

April 12, 1972

REPORT OF UNOLS WORKING GROUP  
ON  
COASTAL ZONE RESEARCH VESSELS

1. Purpose of Report

The purpose of this report is to inform the UNOLS Members and Advisory Council of the efforts and recommendations of the Working Group for discussion and further guidance at the UNOLS Meetings, May 3-5, 1972.

2. Background

The need for coastal zone research vessels to meet the needs of academic research institutions was raised at the first UNOLS Meeting in November 1971 at LaJolla, California. Such vessels, it was envisioned, should be more capable than those presently used in the growing efforts of institutions responding to the existing and documented needs of coastal zone research. At subsequent meetings the UNOLS Advisory Council directed that a Working Group be formed to examine the needs for Coastal Zone research facilities, and ships in particular, and to develop a plan to implement those needs.

3. Members of the Working Group

Dr. R. J. Wold, University of Wisconsin-Milwaukee, Chairman  
Dr. W. S. Gaither, University of Delaware  
Dr. M. Gilmartin, Stanford University  
Dr. D. W. Menzel, Skidaway Institute of Oceanography  
Dr. R. E. Smith, State University System of Florida  
Dr. G. H. Savage, University of New Hampshire  
Captain T. K. Treadwell, Texas A&M University  
Mr. John Dermody, University of Washington

Captain R. P. Dinsmore, Executive Secretary, UNOLS

4. Meetings

The Working Group has held two meetings to date; the first on March 14-15, 1972 at the University of Delaware, Lewes; and the second at the University of Wisconsin at Milwaukee on April 12, 1972.

## 5. Goal of the Working Group

The Working Group considered that the recommendations should be directed principally to academic research needs, both basic and applied, including the role played by graduate research. Emphasis is to be placed on multi-institutional operational arrangements. Three major components are recognized, viz: vessels and other platforms, shore facilities and support systems. These components are further developed in Appendix II.

## 6. Requirements for Coastal Zone Research

In considering the needs for coastal research facilities the Group concurred that science as well as other socio-economic requirements cannot be disassociated from facilities and currently are being documented by past and present efforts, and this group should not endeavor to "re-invent the wheel" in defining the research needs for the Coastal Zone. The Group compiled and reviewed a series of Federal, regional and industry reports on the problems and needs for coastal zone research and from this compiled a listing of facility requirements vis-a-vis academic research disciplines. A synopsis of requirements is given in Appendix I. A non-exhaustive but comprehensive list of reports is given in Appendix IV.

## 7. Concepts of a Coastal Zone Research Vessel

In the course of its progress the Working Group established the following points of agreement.

- a. That coastal research vessels under consideration should be cooperative vessels to serve the research needs of a group of institutions. Institutional vessels operated for and by a single laboratory, whether or not use is shared as determined by that laboratory, are not within the scope of this report. However, the numbers and availability of such vessels should be included as a factor in assessing the total facility needs of a particular area.
- b. That the general size (and inferred capability) of a coastal cooperative research vessel is somewhere between 70-ft and 120-ft., and that it be specifically adapted for coastal applications.
- c. That the coastal cooperative research vessel should be of the modular-concept where standardized, transportable vans, labs, or other components would be equally adaptable to shore use as well as shipboard.

- d. That ship operations be regional in concept. A regional approach would better respond to regional research needs as well as improve such matters as data management, equipment standards, etc.
- e. That a regional cooperative research vessel (as well as associated facilities) should be managed and operated by a capable institution within the region, but its use be controlled by a regional review group on behalf of the regional needs and scientific merit. Such regional facilities would be coordinated nationally through UNOLS.

#### 8. Regional Concept for Facility Operation

The Group considers that the regional approach for operating and controlling a coastal zone research vessel is the optimum arrangement. Being responsive to a region would responsibly tie together many of the problems of the region into common efforts. As a regional responsibility portions of operating support could be more readily identified.

Coastal zone facility scheduling requires considerable flexibility. Projects tend to be short in duration and sometimes have very short lead times.

A regional policy group should be made up of individual users. This regional association will determine overall scheduling policies based on regional needs and/or scientific merit. Direct operations and maintenance would be assigned to a participating institution or institutions within the region who would operate the facility on behalf of the region.

