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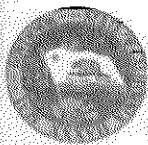
University of California, Los Angeles

# **Workshop on Educating California Coastal and Ocean Managers**

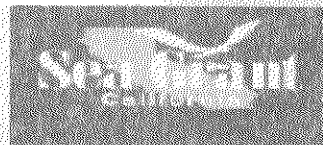
## **Proceedings**

September 28, 2001

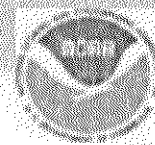
University of California, Los Angeles



State of California,  
Resources Agency



California State Sea  
Grant Program



US NOAA/NOS



Institute of the Environment

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University of California, Los Angeles

# **Workshop on Educating California Coastal and Ocean Managers**

## **Proceedings**

September 28, 2001  
University of California, Los Angeles

Edited by:  
Gregor Hodgson and Lena Maun

Sponsored by:

California State Sea Grant Program  
California State Resources Agency  
US NOAA/NOS

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# Preface

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After over a decade overseas as a practitioner of Integrated Coastal Management (ICM), I was invited to the University of California, Los Angeles (UCLA) in 2000 to take up a Visiting Professor position at the Institute of the Environment (IoE). Given that the field of ICM was “invented” in California in the early 1970s, I was surprised to learn that there was no interdisciplinary graduate degree program in ICM available in the state. This is a serious gap in the tertiary educational system of a state dominated by a coastal-based economy, conflicts, and culture. The gap was highlighted in a 1997 report “**California’s Ocean Resources: An Agenda for the Future,**” by the California Resources Agency, which targeted the establishment of an ICM postgraduate degree program as a priority.

There is, and will always be, a need for cutting edge research into the multidisciplinary problems encountered in coastal areas. As a major US research university featuring a wide diversity of departments, UCLA would seem to be a good location to establish a coastal research initiative. In addition, I suspected that there was a growing need for masters and doctoral graduates with more interdisciplinary training than science or economics departments would traditionally provide. This need was confirmed in informal conversations with academics, industry professionals, environmental groups and government agencies

By 2000, the IoE had started the process of developing a graduate program in environmental science, opening an opportunity to include a specialization in coastal and ocean management.

As part of the process of preparing the new program, UCLA graduate student Lena Maun carried out a review of US graduate programs in ICM (Appendix 5). She also assisted in the Workshop planning and organization.

The Workshop thus represents a first step in the process of consensus building and determining what type of ICM graduate program should be developed.

I am grateful to Madelyn Glickfeld, an Adjunct Professor in the IoE and Assistant Secretary of Resources, and the members of the IoE Executive Committee, who strongly supported a proposal to hold the Workshop. I also received advice and encouragement from Brian Baird and Chris Potter, State Resources Agency, Russell Moll, Director of the California SeaGrant Program, and Peter Douglas, Executive Director, California Coastal Commission. In particular, the planning for the workshop was greatly aided by discussions with William Hamner, Keith Stolzenbach, Richard Turco and extensive planning assistance and recommendations on potential participants from Madelyn Glickfeld.

UCLA’s IoE, California SeaGrant Program, the State Resources Agency and US National Oceanic and Atmospheric Administration National Ocean Service (NOAA/NOS) co-sponsored the event. The organizers would like to thank the sponsors of the workshop for their generous support. Finally, we owe a special thanks to the participants for traveling to UCLA and working so hard, despite the tragic events on September 11, 2001.

*Gregor Hodgson, PhD*

## Executive Summary

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The Workshop on Educating California Coastal and Ocean Managers took place at the Tom Bradley International Hall at the University of California, Los Angeles (UCLA) on September 28, 2001. The Workshop was organized by the UCLA Institute of the Environment (IoE) and was opened by the California Secretary of Resources, Mary Nichols. Fifty-two representatives from federal and state agencies, the private sector, non-governmental organizations (NGO's), and academia attended the workshop. Participants were invited based upon their expertise and experience in a discipline within the broad field of Ocean and Coastal Management. The one-day Workshop began with a morning session of presentations from each major potential employer of coastal and ocean management graduates: government, private sector, academia and NGO. In the afternoon, three breakout groups were formed to examine questions relating to the feasibility and need for developing a coastal and ocean management program:

1. What are seen as the most pressing coastal management issues in the next five to ten years by academics and staff of government agencies, NGOs and corporations?
2. What is the estimated need in academia government, NGOs, and corporations for coastal management graduate degree holders (Masters and PhD) in the coming five to ten years at the state, national, and international levels?
3. What skills do current graduate degree holders/hires lack?

4. What skills should a coastal management graduate degree program provide?

The Workshop participants reached a clear consensus that there is, and will continue to be, a strong demand for coastal managers and that a graduate-level coastal management program is not only desired by a wide array of individuals working in both the public and private sectors, but is necessary to adequately manage California's important coastal resources. Coastal management is a complex field due to the many possible conflicts that can and do occur. To address this complexity, participants agreed that future managers must have specialized training in one area as well as exposure to a broad range of subjects from science and engineering to policy and law. Given the wide spectrum of departments, UCLA was considered to be a suitable location to base a multi-campus program, with exchanges available with other universities.



# Introduction

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Gregor Hodgson  
Assist. Director, IoE Coastal Center

More than half of the world's population lives within 60 km of the shoreline, and the United Nations predicts this figure will rise to 75 percent by the year 2020. The coastal zone is an incredibly diverse and important area both economically and ecologically. This zone contains the planet's most productive marine ecosystems, providing habitat and essential spawning and nursery ground for most commercially and recreationally important fisheries. Coastal wetlands serve as efficient filters for land-based contaminants and buffer storm surges to help retard coastal erosion. Marine recreation supports a multitude of businesses, and coastal real estate is increasingly scarce and expensive. It is here, where the shore and rivers meet the sea, and where people are most inclined to build, manufacture, and play, that development conflicts are greatest.

In the US, owning a home on the coast is highly desirable, shown by the fact that the coastal population has risen by 40 million people since 1960. This rapid growth has led to numerous conflicts among socio-economic sectors and ecological systems presenting a challenge to government agencies and sustainable development. There have been successes, but also many dramatic failures. For example, NOAA considers over 30% of US fisheries to be over-fished, while new invasive species such as the alga *Caulerpa taxifolia*, are flourishing in Southern California.

Measuring over 1000 miles in length, California's coastline is one of the longest in the United States. California garners huge commercial, recreational, environmental and aesthetic profits from its coast. In "California's Ocean Resources: An Agenda

for the Future" (March 1997) seven coastal industries were chosen for an analysis of total revenue and employment. Together, the industries generated \$17.3 billion in 1992 and employed 370,000 people. Given this high value and intensive usage, it would appear to be a safe assumption that the need for well-trained coastal managers will increase. A goal of this Workshop was to test this assumption with people familiar with California's environmental, governmental and economic climate.

## Coastal and Ocean Management Graduate Training Needs

Coastal Management was "invented" in California with the passage of Proposition 20 in 1972. Therefore, it is ironic that no comprehensive, interdisciplinary Integrated Coastal and Ocean Management (ICM) degree is offered through California tertiary institutions. California students seeking similar degrees must travel to other states such as Washington, Oregon, Delaware or Rhode Island where comprehensive programs exist under various titles. While there are substantial pockets of ICM expertise throughout the state, and several programs where ICM courses are offered, there is no one university where ICM is a major focus.

Many of us involved in the practice and teaching of ICM believe that a graduate program in ICM in California is much needed and long overdue. Anecdotal evidence suggests that many California agencies, corporations and environmental groups are hiring standard environmental, natural, social or physical science postgraduates and retraining them to fit their real needs, or hiring ICM postgraduates from out-of-state or international programs. Universities continue to produce graduates

### **Box 1. Alphabet soup –ICM definitions**

Terms used to describe coastal and ocean management such as ‘coastal zone management,’ ‘Integrated Coastal Management’ (ICM) and ocean policy are defined differently by different scholars and practitioners. The most recent trend, however, is that international agencies such as the UN and World Bank, and some senior scholars have adopted the acronym “ICM” to stand for integrated coastal and ocean management. Perhaps “ICOM” would have been better as the absence of the term “ocean” may be incorrectly interpreted to refer only to terrestrial systems.

However, the word “Integrated” is the essence of the work and what differentiates it from e.g. Coastal Policy or Environmental Biology. The word “Integrated” indicates that the issues and solutions in coastal management must be considered across disciplines and across geographic, ecosystem and other boundaries. Thus, our use of the acronym ICM in this report encompasses a broad geographic focus including coastal waters (e.g. the EEZ), terrestrial areas (to the mountain top in a coastal watershed) and everything in between. This definition is purposely geographically broader than e.g. the California legislature’s definition of the coast.

An ICM postgraduate degree program would be one that is based on the *interdisciplinary study* of this process of managing coastal areas, including adjacent sea areas, and would include elements of the biological, physical and social sciences as well as law and economics. It follows then that an ICM postgraduate would not be the same as coastal policy or a coastal planning postgraduate.

who are not trained to carry out multidisciplinary research.

development process for such a program?

In the 1997 Ocean Resources report, the California Resources Agency noted this gap in postgraduate level coastal and ocean management education and targeted the establishment of such a postgraduate degree program as a priority. This prioritization was based on the belief that there is a market for postgraduates of such a degree program in California, other states and internationally. The IoE has an interest in participating in the development of an ICM graduate program. Prior to committing funds and energy to the design of such a program, however, at least two major questions need to be answered:

1. Is there a sufficient market for ICM postgraduates (masters and PhD) to justify setting up such a program?
2. Is there sufficient support from government and university administrators to sustain the

### **The First Step: A Needs Assessment Workshop**

As an initial step in determining whether such a degree program would be in the long-term interests of the state, the Executive Committee of the IoE approved a plan to hold a workshop to examine the questions presented thus far.

To answer these questions with some degree of confidence, it is important to ask the people who know most about coastal and ocean management needs in California. These are the local, state, federal agencies, environmental groups, corporations and academics that train and employ resource managers, planners, etc.

This Workshop is a first step in the process of consensus-building regarding whether there is a need for a graduate program in ICM in California. Without this consensus, there will be no need to proceed. Several

previous attempts to set up such a program in California dating back 20 years failed. If the outcome of this workshop is a consensus that such a program is needed, then a second Workshop can be held to examine questions relating to where, when, what type and how a (multicampus?) graduate program in Ocean and Coastal Management could be established in the state.

### **Workshop Goals**

The goals of this Workshop are to answer the following questions:

1. What are the coastal management issues seen as most pressing in the coming five to ten years by academics and staff of government agencies, NGOs and corporations?
2. What is the estimated need in government, NGOs, and corporations for coastal management graduate degree holders (Masters and PhD) in the coming five to ten years at the state, national, and international levels?
3. What skills do current graduate degree holders/hires lack?
4. What skills should a coastal management graduate degree program provide?

### **Workshop Methods**

Prior to the Workshop, a written summary of existing Coastal and Ocean Management related graduate programs at a state and nationwide level was prepared. At the Workshop, participants were asked for their assistance in filling in gaps and correcting errors. A "Needs Assessment Questionnaire" also was developed to

provide a series of questions for discussion and to provide concrete results for analysis.

During the Workshop, presentations were made by representatives from different sectors regarding their views of postgraduate education and employment prospects in coastal management and need for a graduate program. Small group discussions focused on the questions presented in the Needs Assessment Questionnaire.

After the Workshop, discussions were summarized to formulate conclusions. The results of the Questionnaire were tallied and circulated. A "Plan of Action" was then developed to recommend the next steps in developing a Coastal Management program.





# Welcome

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Chih-Ming Ho ,  
UCLA Associate Vice Chancellor,  
Research

On behalf of UCLA, I would like to welcome you to the Workshop on Educating California Coastal and Ocean Managers. I live here in Southern California, not far from the ocean, and one statistic I never realized was that half of the world's population lives within 60 km of the shore. This is very surprising and also indicates how important a coastal management program is to California with over 1000 miles of coastline. We have conservation problems, pollution problems, and environmental problems and we need to get information regarding the extent of these problems. Compounding this issue is that information is not static; it is dynamic. For example, we need to collect information on coastal management issues and develop a feedback mechanism. It is like a black box, information goes into the box and a response comes out.

