact on the environment. Physical coastal infrastructure modeling and long term simulation must be undertaken and incorporated in the design and phasing of interventions. To avoid possible negative environmental impacts, care must be taken to in the design of intervention solutions, and ICZMS will support the environmental impact analysis through its robust GIS capability.

According to the Annual Report of the Commission on the Protection of the Black Sea against Pollution 2003/2004, a strategic target is to achieve environmental conditions in the Black Sea similar to those observed in the 1960s. An intermediate target is to establish priority actions and identify measures for rehabilitation and protection of the Romanian Black Sea Coast. This task demands a more careful analysis of the environmental impacts of the proposed coastal erosion solutions and ICZMS supports this. A reduction in the discharge of contaminants to the fluvial environment is an additional potential benefit of this project, contributing to the protection of aquatic habitats in lakes and marine environments.

Developmental Impact

Coastal erosion affects the environment, but it also has significant socioeconomic impacts. As Romania develops and joins the EU, Black Sea coastal tourism is significant potential source of income. This project will help stem the economic losses due to reduced beach surface and damage to tourist infrastructure. The ICZMS will directly support planning for sustainable coastal development.

US Export potential

Development of a response to Romania's coastal erosion problem is an undertaking that would require the type of proven experience offered by the U.S. environmental, communications, and high tech industry. American ocean engineering science and technology, and coastal monitoring equipment manufactured in the U.S. form a substantial part of the required investment for implementation and operation of the ICZMS. Preliminary estimates are that a large majority of the equipment and services required for ICZMS would be imported, and the US is a leading supplier in most of the categories.

The system calls for a wide range of capabilities including: digital terrain mapping, bathymetric mapping, GIS, spatial data management, hydrologic modeling, wave action modeling, and sediment transport models. US-based GIS technology can play a major role. GIS provides a critical tool in managing and analyzing the multiple spatial layers involved in the ecological development and maintenance of beach ecosystems and in mapping the changing characteristics of the Romanian coastal zone.

Implementation of this project would necessitate the acquisition of monitoring equipment, hydro-meteorological hardware, telemetry/communications systems, computers, storage, software, and training. The following types of science and engineering services are called for in the project:

- coastal management,
- hydraulic engineering,
- wave and hydraulic modeling,
- sediment transport,
- mapping and geospatial analysis.

Out of the total project implementation cost, the US export potential consists of sales of both equipment and scientific/engineering/technical services. It would also include maintenance contracts, technical assistance, training, and ongoing scientific and management support. It is our preliminary estimate that of the \$19 million preliminary budget, over 90% will be imported. While firms and institutes from the Netherlands and from Denmark are strong competitors in coastal management practices and technologies, the US has a very high likelihood of capturing the greater share of the exports to the project.

U.S. companies that would potentially be interested in this project include:

- Coastal, Water or Environmental Engineering: CH2M, Booz-Allen, Froehling & Robertson, Washington Group, Parson Brinkerhoff, ENSR/AECOM, QEA, Dynamic Solutions
- Equipment Suppliers: Harris, ESRI, Montgomery Watson Harza, Hydro Lab, Handar, Sequoia Scientific, D&A Instruments, Teledyne RD Instruments
- Project Integrators: ENSR/AECOM, Lockheed Martin, Global Waters

The following firms provide services or equipment called for in ICZMS. MEWM could contact them, as well as the USACE/CHL, to elaborate on this project description, and to refine the project details and the budget:

Chris Wallen
Dynamic Solutions, LLC
322 Nancy Lynn Lane, Suite 1
Knoxville, TN 37919
Phone: (865) 212-3331
Email: cmwallen@dsllc.com

Email: mrashid@ensr.aecom.com
www.ensr.aecom.com

Sequoia Scientific
2700 Richards Road, Suite 107
Bellevue, WA 98005
Phone: (425) 641-0944
www.sequoiasci.com

C. Kirk Ziegler, Ph.D.
Senior Managing Engineer
Quantitative Environmental Analysis, LLC
305 West Grand Ave, Suite 300
Montvale, NJ 07645
Phone: (201) 930-9890 ext 12
Email: kziegler@qea.com

D & A Instrument Company
24 Seton Road
Port Townsend, WA 98368 U.S.A.
Phone: (360) 385-0272
www.d-a-instruments.com

Mizan Rashid, Ph.D., P.E.
Director, Hydraulic Engineering Services
ENSR/AECOM
9521 Willows Road NE, Redmond, WA 98052
Phone: (425) 881-7700 X 110
Mobile: (206) 715-0124

Teledyne RD Instruments USA
14020 Stowe Drive
Poway, CA 92064
Phone: (858) 842-2600
www.rdinstruments.com

Feasibility Study

The Feasibility Study should address the following issues:

1. Establish the data that needs to be collected to establish the State-of-the-Coast, to design the Romanian Coastal Zone GIS, and to identify the monitoring and measurements required to define the processes that drive the dynamics of the coastal state.
2. Design an efficient monitoring system for the state-of-the-coast and its evolution.
3. Establish the detailed plans and architectures for the development of a large-scale Romanian coastal erosion model, a Danube delta sediment transport model, and finely gridded sectoral models.
4. Propose the elements and functions of a Coastal Zone Modeling and Monitoring Center.
5. Develop a concept of an integrated, networked coastal management system where each organization's users have the possibility of sharing data and information with other users.

The following activities should be entirely excluded from the Feasibility Study:

- Any pilot projects, data collection or the establishment of a GIS
- Any coastal modeling
- The delivery of any equipment or software
- The design of any specific erosion-abatement civil works
- The development of any policies regarding coastal management

The selected engineering/technology consulting company for this technical assistance contract must be able to field a team with the following key competencies:

- coastal management engineer,
- hydraulic engineer,
- wave and hydraulic modeler,
- sediment transport engineer,
- water monitoring equipment instrumentation specialist
- mapping and geospatial analyst,
- systems analyst
- telecommunications/data network engineer
- environmental engineer
- economist

Tasks of the Feasibility Study

Task 1 Initial Meeting, Document Collection and Review

- An initial meeting with the MEWM will start the Feasibility Study
- Following the initial meeting, the Consultant will conduct one-on-one meetings with the relevant departments/agencies identified during the initial meeting. The purpose of these meetings will be to clarify the feasibility scope of work and identify staff that should be involved with the Study, and to collect data/information.
- A final Feasibility Study schedule and work plan will be developed
- Review existent studies, measures, and available data on erosion of the Black Sea coast. These should include, but not be limited to, the Coastal Protection Plan, JICA/ECOH feasibility study, MATRA Frame VI Research Project, CADSEALAND (Interreg-CADSES), and rehabilitation of dykes at Mamaia Sud and Eforie Nord.

- Collect and review information related to water quality, water supply and water distribution for the urban areas of the Black Sea Coast;
- Review existing studies and data on the Danube-Black Sea System - flow, waves, sediment transport, and existing infrastructure (transport, dykes, existing erosion protection measures, etc.)

Task 2 Technical Analysis

This task will develop a detailed solution for modeling coastal erosion in Romania. It will design and develop specifications for an integrated information system to support the overall coastal protection strategy and simulate the localized intervention measures. A technical Analysis report will be produced and the Consultant will conduct a briefing session on the draft report for the MEWM and local officials. Based on inputs from the briefing session, the Consultant will develop a final technical report.

Elements of the Technical Analysis include:

- Identify user needs and system requirements
- Document the functional requirements
- Develop a system concept and design with a data architecture and an overall system architecture
- Produce system technical specifications
- Determine itemized equipment, hardware, data and software requirements
- Produce list of proposed equipment and services for project implementation, including a list of U.S. sources of supply with company names and contact information
- Produce a Technical Analysis Report
- Create draft technical analysis report
- Present Report to Client's Steering Committee
- Revise technical analysis report
- Create final technical analysis report

Task 3 Implementation and Investment Plan

This task will produce a project Implementation and Investment Plan.

- Economic analysis - compile costs and benefits and determine the Internal Rate of Return (IRR) and Net Present Value (NPV) of the project. This will include an economic analysis to determine the environmental, property risk, and tourist economy benefits potentially generated by implementing the proposed system.
- Prioritize functions and establish anticipated future steps required to implement the project
- Develop a detailed implementation schedule, budget and investment plan, which will be presented on a monthly basis
- Perform financial analysis of the proposed project funding, reviewing the sources of funding and their stipulations and requirements.
- An appropriate Environment Impact Analysis will be conducted
- The Developmental Impacts of the project will be assessed
- An Implementation and Investment plan will be submitted in draft form, revised based on MEWM's comments, and submitted in final form.

Task 4 Final Report

This task will generate a final report that summarizes and encompasses all the Consultant's findings and recommendations, including the Consultant's final conclusions. The deliverable for this task series is a Project Final Report.