The size and scope of regions tend to become arbitrary matters and precise lines are usually difficult to fix. A certain amount of overlap probably is both necessary and good and therefore regional lines should not be drawn too strictly. The Group concurred generally that regions might comprise New England (Maine to Block Island), Mid-Atlantic (Block Island to Cape Hatteras), Southeast (Cape Hatteras to Florida), Gulf of Mexico, Great Lakes, Pacific Southwest and the Pacific Northwest. Additionally, because of the intensity or focus of problems "mini" or "sub-regions" may emerge. The seven major regions are portrayed as Appendix III.

Within a region the plans for ship acquisition and operation based on cooperative multi-institutional use should be developed as a coherent effort on the part of the region based on a needs analysis. Once established, a regional arrangement could serve as a focus for the development and support for other kinds of research facilities.

## 9. Conclusions

In response to its charge the Working Group concluded

- (a) That capable multi-purpose ships are a fundamental need for coastal research. However, it is often institution arrangements and not ships which are lacking.
- (b) That interest of the scientific and regional community, within given geographical regions, can best be served by a multi-institutional, cooperative ship facility.
- (c) That Coastal Facility needs should include more than ships alone and that ships, even though of principal concern, must also include associated elements of laboratory interfaces as well as instrument standards, calibration and repair, as well as data processing and techniques. Furthermore there is a need to consider specialized coastal facilities such as coastal drilling rigs, habitats, submersibles, and even large, low-cost mobile barges.
- (d) That there be a strong recommendation whereby the acquisition of, and support for, regional cooperative coastal research vessel systems be assigned a singularly high priority; and that operational funding for such vessel systems be established from a broader base than the usual NSF-ONR sources and that assured funding be sought from additional Federal, regional and state sources.

## Attachments

### Tentative Recommendations

- Appendix I -- Development of Academic Research Requirements for Coastal Zone Vessels
- Appendix II -- Component Listing of Regional Cooperative Coastal Zone Research Facilities
- Appendix III -- Map--Proposed Coastal Research Regions for Cooperative Coastal Research Facilities
- Appendix IV -- (Separate Distribution -- limited) Compilation of References Documenting Research Requirements in the Coastal Zone.

RECOMMENDATIONS OF UNOLS WORKING GROUP  
ON  
COASTAL ZONE RESEARCH VESSELS

The Working Group recommends:

1. That there be established within UNOLS a category designated Regional-Cooperative Coastal Zone Research Facility, hereinafter designated Cooperative Coastal Research Facilities. Cooperative Coastal Research Facilities may be either multi-purpose or specialized ships or platforms.
2. That Cooperative Coastal Research Facilities shall be multi-institution facilities operated within designated geographic regions serving the research requirements of academic and related institutions conducting basic and applied research in response to regional needs.
3. That Coastal Research Regions be established along geographic lines approximately as follows:
  - . New England Region (Maine to Block Island)
  - . Mid-Atlantic Region (Block Island to Cape Hatteras)
  - . Southeast Region (Cape Hatteras to Florida)
  - . Gulf of Mexico Region
  - . Great Lakes Region
  - . Pacific Southwest Region
  - . Pacific Northwest Region
4. That within a stated geographic region the community of academic research users be represented by a regional organization which shall seek to identify the regional research requirements and develop a system approach to the acquisition and operation of regional facilities. Within a region facilities may be operated on behalf of participating users to meet regional needs by one or more member institutions.
5. That priority attention at the outset should be directed not only to multi-purpose ships which should have a capability inferred within an approximate size range from 70 to 120 feet, but also to specialized vessels such as coastal drilling rigs, undersea-habitat systems and floating laboratories.