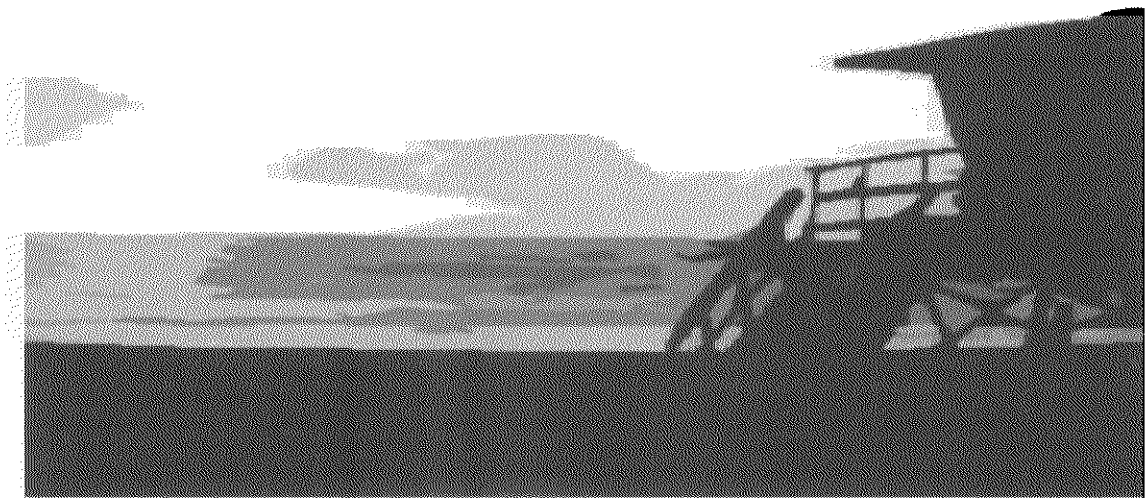
One way to collect and deal with information is through "Informatics Technology" which is a process being studied at UCLA. I will introduce some of UCLA's capacity to serve this need. UCLA is presently one of the largest research institutions in the country. There are 25,328 of some of the best undergraduate students in California currently enrolled, not to mention those enrolled as graduate students. UCLA's entrance GPA averages 4.0 with SAT scores of 1300, making UCLA a very selective school. Our research budget is 650 million dollars, which ranks UCLA number one in the country for public schools and number three in country for all schools (Johns Hopkins being number one). We currently have 3,238 professors producing a large volume of research in all areas. UCLA has a College of Letters and Science, a Medical School, a Law School, a Business School, and an Engineering School. All of

these professional areas are important for coastal management and we are very proud to be the only UC School with this complete set of programs.

I would like to talk about two examples I see useful and important for this group. UCLA is a leading technology provider. These days, most of our programs are also interdisciplinary. I am in the Mechanical Engineering Department. My students take many different classes including molecular biology, chemistry, and, of course, a lot of engineering. In my lab we are working on a chemical sensor, which is one of the examples of multi-disciplinary work applicable across campus. This chemical sensor is part of micro-machine technology; the sensors are extremely small, extremely sensitive, and can collect a large array of information. We could easily make thousands of these sensors and distribute them in the ocean to collect information.

We are also working on DNA-based sensors that use complimentary strand technology to detect specific cells. This is applicable in aquatic studies as well. For example, the sensors can detect *E.coli* and pathogens in waters. These DNA sensors are also an example of a multi-campus approach to new challenges. We are currently working with the Biological Engineering Department, the Chemical Engineering Department, and the Medical School. It is hard to restrict such work to one department. These sensors must be developed for different environments, distributed (which is not an easy task), and then the information must be collected and analyzed, a task too big for one lab.

We really need to collect and understand a diverse range of information from many areas for successful coastal management. Here at UCLA, we can provide the support and the many departments to facilitate the process.



# Keynote Address

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Hon. Mary Nichols  
Secretary, California State Resources  
Agency

First of all, thank you for inviting me to be here today. This is a topic that is near and dear to my heart. I spend a lot of time these days thinking about how to recruit and to retain the knowledgeable people we need to do coastal management in California. I also spend time examining our relationship with the research community. I am not here to reveal all the answers because I do not have them. But I want to lay out, for this group of people, some perspectives on the topic we are here to address at this workshop. So, I am happy to have the opportunity to help kick off this discussion.

All of us are drawn these days to figure out what connection the events of September 11<sup>th</sup> have had to our world. It is difficult, especially for us on the West Coast, to feel quite what it is like closer to the epi-center of the attack on the US and where the preparation for war is much more visible. I was back on the East Coast last week visiting family so it is a little fresher in my mind. Believe me, this is not a digression from the topic at hand to say that it is both illustrative of the fact that when we give the statistics of the length of the California coastline, the importance of the coast to the economy, and the place that the California coast plays in literature and the imagination of all Americans. You only have to look at the victims to see that perhaps the most moving group, and certainly there were many, was the group of teachers and students on their way to the marine sanctuary in California from Boston to study how we do coastal management here. They happened to be in the wrong place at the wrong time and their lives were lost prematurely. We will try to do something at the Marine Sanctuary to commemorate this particular loss.

This also reminds us of issues regarding national priorities:

- Where will money be spent?
- How are we going to approach things like international relations and the free-flow of information?

These issues are going to be very different in the future. I have only lived through one of our nation's wars which is one more than my children. But I remember during the Vietnam War when scholars of Asian background and individuals working on issues that in any way touched Asian issues, even when totally unrelated to national issues, had lives and work compromised. I ask you to keep that fact in mind as you start thinking about today's issues. Having said that, there are some things I have found over the last couple of weeks that gives me optimism of future hope and that there is goodness in the world. It is that we have a connection with the natural environment and we have the ability to get out of the rubble, so to speak, and get into the natural world. This fact seems to be the foundation for most of the hope we have in civilization, so I feel the work we are doing here is truly important.

I am here to talk specifically about the need for a graduate program in Coastal Management in California. As you heard in the introductions, I preside over, temporarily at least, the agency that deals with most of the laws, policy, and procedures as well as the planning tools we have for that job. I say most, but not all, because Art Baggett, head of the State Water Resources Control Board (SWRCB) sitting in the back of the room, has a very important piece of this "pie" which is the quality and allocation through the jurisdiction of water that flows into the ocean. But clearly our managers are faced with some extraordinary challenges. You all know the facts about where the population

lives, what the demands on coastal resources are, and what some of the failures have been within our state. This is not just true in California but particularly drastic in California. There are issues of wetlands, fisheries, fishery economics, and loss of whole communities relying on fisheries.

Although we are making some strides, it is safe to say that life will never be like it was when the Europeans first came to California. There will be some differences, although, there are some aspects of the ecosystem we will try to recreate. There is nothing more difficult to grapple with than the sheer fragmentation of interests and responsibility among various groups. It is not just that we have eight different agencies that have prime responsibilities in these areas. Not only do we have conflicts within our agencies, we are also frequently not communicating with the private sector, public groups, or academia. Here we are with the sixth largest economy in the world, with an ocean that plays a major part in driving that economy and we really do not have an Integrated Coastal Management Program. Coastal management is how we forge good environment and economic solutions that face us here in California.

We are clearly spending money and accomplishing measures, but we obviously lack some essential tools to communicate with the public about what we are doing to take advantage of new technology. Brian Baird, our all encompassing coastal manager at the Resources Agency, pulled out a quote by Wilburt McCloud Chapman from 1949, (they do not make names like that anymore), who was the state's leading Fishery Manager. He was focusing on, at that time, ocean fisheries. He said,

“Dealing with these conditions involves biological, chemical, political, commercial, diplomacy, technology, academia, economics and personal relations, factors many of which I do not understand. I have come to the conclusion that nobody else understands

them either. Therefore, at every opportunity, I seek to thrust together people who have superior knowledge of one or more of these factors so that they can jointly produce decisions and conclusions bearing on those observations that are more sound and practical than those produced by any one individual.”

Fifty years later, I think it is fair to say that within my agency and others, we are hiring entry levels at the beginning of their careers who are very well versed in one of these specialties but who are often less than aware of the larger picture addressing these issues. That is why there was a reference to the compelling need for graduate level training in the interdisciplinary area of coastal management in the California Ocean Plan. We simply have to have a new generation of people coming into public service, and hopefully also working as consultants in the private sector and in other realms as well, who have needed skills, interdisciplinary background and breadth of training and vision to forge new solutions for the collective knowledge. We need to have people grounded in the fundamentals of Integrated Coastal Management and we also need people who have some of the training and experience in dealing with complex human decision-making situations.

Let me just outline my role today. I will present some of the coastal issues we are facing right now that I think cry out for people who have the skills I was talking about. Clearly, the pressures of developing the shoreline are not going away. The superheated economy of a few years ago may have cratered, but the desire to build on the coast is not going away. Oil and gas development are always a threat and an area people want to re-raise and question again. There are issues of water quality in the near-shore environment as well as the safety of the beaches themselves. There are concerns of production, concerns over state wetlands and all of the services they perform. There is the loss of shorelines and beaches. These

issues are clearly placing big demands on us and just as those demands are put on us, we have new laws that are not always put together in a consistent manner.

Just within the last few years, the state has been given new duties, although, of course, never enough money to pay for them. There is the California Marine Life Protection Act, the California Marine Life Management Act, the California Marine Life Stewardship Act, and the California Marine Life Improvement Act, among others. The Government just signed a bill that gives the Department of Fish and Game the ability to go out and look at aquarium and pet stores in order to stamp out *Caulerpa*, a toxic alga that invades new areas when home aquaria are dumped into our waters. We need to update our whole approach to shoreline erosion and we need to look, in turn, at experts in the state to beef up shoreline erosion policies that were last looked at during the Jerry Brown era. We have something called the Coastal Management Sediment Working Group that also includes state agencies, local government, cross cutting committees, that is making some progress. We have the Southern California Wetlands Recovery Project that started out as a project of the State Coastal Conservancy and has taken on a life of its own. The project is working on identifying and trying to prioritize areas for protection or acquisition while constantly trying to restore wetlands in Southern California. The process has attracted a lot of support from private sector and non-profit. But the group is struggling with definite questions: what is restored and how do you know when you are there? We are not really there yet. California is rewriting a class of marine management areas off of our shores. We had eighteen of them when I first came into office and we are now replacing them with six. The Department of Fish and Game is trying to come up with a master plan for these designations, which will include, for the first time ever, the ability to eliminate or severely limit the taking of marine life and resources in state waters. This is a tremendously difficult thing to do given the

local and political pressures and economic investments, particularly in the sport and commercial fishing arena.

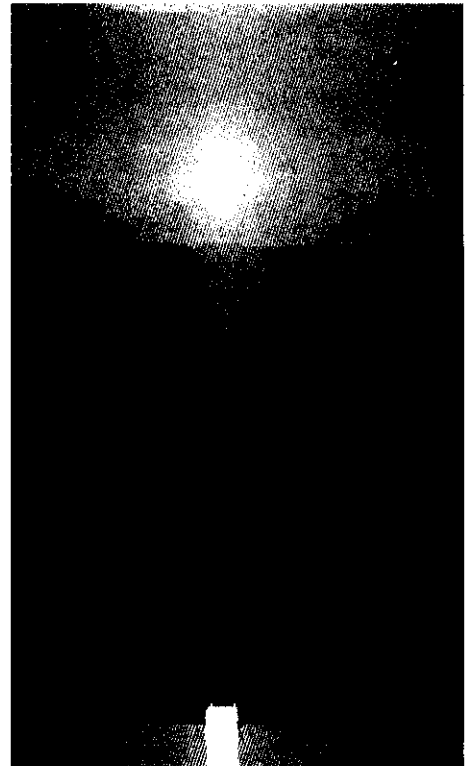
All of these types of issues and problems require our managers to gather groups of people and learn how to work in a disciplinary and integrated manner. We need better science, more access to science, and need help learning from other collaborative projects. Because each one of these projects takes years to build personal trust among participants, there are frequent blow-ups that need to be fixed through legislative policy. But, it is time to learn from some of these experiences and move on.

In 1997, the Resources Agency identified the lack of graduate ICM programs in California and recommended for one to be developed. I would like to offer our assistance in any way we can to make this happen. I have a very selfish motive. It is ironic that we have not extended the leadership that began in 1969 after the oil spill off of the Santa Barbara coast that led to the passage of the Coastal Zone Management Act at the National Level and to the creation of a multitude of different coastal and ocean programs we are operating with today. I believe that some form of graduate program is necessary, whether it is housed in one place or many and whether it is a real program or department or whether it is a virtual one. We need one that links expertise, raises the profile, and keeps people informed on the needs of a coastal management program if we are to move on. We certainly could benefit and contribute. We have within our state agency the Coastal Commission, The San Francisco Bay Conservation and Development Commission, and the Coastal Conservancy; people who are nationally and internationally recognized leaders in these fields. It is not that we are lacking or less than some place else; these leaders are the best. But they are not enough. It is just that the problems are overwhelming our abilities to cope with them. We have developed in the last few years better working relations

with the California Sea Grant programs at the University of Southern California and UC San Diego as well as with extension programs. We are very committed to these programs.