- Final report with executive summary, including the cumulative findings of the Feasibility Study, with a section for the results of each of Tasks 1-3, and final conclusions
 - Draft report including final conclusions
 - Revise draft report
 - Final report
 - Create visual presentation summary of final executive summary
- Executive Presentation and Discussion Forum
- Delivery and Acceptance of Final Report to MEWM

Feasibility Study Schedule

Task Schedule		Project Name: Romania ICZMS																	
Task / Week		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Task 1. Project Startup																			
Task 1.1 Initial Meeting																			
Task 1.2 Data Collection and Review																			
Task 2. Technical Analysis																			
Task 2.1 User Needs Assessment																			
Task 2.2 Requirements																			
Task 2.3 System Design																			
Task 2.4 Technical Analysis Report																			
Task 4. Implementation/ Invest. Plan																			
Task 4.1 Schedule and Budget																			
Task 4.2 Economic and Financial Analysis																			
Task 4.3 Environmental Impact and Reg Issues																			
Task 4.4 Developmental/Org Impacts																			
Task 4.5 Implementation and Investment Plan																			
Task 5. Final Report																			
Task 5.1 Executive Summary and Final Report																			
Task 5.2 Executive Presentation Forum																			

Feasibility Study Budget

Feasibility Study Budget by Category by Task

Task Cost Summary		Task 1	Task 2	Task 4	Task 5	
Budget Totals						
Labor		\$ 30,120	\$ 92,360	\$ 94,480	\$ 29,280	\$246,240
Travel		\$ 13,288	\$ 22,872	\$ 21,872	\$ 10,766	\$ 68,598
Communications		\$ 540	\$ 1,700	\$ 1,700	\$ 520	\$ 4,460
Other Costs (Specify)		\$ 1,950	\$ 4,350	\$ 4,350	\$ 4,950	\$ 15,600
Totals		\$ 45,898	\$121,282	\$122,202	\$ 45,516	\$334,898

A preliminary budget for the Feasibility Study is as follows:

Cost Budget For:		USTDA Feasibility Study Budget			
Project:		Project Name: Romania MEWM ICZMS			
Labor (Loaded Rates)					
	Days	x	Unit Cost	=	Total Cost
Project Manager	44		\$ 1,280		\$ 56,320
Coastal Management Engineer	32		\$ 1,120		\$ 35,840
Hydraulic Engineer	25		\$ 1,080		\$ 27,000
Wave and Hydraulic Modeler	16		\$ 960		\$ 15,360
Sediment Transport Engineer	18		\$ 1,080		\$ 19,440
Mapping and Geospatial Analyst	23		\$ 960		\$ 22,080
Systems Analyst	10		\$ 1,080		\$ 10,800
Telecommunications/ Data Network	10		\$ 1,080		\$ 10,800
Economist	28		\$ 1,080		\$ 30,240
Environmental Engineer	17		\$ 1,080		\$ 18,360
Total	223				\$ 246,240
					\$ 246,240
Travel					
	Count	Units	Cost Each		Item Total
Airfare US-Bucharest, Return	16	trips @	\$ 1,400		\$ 22,400
Airfare Domestic Romania	10	trips @	\$ 200		\$ 2,000
Per Diem Romania, Days	154	days @	\$ 252		\$ 38,808
Ground Transportation, Days	154	days @	\$ 35		\$ 5,390
Total					\$ 68,598
					\$ 68,598
Equipment and Supplies					
Pilot project computers				\$ -	
Pilot project US equipment				\$ -	
				\$ -	\$ -
Communications					
				\$ 4,460	\$ 4,460
Other Costs (specify)					
Translation services				\$ 8,400	
Printing and maps				\$ 4,200	
Administrative Costs for FS				\$ 3,000	
				\$ 15,600	\$ 15,600
Total Costs					\$ 334,898
					\$ 334,898

Appendix 4
Terms of Reference

Appendix 4 Terms of Reference

The Romanian Black Sea coastline has been undergoing significant erosion for several decades. Erosion along the coast limits socioeconomic opportunities and has detrimental impacts on public infrastructure and the environment. The Government of Romania (GOR) is implementing a Coastal Erosion Control Program (COASTEROSION Program) that involves the development of an Integrated Coastal Zone Modeling System (ICZMS) for the study of potential structural and non-structural coastal erosion control measures. Implementation of the COASTEROSION Program entails the following four phases:

1. Phase I involves the assessment of the ICZMS spatial data requirements and specification of the software and hardware for a spatial data monitoring program and data management system within the context of a Romanian Coastal Zone Geographic Information System (GIS), which will be needed to interface with regional numerical models to implement a regional sand management system (RSM) similar to the RSM of the U.S. Army Engineer Research and Development Center. Additionally, Phase I involves the definition of the overall implementation framework for the COASTEROSION Program and identification of the Romanian institutional support required for its execution. Phase I also include the preparation of the terms of reference and cost estimate for Phases II and III of the Program.
2. Phase II entails obtaining and deploying the hardware and software technology for the acquisition of spatial data and related information needed to create the numerical models for RSM. It also includes setting up the GIS required to address spatial data input, management and data analysis requirements of the RSM. Spatial data required by the RSM GIS includes hydrographic and topographic survey data, aerial and oblique photography, dredge material record, digital nautical charts, and generic GIS information. The RSM GIS serves as the link between engineering analyses and regional numerical models. Phase II also involves establishing the analytical models that will provide the means for evaluating coastal management alternatives for erosion control and coastal management. Phase II involves the refinement of the terms of reference and cost estimate for Phase III of the Program.
3. Phase III consists of the actual feasibility study on structural and non-structural erosion control measures for the Romanian Black Sea coastline. Phase III includes the preparation of the terms of reference and cost estimate for Phase IV of the Program.
4. Phase IV involves the implementation of the coastal erosion control projects.

The Ministry of Environment and Water Management of Romania (Grantee) requires technical assistance to carry out Phase I of the COASTEROSION Program.

TASK 1: REVIEW OF RELEVANT REPORTS AND DATA AND BASELINE CONDITIONS REPORT

In concert with the Grantee, the Contractor shall investigate and review the existing hydrographic, oceanographic information and data. This task shall include inspection of key

coastal features and the review of all relevant reports and other existing documents pertaining to the study area including but not limited to the following:

1. Giosan, L., Bokuniewicz, H.J., Panin, and N., Postolache, 1999. Longshore Sediment Transport Pattern along the Romanian Danube Delta Coast. *Journal of Coastal Research*, 15(4), 859-871.
2. ECOH Corporation. 2006. Volume 1, 2 and 3 of the Study on Protection and Rehabilitation of the Southern Romanian Black Sea Shore in Romania. Draft report submitted to the Government of Romania, ECOH Corporation, Tokyo, Japan.
3. MATRA Frame VI Research Project Report.
4. CADSEALAND (Interreg-CADES) Report.
5. Rehabilitation of dykes at Mamaia Sud and Eforie Nord Report.

The above documents shall be provided by the Grantee.

The work performed under this task will familiarize the Contractor with the environmental setting along the 240 km of Romanian Black Sea coastline. The Contractor shall visit and inspect the most relevant coastal features including manmade infrastructures that may have a potential impact in sediment movement and coastal erosion along the Romanian Black Sea littoral. The Contractor shall gather, develop and compile spatial data sources and baseline information concerning coastline conditions. The Contractor shall use appropriate scaled maps (maps scale to be selected depending on availability) to document baseline conditions. In addition, this task will allow the identification of the specific spatial data needs to perform all the work required to establish the ICZMS. The Contractor shall conduct a workshop for various stakeholders and relevant Romanian government officials to document the findings of this task. The Grantee shall be responsible for providing the venue for the workshop and for inviting the audience to the workshop.

Deliverable: Technical Memorandum on Spatial Data Sources, Needs and Baseline Conditions.

TASK 2: INTEGRATED COASTAL ZONE MANAGEMENT SYSTEM INSTITUTIONAL FRAMEWORK

The purpose of this task is to provide a long-term strategy for the development of the institutional capability needed to carry out the COASTEROSION Program. The Contractor shall design the institutional strengthening agenda to support the development and implementation of all phases of the COASTEROSION Program. The Contractor shall provide a detailed list of the administrative, financial and operational resources needed for the successful implementation of the COASTEROSION Program. The Contractor shall also provide the schedule for the implementation of the institutional strengthening program.

Deliverable: Technical Memorandum on Integrated Coastal Zone Management System Institutional Framework and Strengthening Program

TASK 3: SPATIAL DATA MONITORING STATIONS, GIS AND COMMUNICATION TECHNOLOGY

This task involves the identification, assessment and specification of all components of the spatial data monitoring stations, Geographic Information System (GIS) and communication technology for implementation of the ICZMS. The Contractor shall be responsible for defining the location and the number of spatial data monitoring stations to support the regional scale numerical model that will be developed as part of the ICZMS. The Contractor shall select and specify each and all components of the monitoring system for the collection of spatial data input including but not limited to:

1. Aerial and oblique photography;
2. Bathymetry;
3. Hydrographic (water current, wave characteristics and direction);
4. Sediment measurements;
5. Topographic survey data;
6. Dredged material and sediment records;
7. Meteorological data;
8. Telemetry and remote sensing instrumentation; and
9. Related software and hardware.

The Contractor shall provide the details (including but not limited to activities such as scheduling, sampling frequency, and budget) of the spatial data monitoring program. The Contractor shall be responsible for the operational compatibility of all equipment and components of the spatial data monitoring, GIS and communication system. The Contractor shall provide a manual of operation that specifies the procedures for each piece of equipment and component for the entire system. The manual of operation shall include all maintenance requirements including preventive measures and recommendations for the spare part inventory needed for the long-term operation of all equipment. The Contractor shall provide the individual cost of each piece of equipment and/or component and the total cost of the entire system.

The Contractor shall assess the availability of U.S. manufactured equipment and products for all components of the spatial data monitoring stations, GIS and communication technology and shall provide for each piece of equipment and/or component detailed technical specifications. Additionally, the Contractor shall provide for each U.S. manufacturer its business name, website, point of contact, address, telephone and fax numbers, and email address.

Deliverable: Technical Memorandum, Technical Specifications and Procurements Documents, Monitoring Program and Manual of Operation for the Spatial Data Monitoring Stations, GIS and Communication Technology.

TASK 4: PREPARATION OF TERMS OF REFERENCE AND COST ESTIMATE FOR PHASES II AND III

The Contractor shall prepare the terms of reference (TOR) for the deployment of the spatial data monitoring stations, hardware, software and related technology for the acquisition of spatial data and information needed to create the numerical models for Regional Sand Management (RSM). This task also includes the TOR for setting up the GIS and the ArcView capability required to address spatial data input, management and data analysis requirements of the RSM. Spatial data required by the RSM GIS includes the hydrographic and topographic survey data, aerial and oblique photography, dredge material record, digital nautical charts, and generic GIS information listed in task 3. The Contractor shall take into account that RSM GIS serves as the link between engineering analyses and regional numerical models.