6. That Cooperative Coastal Research Facilities be of a modular concept where standardized, transportable vans, labs or other components would be equally adaptable to shore use as well as shipboard and also between vessels wherever possible. They should include such support systems as navigation, communications, data processing, technicians and technical standards. Where possible, uniform standards should be set which might apply not only to coastal research craft but to ocean-going ships. The role for developing such standards could be assigned to the Research Vessel Operators Council (RVOC).
7. That the scheduling and use of a Cooperative Coastal Research Facility be controlled by a regional organization. Facility use should be awarded on the basis of regional needs and scientific merit.
8. That funding for the support and operation of Cooperative Regional Research Facilities be developed taking into consideration the obligations Federal, State and Regional Agencies which have responsibilities and needs to support Coastal Zone Research.
9. That the aforementioned system be implemented effective in 1973. This should be accomplished in two ways:
  - (a) By the commitment of funding by appropriate Federal, Regional and State Agencies for the operation of Regional-Cooperative Coastal Zone Research Facilities when such facilities are identified and a regional plan is approved.
  - (b) By the acquisition of at least two ships (multi-purpose or special purpose) from Federal FY-73 ship construction funds.

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APPENDIX I

DEVELOPMENT OF ACADEMIC RESEARCH REQUIREMENTS FOR COASTAL ZONE RESEARCH VESSELS AND OTHER FACILITIES

<u>COMPARTMENT &amp; DISCIPLINE</u>	<u>GENERAL &amp; SPECIAL REQUIREMENTS</u>
<p>1. <u>Bedrock and deep sediments</u>            Geology            Geophysics            Geochemistry            Rock mechanics            Mineral extraction</p>	<p>General requirements for accurate navigation, capability of towing and lowering survey instruments, and obtaining long (piston) cores.</p> <p>Special requirements for deep drilling, with accurate station-keeping and heavy lifting capability.</p>
<p>2. <u>Superficial sediments and Sediment/Water interface</u>  <u>Physics</u> of sedimentation and compaction; boundary layer flow; bottom friction; density currents.</p> <p><u>Mechanical</u> properties in situ and in samples; engineering measurements.</p> <p><u>Chemistry</u>, particularly of sediment/water exchanges and chemical history of the drainage basin.</p> <p><u>Biology</u>, bottom fauna, microbiological conversions; biogeochemistry; demersal populations and fish.</p>	<p>General requirements as for 1, except that shorter cores are needed, with provision for keeping interface intact. The principal surveying instruments will be in the Sonar class; and, as for compartment 1 also, the data reduction and plotting requirements will be extensive.</p> <p>In addition to handling of special grabs, dredges, trawls, and suitable winches, a special requirement will be the placement on the bottom and recovery of <u>in situ</u> devices for short-term (e.g. cameras to observe animal (behavior) or long-term observations (e.g. sediment/water exchanges of oxygen and other substances; near-bottom flow; sedimentation and re-suspension). Placement of such devices must be carried out with minimum disturbance.</p>
<p>3. <u>The water/shore interface-beach studies</u>            Physics - sediment transport; wave action.</p> <p><u>Engineering</u>, see 7</p> <p><u>Chemistry</u>, sorting and exchange, placer deposits, calcareous deposits.</p> <p><u>Biology</u>, attached algae; inshore fauna; fish spawning activities.</p>	<p>Placement and recovery of underwater habitats or diver stations is another possible special requirement.</p> <p>Special platforms (e.g. towers, shallow draft boats) will be required for near-shore studies; and these may have to be carried either on road trailer or be carried or towed by a larger vessel. Divers and diver support will also be needed.</p>

Compartment & Discipline  
continued

General & Special Requirements  
continued

4. The Water Column

Physics: radiation fluxes; distribution of physical properties; water motions (periodic, "steady", turbulent) on space scales ranging from whole-basin dimensions to those of local turbulence and short waves, and on time scales ranging from months to seconds; processes of stratification and destratifications; upwelling; internal wave generation and decay.

Chemistry: distribution and exchanges of dissolved materials; turbulent diffusion of conservative and non-conservative substances.

Biology: growth, distribution, and decay of components of the food web, from micro-organisms to fish.

Engineering: behavior of moored, towed, and self-propelled objects and research platforms.