At the same time, as many of you in the room are acutely aware, every year we fight for very small amounts of money to keep those programs going. The state of California is not spending anywhere near the amount of money than it should from an environmental or economic perspective. We have been working with the San Diego Marine Council and we see such programs, and extension agencies, as being a real resource for establishing this kind of graduate program. I served on the advisory program at the Donald Bren School and I have a personal bias to masters programs as a way to capture young people at a time of their careers where they have learned enough to come into government with some real skills and policy knowledge and energy but before they get really specialized. That does not mean I would never hire anyone with a PhD; we can and we will, but I think when you start looking at starting a graduate program, it is helpful to start looking at different interests, skills, expertise, and resources of the current faculties to attract students to these programs. We need to see how those interests relate to the people that will never be researchers or at the forefront of the research process, but will be able to gather data and manage that data, or who's job it is to enforce some regulations. We must not look at it as just one more degree-granting place in the university but look at it in a larger continuum.

With that, I congratulate you Greg and others in putting this together. I think it is very timely and I whole-heartedly pledge my support. Thank you.



## Introduction, On Behalf of the IoE

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Arthur Winer  
Professor, Environmental Health  
Sciences, Environmental Science and  
Engineering,

Good Morning! Well, Mary Nichols and I have been professional colleagues and friends for nearly three decades now, and it is always a pleasure to follow her on any program. It is also a pleasure to welcome each of you on behalf of the UCLA Institute of the Environment, and on behalf of Richard Turco, IoE Director, who is in Europe this week and therefore could not be here today.

As some of you may know, the IoE was formed about four years ago by a substantial group of UCLA faculty who wanted to conduct environmental research and teaching not only across disciplinary boundaries, but also across the artificial administrative walls that have traditionally separated academic departments from each other. So this was largely a bottom-up effort. Fortunately, the UCLA administration committed essential resources at an early stage, including space and seven ladder faculty positions.

Today, the IoE has a full range of activities in research, teaching and community outreach, and after only four years, IoE investigators have brought in nearly twenty-five million dollars of extramural support. Key projects include one of the five national Fine Particulate Research Centers, an EPA funded project to identify airborne sources of pollution in Santa Monica Bay, extensive research efforts in Malibu Lagoon and the wetlands at Mugu Lagoon, and a major Los Angeles Watershed Project involving a dozen faculty from eight different campus units.

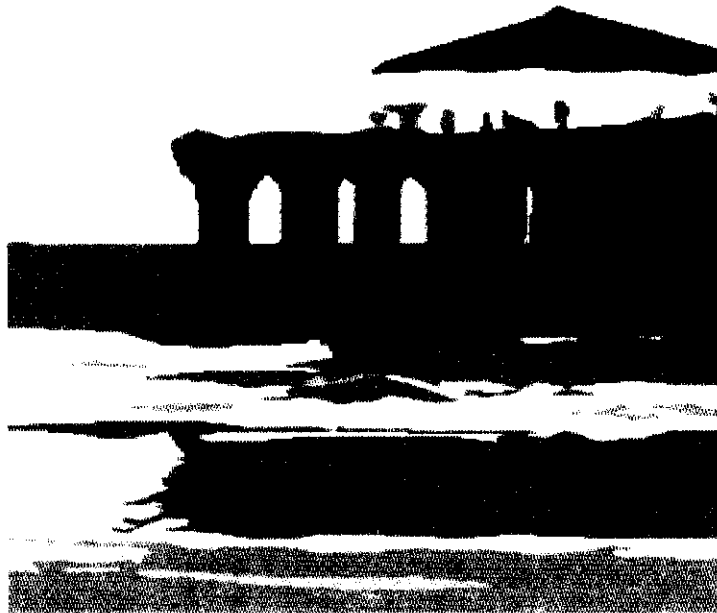
Each year, the IoE publishes the Southern California Environmental Report Card, in which we evaluate four critical environmental issues and grade the public and the agencies on their performance with respect to those issues. The 2001 Report Card will be released at the end of next week and I hope many of you will have a chance to look at that.

Now for me to emphasize to this group how critical coastal issues are to the state of California, to North America, an indeed to the entire world, is a bit like bringing coals to Newcastle, particularly after Mary's excellent remarks. Suffice it to say, coastal and ocean issues are a major focus of both teaching and research in the UCLA Institute of the Environment. Directly, or indirectly, almost all of us who collaborate in the IoE are engaged in research relevant to coastal issues. Even as a classical atmospheric chemist I need to be concerned with the impact air pollutants are having in the Santa Monica Bay, and in run-off from the Los Angeles watershed. Fortunately, as I mentioned earlier, my colleagues have had a major research program on these very issues.

The Institute has developed a series of multi-disciplinary courses at the undergraduate level at UCLA, with environmental minors being organized in six key areas: the physical, life and social sciences, public health, public policy and engineering. I'm pleased to be able to use this forum to announce plans for the IoE to also establish a graduate teaching program, as well as a coastal science and management center. We all know there's a wide range of environmental studies programs available on campuses in California, but given the immense value of coastal and near-ocean resources, it is surprising that there is no

specifically designed and integrated coastal management graduate degree program in California. This appears to be a serious gap in graduate training in the state. Ideally, such a program would offer both a masters and a PhD, and would expose students to a broad range of coastal and marine issues in a multi-disciplinary curriculum, including policy and socio-economics.

We in the Institute of the Environment believe there is a significant demand for graduates of such a program, however, it is important to confirm our assumptions about that, and that's one important purpose of today's workshop. Now I know you are anxious to get on with your work, so again, welcome on behalf of the UCLA Institute of the Environment, and I wish well in your deliberations today.





# International Integrated Coastal Management

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Stephen Olsen  
Director, Coastal Resources Center,  
University of Rhode Island

Just as a little background, I began struggling with this issue a very long time ago. In 1971, the very small state of Rhode Island called for a coastal management program and asked that the coast be managed as an ecosystem for the present and future. We began thinking about this in an operational manner. I worked on other issues in New England dealing with oil drilling in our prime fishing ground, the Georges Bank. Also, in 1985, I began working in a number of places in Asia and Africa and I have spent a lot of time in Latin America. What I am going to do is highlight my take on the skills, knowledge, attitudes, and perceptions that people need to be effective and not have to go through the retraining Greg has alluded to following graduation from traditional programs and which I would echo. As people, who in my view, are helping shape a new field of ecosystem management, ecosystem management meaning that people are inside the system, I believe that the coastal ecosystem can be the crucible where we learn or do not learn how to do that. It is fair to say that humanity is concentrated, what we do is concentrated and the challenges in ICM are too. The skills and knowledge that I am going to run through here could apply to any undertaking, but it is, I will argue, in the coastal area that they take on a particular urgency and our education of people to do this is particularly hard challenge.

Let me start out. The Coastal Resources Center (CRC), of which I am the director, is at the Graduate School of Oceanography at the University of Rhode Island somewhat erroneously. We are not an academic program, we are not a degree program but we do conduct four week trainings there and

at other areas of the world. And we have trained 670 people for this field. Ok, so what are the skills and knowledge needed?

## 1. Leadership:

But leadership of a particular kind. It is leadership in working with a number of people from different areas at different times. It is the kind of leadership that is often leading from behind rather than from in front. It is common to think that we either have leadership or not, but I think that it is something that can be learned and in fact that we know how to do it. Most of the people we hire come from the sciences or they are lawyers or engineers. They have not been taught what it is like to be a leader in this kind of profession and either they learn it on the job or not, and that is an inefficient way of doing things. Coastal management programs are extremely complex and managing them is extremely difficult. Usually, there is funding from many different sources and working with many different agencies particularly in the developing world. The administrative burden of running programs funded by the World Bank or by local governments is exceedingly difficult.

## 2. Ethics:

The coastal zone is extremely complex and managing it is extremely difficult. Many times, you have funding from different sources and are dealing with agencies with different cultures. The administrative burden of running things, especially in third world countries where corruption sometimes runs rampant, is immense. Moral leadership and behavioral ethics becomes extremely important in administering such programs.

## 3. Adaptive Management:

Coastal management is an expression of adaptive management. It is not finding new technology. Most of it is a protracted process of learning that if taken seriously, can be a means of working towards more sustainable forms of conservation. Then, obviously, we are going to get where we need to go by a long series of small steps and keeping continuity between those steps in a protracted process of learning and adaptation lies at the heart of success. I believe that there are conceptual models that can be helpful in seeing this as a long-term process, which is really about changing societal values and behavior. Anybody will tell you, who has studied human behavior be it historians, psychologists or public health practitioners, that changing values and behavior at the societal level is the hardest thing that you can do. It is very obvious in coastal management that there are a few things we can do through regulation. Most of these regulations have been put in place and are supported because people believe in what you or the program is trying to do. That happens through a process of building trust, constituencies, and a climate in which change can happen.

#### **4. Managing ecosystems dominated by humans:**

You can, at the risk of being cute, say that coastal regions are very important because they are an important habitat for a very important species -- and that species is us. It is about managing people. We tend not to see us human beings as part of ecosystems. There are not many systems yet, that properly integrate humanity and the rest of the creation. The emerging discipline of Ecological Economics has been trying to do this for a number of years. Much of coastal management, from a problematic point of view, is conflict resolution. Because of this nature, the first ten to fifteen years of any program is spent integrating these issues. Dealing with the Department of Agriculture, Department of Fisheries, the Navy, the urban planners, and the tourism industry

among others, is extremely complex. Having the skills and knowledge of how to run a public meeting involving all of these people is imperative. Very often we go into places and see this first hand. For example, I am doing a lot of work in Mexico, a very educated place where you have your usual mix of lawyers, scientists and people who work for the Mayor -- and getting them to understand the needed skills on how to run an effective meeting is often difficult. It takes an enormous amount of skill to manage such a process. Hardly anyone coming out of a school program has a clue how this process works.

#### **5. Cultural literacy:**

A priority for us, for people in this part of the world -- North Americans -- is to spend less time talking about whom than what. Trying to understand what underlies how people react or why they are willing to die for what they believe in is especially foreign at times, especially in developing countries where things are harder and where people are often dying for what they believe in often in marvelous and heroic ways. Most of the people we hire who are Americans are amazingly ignorant of other cultures and other ways of seeing the world and what is surprising to me is that when we have gotten together with people from Asia, Latin America, and Africa, these cultural divides are just as strong.

So, that is my list of skills and knowledge. As we are running short on time, I will end here. But quickly, I do want to present one more idea on all of this. My own view is that looking at the people that we have trained and the places we have worked, we really need two types of people to do this process:

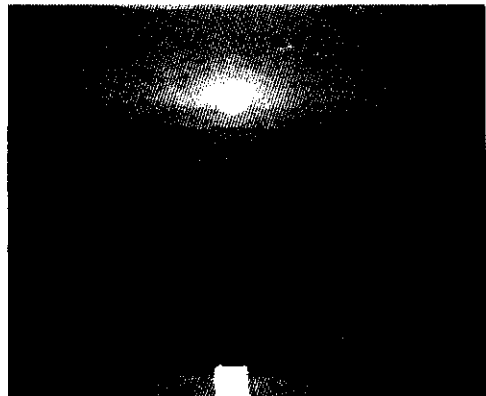
- 1. Innate specialists:** the lawyers, biologists, engineers, etc. You will always need these individuals to do sector by sector managing. The trouble is, that those people have not been given the injection that allows

them to work in an interdisciplinary group.

2. **Specialists in integration:** here I do not mean generalists, but specialists who have the skills I have been talking about. You do not need a great number of them, but need a number of people that can orchestrate the larger effort.

Graduates and individuals that we have trained in our program have definitely said that they have benefited from this two-tiered system. We are also finding that many of the people we have trained are moving up the "ladder" fast and there is a need to constantly train individuals for those entry-level positions. I think that this is an important element to look at when you discuss need.

At that, I will end. Thank you very much for your time and I wish you luck on this very important process.



# California Integrated Coastal Management

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Charles Damm  
Senior Deputy Director, Southern  
California Coastal Commission

Thank you. It is a privilege to be here today. Certainly, I have a bias to an integrated program and have been looking forward to beginning this process. Just a quick thirty seconds on who I am. I am the Senior Deputy Director of the Southern California Coastal Commission offices, which means I am responsible for three main offices: San Diego, Long Beach and Ventura. You probably all realize that these offices are large, busy and involved with lots of controversy. And similar to what other speakers have already said this morning, when we hire new people, we spend about six months trying to train these people, which is why I mentioned my bias to an integrated type coastal management graduate program.

The Coastal Commission itself is the state's Coastal Zone Management agency along with the San Francisco Bay Conservation and Development Commission. In 1972, there was an initiative that would eventually lead to the inception of the Coastal Commission. The Commission became a permanent agency in 1976 and is responsible for dealing with issues related to public access, conservation, environmentally sensitive habitats and more technical issues such as geological hazards. However, the Coastal Commission has limited jurisdiction. The coastal zone, as defined by 1972's Act, is limited to five miles inland and five miles seaward. That does not allow the Coastal Commission to look at really broad issues, for example, issues related to non-point source pollution that emanate from watersheds that extend well outside the coastal zone. This example is one area where an ICM graduate program would go a

long way towards assisting the state of California.