The Contractor shall also provide the TOR for establishing the numerical models that will provide the means for evaluating costal management alternatives for erosion control. The Contractor shall assess and provide the cost of the spatial data monitoring system and the cost associated with developing the numerical models and carrying out the modeling effort to identify potential erosion control measures.

Additionally, the Contractor shall prepare the TOR and planning level cost estimate for Phase III of the COASTEROSION Program.

Deliverable: Technical Memorandum, Terms of Reference and Cost Estimate for Phase II and Terms of Reference and Planning Level Cost Estimate for Phase III.

TASK 5: ECONOMIC ANALYSIS

The Consultant shall assess the economic impact of the COASTEROSION Program. As part of the economic analysis, the Contractor shall examine the economic benefits of the COASTEROSION Program to coastal natural resources and to the existing manmade developments. The analysis shall investigate and document the cost of potential unavoidable coastal resources management losses if the COASTEROSION Program is not carried out. The analysis shall include a comparison of the projected economic scenarios with and without the Program.

Deliverable: Technical Memorandum Documenting the Economic Analysis.

TASK 6: FINANCIAL ANALYSIS

This task shall require the Contractor to assess the ability of the Program to receive financing for the subsequent phases of the COASTEROSION Program and specifically identify financing sources for Phase II.

The Consultant shall prepare a financial plan for the implementation of the COASTEROSION Program. The financial plan shall satisfy the requirements of the Grantee who is the responsible party for seeking/obtaining project financing. In addition, the financial plan shall also satisfy the

requirements of all prospective funding institutions, which shall be identified by the Grantee at the onset of the assignment. In concert with the Grantee, the Contractor shall assess the potential interest in lending support to the Program of the International Financial Corporation, U.S. Ex-Im Bank, European Bank for Reconstruction and Development and other local and international financial institutions. The financial analysis shall include, but not be limited to, a detailed analysis of the cost-recovery program required for the self-sustainability of the Program.

The cost-recovery program should take into account the costs associated with the operation and maintenance of the spatial data collection system plus the debt service and the cost of equipment replacement. All sources of revenue must be identified.

Deliverable: Technical Memorandum Documenting the Financial Analysis.

TASK 7: ENVIRONMENTAL ANALYSIS

The Contractor shall conduct an environmental evaluation of the benefits of the COASTEROSION Program in accordance with Romanian and European Union (EU) regulatory requirements. The evaluation shall investigate and compare with and without COASTEROSION Program environmental scenarios. Environmental control and mitigation measures shall be assessed and specified as necessary.

Deliverable: Technical Memorandum Documenting the Environmental Analysis.

TASK 8: DEVELOPMENTAL IMPACT ANALYSIS

The Contractor shall provide an assessment of the developmental impacts associated with the COASTEROSION Program in terms of the following:

1. Developing coastal management related infrastructure that will have a positive impact on the development of commercial and business activities needed for economic growth in Romania;
2. Exemplifying the economic benefits of coastal management technology transfer;
3. Creating new and more skilled jobs related to coastal resources management and expanding work force associated with improved coast conditions; and
4. Introducing coastal management technology that could be replicated in other parts of Black Sea to generate related business opportunities.

Deliverable: Technical Memorandum Documenting the Developmental Impacts of the Program.

TASK 9: FINAL REPORT

The Contractor shall prepare and deliver to the Grantee and USTDA a substantive and comprehensive final report of all work performed under these Terms of Reference ("Final Report"). The Final Report shall be organized according to the above tasks, and shall include all deliverables and documents that have been provided to the Grantee. The Final Report shall be prepared in accordance with Clause I of Annex II of the Grant Agreement. The Consultant shall deliver to the Grantee and USTDA with the final report on CD-ROM as stated in Clause I of Annex II of the Grant Agreement. The CD-ROM version of the final report shall include:

- Adobe Acrobat readable copies of all documents;
- Source files for all drawings in AutoCad or Visio format; and
- Source files for all documents in MS Office 2000 or later formats.

Deliverable: Final Report

Appendix 5

Budget

Appendix 6

Contacts

Appendix 6 Contacts

U.S. Government

USTDA

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Europe and Euroasia Region
U.S. Trade & Development Agency
1000 Wilson Boulevard, Suite 1600
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ALupo@ustda.gov
Ph: 703-875-4357
Fax: 703-875-4009

U.S. Army Engineer Research Development Center (ERDC)

Robert Kennedy, PhD
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US Army Engineer Research and Development Center
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Grantee

Mary-Jeanne Adler, Director
Emergency Situation Management Directorate
Ministry of Environment and Water Management
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Financial Institutions

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Export-Import Bank of the United States
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Washington, DC 20571
Craig.Oconnor@exim.gov
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Sudipto Sarkar, Senior Official Romania Country Program
The World Bank
1818 H Street, NW
Washington, DC 20433
SSarkar1@worldbank.org
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U.S. Equipment and Services Providers

Jeff Holtz
Dynamic Solutions, LLC
322 Nancy Lynn Lane, Suite 1
Knoxville, TN 37919
Phone: (865) 212-3331
www.dsllc.com

Mizan Rashid, Ph.D., P.E.
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ENSR/AECOM
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John Downing, President
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Phone: (360) 385-0272
www.d-a-instruments.com

Dan Murthy, Technical Support
Teledyne RD Instruments USA
14020 Stowe Drive
Poway, CA 92064
Phone: (858) 842-2600
www.rdinstruments.com

Yogesh C Agrawal, President/Senior Scientist
Sequoia Scientific, Inc.
2700 Richards Rd
Bellevue, WA 98005
425.641.0944 x 106
Cell: 208.571.8525
www.sequoiasci.com

ANNEX 3



**U.S. TRADE AND DEVELOPMENT AGENCY
Arlington, VA 22209-2131**

NATIONALITY, SOURCE, AND ORIGIN REQUIREMENTS

The purpose of USTDA's nationality, source, and origin requirements is to assure the maximum practicable participation of American contractors, technology, equipment and materials in the prefeasibility, feasibility, and implementation stages of a project.

USTDA STANDARD RULE (GRANT AGREEMENT STANDARD LANGUAGE):

Except as USTDA may otherwise agree, each of the following provisions shall apply to the delivery of goods and services funded by USTDA under this Grant Agreement: (a) for professional services, the Contractor must be either a U.S. firm or U.S. individual; (b) the Contractor may use U.S. subcontractors without limitation, but the use of subcontractors from host country may not exceed twenty percent (20%) of the USTDA Grant amount and may only be used for specific services from the Terms of Reference identified in the subcontract; (c) employees of U.S. Contractor or U.S. subcontractor firms responsible for professional services shall be U.S. citizens or non-U.S. citizens lawfully admitted for permanent residence in the U.S.; (d) goods purchased for implementation of the Study and associated delivery services (e.g., international transportation and insurance) must have their nationality, source and origin in the United States; and (e) goods and services incidental to Study support (e.g., local lodging, food, and transportation) in host country are not subject to the above restrictions. USTDA will make available further details concerning these standards of eligibility upon request.

NATIONALITY:

1) Rule

Except as USTDA may otherwise agree, the Contractor for USTDA funded activities must be either a U.S. firm or a U.S. individual. Prime contractors may utilize U.S.

subcontractors without limitation, but the use of host country subcontractors is limited to 20% of the USTDA grant amount.

2) Application

Accordingly, only a U.S. firm or U.S. individual may submit proposals on USTDA funded activities. Although those proposals may include subcontracting arrangements with host country firms or individuals for up to 20% of the USTDA grant amount, they may not include subcontracts with third country entities. U.S. firms submitting proposals must ensure that the professional services funded by the USTDA grant, to the extent not subcontracted to host country entities, are supplied by employees of the firm or employees of U.S. subcontractor firms who are U.S. individuals.

Interested U.S. firms and consultants who submit proposals must meet USTDA nationality requirements as of the due date for the submission of proposals and, if selected, must continue to meet such requirements throughout the duration of the USTDA-financed activity. These nationality provisions apply to whatever portion of the Terms of Reference is funded with the USTDA grant.

3) Definitions

A "U.S. individual" is (a) a U.S. citizen, or (b) a non-U.S. citizen lawfully admitted for permanent residence in the U.S. (a green card holder).

A "U.S. firm" is a privately owned firm which is incorporated in the U.S., with its principal place of business in the U.S., and which is either (a) more than 50% owned by U.S. individuals, or (b) has been incorporated in the U.S. for more than three (3) years prior to the issuance date of the request for proposals; has performed similar services in the U.S. for that three (3) year period; employs U.S. citizens in more than half of its permanent full-time positions in the U.S.; and has the existing capability in the U.S. to perform the work in question.

A partnership, organized in the U.S. with its principal place of business in the U.S., may also qualify as a "U.S. firm" as would a joint venture organized or incorporated in the United States consisting entirely of U.S. firms and/or U.S. individuals.

A nonprofit organization, such as an educational institution, foundation, or association may also qualify as a "U.S. firm" if it is incorporated in the United States and managed by a governing body, a majority of whose members are U.S. individuals.

SOURCE AND ORIGIN:

1) Rule

In addition to the nationality requirement stated above, any goods (e.g., equipment and materials) and services related to their shipment (e.g., international transportation and insurance) funded under the USTDA Grant Agreement must have their source and origin in the United States, unless USTDA otherwise agrees. However, necessary purchases of goods and project support services which are unavailable from a U.S. source (e.g., local food, housing and transportation) are eligible without specific USTDA approval.