General requirements are for (1) station keeping ability, in all but the roughest weather and winches for lowering and raising water bottles, sampling pumps, electronic probes, and plankton nets; (2) ability to tow probes and sampling pumps, nets and midwater trawls, at known constant or varying depths, sometimes at ship's cruising speed; and (3) ability to place and remove moored instrument buoys, and sampling gear--again in all but the roughest weather, and with mooring arrangements to stand exposure for several months. To match the data gathering capability of probes, towed sensor packages, and moored instruments, a data reduction system must be provided on ship, and on shore, and perhaps with ship-to-shore links.

Special requirements will be for synoptic or quasi-synoptic surveys, cooperatively with other vessels, with aircraft, and with satellite survey boats carried by a "mother" research ship. Communications between craft (air & water) and between craft and moored or drifting instruments will be needed.

Special craft or structures will be desired for some studies, i. e. stable towers or floating platforms (moored and unmoored) for offshore work, perhaps some with diver habitat facilities. Towing, placing, tracking, and recovering such structures will also be a required capability. Special sonars will be developed for plankton and fish surveys.



APPENDIX II

Component Listing of Regional Cooperative Coastal Zone  
Research Facilities with the Scope of the Working Group  
on Coastal Zone Research Vessels

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A. Vessels and other platforms-

1. These should be multipurpose as far as reasonably possible.
2. Operating economy must be a major consideration in the design.
3. Containerized labs should account for the major portion of the lab space aboard a vessel or platform. These labs must be quickly interchangeable. They should be considered as a facility a particular investigator can use 12 months of the year. These labs must be no larger than what can be transported by truck without special permits.
4. The operating crew must be a minimal size.
5. The maximum duration at sea should be on the order of two weeks.
6. Other platforms:
  - a) Spartan Barge -  
Self-powered, A frame ability, capable of being moored in fast-running currents.
  - b) Submersible -  
Inexpensive with maximum depth capability of 800'
  - c) Semi-submersible -  
Mobile stable platform
  - d) Habitat -  
Mobile shallow water capability, 100-150' depth.
  - e) Jack-up units -  
Shallow water only
  - f) Aircraft

B. Shore Facility -

1. The shore facility should be completely compatible with vessels. It is a component of a total system.
2. Should have containerized handling capabilities.

C. Support Systems -

1. Navigation
2. Communications
3. Data Processing including software
4. Technicians
5. Oceanographic equipment standards lab

Compartment & Discipline  
continued

General & Special Requirements  
continued

5. The Air/Water Interface

As the site of exchange of radiation, energy, materials and momentum, this interface will receive increasing attention. Although the main emphasis will be on physical processes and exchanges, some attention will be paid to chemical (materials exchange) and biological aspects (neuston community) of this interface.

Engineering aspects will be concerned with wave and wave forecasting.

6. The Meso-Scale Region of Water Atmosphere Interaction

Studies of marine meteorology on scales of up to, say, ten times the basin dimensions; shore and lake breeze phenomena; weather modification; structure of storm systems; including the basin responses to periodicity, divergence, and curl of the wind stress.

7. Engineering Studies

including coastal engineering and ice research. For improvement of navigation, port and marina development, and control of shorelines, research and engineering applications are needed in such subjects as ice breaking techniques, ice forecasting, dredging and landfill, shore erosion, wave forecasting and behavior of materials and structures in the lakes.

Many of the general requirements for 4 will apply to this compartment also, with the qualification that the sampling and measurements are required in the air also. To some extent, the research vessels and satellite survey boats can be instrumented, but much reliance will have to be placed on measurements on moored or drifting platforms or on towers, or on free-fall devices.

Special requirements will be a ship-borne instrument and data-gathering system, in which the observations are not seriously influenced by the presence or motions of the vessel.

Although a large part of the observing network may be land based, measurements will also be made from craft (water and air) and from in-water structures. Sonde measurements of the lower atmosphere (up to 1000m?) will be needed on synoptic measuring grids.

The general requirements are similar to those of Compartment 3, i.e., working platforms in shallow nearshore waters--also space on shore for pilot experiments, assembly of large structures or components and the ability to tow such to the sites being studied.

Special requirements will vary with the project, but could include large physical models (of ice breakers, shore protection structures, harbor marinas and airports).

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PROPOSED COASTAL RESEARCH REGIONS  
FOR  
COOPERATIVE-COASTAL RESEARCH FACILITIES