The Commission hires a number of people each year primarily not because we are opening up new positions, but because at entry levels, we are finding that people are moving on to other agencies or to the private sector, which I think is an indicator that there is a need for training persons at the graduate level. There is the ability for people in this field to find jobs. In fact, in the future, I would argue that there is going to be a greater need for people to come out of these graduate programs. We have hired individuals at the master's level and this degree has proven beneficial, but often we find that these people have focused their education, even at this level, on a specific need, and that does lead them to have a bias to a certain outcome when dealing with a multidisciplinary type approach. This is especially true in the coastal zone where you balance conservation with providing access. Often, this balance requires recent hires to be retrained and that is what I hope would be a major benefit of this type of program going forward. It would allow a person coming out of graduate degree program to have a multidisciplinary approach as part of their background. Meeting that need in the real world is necessary to balance a number of competing interests. Currently, because of the population growth that the state of California is experiencing and expects to experience in the future, those competing demands and the ability to balance needs, especially with increased demand, I think is greater than ever.

Precious coastal resources are in greater demand for development while at the same time there is a greater desire for protecting the remaining environmentally sensitive areas that are in the coastal zone. Those issues are very tough to reconcile. I have a

couple of suggestions based on this dilemma should this come to fruition:

1. Any program should include as part of the program the ability to train for conflict resolution skills. Very often, we hire people with very good technical backgrounds but they have not been taught the key skills with working with the public or other agencies. In the "real world", this skill is absolutely critical.
2. The other thing I would suggest that be incorporated in the program is the ability to have an education component that reaches out to all social and economic groups. We need to, as part of an educational program, be especially sensitive to the fact that there are people, because of socio-economic status, who have not been exposed to the issues we are dealing with today. But with population growth, there is very little doubt that there is a need to deal with a multitude of issues all of which require a greater need for an integrated graduate degree program. I hope this program is incorporated to achieve this goal in the future.

Thank you.



# Private Sector and Integrated Coastal Management

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**Ralph Appy,**  
**Assistant Director, Environmental**  
**Management**  
**Port of Los Angeles**

First of all, I would like to say thank you for having me here today. Just as an aside, although I did not go to UCLA, my mother actually graduated from here before there was even a graduate program and my son will graduate with a degree in Biochemistry. I believe that the UC system is one of the greatest educational values in the world.

The Port of Los Angeles, for those of you that do not know, is 7000 acres of land and sea administered by the City of Los Angeles under a special grant. So we have kind of a dual role at the Port. We mainly are involved with maritime commerce, navigation, and fisheries. We are at one point a developer; we develop major infrastructure projects, a landlord; we oversee tenants that use the facilities, and we are a public agency and even have our own chapter in the California Coastal Act. We have a broad and diverse mandate, which causes a lot of conflict. Together, with the Port of Long Beach, we are the third largest port in the world. The Port of Los Angeles and the Port of Long Beach have a little competition over who is the largest container port. This large port in the middle of the large metropolitan area we have here creates what they call a 'load center' where commerce comes in from all over the Pacific Rim. The Port needs to accept and distribute the load, which causes a lot of land use and environmental issues, especially now.

As an aside, one thing I find difficult and I think that people should keep in mind when developing the program we are here to talk about today, is that it is easy to become desensitized. I spend about ninety-five

percent of my time at my desk dealing with papers. You need to get out into the field every once in awhile and lay your hands on the resources. That is why it is important for me to be here today. I really enjoy being part of the academic issues; it brings you back to center. I like to go out with some of the fisheries officers that come to sample in the Port and collect data with them and get back to that sort of act. It reminds me of what I am regulating and any program should include a mix of regulatory and fieldwork to keep both areas fresh in the student's mind.

Another critical issue in regards to Coastal Management to think about is the economic aspects. I was fortunate to be part of a 26-week program at the Andersen School of Management here at UCLA. During the program, we each got to get up and say a little bit about what we do. There was a big mix of people there, CEO's, dot-comers, etc. When I got up to say my part, I was one of only two people involved with environmental regulation, what was surprising to me was that, even though we had a lot of capitalist representation, many of the other participants did not even know the Port existed. About seventy-five of the participants were also unaware of the California Coastal Act. It made me think, "What an opportunity, maybe it is a good approach to link ourselves with the captains of industry". After all, many of the decisions that are dealt with on the lower regulatory level come down from above and wouldn't it be great for those people making the original decisions to have an idea of the issues facing our coasts. Many of the senior level managers at the Port come from construction or engineering backgrounds and probably have never seen the Coastal Act. Maybe, this is an opportunity for this program to dovetail with other business and economic programs and to look at the tie

between environmental and economic issues. Another thought on this matter is the link to high schools. There is currently a big push for high schools to be involved with maritime issues. I can think of at least three high schools offering programs in maritime commerce and international trade. They see the job market for these types of jobs increasing in the future and again, if some aspect of the environmental coastal issues could be transferred from a graduate program to the high schools, we may see more cooperation in the future.

One of the issues we are dealing with at the Port right now is growth. We have massive container ships coming into the Port and the amount of goods is predicted to double in the next 10-15 years. We are already at peak capacity. There is a big question of how we are going to grow and expand. There are complex land issues. We also have a very vocal community in the area especially in the last three years who have concerns over our present and future growth. This situation is not only affecting us, you can pick any port in the United States, you can pick Oakland, Houston, you name it. They are all are dealing with these kinds of complex issues, especially expansion in already crowded metropolitan areas. Some major environmental issues we are dealing with at the Port are as follows. TMDLs or Total Daily Maximum Loads are a big issue in regards to surface-water runoff. Toxic air contaminants are a huge issue. We have large ships burning diesel fuel and all of the trucks to transport the goods coming into and out of the Port. Exotic species are also an issue from the ballast water of the ships. We just completed a major base line study of exotics at the Port and found a number of species especially the Japanese Oyster.

Development is always a problem. We infill the Port to make more berths and area for shipping and we are constantly restoring wetlands in someone else's backyard to mitigate the infills. This situation brings up many multi-jurisdictional issues and we have to deal with different environmental

and community groups as well as different regulations. I guess I am trying to give you a flavor of the complex situation and to emphasize that a program like this is very needed.

In terms of our hiring practices, we are part of the City of Los Angeles. We just hired three people and two of them were really qualified for the position because we hired them on an emergency basis. One is a hazard specialist and one is a geologist. They worked for us a year before they got listed on the city's permanent employee list. None of the other people on the list, although educated, had any coastal background, none had even seen the Coastal Act and were unaware of the major coastal issues. So, we have a real need for trained and informed people. The problem is how are we going to get them hired? And that has to do with the city hiring process. It is now very difficult to fill our positions. We usually hire someone with a specialty and have to train them. As an aside, our planning division is looking for two planning people with coastal backgrounds.

In terms of turnover, our turnover is about one person per year in my small division, which is twelve strong. But we do use a lot of consultants, and quite often the consultants do not have the integrated background we need. The people we hire and train usually get lured by the consulting companies a few years later at sometimes double their salary showing there is a need in the consulting companies as well.

One last comment before I finish. Ten to twelve times a year, I have discussions with international partners and interested parties coming into the Port. Whenever I have these discussions, it is like talking to a great sponge- they are so interested in what is going on environmentally in the Port. This might be another opportunity for a link between a graduate program and business. With that, I think I will end here. Thank you for your time.

# NGO's and Integrated Coastal Management

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Mark Gold,  
Director, Heal the Bay

Good Morning. For those of you who do not know me, my name is Mark Gold, I am the Director of Heal the Bay and I am a graduate of the Environmental Science and Engineering (ESE) program here at UCLA. I do care a lot about this university and I am so excited that we are even here today to discuss the possibility of starting a coastal management program. For those of you who know me, I'll be as candid as always in saying where I think this program should go.

To be effective in the environmental group setting, you need to have a wide variety of skills and I know that everyone that has come up here today has said the same thing. You need to be part scientist, part lawyer, and part politician to be effective. You just cannot be good in one discipline and be effective. Another interesting thing to note is that although we have not had such a program at UCLA, I was noting that just at my table you have some pretty effective leaders. You have Steve Fleischli of Bay Keeper with a law degree, Madelyn Glickfeld who continues to be a strong state leader in coastal issues, and of course, Rich Ambrose. We have some Bruins that have managed to work and excel in this field despite lack of broad training. I am probably the only UCLA graduate with a multidisciplinary degree from ESE.

When you look at getting things done in the environmental field, most nonprofits are really small and you have to be a squeaky wheel to get things done. So, what we have heard before about the ability to negotiate and the ability to communicate is absolutely critical. I have interviewed many candidates that have the technical skills but really could not talk their way out of a paper bag, and frankly if they are going to testify in front of

the Coastal Commission or speak to the Regional Water Quality Control Board (RWQCB), they better be able to communicate or you will not get anything done. That is really critical and something that very few of our candidates have experience in at all. Negotiation skills are also critical. If you cannot negotiate on an issue, you are not going to win on an issue. Most of these coastal management issues are not as black and white as we would like them to be and there is really no question that you need to develop relationships with the regulating agencies as well as those being regulated if you are ever going to get anywhere.

You also need a great deal of passion to get things done. Leadership skills were brought up before and I really have not seen much of that at all. And really, it gets back to having to be proactive to be effective. Another strange thing that has not come up yet, but maybe it is because I am talking from a non-profit's standpoint, is you need to have media skills. It is critical to develop relationships with the print and TV media, to be able to write opinion pieces and to get them into the paper because that is how you get people on "your side" and develop membership. There are not a huge number of people working in environmental groups but a disproportionate amount of legislation gets passed because of the work of non-profits mostly because of this ability to get the word out. One example, looking at Heal the Bay, is storm water runoff. We have done a lot of research projects. We have partnered with the City of Los Angeles and the Orange County Sanitation District to show that there are human enteric viruses getting into the storm drain and that led to the first ever health effect study of people swimming in storm drain contaminated water. That led, in turn, to a bill by Assemblyman Howard Wayne from San Diego, that Heal the Bay helped craft, which



created a bathing water standard and mandatory reporting to the public. That led to another bill, Assembly Bill 538, which created a set of sanitary regulations so that if you do have closures, you actually have to go upstream and survey to find the source of contamination.

Moving on, there is now so much work on water quality in Southern California. The biggest example of this is Huntington Beach when they closed "Surf City, USA." That became a national story and really ended up catalyzing a strong coastal protection movement in Orange County. I bring all of that up because you have research, advocacy, and regulations all playing into the story and now you have an environmental movement in Orange County, a place where none existed prior to this event. The biggest issue in Orange County is whether or not the Sanitation District is going to go to full secondary treatment at all of its plants. It is amazing how things worked and came together. It is an amazing example of what can happen when you have a multidisciplinary approach to a problem.

Moving on, another thing non-profits have to be well versed in is commenting on regulations and permits. You need to have some diversity in looking at all of these different things. Another example is looking at how local issues have had state impacts. One example is the Baykeeper, Heal the Bay and NRDC lawsuit against the EPA on Total Maximum Daily Loads (TMDLs) in the Los Angeles and Ventura Region. The RWQCB now has a very large TMDL unit, which came out of that lawsuit. And now you see statewide, a big expansion in TMDL regulation in water quality control boards. We have also seen a huge increase in storm water budgets in regulatory agencies. Many of them have increased by a factor of four. It is amazing that environmental groups have had a great impact on the number of environmental jobs.

In regards to Heal the Bay's approach, we have about twenty-three people on board

and have about five that deal with specific issues. We have one engineer, one environmental economist, two biologists, and a landscape architect and of those five, three are ESE students. I do not think that is just because I am loyal to the program but because those people have multi-disciplinary experience -- they work with regional planners on their problems course, have field experience, and have an idea of regulatory framework and that is essential. It is essential to know what the RWQCB is or what the California Coastal Act is. Most of the candidates have no clue what these two things are. In the long run, we would like to be able to get to a point where we would like to provide some technical assistance to other environmental groups or state agencies in the manner of how NRDC assist such groups on environmental law issues. In the long run, we would like to expand to see us fill that role.

Wrapping things up, I think that the big issues of coastal watershed management are Marine Protected Areas (MPAs), TMDLs, storm water continues to be a big issue, the beach issue -- we saw this year \$34 million from the state go to cleaning up California beaches, and wetland restoration. Another area is modeling. Modeling is a niche, especially in regards to TMDLs. There are just not enough environmental modelers out there. And finally, for the program itself, I cannot emphasize the need not just for a PhD program but also for a Master's program. You do not know how much it pains me to have people come to me for advice on Master's Programs and have to steer them to UC Santa Barbara or, God forbid, USC. But they have programs in Environmental Management and we do not. With that, I think I will close and let us get to our workshops. Thank you.