2) Application

Accordingly, the prime contractor must be able to demonstrate that all goods and services purchased in the host country to carry out the Terms of Reference for a USTDA Grant Agreement that were not of U.S. source and origin were unavailable in the United States.

3) Definitions

“Source” means the country from which shipment is made.

“Origin” means the place of production, through manufacturing, assembly or otherwise.

Questions regarding these nationality, source and origin requirements may be addressed to the USTDA Office of General Counsel.

ANNEX 4

USD# 77-81021B
ROM

AS SUPD, mm

[Handwritten signature]

SEP 28 2007

GRANT AGREEMENT

[Handwritten initials]

This Grant Agreement is entered into between the Government of the United States of America, acting through the U.S. Trade and Development Agency ("USTDA") and the Romanian Ministry of Environment and Sustainable Development ("Grantee"). USTDA agrees to provide the Grantee under the terms of this Agreement US\$385,772 ("USTDA Grant") to fund the cost of goods and services required for Technical Assistance ("TA") on the proposed Black Sea Coastal Erosion Control Program Phase I Project ("Project") in Romania ("Host Country").

1. USTDA Funding

The funding to be provided under this Grant Agreement shall be used to fund the costs of a contract between the Grantee and the U.S. firm selected by the Grantee ("Contractor") under which the Contractor will perform the TA ("Contract"). Payment to the Contractor will be made directly by USTDA on behalf of the Grantee with the USTDA Grant funds provided under this Grant Agreement.

2. Terms of Reference

The Terms of Reference for the TA ("Terms of Reference") are attached as Annex I and are hereby made a part of this Grant Agreement. The TA will examine the technical, financial, environmental, and other critical aspects of the proposed Project. The Terms of Reference for the TA shall also be included in the Contract.

3. Standards of Conduct

USTDA and the Grantee recognize the existence of standards of conduct for public officials, and commercial entities, in their respective countries. The parties to this Grant Agreement and the Contractor shall observe these standards, which include not accepting payment of money or anything of value, directly or indirectly, from any person for the purpose of illegally or improperly inducing anyone to take any action favorable to any party in connection with the TA.

4. Grantee Responsibilities

The Grantee shall undertake its best efforts to provide reasonable support for the Contractor, such as local transportation, office space, and secretarial support.

5. USTDA as Financier

(A) USTDA Approval of Competitive Selection Procedures

Selection of the U.S. Contractor shall be carried out by the Grantee according to its established procedures for the competitive selection of contractors with advance notice of the procurement published online through *Federal Business Opportunities* (www.fedbizopps.gov). Upon request, the Grantee will submit these contracting procedures and related documents to USTDA for information and/or approval.

(B) USTDA Approval of Contractor Selection

The Grantee shall notify USTDA at the address of record set forth in Article 17 below upon selection of the Contractor to perform the TA. Upon approval of this selection by USTDA, the Grantee and the Contractor shall then enter into a contract for performance of the TA. The Grantee shall notify in writing the U.S. firms that submitted unsuccessful proposals to perform the TA that they were not selected.

(C) USTDA Approval of Contract Between Grantee and Contractor

The Grantee and the Contractor shall enter into a contract for performance of the TA. This contract, and any amendments thereto, including assignments and changes in the Terms of Reference, must be approved by USTDA in writing. To expedite this approval, the Grantee (or the Contractor on the Grantee's behalf) shall transmit to USTDA, at the address set forth in Article 17 below, a photocopy of an English language version of the signed contract or a final negotiated draft version of the contract.

(D) USTDA Not a Party to the Contract

It is understood by the parties that USTDA has reserved certain rights such as, but not limited to, the right to approve the terms of the contract and any amendments thereto, including assignments, the selection of all contractors, the Terms of Reference, the Final Report, and any and all documents related to any contract funded under the Grant Agreement. The parties hereto further understand and agree that USTDA, in reserving any or all of the foregoing approval rights, has acted solely as a financing entity to assure the proper use of United States Government funds, and that any decision by USTDA to exercise or refrain from exercising these approval rights shall be made as a financier in the course of funding the TA and shall not be construed as making USTDA a party to the contract. The parties hereto understand and agree that USTDA may, from time to time, exercise the foregoing approval rights, or discuss matters related to these rights and the Project with the parties to the contract or any subcontract, jointly or separately, without thereby incurring any responsibility or liability to such parties. Any approval or failure to approve by USTDA shall not bar the Grantee or USTDA from asserting any right they might have against the

Contractor, or relieve the Contractor of any liability which the Contractor might otherwise have to the Grantee or USTDA.

(E) Grant Agreement Controlling

Regardless of USTDA approval, the rights and obligations of any party to the contract or subcontract thereunder must be consistent with this Grant Agreement. In the event of any inconsistency between the Grant Agreement and any contract or subcontract funded by the Grant Agreement, the Grant Agreement shall be controlling.

6. Disbursement Procedures

(A) USTDA Approval of Contract Required

USTDA will make disbursements of Grant funds directly to the Contractor only after USTDA approves the Grantee's contract with the Contractor.

(B) Contractor Invoice Requirements

The Grantee should request disbursement of funds by USTDA to the Contractor for performance of the TA by submitting invoices in accordance with the procedures set forth in the USTDA Mandatory Clauses in Annex II.

7. Effective Date

The effective date of this Grant Agreement ("Effective Date") shall be the date of signature by both parties or, if the parties sign on different dates, the date of the last signature.

8. TA Schedule

(A) TA Completion Date

The completion date for the TA, which is January 31, 2009, is the date by which the parties estimate that the TA will have been completed.

(B) Time Limitation on Disbursement of USTDA Grant Funds

Except as USTDA may otherwise agree, (a) no USTDA funds may be disbursed under this Grant Agreement for goods and services which are provided prior to the Effective Date of the Grant Agreement; and (b) all funds made available under the Grant Agreement must be disbursed within four (4) years from the Effective Date of the Grant Agreement.

9. USTDA Mandatory Clauses

All contracts funded under this Grant Agreement shall include the USTDA mandatory clauses set forth in Annex II to this Grant Agreement. All subcontracts funded or partially funded with USTDA Grant funds shall include the USTDA mandatory clauses, except for clauses B(1), G, H, I, and J.

10. Use of U.S. Carriers

(A) Air

Transportation by air of persons or property funded under the Grant Agreement shall be on U.S. flag carriers in accordance with the Fly America Act, 49 U.S.C. 40118, to the extent service by such carriers is available, as provided under applicable U.S. Government regulations.

(B) Marine

Transportation by sea of property funded under the Grant Agreement shall be on U.S. carriers in accordance with U.S. cargo preference law.

11. Nationality, Source and Origin

Except as USTDA may otherwise agree, the following provisions shall govern the delivery of goods and services funded by USTDA under the Grant Agreement: (a) for professional services, the Contractor must be either a U.S. firm or U.S. individual; (b) the Contractor may use U.S. subcontractors without limitation, but the use of subcontractors from Host Country may not exceed twenty percent (20%) of the USTDA Grant amount and may only be used for specific services from the Terms of Reference identified in the subcontract; (c) employees of U.S. Contractor or U.S. subcontractor firms responsible for professional services shall be U.S. citizens or non-U.S. citizens lawfully admitted for permanent residence in the U.S.; (d) goods purchased for performance of the TA and associated delivery services (e.g., international transportation and insurance) must have their nationality, source and origin in the United States; and (e) goods and services incidental to TA support (e.g., local lodging, food, and transportation) in Host Country are not subject to the above restrictions. USTDA will make available further details concerning these provisions upon request.

12. Taxes

USTDA funds provided under the Grant Agreement shall not be used to pay any taxes, tariffs, duties, fees or other levies imposed under laws in effect in Host Country. Neither the Grantee nor the Contractor will seek reimbursement from USTDA for such taxes, tariffs, duties, fees or other levies.

13. Cooperation Between Parties and Follow-Up

The parties will cooperate to assure that the purposes of the Grant Agreement are accomplished. For five (5) years following receipt by USTDA of the Final Report (as defined in Clause I of Annex II), the Grantee agrees to respond to any reasonable inquiries from USTDA about the status of the Project.

14. Implementation Letters

To assist the Grantee in the implementation of the TA, USTDA may, from time to time, issue implementation letters that will provide additional information about matters covered by the Grant Agreement. The parties may also use jointly agreed upon implementation letters to confirm and record their mutual understanding of matters covered by the Grant Agreement.

15. Recordkeeping and Audit

The Grantee agrees to maintain books, records, and other documents relating to the TA and the Grant Agreement adequate to demonstrate implementation of its responsibilities under the Grant Agreement, including the selection of contractors, receipt and approval of contract deliverables, and approval or disapproval of contractor invoices for payment by USTDA. Such books, records, and other documents shall be separately maintained for three (3) years after the date of the final disbursement by USTDA. The Grantee shall afford USTDA or its authorized representatives the opportunity at reasonable times to review books, records, and other documents relating to the TA and the Grant Agreement.

16. Representation of Parties

For all purposes relevant to the Grant Agreement, the Government of the United States of America will be represented by the U. S. Ambassador to Host Country or USTDA and Grantee will be represented by the Minister of Environment and Sustainable Development. The parties hereto may, by written notice, designate additional representatives for all purposes under the Grant Agreement.

17. Addresses of Record for Parties

Any notice, request, document, or other communication submitted by either party to the other under the Grant Agreement shall be in writing or through a wire or electronic medium which produces a tangible record of the transmission, such as a telegram, cable or facsimile, and will be deemed duly given or sent when delivered to such party at the following:

To: Ms. Mary-Jeanne Adler
Director
Emergency Situation Management Directorate
Ministry of Environment and Sustainable Development
12 Libertatii Blv, sector 2, Bucharest

Phone: +40-21-316-05-21
Fax: +40-21-316-02-82
E-mail mj.adler@mmediu.ro

To: U.S. Trade and Development Agency
1000 Wilson Boulevard, Suite 1600
Arlington, Virginia 22209-3901
USA

Phone: (703) 875-4357
Fax: (703) 875-4009

All such communications shall be in English, unless the parties otherwise agree in writing. In addition, the Grantee shall provide the Commercial Section of the U.S. Embassy in Host Country with a copy of each communication sent to USTDA.