## Results

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The results of this workshop are clear and warrant careful consideration by University of California administrators and policy makers. The lack of an Integrated Coastal Management graduate program is problematic from an academic, private industry, non-profit and government standpoint. Extensive on-the-job re-training is commonly needed to bring fresh graduates up to speed on coastal issues. A graduate level coastal management program is not only desired by a wide array of individuals working in both the public and private sectors, but it is necessary to adequately manage California's vital coastal resources.

Purposely, participants with very different expertise were brought together to present a holistic view of coastal management needs and issues. Together, the participants agreed that coastal management is an extremely intertwined and complex field. To address this complexity, participants from government, NGO's, academia, and the private sector all felt that future managers must have some level of disciplinary expertise, but also should be able to work together in teams, and to recognize that coastal management problems require multidisciplinary solutions.

So, what would a coastal management graduate level program need and what should the program address? Participants were asked to answer these questions through filling out a questionnaire (Appendix A) and taking part in discussion groups, named Working Groups, during the afternoon session (Appendix B). All three working groups (Yellow, Orange and Red), were comprised of people with mixed expertise and backgrounds. Together, the working group and questionnaire results conveyed many of the same findings.

Current graduates that are being hired by the participants lack a number of essential skills

in regards to coastal management. Most PhD students are too specialized and many masters students have not been taught essential key points such as leadership, conflict resolution, negotiation, problem solving skills, lateral thinking, application of science to management and policy issues, and how to communicate to a diverse audience. As to the question of whether a graduate program is actually needed, the overwhelming response was affirmative. Again, both working group results and questionnaire results showed agreement between participants that coastal resources are extremely important in California and that we are not able to adequately address many issues with the current graduates from our educational system.

These results are illustrated quite clearly in the working group discussions. The first topic discussed in the groups was what are the critical coastal issues facing California? Some issues highlighted in the group discussions included biodiversity conservation, fishery management, diversity of coastal issues, Marine Protected Areas (MPAs), population growth, and urban development. One particularly interesting comment made by the Red Group was that California has an historical willingness to both fund and support coastal protection and management. This comment suggests that coastal management is a priority for the citizens of California, and will most likely to continue to be so in the future.

This question of priority was also addressed in the questionnaire's first section. A list of possible environmental and coastal issues, such as air pollution, open space and invasive species, was presented and participants were asked to rank the importance of these issues both in the present and the future. Participants were asked to rank issues from one to ten, with

**Box 2.** Answers to Question 4 on the Questionnaire: What sets of skills are typically lacking in advanced degree holders that might require on-the-job training? Frequency Missing and Importance of Missing Skills are rated on a scale of 1-5 (1 = frequently missing to 5 = infrequent; 1 = very important to 5 = low importance, respectively). Results are based on 25 completed questionnaires

Missing Skill	Frequency Missing	Importance of Skill
Policy	1	1
Law	1	2
Economics	1	2
Basic and applied science	3	1
Engineering	2	2
Statistics	2	2
Knowing how legislative process works	1	2
Ability to understand other cultures	1	2
Objective thinking	2	1
How to work with a multidisciplinary team	2	2
Problem solving	2	1
Conflict resolution	1	1
Writing	2	1
Public presentation	2	1
Foreign language ability	1	3
Lateral thinking	1	1

one being the highest importance. Combined results showed that water pollution and population increase were ranked highest in importance.

Only one issue received a rank of three or above (denoting low importance) suggesting there are a multitude of issues facing California's coastal management that are of great importance. This finding is supported by the many items added by participants in the "others" category. Findings from both the discussions and the questionnaire establish that there is a need to address a large group of coastal management issues.

One way to address such needs is to train future regulators through a specialized program. However, presently, most US and California Universities offer a myriad of

specialized environmental, engineering, and policy type programs. The next question to be answered is whether these existing programs adequately prepare graduates for careers in coastal management.

The question of adequate preparation was asked in both group discussions and more formally by the questionnaire. Determining what fields are actually necessary in regards to coastal management is the first step in answering this question. The discussion groups talked about a very diverse group of skills sets including, physical and biological sciences, quantitative skills (such as statistics), historical/global perspectives, ecosystem function, risk management, GIS, communication skills, out-of-the-box thinking, and politics. Such a list shows why a non-integrated graduate program cannot

meet the needs of coastal management. An integrated program would allow an individual to recognize most, if not all, of the pieces of a puzzle.

The responses to the questionnaire support this idea. Seventy-one percent of the respondents have hired a recent graduate to work on an aspect of coastal management. Sixty-seven percent of these graduates have degrees in the biosciences and 54% have environmental science degrees. Also represented were the physical sciences (29%), engineering (21%), geography (21%), social sciences (21%), and law (13%). Here, one can see that a range of people are needed and hired. However, these graduates were often missing a number of important skills as seen in the responses to question four. (“What sets of skills are typically lacking in advanced degree holders that might require on-the-job training” and highlighted in Box 2). The missing skills were: policy, law, economics, the ability to understand other cultures, conflict resolution, ability to understand the legislative process and lateral thinking. Of these skills, policy, conflict resolution and lateral thinking were also seen as critically important skills for practitioners. Being trained in more than one area allows students to approach problems laterally integrating more than one perspective.

Another important question pertains to the future demand for graduates of an ICM program. Both the discussion groups and the questionnaire dealt with this issue. In the questionnaire, 88% of respondents answered yes to the question: “Will your agency hire more coastal management graduates in the next five years?” Of those responding “Yes,” the individuals estimated they would

hire 301 total graduates, which represents about 14.3 per agency. The results inferred from the discussions were not as clear but also suggested a future need. All three groups talked about the sectors where jobs would be available and included in their list consulting, NGO’s, government, transportation, tourism, and private industry.

However, the groups then somewhat contradicted this finding when, in addressing the need for future hires in specific companies and organizations, they did not report such a high demand. For example, the orange group talked about the fact that governments would find it almost impossible to hire graduates with a coastal management degree program background. There are currently restrictions on hiring certain types of graduates for government jobs and this issue would need to be resolved before some agencies could hire ICM graduates. This discrepancy must be investigated and addressed.

**Box 3.** Answers to Questions 6 and 7 on the Questionnaire:

Numbers of Participants answering “Yes” to the question: Do you expect to see an expansion in the job market for ICM postgraduates in the coming 5-10 years?

<b>Level:</b> International	<b>21 (88%)</b>
National Level	<b>20 (83%)</b>
Local	<b>19 (79%)</b>
State	<b>8 (33%)</b>

What types of jobs would you anticipate coastal management postgraduates (masters and PhD) to qualify for?

<b>Sector:</b> Business	<b>18 (75%)</b>
Government	<b>22 (92%)</b>
Academic	<b>14 (58%)</b>
NGO	<b>19 (79%)</b>

The next questions in this process will be to determine how to implement such a

multidisciplinary ICM program in the UC system and possibly with links outside. Question five from the questionnaire's supplementary questions addressed this point with respect to UCLA. ("What are the advantages and disadvantages of headquartering an ICM program at UCLA?"). The Red Group also went a step further and examined where such an ICM program could be located and why.

UCLA has been suggested as a school that could develop such a program with linkages to other UC schools, such as Santa Barbara and Berkeley, which also have strengths in teaching and research with respect to coastal issues. Participants listed some benefits of centering the school at UCLA including reputation, proximity to critical issues, motivation, and that the momentum already exists. Some disadvantages include, structural and cultural issues, lack of faculty in certain important ICM areas, resource limitations, distance from Sacramento, and that there may be competition from other UC campuses.

Because of the need for a graduate program in ICM, a second meeting of all interested universities was recommended to determine how to set up the program. The next meeting of state, academic, and private sector participants will focus on program development, linkages, content, internships and financial support.



## Recommended Action Plan

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There is a compelling need to develop a graduate level ICM program in the state of California. To meet this need an Action Plan has been outlined below.

An ICM Working Group will be established to design the graduate program. The Group will need to examine questions of location, breadth of the program, faculty support, funding, and linkages with existing programs at California tertiary institutions. The Group should plan meetings that involve California state officials, academic members, and both non-profit and corporate entities that are working within the field of ICM. Involving non-academic stakeholders will ensure that the wider needs of the state of California are addressed, and may also encourage support from the outside community both in terms of funding and direct assistance.

The Group will consider what type of programs (i.e. Masters, PhD, certificate) will best meet the state's needs. There were differing opinions among the Workshop participants. The Institute of the Environment at UCLA has demonstrated an interest in developing such a program and the Group should consider whether this would best meet the state's needs. UCLA has the advantage of having many established professional schools and relevant faculty. As pointed out in the results discussion, UCLA's location in Southern California might focus a management program to Southern California issues. Choosing a Northern California school, however, would create the same problem. There may, in fact, be room and need for more than one program and planning for any program should begin immediately.



Factors Involved in Developing Program/Questions To Be Answered	Action	Preliminary Timeline
Is there a need for a separate and distinct Coastal Management graduate level program in California?	Analyze results from first meeting. Contact employment departments, heads of organizations to ascertain future job market. Contact undergraduate Career Centers at California schools to poll student interest in said program.	July 2002
Working Group Establishment	Contact interested parties and representatives from Government, academia, and the business sectors.	October 2002
Larger Group Establishment	Identify and contact other individuals to be involved on larger development questions.	October 2002
If need, Is there support?	Contact all parties interested and hold meeting. Contact State agencies and Universities to ascertain support.	Nov 2002
What factors should be addressed in looking at establishment?	What level? Which campuses? Unique Program or as part of an existing program? Involvement from the state? Choose courses	Jun-03



# Appendix

## I. Working Group Discussions and Questionnaire

The findings of the three working groups (called Red, Orange and Yellow) are presented below. Each Group included representatives from each sector (academia, private sector, NGO, government). Each group structured their discussions slightly differently, but all answered the main questions:

1. What are the coastal management issues seen as most pressing in the coming five to ten years by academics and staff of government agencies, NGOs and corporations?

2. What is the estimated need in academia government, NGOs, and corporations for coastal management graduate degree holders (Masters and PhD) in the coming five to ten years at the state, national, and international levels?
3. What skills do current graduate degree holders/hires lack?
4. What skills should a coastal management graduate degree program provide?

The Red Group additionally addressed a specific graduate program.

## Yellow Group

**Led By:** Stephen Olsen

**Participants:** Jae Cheung, Beth Jines, Debora Smith, Michael Weber, James Noblet, Linda Duguay, Leigh Taylor Johnson, Richard Murphy, William Hamner, Richard Ambrose, James McWilliams, Anthony Orme, Cathie Magowan, Caroline Pomeroy

### 1. Coastal Management Issues

#### Larger CA Needs:

- Outdoor Recreation (Impacts/Sustainability)
  - Fishing
  - Boating
- Demographics
- Water Pollution/Water Quality
- Habitat Degradation
- MPAs/No Take MPAs
- Conflicts among user groups
  - Process to resolve conflicts
  - Linkages among issues
- Watershed Management
- Energy Crisis- increase power plant production
- Decreasing Sand Supplies
- Transportation Impacts
  - Coastal Transport (Commerce)
- Institutional Problems
- Inability for Multi Agency Cooperation
- Communication
- Equity Issues (Cost/Benefits)
- University/Academic Inertia
  - Disconnect Between Academic Research Funding and Management Needs
- Changing Human Behavior
- Need to Link Top to Down



### Specific Institutional/Social Issues:

- Public Awareness
- Research in Service of Management (Applied vs. Basic)
- Population Diversity
- Failure of Managed Fisheries

### Specific Environmental Issues:

- Population Growth
- Loss of Biodiversity
- Water Quality
- Loss of Critical Habitat
- Over-fishing
- Invasive Species

*All of these issues have both social and environmental overlaps*

## **2. Coastal Management Needs**

### Larger Needs in CA:

- Retraining of Professionals (See UW Data- increase percentage already full time while pursuing MS/PhD
  - Motivation for pursuing MS/PhD
  - Career/Salary vs. Knowledge
- National Science
- Need Social Science skills and Vice Versa
- Cross-Disciplinary Communication
- Program with Range of Specialties
  - Certificate, Masters, etc.
  - Professional Development/ Continuing Ed
- Other Fields Imparting Some of the Knowledge of ICM to be typed

### Specific Skills and Needs:

- Culture of “out of Box/Non Status Quo” Thinking
- Problem Solving Skills
- Leadership and Inspiring Others
- Administrative Abilities
- Writing/Reading for Policy/Eas/EIAs
- Communicate for Diverse Audience
- Project Management Skills
- Fundraising/Grant Writing
- Conflict Resolution/Negotiation
- Transparency in Decision Making
- See “Big Picture” over Various Scales Including Feedback and Interaction
- Application of Science Method to Public Policy
- Evaluation Research
  - Outcome Evaluation
  - Summative Evaluation
  - Performance Evaluation

### Specific Knowledge Needs:

- Ecosystem Function (Broadly Defined)
- Assessments
- Economic Valuations
- How to Integrate Across Environment/Social/Governmental Functions
- Global Perspective
- Quantitative Skills
  - Stats/Modeling

- Data Management
- Environmental Justice/Diversity Training/Cultural Sensitivity
- Historical Perspective
- Applied Economics to Evaluation Management
- Environmental Law and Policy
- Risk Management and Prioritization
- Physical Science Related to
  - Oceanography
  - Hydrology
  - Fluid Mechanics
  - Abiotic/biotic

Domestic Needs vs. International Needs:

- Local Capacity (training at UCLA networked with oversea universities?)
- Recognition of Regional Needs
- Countries with Similar needs/issues to CA

**3. Types of Jobs to Be Available**

- Consulting
- NGO's
- Govt: Federal, State, Municipal
- Private Industry (Both Overseas and US)
- Transportation
- Utilities
- Aquaculture
- Tourism (Development)

# Orange Group

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**Led By:** Madelyn Glickfeld

**Participants:** Bryant Chesney, Chris Potter, Dennis Dickerson, Marianne Yamaguchi, Delores Wesson, Jodi Cassell, Steve Fleischli, Michael Stenstrom, Felicia Federico, Stanley Trimble, Richard Vance, Michael Vincent McGinnis, Dianne Cashin

## 1. Issues Facing Coastal Management:

### Larger California Issues:

- Lack of Category—Coastal hazards, Sea Level Change etc
- Southern CA—Characterization of the disturbance, Southern CA Bight Ecosystem
- Ecological Literacy
- Water Pollution, top priority
- Biodiversity Conservation, High
- Urban Development, High

### Training Issues:

- Students do not know regulatory framework
- Scientists: No training on policy, thought to be a low priority need
- Few Coastal Policy people on UC Staff
- UC resistance to change on integrated programs, funding, getting scientists to work together, tenure issues, interdisciplinary journals looked down upon.

## 2. Coastal Management Needs:

### Important Skill Sets Needed:

- Integrators
- Communications—Public Presentations
- Policy development
- Understanding politics
- Leadership training, people management
- Conflict resolution/negotiation skills
- Need for tailored courses for breadth vs. depth
- GIS training
- Project management
- Implementation of Law
- Human dimensions of ocean and coastal Resource Management

### Training Needs:

- Regulatory process
- Writing/communications
- Public presentations
- Problem solving
- Conflict resolution/negotiation
- Instilling a sense of dedication
- Modeling systems

*In general, students and applicants have adequate technical training*

### 3. Types of Jobs to Be Available

#### Agencies, Will they need ICM Graduates?:

- California Department of Fish and Game:  
No, hire Specialists
- Sea Grant: Some, Not a lot of ICM related programs, mostly through research but did hire a few
- Surfrider: No, Volunteers
- UCSB: All research assistants- specialty
- USC Sea Grant: Yes, about 3 per year
- UCLA Geography: Yes 8 in 5 years
- ISSUE: Hiring ICM background at Government Agencies nearly impossible due to requirements
- JCCC: Yes, 2 PhD's, 15 MS in 5 years

#### Where does ICM fit in?:

- Academic:
  - Very few faculty and researchers
  - Issue--- universities need to hire more
- NGO's:
  - Environmental groups—not that many jobs. Need help but can only pay so much. NGO's might be a good place for internships, volunteer work
- International
- Consulting
  - National- Consulting-TMDLs
  - Need across the board is clear
- Government:
  - Fisheries Management and ESA issues
  - Regional Coastal Planning and watershed management
- NGO's growing a lot. TMDLs, fisheries, and watershed management
- National Marine Sanctuaries- mostly biologists
- State
  - HCCP, Coastal Commission TMDLs, Storm water, non point source pollution,
  - Local, quasi governmental. JPAs, watershed management groups, conservancies
  - Issue—setting up a multi jurisdictional planning process
  - Local, environmental Compliance

# Red Group

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**Led By:** Mark Gold

**Participants:** Arthur Baggett, Charles Damm, Marija Vojkovich, Russell Moll, Phyllis Grifman, Donald Shulz, Ralph Appy, Steve Gaines, Malcolm Gordon, Philip Rundel, David Gulko, Gayle Byock

## 1. Issues Facing Coastal Management:

### California Environmental Issues:

- Loss of biodiversity
- Water Quality—Watersheds
- Habitat Loss
- Over-fishing
- Invasive species
- Population growth

### Institutional/Social Issues:

- Institutional problems
  - Multi agency cooperation
  - Communications
- Changing human behavior
  - Public awareness
- Equity issues
- Management
  - Fisheries failing

*All of these issues have both social and environmental aspects.*

### State Issues:

- Coastal dominant economy, population, culture, lifestyle
- Good surf
- Weather
- Lots of coast, very diverse habitats
- World Heritage Site—Channel Island
- UN Hotspot of Biodiversity
- 2<sup>nd</sup> most aquatic endangered
- Huge number of people working on coastal issues
- Progressive regulations and Policies
- Diversity of coastal Issues

*Historic willingness to fund Coastal Management and Protection*

### Additional Problems:

- Outdoor recreation
  - Boating, Fishing, Tourism
- Watershed management
- Energy crisis
  - Power plant impacts
- Decreased sand supplies
- Transportation impacts
  - Lands
  - Ocean (commerce)
- MPAs (no-take areas)
  - Conflict among user groups
  - Process to resolve conflicts

## 2. Coastal Management Needs:

### Motivation:

- Retraining professionals
- Natural scientists need social scientist skills and vice versa
- Cross disciplinary communication

### Coastal Management Program

- Range of objectives
  - MS/PhD, certificates, professional development, continuing education
- Draw on expertise/experience from other fields

### Professional Skills:

- Out-of-the-box thinking
- Problem solving skills
- Leadership (Courses)
- Administrative abilities
- Writing/reading for policy
- Communication for diverse audience
- Project management skills
- Fundraising/grant writing
- Conflict resolution/negotiation

### Knowledge:

- Ecosystem function
  - Broadly defined
- Physical sciences
  - Oceanography, hydrology, fate and transport
- Quantitative skills
  - Statistics, modeling, data management
- Economics
  - Economic evaluation, management alternatives
- Environmental law and policy
- Risk management and prioritization
- Environmental justice, diversity training, cultural sensibility
- Historical perspective
- Global perspective
- Adaptive management
  - Evaluation (outcomes vs. performance)

## 3. Jobs to Be Available

- Government
  - Federal (including Military)
  - State
  - Municipal
- Consulting
- Private Industry
  - Transportation, utilities, aquaculture, tourism
- NGO's
- Domestic/International
  - Need to increase local capacity training at UCLA and networked w/overseas universities
  - Issue: Setting up multi-jurisdictional planning processes
- Local
  - Environmental Compliance
  - Governmental and Consulting
  - Conservancies and NGO's

Who will be hiring (Among agencies represented)?

- CA Fish and Game
- Institute of the Environment (Not hiring)
- Surfrider
- University of Southern CA
- Sea Grant Network
- UC Santa Barbara (Not hiring)
- POLA (Port of LA)
- CA Coastal Commission
- Heal the Bay

*\*\*Only CA Coastal Commission will hire a significant number but the numbers of each type of employer is large*

How will represented agencies contribute?

- CA Coastal Commission—Internships; Hire Grads
- POLA—Student workers; Hire grads (tough); Help teach a class
- UC Santa Barbara—workshops, ICM and Southern California Bight; Strengthening watershed management and biodiversity plans; Internships
- Surfrider—Provide projects such as mapping and monitoring; Help out University; provide help for student members
- CA Dept. of Fish and Game—Internships; Help on lectures and workshops; Advisors and Mentors; Provide case-study materials
- Heal the Bay—Internships; Volunteer opportunities, teaching; Allow use of data; Career counseling

**4. Is there a need for an ICM Program? Is it appropriate to be located at UCLA?**

- Yes, major coastal management decisions will happen in CA; no matter what UC should have an influence over them.

What are the obstacles/issues?:

- Deciding role of science in coastal resource management
- Lack of integrated planning—huge problem
- Private foundations and government funding can help pay for it
- Need an entrepreneurial approach across campuses

Multi-campus Issue:

- No: Should not be multi-campus—very few really work, universities operate too independently.
- But, politically, if it's not multi-campus, it won't happen

Timeframe

- Masters program—2-3 years
- Doctoral—4-5 years

Needs:

- Money
- Social alliance across campuses
- Demonstrate demand at graduate level  
(Needs analysis)
- A leader with clout statewide and at Murphy
- Obstacle—getting University resources for multidisciplinary program in department structure

UCLA:

- Resources are here
- Lack coordination and leadership
- Leadership at Murphy and beyond
- Need for letters of support at all levels
- UCLA structural and cultural issues
- Lack of faculty/depth in many important areas



## II. Questionnaire Results

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The results of the questionnaire are tabulated below. Answers are given in bold and if the response was numerical, the average is given. A brief discussion of some of the major results is also presented.

### Workshop on Educating CA Coastal and Ocean Managers

September 28, 2001

UCLA, IOE

#### Section I. Needs Assessment

- 1) What are the major coastal and ocean management issues facing California and your agency (or that you encounter in your work)? Please prioritize with respect to what you believe are the most important problems to solve. "1" being highest priority and "5" being the lowest. You can use a number more than once.

**Here, the average response was recorded.**

#### A. California Problems

2 Biodiversity conservation/endangered species  
2 Air pollution  
1 Water pollution  
2 Solid waste  
2 Invasive species  
2 Open space  
2 Residential development  
2 Urban development  
2 Offshore oil  
3 On shore oil  
2 Transportation  
1 Population increase  
2 Fisheries  
2 Wetlands  
2 Forest cutting  
Other (Pls list)

**Results: Water Pollution and Population got the highest ratings, but all categories received high ratings.**

#### B. Your agency (or work)

1 Biodiversity conservation/endangered species  
3 Air pollution  
1 Water pollution  
3 Solid waste  
2 Invasive species  
2 Open space  
2 Residential development  
2 Urban development  
2 Offshore oil  
3 On shore oil  
2 Transportation  
2 Population increase  
1 Fisheries  
2 Wetlands  
3 Forest cutting  
Other (Pls list)

**Results: Water pollution, fisheries, and biodiversity were viewed as the most pressing ICM issues in California.**

#### **"Other" Issues included:**

**In A. California Problems: energy supplies, power plant impacts, global warming, coastal education and public awareness, environmental governance, watershed management, regulatory complexity, coastal hazards, allocation issues, sand supplies, and recreation.**

**In B. Your Agency: Lack of state watershed programs, marine and coastal recreation impacts/sustainability, public awareness, habitat degradation, coastal hazards, industrial impacts, sustainable energy supplies, watershed management, and research funding.**

- 2) Have you or your agency hired (or your department produced) recent postgraduates (masters and/or PhD) who deal with coastal management issues (using our broad ICM definition) as part of their work?

No 4

Yes 18 (71%) If yes, how many over last five years? Total= 204 Average= 12 per agency

- 3) If yes, what types of degrees do they have?

16 Biological science

7 Physical science

5 Engineering

5 Geography

5 Social science

3 Law

13 Environmental science

- 4) What sets of skills are typically lacking in advanced degree holders that might require on-the-job training? Please first rank based on frequency of missing skills set (1 = frequently missing to 5 = infrequent) and then a second time by the importance of that missing skills set (1 = very important to 5 = low importance).

**Here, the average response was recorded.**

<u>Frequency</u>	<u>Importance</u>	<u>Missing Skill</u>
1	1	Policy
1	2	Law
1	2	Economics
3	1	Basic and applied science
2	2	Engineering
2	2	Statistics
1	2	Knowing how politics really works e.g. the legislative process
1	2	Ability to understand other cultures
2	1	Objective thinking
2	2	How to work with a multidisciplinary team
2	1	Problem solving
1	1	Conflict resolution
2	1	Writing
2	1	Public presentation
1	3	Foreign language ability
1	1	Lateral thinking

**Interpretation: Policy, conflict resolution, and lateral thinking were all seen to be high priority needs that are usually missing.**

Other:

**Regulatory process, Overall balance of skills, Conceptual/critical thinking, Modeling systems, People management, leadership, and GIS training.**

- 5) What skills sets (if different from '4' above) would you like to see graduate degree holders have that they do not presently have?