Any communication relating to this Grant Agreement shall include the following fiscal data:

Appropriation No.: 117/81001
Activity No.: 2007-81021B
Reservation No.: 2007810031
Grant No.: GH2007810006

18. Termination Clause

Either party may terminate the Grant Agreement by giving the other party thirty (30) days advance written notice. The termination of the Grant Agreement will end any obligations of the parties to provide financial or other resources for the TA, except for payments which they are committed to make pursuant to noncancellable commitments entered into with third parties prior to the written notice of termination.

19. Non-waiver of Rights and Remedies

No delay in exercising any right or remedy accruing to either party in connection with the Grant Agreement shall be construed as a waiver of such right or remedy.

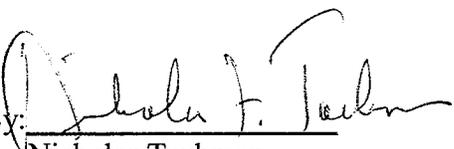
20. U.S. Technology and Equipment

By funding this TA, USTDA seeks to promote the project objectives of the Host Country through the use of U.S. technology, goods, and services. In recognition of this purpose, the Grantee agrees that it will allow U.S. suppliers to compete in the procurement of technology, goods and services needed for Project implementation.

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IN WITNESS WHEREOF, the Government of the United States of America and the Romanian Ministry of Environment and Sustainable Development, each acting through its duly authorized representative, have caused this Agreement to be signed in the English language in their names and delivered as of the day and year written below. In the event that this Grant Agreement is signed in more than one language, the English language version shall govern.

For the Government of the United States of America

By: 
Nicholas Taubman
Ambassador of the U.S.A. to Romania

For the Romanian Ministry of Environment and Sustainable Development

By: 
Lucia Ana Varga
State Secretary, Ministry of Environment and Sustainable Development of Romania

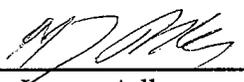
Date: September 24, 2007

Date: September 24, 2007

Witnessed:

By: 
Cindy Biggs
Commercial Attaché,
Embassy of the U.S.A. in Romania

Witnessed:

By: 
Mary-Jeanne Adler
Director, Emergency Situation
Management Directorate,
Ministry of Environment and
Sustainable Development of Romania

Annex I -- Terms of Reference

Annex II -- USTDA Mandatory Clauses

Annex I

Terms of Reference

The Romanian Black Sea coastline has been undergoing significant erosion for several decades. Erosion along the coast limits socioeconomic opportunities and has detrimental impacts on public infrastructure and the environment. The Government of Romania (GOR) is implementing a Coastal Erosion Control Program (COASTEROSION Program) that involves the development of an Integrated Coastal Zone Modeling System (ICZMS) for the study of potential structural and non-structural coastal erosion control measures. Implementation of the COASTEROSION Program entails the following four phases:

1. Phase I involves the assessment of the ICZMS spatial data requirements and specification of the software and hardware for a spatial data monitoring program and data management system within the context of a Romanian Coastal Zone Geographic Information System (GIS), which will be needed to interface with regional numerical models to implement a regional sand management system (RSM) similar to the RSM of the U.S. Army Engineer Research and Development Center. Additionally, Phase I involves the definition of the overall implementation framework for the COASTEROSION Program and identification of the Romanian institutional support required for its execution. Phase I also includes the preparation of the terms of reference and cost estimate for Phases II and III of the Program.
2. Phase II entails obtaining and deploying the hardware and software technology for the acquisition of spatial data and related information needed to create the numerical models for RSM. It also includes setting up the GIS required to address spatial data input, management and data analysis requirements of the RSM. Spatial data required by the RSM GIS includes hydrographic and topographic survey data, aerial and oblique photography, dredge material record, digital nautical charts, and generic GIS information. The RSM GIS serves as the link between engineering analyses and regional numerical models. Phase II also involves establishing the analytical models that will provide the means for evaluating coastal management alternatives for erosion control and coastal management. Phase II involves the refinement of the terms of reference and cost estimate for Phase III of the Program.
3. Phase III consists of the actual feasibility study on structural and non-structural erosion control measures for the Romanian Black Sea coastline. Phase III includes the preparation of the terms of reference and cost estimate for Phase IV of the Program.
4. Phase IV involves the implementation of the coastal erosion control projects.

The Ministry of Environment and Sustainable Development of Romania (Grantee) requires technical assistance to carry out Phase I of the COASTEROSION Program. The Technical Assistance funded pursuant to this Grant Agreement includes only Phase I work.

Task 1: Review of Relevant Reports and Data and Baseline Conditions Report

In concert with the Grantee, the Contractor shall investigate and review the existing hydrographic and oceanographic information and data. This task shall include inspection of key coastal features and the review of all relevant reports and other existing documents pertaining to the study area including but not limited to the following:

1. Giosan, L., Bokuniewicz, H.J., Panin, and N., Postolache, 1999. Longshore Sediment Transport Pattern along the Romanian Danube Delta Coast. *Journal of Coastal Research*, 15(4), 859-871.
2. ECOH Corporation. 2006. Volume 1, 2 and 3 of the Study on Protection and Rehabilitation of the Southern Romanian Black Sea Shore in Romania. Draft report submitted to the Government of Romania, ECOH Corporation, Tokyo, Japan.
3. MATRA Frame VI Research Project Report.
4. CADSEALAND (Interreg-CADSES) Report.
5. Rehabilitation of dykes at Mamaia Sud and Eforie Nord Report.

The above documents shall be provided by the Grantee.

The work performed under this task will familiarize the Contractor with the environmental setting along the 240 km of Romanian Black Sea coastline. The Contractor shall visit and inspect the most relevant coastal features including manmade infrastructures that may have a potential impact in sediment movement and coastal erosion along the Romanian Black Sea littoral. The Contractor shall gather, develop and compile spatial data sources and baseline information concerning coastline conditions. The Contractor shall use appropriate scaled maps (maps scale to be selected depending on availability) to document baseline conditions. In addition, this task will allow the identification of the specific spatial data needs to perform all the work required to establish the ICZMS. The Contractor shall conduct a workshop for various stakeholders and relevant Romanian government officials to document the findings of this task. The Grantee shall be responsible for providing the venue for the workshop and for inviting the audience to the workshop.

Deliverable: Technical Memorandum on Spatial Data Sources, Needs and Baseline Conditions.

Task 2: Integrated Coastal Zone Management System Institutional Framework

The purpose of this task is to provide a long-term strategy for the development of the institutional capability needed to carry out the COASTEROSION Program. The Contractor shall design the institutional strengthening agenda to support the development and implementation of all phases of the COASTEROSION Program. The Contractor shall provide a detailed list of the administrative, financial and operational resources needed for the successful implementation of the COASTEROSION Program. The Contractor shall also provide the schedule for the implementation of the institutional strengthening program.

Deliverable: Technical Memorandum on Integrated Coastal Zone Management System Institutional Framework and Strengthening Program

Task 3: Spatial Data Monitoring Stations, GIS and Communication Technology

This task involves the identification, assessment and specification of all components of the spatial data monitoring stations, GIS and communication technology for implementation of the ICZMS. The Contractor shall be responsible for defining the location and the number of spatial data monitoring stations to support the regional scale numerical model that will be developed as part of the ICZMS. The Contractor shall select and specify each and every component of the monitoring system for the collection of spatial data input including but not limited to:

1. Aerial and oblique photography;
2. Bathymetry;
3. Hydrographic (water current, wave characteristics and direction);
4. Sediment measurements;
5. Topographic survey data;
6. Dredged material and sediment records;
7. Meteorological data;
8. Telemetry and remote sensing instrumentation; and
9. Related software and hardware.

The Contractor shall provide the details (including but not limited to activities such as scheduling, sampling frequency, and budget) of the spatial data monitoring program. The Contractor shall be responsible for the operational compatibility of all equipment and components of the spatial data monitoring, GIS and communication system. The Contractor shall provide a manual of operation that specifies the procedures for each piece of equipment and component for the entire system. The manual of operation shall include all maintenance requirements including preventive measures and recommendations for the spare part inventory needed for the long-term operation of all equipment. The Contractor shall provide the individual cost of each piece of equipment and/or component and the total cost of the entire system.

The Contractor shall assess the availability of U.S. manufactured equipment and products for all components of the spatial data monitoring stations, GIS and communication technology and shall provide for each piece of equipment and/or component detailed technical specifications. Additionally, the Contractor shall provide for each U.S. manufacturer its business name, website, point of contact, address, telephone and fax numbers, and email address.

Deliverable: Technical Memorandum, Technical Specifications and Procurements Documents, Monitoring Program and Manual of Operation for the Spatial Data Monitoring Stations, GIS and Communication Technology.

Task 4: Preparation of Terms of Reference and Cost Estimate for Phases II and III

The Contractor shall prepare the terms of reference (TOR) for the deployment of the spatial data monitoring stations, hardware, software and related technology for the acquisition of the spatial data and information needed to create the numerical models for RSM. This task also includes preparing the TOR for setting up the GIS and the ArcView capability required to address spatial data input and management and data analysis requirements of the RSM. Spatial data required by the RSM GIS includes the hydrographic and topographic survey data, aerial and oblique photography, dredge material record, digital nautical charts, and generic GIS information listed in task 3. The Contractor shall take into account that RSM GIS serves as the link between engineering analyses and regional numerical models.