**Large scale planning, policy analysis, coastal planning, marine management, applied ecology, conservation policy, restoration ecology, regulatory framework, negotiation, cultural literacy, socio-political climate understanding, communication, mediation skills, media relations, grant-writing and writing skills**

- 6) What types of jobs would you anticipate coastal management postgraduates (masters and PhD) to qualify for?

18 Business  
22 Government  
14 Academic  
19 Environmental (NGO)

- 7) Do you expect to see an expansion in the job market for ICM postgraduates in the coming 5-10 years?

	<b>Yes</b>
International	<b>21</b>
National	<b>20</b>
Local	<b>19</b>
State	<b>8</b>

- 8) If yes, what types of new jobs do you expect to be added?

**International—Big growth in consulting**

**National—Ecosystem planning**

**State—Coastal commission, legislative regulatory boards**

**Local—CEQA compliance**

**Others: Ports/transportation, fisheries, invasive species, planning boards, GIS database, K-12 teacher training, technology, modelers, compliance assurance**

- 9) Do you expect your agency (or an agency you know) to hire more ICM postgraduates in the coming 5 – 10 years? **21** Yes      **2** No

- 10) If yes, can you “guesstimate” the numbers per year?

**Total response of 301 based on a 10-year cycle or an average of 14.3 per agency**

- 11) Given that California:

- is part of the Pacific Rim,
- has the 7<sup>th</sup> largest economy in the world,
- consumes an a lot of global resources,

- produces significant levels of pollution,
- and that many of the environmental problems affecting coastal areas are regional or global in nature,  
should California be doing more to offer ICM education for international grad students – mid-career professionals?   **21** Yes        **0** No

12) Does California have any special attributes that make it a good place to provide postgraduate education in ICM?

**Population Growth, 1100 miles of Coast, Second in highest number of aquatic species that are endangered, Diversity in Coastal Issues, “Real-World” problems for case-studies, Great Deal of Interest in Environmental Issues, Biodiversity threatened, Population pressures, Major Shipping Activities, and CA Border issues are unique**

13) What role do you see your institution/business/agency in setting up a grad program in ICM in California?

**Internships, Grant Support applied to student research, Teaching Classes, Volunteer Opportunities, Career Counseling, Advisory, Could assist in making changes to civil service classification, Cousteau Name, Link UCC/Wrigley Station, Teach Courses, Hiring Graduates, and Provide workshops at UCSB/Bren School**

14) What role, if any, would you like to personally play in this process?

**Provide speakers for practical “real world” experience, Outreach to Faculty/Programs, Advisor, Help with Curriculum, Facilitate where appropriate, and Teach Courses**

Other Questions (if you have time)

1) Is it appropriate for UC to offer a professional degree in ICM?

**Yes: 20**

2) Would a multi-campus approach to ICM grad training work? Any existing models?

**Yes: 11    No: 3**

3) What is a realistic goal for setting up such a program? 2-3 years? **10** 4-5 years? **3**

4) What steps do you suggest are needed to set up such a program?

**Funding, leadership, seek changes to State Civil Service Classification, partner with the Resources Agency/CAL EPA, UC Support, create a task force of NGOs/Governments/businesses, develop a purpose and a mission statement, start planning now with or without state support, develop agency links and linking activities, develop courses**

5) What are the advantages and disadvantages of headquartering an ICM program at UCLA?

**Advantages: Reputation, proximity to critical issues, motivation, momentum already**

**exists, IOE exists as a multidisciplinary organization, Southern CA Perspective: would require concerted effort to develop central and Northern CA understanding.**

**Disadvantages: Structural and cultural issues, lack of faculty in certain important ICM areas, lacks coordination, resources may be limited, far from Sacramento, may be competition from UCI, UCSB, UCSB**

### III. Workshop Program

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8:00 - 8:30	Coffee and Doughnuts	
8:30 - 8:40	Welcome	Chih-Ming Ho, Assoc. Vice Chancellor, Research
8:40 - 9:00	CA Coastal and Ocean Management	Mary Nichols, Secretary, Resources Agency
9:00 - 9:10	Institute of the Environment (IOE) and the Coast	Arthur Winer, IOE
9:10 - 9:25	Workshop Goals and Procedures	Gregor Hodgson, IOE
9:25 - 9:40	Issues and Training Needs: University	Stephen Olsen, Coastal Resources Center
9:40 - 9:55	Issues and Training Needs: State	Chuck Damm, CA Coastal Commission
9:55 - 10:10	Issues and Training Needs: Corporate	Ralph Appy, Port of LA
10:10 - 10:25	Issues and Training Needs: NGO	Mark Gold, Heal the Bay
10:25 - 12:00	Group break-out Session 1: Major Coastal and Ocean Management issues?	
12:00 - 1:30	Lunch	
1:30 - 3:30	Group break-out Session2: Skills needed and numbers?	
3:30 - 3:50	Coffee break	
3:50 - 4:30	Presentation of group results to Workshop	
4:30 - 5:00	Summary of Workshop Conclusions and Recommendations for Action, Chaired by Gregor Hodgson	
6:00 - 8:00	Cocktail Reception, UCLA Discovery Center	

## IV. Workshop Participants

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	Name	Title	Agency
1	Richard Ambrose	Associate Professor	UCLA; ESE, EHS
2	Ralph Appy	Assis. Dir., Env. Management	Port of LA
3	Arthur Baggett	Chair	State Water Resources Control Board
4	Gayle Byock	Assistant Vice Chancellor	UCLA Chancellor's Office
5	Beth Cardella		Irvine Group
6	Diane Cashin	Assis. Dir., Federal Relations	UCLA Government & Community Relations
7	Jodi Cassell	Marine Advisor	CA Sea Grant
8	Bryant Chesney	Fishery Biologist	National Marine Fisheries Service
9	Jae Chung	Project Manager	Army Corps of Engineers
10	Charles Damm	Senior Deputy Dir.	Coastal Commission
11	Gary Davis	Science Advisor	US National Park Service
12	Dennis Dickerson	Executive Officer	Regional WQ Control Board
13	Linda Duguay	Director	USC Sea Grant
14	Felicia Federico		UCLA; Geography
15	Steve Fleischli	Executive Director	Santa Monica Baykeeper
16	Steve Gaines	Director	Marine Science Institute
17	Madelyn Glickfeld	Assis. Sec., Resources Agency	State of CA, Resources Agency
18	Mark Gold	Executive Director	Heal the Bay
19	Malcolm Gordon	Professor	UCLA; OBEE
20	Phyllis Grifman	Assistant Director	Sea Grant
21	David Gulko	Aquatic Biologist	Dept. of Land and Natural Resources Hawaii
22	William Hamner	Professor	UCLA; OBEE
23	Robert Hight	Director	Department of Fish and Game
24	Gregor Hodgson	Dir. Reef Check, Visiting Prof. IOE	UCLA; IOE, Reef Check
25	Beth Jines	Assis. Sec. for Water Prog.	CAL EPA
26	Leigh Taylor Johnson	Marine Advisor	CA Sea Grant
27	Jennifer Liebeler	Program Manager	Reef Check
28	Cathie Magowan	Coord., Science & Technology	UCOP Office of Research
29	Lena Maun	Conference Coordinator	UCLA; EHS
30	Michael Vincent	Director	Ocean and Coastal Policy Center
31	James McWilliams	Professor	UCLA; Atmospheric Science/IGPP
32	Russel A. Moll	Director	CA Sea Grant
33	Richard Murphy	Dir., Science & Education	Ocean Futures Society
34	Mary Nichols	Secretary	CA State Resources Agency
35	James Noblet	Senior Scientist	SCCWRP
36	Stephen Olsen	Dir., Coastal Res. Center	University of Rhode Island
37	Anthony Orme	Professor	UCLA; Geology
38	Caroline Pomeroy	Research Scientist	UCSC; Institute of Marine Sciences
39	Chris Potter		CA State Resources Agency

40	Philip Rundel	Professor	UCLA; OBEE
41	Mary Shallenberger	Environmental Advisor	CA State Senate
42	Don Shultz	PE	Surfrider
43	Debora Smith	Assis. Exec. Officer	Regional WQ Control Board
44	Stenstrom	Professor	UCLA, Civil and Environ Eng
45	Stanley Trimble		UCLA; Geology
46	Richard Vance	Associate Professor	UCLA; OBEE
47	Marija Vojkovich	Southern CA Manager	Dept. of Fish and Game
48	Michael Weber	Marine Advisor	CA Fish and Game Commission
49	Delores Wesson	Deputy Director	CA Sea Grant
50	John Westermeier	Principal	Jones and Stokes
51	Arthur Winer	Professor	UCLA; ESE, EHS
52	Marianne Yamaguchi	Director	Santa Monica Bay Restoration Program



# V. California and Nationwide Graduate Programs in Coastal and Ocean Management

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## Introduction

This review is being presented as a resource to give you a better perspective of the scope of graduate programs related to coastal and ocean management both in California and elsewhere. To develop this document, we searched for elements of Coastal Management in existing graduate programs including science, policy, engineering, law, economic, and social programs relating to the marine and coastal environments. Programs were then evaluated for supporting resources such as faculty interests, research centers, interdisciplinary programs, and student interests. Programs are separated by schools, departments, and levels (Masters vs. PhD vs. professional).  
California

**Please note:** Much of the information gathered on these programs was gathered from websites for each university. Please refer to the website for further information.

## California

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### University of California, Santa Cruz

1. **Ocean Sciences**  
M.S. Marine Sciences/PhD

**Focus:** Multidisciplinary approach to Ocean Sciences

**Students:** NA

**Faculty:** 8 Core, 39 Affiliated

**Resources:** Joseph M Long Marine Lab, Año Ntievo Island Field Station

Students in this program study under both the core Ocean Sciences faculty and faculty from related disciplines within Biology, Chemistry, Earth Sciences, **Environmental Studies**, and Physics. Graduates from the program are prepared for research or management positions, become marine science educators, or enter doctoral programs in ocean sciences and related fields.

2. **Environmental Studies**  
MS, PhD

**Started:** 1994

**Focus:** Stresses interdisciplinary learning to deal with complex social and ecological problems.

**Students:** 39

**Faculty:** 8 Core, 39 Affiliated

**Resources:** Monterey Bay Regional Studies Group, Center for the Dynamics and Evolution of Land and Sea Interface

**The Environmental Studies Program at UCSC stresses interdisciplinary learning to deal with complex social and ecological problems. Students have strong backgrounds and significant experience in fields such as ecology, environmental management, environmental education, and environmental advocacy. The program focuses on the interplay of two areas: ecology and social science. Ecology includes conservation biology and agro-ecology while social science includes the environmental policy analysis and political economy of the environment. Graduate students and faculty in the environmental studies program focus their research in both disciplinary and interdisciplinary fields.**

Interdepartmental research initiatives at UCSC include the Center for Justice, Tolerance and Community, **Center for the Dynamic and Evolution of the Land-Sea Interface**, the Center for Global, International and Regional Studies, the Agro-Food Studies Research Group, and the Center for Conservation Science and Policy.

Particular areas represented in faculty and student research in our program include **restoration ecology; fisheries management**; the integration of modeling and experimental approaches to individual behavior and population dynamics. The program maintains connections with organismal and population biologists elsewhere on campus (e.g., the Departments of Ecology and Evolutionary Biology, **Ocean Sciences**, and Earth Sciences) and in regional public and private resource management agencies

### **University of California, Santa Barbara**

#### **1. Donald Bren School of Environmental Management** MESM (Master's of Environmental Science and Management)

**Started:** 1996

**Focus:** The Bren School's mission is to play a leading role in researching environmental issues, training research scientists and professionals, and identifying and solving environmental problems.

**Students:** 90 Masters, 50 Ph.D **Faculty:** 17 Full time

This program is a two-year professional degree designed for individuals wanting to enter the workforce following graduation. Students who have graduated from the program have found employment with government agencies (regional, state, and federal), corporations, non-profit organizations, and environmental consulting firms. The program includes both broad education goals as well as areas of specialization. MESM students choose one of the following specializations during the first quarter of their first year:

- Conservation Planning
- Corporate Environmental Management
- Environmental Economics & Policy
- Environmental Information Management
- **Marine Resources Management**
- **Pollution & Waste Management**
- **Water Resource Management**

**2. Interdepartmental Graduate Program in Marine Sciences**  
M.S./Ph.D

**Started:** 1996

**Focus:** Interdisciplinary program to address modern marine science and the necessity for cross-disciplinary graduate-level training.