The Contractor shall also provide the TOR for establishing the numerical models that will provide the means for evaluating costal management alternatives for erosion control. The Contractor shall assess and provide the cost of the spatial data monitoring system and the cost associated with developing the numerical models and carrying out the modeling effort to identify potential erosion control measures.

Additionally, the Contractor shall prepare the TOR and planning level cost estimate for Phase III of the COASTEROSION Program.

Deliverable: Technical Memorandum, Terms of Reference and Cost Estimate for Phase II and Terms of Reference and Planning Level Cost Estimate for Phase III.

Task 5: Economic Analysis

The Consultant shall assess the economic impact of the COASTEROSION Program. As part of the economic analysis, the Contractor shall examine the economic benefits of the COASTEROSION Program to coastal natural resources and to the existing manmade developments. The analysis shall investigate and document the cost of potential unavoidable coastal resources management losses if the COASTEROSION Program is not carried out. The analysis shall include a comparison of the projected economic scenarios with and without the Program.

Deliverable: Technical Memorandum Documenting the Economic Analysis.

Task 6: Financial Analysis

This task shall require the Contractor to assess the ability of the Program to receive financing for the subsequent phases of the COASTEROSION Program and specifically identify financing sources for Phase II.

The Consultant shall prepare a financial plan for the implementation of the COASTEROSION Program. The financial plan shall satisfy the requirements of the Grantee who is the responsible party for seeking/obtaining project financing. In addition, the financial plan shall also satisfy the requirements of all prospective funding institutions, which shall be identified by the Grantee at the onset of the assignment. In concert with the Grantee, the Contractor shall assess the potential interest in lending support to the Program of the International Finance Corporation, U.S. Ex-Im Bank, European Bank for Reconstruction and Development and other local and international financial institutions. The financial analysis shall include, but not be limited to, a detailed analysis of the cost-recovery program required for the self-sustainability of the Program.

The cost-recovery program should take into account the costs associated with the operation and maintenance of the spatial data collection system plus the debt service and the cost of equipment replacement. All sources of revenue must be identified.

Deliverable: Technical Memorandum Documenting the Financial Analysis.

Task 7: Environmental Analysis

The Contractor shall conduct an environmental evaluation of the benefits of the COASTEROSION Program in accordance with Romanian and European Union (EU) regulatory requirements. The evaluation shall investigate and compare with and without COASTEROSION Program environmental scenarios. Environmental control and mitigation measures shall be assessed and specified as necessary.

Deliverable: Technical Memorandum Documenting the Environmental Analysis.

Task 8: Developmental Impact Analysis

The Contractor shall provide an assessment of the developmental impacts associated with the COASTEROSION Program in terms of the following:

1. Developing coastal management related infrastructure that will have a positive impact on the development of commercial and business activities needed for economic growth in Romania;
2. Exemplifying the economic benefits of coastal management technology transfer;

3. Creating new and more skilled jobs related to coastal resources management and expanding the work force associated with improved coast conditions; and
4. Introducing coastal management technology that could be replicated in other parts of the Black Sea to generate related business opportunities.

Deliverable: Technical Memorandum Documenting the Developmental Impacts of the Program.

Task 9: Final Report

The Contractor shall prepare and deliver to the Grantee and USTDA a substantive and comprehensive final report of all work performed under these Terms of Reference ("Final Report"). The Final Report shall be organized according to the above tasks, and shall include all deliverables and documents that have been provided to the Grantee. The Final Report shall be prepared in accordance with Clause I of Annex II of the Grant Agreement.

In addition to the Final Report copies provided for by Clause I of Annex II of the Grant Agreement, the Contractor also shall provide to the Grantee and USTDA CD-ROM copies of the Public Version of the Final Report. The CD-ROM copies of the Public Version of the Final Report shall include:

- Adobe Acrobat readable copies of all documents;
- Source files for all drawings in AutoCad or Visio format; and
- Source files for all documents in MS Office 2000 or later formats.

Deliverable: Final Report

Notes:

- (1) The Contractor is responsible for compliance with U.S. export licensing requirements, if applicable, in the performance of the Terms of Reference.**
- (2) The Contractor and the Grantee shall be careful to ensure that the public version of the Final Report contains no security or confidential information.**
- (3) The Grantee and USTDA shall have an irrevocable, worldwide, royalty-free, non-exclusive right to use and distribute the Final Report and all work product that is developed under these Terms of Reference.**

Annex II

USTDA Mandatory Contract Clauses

A. USTDA Mandatory Clauses Controlling

The parties to this contract acknowledge that this contract is funded in whole or in part by the U.S. Trade and Development Agency ("USTDA") under the Grant Agreement between the Government of the United States of America acting through USTDA and the Romanian Ministry of Environment and Sustainable Development ("Client"), dated _____ ("Grant Agreement"). The Client has selected _____ ("Contractor") to perform the Technical Assistance ("TA") for the Black Sea Coastal Erosion Control Program Phase I Project ("Project") in Romania ("Host Country"). Notwithstanding any other provisions of this contract, the following USTDA mandatory contract clauses shall govern. All subcontracts entered into by Contractor funded or partially funded with USTDA Grant funds shall include these USTDA mandatory contract clauses, except for clauses B(1), G, H, I, and J. In addition, in the event of any inconsistency between the Grant Agreement and any contract or subcontract thereunder, the Grant Agreement shall be controlling.

B. USTDA as Financier

(1) USTDA Approval of Contract

All contracts funded under the Grant Agreement, and any amendments thereto, including assignments and changes in the Terms of Reference, must be approved by USTDA in writing in order to be effective with respect to the expenditure of USTDA Grant funds. USTDA will not authorize the disbursement of USTDA Grant funds until the contract has been formally approved by USTDA or until the contract conforms to modifications required by USTDA during the contract review process.

(2) USTDA Not a Party to the Contract

It is understood by the parties that USTDA has reserved certain rights such as, but not limited to, the right to approve the terms of this contract and amendments thereto, including assignments, the selection of all contractors, the Terms of Reference, the Final Report, and any and all documents related to any contract funded under the Grant Agreement. The parties hereto further understand and agree that USTDA, in reserving any or all of the foregoing approval rights, has acted solely as a financing entity to assure the proper use of United States Government funds, and that any decision by USTDA to exercise or refrain from exercising these approval rights shall be made as a financier in the course of financing the TA and shall not be construed as making USTDA a party to the contract. The parties hereto understand and agree that USTDA may, from time to time, exercise the foregoing approval rights, or discuss matters related to these rights and the Project with the parties to the contract or any subcontract, jointly or separately, without thereby incurring any responsibility or

liability to such parties. Any approval or failure to approve by USTDA shall not bar the Client or USTDA from asserting any right they might have against the Contractor, or relieve the Contractor of any liability which the Contractor might otherwise have to the Client or USTDA.

C. Nationality, Source and Origin

Except as USTDA may otherwise agree, the following provisions shall govern the delivery of goods and services funded by USTDA under the Grant Agreement: (a) for professional services, the Contractor must be either a U.S. firm or U.S. individual; (b) the Contractor may use U.S. subcontractors without limitation, but the use of subcontractors from Host Country may not exceed twenty percent (20%) of the USTDA Grant amount and may only be used for specific services from the Terms of Reference identified in the subcontract; (c) employees of U.S. Contractor or U.S. subcontractor firms responsible for professional services shall be U.S. citizens or non-U.S. citizens lawfully admitted for permanent residence in the U.S.; (d) goods purchased for performance of the TA and associated delivery services (e.g., international transportation and insurance) must have their nationality, source and origin in the United States; and (e) goods and services incidental to TA support (e.g., local lodging, food, and transportation) in Host Country are not subject to the above restrictions. USTDA will make available further details concerning these provisions upon request.

D. Recordkeeping and Audit

The Contractor and subcontractors funded under the Grant Agreement shall maintain, in accordance with generally accepted accounting procedures, books, records, and other documents, sufficient to reflect properly all transactions under or in connection with the contract. These books, records, and other documents shall clearly identify and track the use and expenditure of USTDA funds, separately from other funding sources. Such books, records, and documents shall be maintained during the contract term and for a period of three (3) years after final disbursement by USTDA. The Contractor and subcontractors shall afford USTDA, or its authorized representatives, the opportunity at reasonable times for inspection and audit of such books, records, and other documentation.

E. U.S. Carriers

(1) Air

Transportation by air of persons or property funded under the Grant Agreement shall be on U.S. flag carriers in accordance with the Fly America Act, 49 U.S.C. 40118, to the extent service by such carriers is available, as provided under applicable U.S. Government regulations.

(2) Marine

Transportation by sea of property funded under the Grant Agreement shall be on U.S. carriers in accordance with U.S. cargo preference law.

F. Workman's Compensation Insurance

The Contractor shall provide adequate Workman's Compensation Insurance coverage for work performed under this Contract.

G. Reporting Requirements

The Contractor shall advise USTDA by letter as to the status of the Project on March 1st annually for a period of two (2) years after completion of the TA. In addition, if at any time the Contractor receives follow-on work from the Client, the Contractor shall so notify USTDA and designate the Contractor's contact point including name, telephone, and fax number. Since this information may be made publicly available by USTDA, any information which is confidential shall be designated as such by the Contractor and provided separately to USTDA. USTDA will maintain the confidentiality of such information in accordance with applicable law.

H. Disbursement Procedures

(1) USTDA Approval of Contract

Disbursement of Grant funds will be made only after USTDA approval of this contract. To make this review in a timely fashion, USTDA must receive from either the Client or the Contractor a photocopy of an English language version of a signed contract or a final negotiated draft version to the attention of the General Counsel's office at USTDA's address listed in Clause M below.

(2) Payment Schedule Requirements

A payment schedule for disbursement of Grant funds to the Contractor shall be included in this Contract. Such payment schedule must conform to the following USTDA requirements: (1) up to twenty percent (20%) of the total USTDA Grant amount may be used as an advance payment; (2) all other payments, with the exception of the final payment, shall be based upon contract performance milestones; and (3) the final payment may be no less than fifteen percent (15%) of the total USTDA Grant amount, payable upon receipt by USTDA of an approved Final Report in accordance with the specifications and quantities set forth in Clause I below. Invoicing procedures for all payments are described below.

(3) Contractor Invoice Requirements

USTDA will make all disbursements of USTDA Grant funds directly to the Contractor. The Contractor must provide USTDA with an ACH Vendor Enrollment Form (available from USTDA) with the first invoice. The Client shall request disbursement of funds by USTDA to the Contractor for performance of the contract by submitting the following to USTDA:

(a) Contractor's Invoice

The Contractor's invoice shall include reference to an item listed in the Contract payment schedule, the requested payment amount, and an appropriate certification by the Contractor, as follows:

(i) For an advance payment (if any):

"As a condition for this advance payment, which is an advance against future TA costs, the Contractor certifies that it will perform all work in accordance with the terms of its Contract with the Client. To the extent that the Contractor does not comply with the terms and conditions of the Contract, including the USTDA mandatory provisions contained therein, it will, upon USTDA's request, make an appropriate refund to USTDA. "

(ii) For contract performance milestone payments:

"The Contractor has performed the work described in this invoice in accordance with the terms of its contract with the Client and is entitled to payment thereunder. To the extent the Contractor has not complied with the terms and conditions of the Contract, including the USTDA mandatory provisions contained therein, it will, upon USTDA's request, make an appropriate refund to USTDA."

(iii) For final payment:

"The Contractor has performed the work described in this invoice in accordance with the terms of its contract with the Client and is entitled to payment thereunder. Specifically, the Contractor has submitted the Final Report to the Client, as required by the Contract, and received the Client's approval of the Final Report. To the extent the Contractor has not complied with the terms and conditions of the Contract, including the USTDA mandatory provisions contained therein, it will, upon USTDA's request, make an appropriate refund to USTDA."

(b) Client's Approval of the Contractor's Invoice

(i) The invoice for an advance payment must be approved in writing by the Client.

(ii) For contract performance milestone payments, the following certification by the Client must be provided on the invoice or separately:

"The services for which disbursement is requested by the Contractor have been performed satisfactorily, in accordance with applicable Contract provisions and the terms and conditions of the USTDA Grant Agreement."

(iii) For final payment, the following certification by the Client must be provided on the invoice or separately:

"The services for which disbursement is requested by the Contractor have been performed satisfactorily, in accordance with applicable Contract provisions and terms and conditions of the USTDA Grant Agreement. The Final Report submitted by the Contractor has been reviewed and approved by the Client. "

(c) USTDA Address for Disbursement Requests

Requests for disbursement shall be submitted by courier or mail to the attention of the Finance Department at USTDA's address listed in Clause M below.

(4) Termination

In the event that the Contract is terminated prior to completion, the Contractor will be eligible, subject to USTDA approval, for reasonable and documented costs which have been incurred in performing the Terms of Reference prior to termination, as well as reasonable wind down expenses. Reimbursement for such costs shall not exceed the total amount of undisbursed Grant funds. Likewise, in the event of such termination, USTDA is entitled to receive from the Contractor all USTDA Grant funds previously disbursed to the Contractor (including but not limited to advance payments) which exceed the reasonable and documented costs incurred in performing the Terms of Reference prior to termination.

I. USTDA Final Report

(1) Definition

"Final Report" shall mean the Final Report described in the attached Annex I Terms of Reference or, if no such "Final Report" is described therein, "Final Report" shall mean a substantive and comprehensive report of work performed in accordance with the attached Annex I Terms of Reference, including any documents delivered to the Client.

(2) Final Report Submission Requirements

The Contractor shall provide the following to USTDA:

(a) One (1) complete version of the Final Report for USTDA's records. This version shall have been approved by the Client in writing and must be in the English language. It is the responsibility of the Contractor to ensure that confidential information, if any, contained in this version be clearly marked. USTDA will maintain the confidentiality of such information in accordance with applicable law.

and

(b) Three (3) copies of the Final Report suitable for public distribution ("Public Version"). The Public Version shall have been approved by the Client in writing and must be in the English language. As this version will be available for public distribution, it must not contain any confidential information. If the report in (a) above contains no confidential information, it may be used as the Public Version (provided USTDA receives a total of four (4) copies). In any event, the Public Version must be informative and contain sufficient Project detail to be useful to prospective equipment and service providers.

The Contractor shall also provide one (1) copy of the Public Version of the Final Report to the Foreign Commercial Service Officer or the Economic Section of the U.S. Embassy in Host Country for informational purposes.

(3) Final Report Presentation

All Final Reports submitted to USTDA must be paginated and include the following:

(a) The front cover of every Final Report shall contain the name of the Client, the name of the Contractor who prepared the report, a report title, USTDA's logo, USTDA's mailing and delivery addresses, and the following disclaimer:

"This report was funded by the U.S. Trade and Development Agency (USTDA), an agency of the U. S. Government. The opinions, findings, conclusions or recommendations expressed in this document are those of the author(s) and do not necessarily represent the official position or policies of USTDA. USTDA makes no representation about, nor does it accept responsibility for, the accuracy or completeness of the information contained in this report."

(b) The inside front cover of every Final Report shall contain USTDA's logo, USTDA's mailing and delivery addresses, and USTDA's mission statement. Camera-ready copy of USTDA Final Report specifications will be available from USTDA upon request.

(c) The Contractor and any subcontractor that performs work pursuant to the Grant Agreement must be clearly identified in the Final Report. Business name,

point of contact, address, telephone and fax numbers shall be included for Contractor and each subcontractor.

(d) The Final Report, while aiming at optimum specifications and characteristics for the Project, shall identify the availability of prospective U.S. sources of supply. Business name, point of contact, address, telephone and fax numbers shall be included for each commercial source.

(e) The Final Report shall be accompanied by a letter or other notation by the Client which states that the Client approves the Final Report. A certification by the Client to this effect provided on or with the invoice for final payment will meet this requirement.

J. Modifications

All changes, modifications, assignments or amendments to this contract, including the appendices, shall be made only by written agreement by the parties hereto, subject to written USTDA approval.

K. TA Schedule

(1) TA Completion Date

The completion date for the TA, which is January 31, 2009, is the date by which the parties estimate that the TA will have been completed.

(2) Time Limitation on Disbursement of USTDA Grant Funds

Except as USTDA may otherwise agree, (a) no USTDA funds may be disbursed under this contract for goods and services which are provided prior to the Effective Date of the Grant Agreement; and (b) all funds made available under the Grant Agreement must be disbursed within four (4) years from the Effective Date of the Grant Agreement.

L. Business Practices

The Contractor agrees not to pay, promise to pay, or authorize the payment of any money or anything of value, directly or indirectly, to any person (whether a governmental official or private individual) for the purpose of illegally or improperly inducing anyone to take any action favorable to any party in connection with the TA. The Client agrees not to receive any such payment. The Contractor and the Client agree that each will require that any agent or representative hired to represent them in connection with the TA will comply with this paragraph and all laws which apply to activities and obligations of each party under this Contract, including but not limited to those laws and obligations dealing with improper payments as described above.

M. USTDA Address and Fiscal Data

Any communication with USTDA regarding this Contract shall be sent to the following address and include the fiscal data listed below:

U.S. Trade and Development Agency
1000 Wilson Boulevard, Suite 1600
Arlington, Virginia 22209-3901
USA

Phone: (703) 875-4357
Fax: (703) 875-4009

Fiscal Data:

Appropriation No.: 117/81001
Activity No.: 2007-81021B
Reservation No.: 2007810031
Grant No.: GH2007810006

N. Definitions

All capitalized terms not otherwise defined herein shall have the meaning set forth in the Grant Agreement.

O. Taxes

USTDA funds provided under the Grant Agreement shall not be used to pay any taxes, tariffs, duties, fees or other levies imposed under laws in effect in Host Country. Neither the Client nor the Contractor will seek reimbursement from USTDA for such taxes, tariffs, duties, fees or other levies.

ANNEX 5

TERMS OF REFERENCE

The Romanian Black Sea coastline has been undergoing significant erosion for several decades. Erosion along the coast limits socioeconomic opportunities and has detrimental impacts on public infrastructure and the environment. The Government of Romania (GOR) is implementing a Coastal Erosion Control Program (COASTEROSION Program) that involves the development of an Integrated Coastal Zone Modeling System (ICZMS) for the study of potential structural and non-structural coastal erosion control measures. Implementation of the COASTEROSION Program entails the following four phases:

1. Phase I involves the assessment of the ICZMS spatial data requirements and specification of the software and hardware for a spatial data monitoring program and data management system within the context of a Romanian Coastal Zone Geographic Information System (GIS), which will be needed to interface with regional numerical models to implement a regional sand management system (RSM) similar to the RSM of the U.S. Army Engineer Research and Development Center. Additionally, Phase I involves the definition of the overall implementation framework for the COASTEROSION Program and identification of the Romanian institutional support required for its execution. Phase I also includes the preparation of the terms of reference and cost estimate for Phases II and III of the Program.
2. Phase II entails obtaining and deploying the hardware and software technology for the acquisition of spatial data and related information needed to create the numerical models for RSM. It also includes setting up the GIS required to address spatial data input, management and data analysis requirements of the RSM. Spatial data required by the RSM GIS includes hydrographic and topographic survey data, aerial and oblique photography, dredge material record, digital nautical charts, and generic GIS information. The RSM GIS serves as the link between engineering analyses and regional numerical models. Phase II also involves establishing the analytical models that will provide the means for evaluating coastal management alternatives for erosion control and coastal management. Phase II involves the refinement of the terms of reference and cost estimate for Phase III of the Program.
3. Phase III consists of the actual feasibility study on structural and non-structural erosion control measures for the Romanian Black Sea coastline. Phase III includes the preparation of the terms of reference and cost estimate for Phase IV of the Program.
4. Phase IV involves the implementation of the coastal erosion control projects.

The Ministry of Environment and Sustainable Development of Romania (Grantee) requires technical assistance to carry out Phase I of the COASTEROSION Program. The Technical Assistance funded pursuant to this Grant Agreement includes only Phase I work.

Task 1: Review of Relevant Reports and Data and Baseline Conditions Report

In concert with the Grantee, the Contractor shall investigate and review the existing hydrographic and oceanographic information and data. This task shall include inspection of key coastal features and the review of all relevant reports and other existing documents pertaining to the study area including but not limited to the following:

1. Giosan, L., Bokuniewicz, H.J., Panin, and N., Postolache, 1999. Longshore Sediment Transport Pattern along the Romanian Danube Delta Coast. *Journal of Coastal Research*, 15(4), 859-871.
2. ECOH Corporation. 2006. Volume 1, 2 and 3 of the Study on Protection and Rehabilitation of the Southern Romanian Black Sea Shore in Romania. Draft report submitted to the Government of Romania, ECOH Corporation, Tokyo, Japan.
3. MATRA Frame VI Research Project Report.
4. CADSEALAND (Interreg-CADSES) Report.
5. Rehabilitation of dykes at Mamaia Sud and Eforie Nord Report.

The above documents shall be provided by the Grantee.

The work performed under this task will familiarize the Contractor with the environmental setting along the 240 km of Romanian Black Sea coastline. The Contractor shall visit and inspect the most relevant coastal features including manmade infrastructures that may have a potential impact in sediment movement and coastal erosion along the Romanian Black Sea littoral. The Contractor shall gather, develop and compile spatial data sources and baseline information concerning coastline conditions. The Contractor shall use appropriate scaled maps (maps scale to be selected depending on availability) to document baseline conditions. In addition, this task will allow the identification of the specific spatial data needs to perform all the work required to establish the ICZMS. The Contractor shall conduct a workshop for various stakeholders and relevant Romanian government officials to document the findings of this task. The Grantee shall be responsible for providing the venue for the workshop and for inviting the audience to the workshop.

Deliverable: Technical Memorandum on Spatial Data Sources, Needs and Baseline Conditions.

Task 2: Integrated Coastal Zone Management System Institutional Framework

The purpose of this task is to provide a long-term strategy for the development of the institutional capability needed to carry out the COASTEROSION Program. The Contractor shall design the institutional strengthening agenda to support the development and implementation of all phases of the COASTEROSION Program. The Contractor shall provide a detailed list of the administrative, financial and operational resources needed for

the successful implementation of the COASTEROSION Program. The Contractor shall also provide the schedule for the implementation of the institutional strengthening program.

Deliverable: Technical Memorandum on Integrated Coastal Zone Management System Institutional Framework and Strengthening Program

Task 3: Spatial Data Monitoring Stations, GIS and Communication Technology

This task involves the identification, assessment and specification of all components of the spatial data monitoring stations, GIS and communication technology for implementation of the ICZMS. The Contractor shall be responsible for defining the location and the number of spatial data monitoring stations to support the regional scale numerical model that will be developed as part of the ICZMS. The Contractor shall select and specify each and every component of the monitoring system for the collection of spatial data input including but not limited to:

1. Aerial and oblique photography;
2. Bathymetry;
3. Hydrographic (water current, wave characteristics and direction);
4. Sediment measurements;
5. Topographic survey data;
6. Dredged material and sediment records;
7. Meteorological data;
8. Telemetry and remote sensing instrumentation; and
9. Related software and hardware.

The Contractor shall provide the details (including but not limited to activities such as scheduling, sampling frequency, and budget) of the spatial data monitoring program. The Contractor shall be responsible for the operational compatibility of all equipment and components of the spatial data monitoring, GIS and communication system. The Contractor shall provide a manual of operation that specifies the procedures for each piece of equipment and component for the entire system. The manual of operation shall include all maintenance requirements including preventive measures and recommendations for the spare part inventory needed for the long-term operation of all equipment. The Contractor shall provide the individual cost of each piece of equipment and/or component and the total cost of the entire system.

The Contractor shall assess the availability of U.S. manufactured equipment and products for all components of the spatial data monitoring stations, GIS and communication technology and shall provide for each piece of equipment and/or component detailed technical specifications. Additionally, the Contractor shall provide for each U.S. manufacturer its business name, website, point of contact, address, telephone and fax numbers, and email address.

Deliverable: Technical Memorandum, Technical Specifications and Procurements Documents, Monitoring Program and Manual of Operation for the Spatial Data Monitoring Stations, GIS and Communication Technology.

Task 4: Preparation of Terms of Reference and Cost Estimate for Phases II and III

The Contractor shall prepare the terms of reference (TOR) for the deployment of the spatial data monitoring stations, hardware, software and related technology for the acquisition of the spatial data and information needed to create the numerical models for RSM. This task also includes preparing the TOR for setting up the GIS and the ArcView capability required to address spatial data input and management and data analysis requirements of the RSM. Spatial data required by the RSM GIS includes the hydrographic and topographic survey data, aerial and oblique photography, dredge material record, digital nautical charts, and generic GIS information listed in task 3. The Contractor shall take into account that RSM GIS serves as the link between engineering analyses and regional numerical models.

The Contractor shall also provide the TOR for establishing the numerical models that will provide the means for evaluating costal management alternatives for erosion control. The Contractor shall assess and provide the cost of the spatial data monitoring system and the cost associated with developing the numerical models and carrying out the modeling effort to identify potential erosion control measures.

Additionally, the Contractor shall prepare the TOR and planning level cost estimate for Phase III of the COASTEROSION Program.

Deliverable: Technical Memorandum, Terms of Reference and Cost Estimate for Phase II and Terms of Reference and Planning Level Cost Estimate for Phase III.

Task 5: Economic Analysis

The Consultant shall assess the economic impact of the COASTEROSION Program. As part of the economic analysis, the Contractor shall examine the economic benefits of the COASTEROSION Program to coastal natural resources and to the existing manmade developments. The analysis shall investigate and document the cost of potential unavoidable coastal resources management losses if the COASTEROSION Program is not carried out. The analysis shall include a comparison of the projected economic scenarios with and without the Program.

Deliverable: Technical Memorandum Documenting the Economic Analysis.

Task 6: Financial Analysis

This task shall require the Contractor to assess the ability of the Program to receive financing for the subsequent phases of the COASTEROSION Program and specifically identify financing sources for Phase II.

The Consultant shall prepare a financial plan for the implementation of the COASTEROSION Program. The financial plan shall satisfy the requirements of the Grantee who is the responsible party for seeking/obtaining project financing. In addition, the financial plan shall also satisfy the requirements of all prospective funding institutions, which shall be identified by the Grantee at the onset of the assignment. In concert with the Grantee, the Contractor shall assess the potential interest in lending support to the Program of the International Finance Corporation, U.S. Ex-Im Bank, European Bank for Reconstruction and Development and other local and international financial institutions. The financial analysis shall include, but not be limited to, a detailed analysis of the cost-recovery program required for the self-sustainability of the Program.

The cost-recovery program should take into account the costs associated with the operation and maintenance of the spatial data collection system plus the debt service and the cost of equipment replacement. All sources of revenue must be identified.

Deliverable: Technical Memorandum Documenting the Financial Analysis.

Task 7: Environmental Analysis

The Contractor shall conduct an environmental evaluation of the benefits of the COASTEROSION Program in accordance with Romanian and European Union (EU) regulatory requirements. The evaluation shall investigate and compare with and without COASTEROSION Program environmental scenarios. Environmental control and mitigation measures shall be assessed and specified as necessary.

Deliverable: Technical Memorandum Documenting the Environmental Analysis.

Task 8: Developmental Impact Analysis

The Contractor shall provide an assessment of the developmental impacts associated with the COASTEROSION Program in terms of the following:

1. Developing coastal management related infrastructure that will have a positive impact on the development of commercial and business activities needed for economic growth in Romania;
2. Exemplifying the economic benefits of coastal management technology transfer;
3. Creating new and more skilled jobs related to coastal resources management and expanding the work force associated with improved coast conditions; and
4. Introducing coastal management technology that could be replicated in other parts of the Black Sea to generate related business opportunities.

Deliverable: Technical Memorandum Documenting the Developmental Impacts of the Program.

Task 9: Final Report

The Contractor shall prepare and deliver to the Grantee and USTDA a substantive and comprehensive final report of all work performed under these Terms of Reference (“Final Report”). The Final Report shall be organized according to the above tasks, and shall include all deliverables and documents that have been provided to the Grantee. The Final Report shall be prepared in accordance with Clause I of Annex II of the Grant Agreement.

In addition to the Final Report copies provided for by Clause I of Annex II of the Grant Agreement, the Contractor also shall provide to the Grantee and USTDA CD-ROM copies of the Public Version of the Final Report. The CD-ROM copies of the Public Version of the Final Report shall include:

- Adobe Acrobat readable copies of all documents;
- Source files for all drawings in AutoCad or Visio format; and
- Source files for all documents in MS Office 2000 or later formats.

Deliverable: Final Report

Notes:

- (1) The Contractor is responsible for compliance with U.S. export licensing requirements, if applicable, in the performance of the Terms of Reference.**
- (2) The Contractor and the Grantee shall be careful to ensure that the public version of the Final Report contains no security or confidential information.**
- (3) The Grantee and USTDA shall have an irrevocable, worldwide, royalty-free, non-exclusive right to use and distribute the Final Report and all work product that is developed under these Terms of Reference.**