**Students:** 35 students Fall 2001

**Faculty:** Thirty-six from seven departments

**Resources:** Marine Science Institute

The Marine Science Program at UCSB encompasses many of the traditional disciplines including biology, geology, chemistry, physics and engineering while including an interdisciplinary perspective of the ocean as all integrated system. This graduate program brings together 36 marine faculty located in 7 departments on the UCSB campus to accomplish such goals. Students typically pursue areas such as biological, chemical, and physical oceanography, marine optics and remote sensing, marine geology and geophysics, marine biology, paleoceanography, ocean engineering and **marine policy**. Some students focus on a particular disciplinary area for their research (e.g. biological oceanography, marine geology, ocean physics, etc.). Others complete interdisciplinary dissertations involving expertise in two or more sub-disciplines within marine science.

**University of California, San Diego**

**1. Applied Ocean Science**  
Ph.D.

**Focus:** Applied Ocean Science (AOS) is an interdepartmental Ph.D. program focusing on how people use and affect the sea.

**Students:** N/A

**Faculty:** 20

**Resources:** Marine Physical Lab, Center for Coastal Studies

Applied Ocean Science (AOS) is an interdepartmental Ph.D. program focusing on how people use and affect the sea. It is administered by an interdepartmental group composed of members of the faculties of cooperating departments: the Graduate Department of the Scripps Institution of Oceanography (SIO), the Department of Mechanical and Aerospace Engineering (MAE), the Department of Structural Engineering (SE), and the Department of Electrical and Computer Engineering (ECE).

Students become trained in modern engineering and instrumentation, as well as marine science through this interdepartmental curriculum, which uses resources from all involved departments. Since physical, chemical, geological, and biological aspects of the oceans and all forms of engineering may be involved, the curriculum allows some flexibility in regards to areas of specialization.

**2. Scripps Institute of Oceanography**  
M.S., Ph.D.

**Focus:** Multidisciplinary approach to Oceanography

**Students:** N/A

**Faculty:** 126

**Resources:** Scripps Research Vessels, World-Renowned Labs, Center for Coastal Studies, CA Coast Ocean Observation

Scripps is well known for their Oceanography Research and work. The graduate program uses a multidisciplinary approach to Oceanography by spanning many sciences including physics, chemistry, geology, biology, meteorology, climatology and paleontology. Scripps scientists are noted for the diversity of their research and have helped pioneer exploration of the world's marine environments. Studies include climate change, plate tectonics, ocean circulation, marine biology and ecology, marine pharmaceuticals, seafloor mapping, seismology.

The graduate department of Scripps Institution of Oceanography offers instruction leading to Ph.D. degrees in Oceanography, Marine Biology, and Earth Sciences. A graduate student's work normally will be concentrated in one of several curricular programs: Applied Ocean Science, Biological Oceanography, Climate Sciences, Geological Sciences, Geophysics, Marine Biology, Marine Chemistry and Geochemistry, and Physical Oceanography. The interdisciplinary nature of research in marine and earth sciences is emphasized; students are encouraged to take courses from various UCSD departments, and to consider interdisciplinary research projects.

**University of California, Berkeley**

**1. Department of Environmental Science, Policy and Management**  
MS, PhD

**Focus:** Interdisciplinary while focusing on a main area of study

**Students:** N/A

**Faculty:** 19

**Resources:** Blodgett Forest, Russel Reservation

The Department of Environmental Science, Policy and Management is an interdisciplinary program based on extensive understandings and specific areas of specialization. Students in this program choose from four broad areas:

- Ecosystem Science
- Forest Science
- Insect Biology
- **Resource Institutions, Policy, and Management.**

Students then choose an area of specialization within the context of the disciplinary emphasis. Some examples of areas include: Microbial Community Ecology, Ecosystem Function, American Environmental History and Policy, International Forest Management, Biogeochemistry, Mediterranean Grassland Ecosystems, Remote Sensing, and Forest Management.

## **2. Interdepartmental Graduate Group in Range Management** **MS**

The graduate program is administered by an interdepartmental group of faculty members from the Department of Environmental Science, Policy, and Management and related departments on the Berkeley campus. The program prepares students with a bachelor's degree in resource management or related discipline to pursue advanced work. Graduate study leads to a Master of Science degree that serves as the basis for a professional career in rangeland management. Fields of specialization include grassland, savanna, and shrubland ecology, rangeland rehabilitation, **wetland ecology**, and rangeland policy.

Excellent laboratory and field facilities are available for student research. These include several experimental range properties and large wildland ranges easily accessible from Berkeley. The faculty members are actively engaged in both theoretical and practical research.

## **3. Ocean Engineering** **M.S., M.Eng., and PhD**

**Focus:** Studying Ocean processes while learning how humans affect these processes

**Students:** 19

**Faculty:** 10

**Resources:** Richmond Field Station, Model Towing Tank, Computational Marine Mechanics Lab, Fluid Mechanics Lab

Ocean Engineering at Berkeley is concerned with learning how the various components of the ocean work and how people can best apply technology to the ocean environment. The program deals with such issues as what humans can do to harness the resources of the ocean in a safe and environmentally responsible way.

Ocean Engineering students find jobs in areas such as the oil/gas industry, shipping/ship building industry, ocean research/exploration, environmental agencies, and government. Because Ocean Engineering is seen as a broad field, the program views successful application of technology in the world's oceans to require a wide knowledge base in such areas as Civil Engineering, Environmental Engineering, Mechanical Engineering, Electrical Engineering, Oceanography, and many others.

Master of Science Degrees are typically completed in a year. Master of Engineering Degrees usually takes two years to achieve. Doctorate Degrees can take from two to four years to complete following a Master's Degree. The program offers a wide range of academic possibilities for students. Being an interdisciplinary study, the Ocean Engineering curriculum has students exposed to numerous engineering and ocean related topics. Students take classes from various different departments on campus and can engage in a wide variety of Ocean Engineering related research topics.

**4. City and Regional Planning Environmental Planning and Policy Concentration  
MCP (Masters City Planning), Ph.D.**

**Started** 1948

**Focus:** The environmental planning and policy concentration is designed to give MCP students both a broad knowledge of the relationship between the built environment and the natural environment.

**Faculty:** 34

**Students:** NA

The environmental planning and policy concentration is designed to give MCP students both a broad knowledge of the relationship between the built environment and the natural environment and specific technical skills that can be applied professionally to solve environmental problems. The program views environmental issues as affecting every aspect of planning. In doing so, the program requires students to have an understanding of history, theory, institutions, economics, law, quantitative and qualitative methods, urban design, and natural factors. The program is particularly concerned with the relationship between human settlements and the natural environment. Students are encouraged to consider how negative environmental impacts can be mitigated through the development of alternative approaches to urban settlement patterns, urban design and infrastructure systems. Both physical planning and non-spatial policy affect environmental planning and policy.

A three-year joint degree program is also available in the Department of Landscape Architecture and Environmental Planning, where students receive both MCP and MLA degrees. Other joint degree programs related to the environment planning and policy concentration include law (with Boalt Hall or Hastings College of Law), Public Health, and Transportation Engineering.

**5. Civil and Environmental Engineering Focus in Coastal Engineering Graduate  
Research in Environmental Engineering  
MS, Ph.D.**

**Started** 1948

**Focus:** The current program is addressing complex problems that require innovative solutions to physical, chemical, and ecological issues across all relevant environmental media including air, water, and soil. **Faculty:** 34

**Students** NA

The main focus of this program is a merging of the fields of Hydraulics and Sanitary Engineering. Historically, the hydraulic program focused on major issues of water resources development in the State of California through surface water impoundments and groundwater utilization. Additional considerations were given to sediment transport, **coastal zone processes related to ports and harbors and hydrologic mixing processes.** The historic sanitary engineering program made a number of advances in applied water chemistry of water distribution systems, pollutant effects on San Francisco Bay, and the operation of advanced wastewater treatment systems. The current program is addressing complex problems that require innovative solutions to physical, chemical, and ecological issues across all relevant environmental media including air, water, and soil. Students also take classes in the departments of Public Health, Public Policy, Chemical

Engineering, Biotechnology, Ecosystem Sciences, Integrative Biology, Atmospheric Sciences, and Energy and Resources.

**Coastal Engineering** in UC Berkeley's Program is interpreted in a broad sense. The program encompasses transport processes in the deep ocean, to the continental shelf, in the near shore and surf zones, in coastal bays and harbors, and in tidal estuaries and in coastal wetlands. Characterization of the marine environment, the circulation, transport and water quality of coastal waters, coastal sediment processes, coastal geomorphology, shoreline evolution, the functional design of coastal structures (such as outfalls, harbors, sea walls, and sand bypassing) and the impact of engineered structures on the marine environment fall within the domain of Coastal Engineering.

**6. Environmental Law Program**  
JD, JD/MS, JD/PhD

**Started:** 1996

**Focus:** Environmental Law is a concentration leading to a certificate offered in Boalt Law School. Included in this concentration is an Ocean Law and Policy Class.

**Faculty:** 10

**Students:** NA

**Resources:** Environmental Law Clinic

Berkeley's Boalt Law School includes a distinct program in environmental law. In this program, students receive advanced training in environmental law. In addition to course work, students write a publishable paper in their third year. Students who meet the requirements are awarded a Certificate of Specialization in Environmental Law. Students may also choose to complete a joint JD/MS or a JD/PhD with concentrations in Environmental Law.

The Environmental Law Program offers a broad selection of environmental law courses, from the basic Environmental Law and Policy to the Advanced Environmental Law Workshop. The curriculum includes Comparative Environmental Law, Energy Law and Policy, Environment and Culture, Environmental Justice, **International Environmental Law**, **Land Use Planning**, Public Lands, and **Water Law**. Specialized seminars in Environmental Enforcement, **Ocean Resources**, Public Trust, and The Takings Clause are also offered.

Boalt also has a Ph.D. program in law and society studies, the Jurisprudence and Social Policy program. Boalt students with a strong interest in environmental law and policy may apply to that program as well. In recent years, the program has produced graduates with J.D. and Ph.D. degrees with specializations in environmental history and law, **natural resources law**, **Law of the Sea**, and occupational safety regulation.

**UC Irvine**

**1. The Water Resources and Environmental Engineering**  
MS, Ph.D.

**Focus:** Focuses on hydrologic modeling, contaminant fate and transport, pollution control technologies, and microbial diagnostics and chemical processes in natural waters

**Students:** N/A

**Faculty:** 5

**Resources:** Environmental Biotechnology Laboratory, Environmental Water Chemistry Laboratory, Laboratory Of Environmental Transport Phenomena And Physicochemical Hydro Dynamics, Soil Water Physics Laboratory, Water Resources & Environmental Engineering Computational Laboratory.

**The Water Resources and Environmental Engineering** graduate program in UCI's Department of Civil and Environmental Engineering focuses on hydrologic modeling, contaminant fate and transport, pollution control technologies, and microbial diagnostics and chemical processes in natural waters. Particular research emphasis is placed on contaminant fate in saturated and unsaturated subsurface formations, coastal surface waters, and atmospheric droplets. Innovative treatment technologies are being developed for drinking water, hazardous and toxic waste, and for water reclamation and reuse. The objectives of the program are to prepare graduates for a career in private engineering firms and public agencies, in research and development, and in academic positions.

## 2. **Social Ecology**

M.A., M.S., M.U.R.P., and Ph.D.

Social Ecology at UCI is an extremely broad subject area and includes crime and justice in society, social influences on health and human development over the life course, and **the effects of the physical environment on health and human** Programs of study leading to the M.A., M.S., M.U.R.P., and Ph.D. degrees are offered. Doctoral students have the opportunity to pursue an individualized course of study in the principles and methods of social ecology, leading to the Ph.D. in Social Ecology, or a specialized course of study that leads to the Ph.D. in Social Ecology with a concentration in Environmental Analysis and Design. Additional programs lead to one of the following degrees: Ph.D. in Criminology, Law and Society; Ph.D. in Environmental Health Science and Policy; Ph.D. in Health Psychology; Ph.D. in Human Development; or **Ph.D. in Urban and Regional Planning**. Master's degree students may elect a course of study that leads to the M.A. in Social Ecology, the M.A. in Social Ecology with a concentration in Demographic and Social Analysis, the M.S. in Environmental Health Science and Policy, or **the Master of Urban and Regional Planning**.

Faculty Research includes human stress, urban growth management and policies, transportation policies, poverty and homelessness, **water quality and water policy**, air quality, biotechnology, epidemiology, the use of scientific information in public policy formulation and litigation, and processes involved in environmental regulation.

### **Master Of Urban And Regional Planning**

The Master of Urban and Regional Planning (M.U.R.P.) program trains researchers and professionals in contemporary methods of planning and policy analysis. The program is fully accredited by the National Planning Accreditation Board and has 14-core full-time faculty. This program views planners as mediators between the market-driven forces of metropolitan change and the environmental, economic, and social impacts of such change.



### **Ph.D. In Social Ecology With A Concentration In Environmental Analysis And Design**

The doctoral concentration in Environmental Analysis and Design prepares students to conduct research on questions of vital importance to professionals in environmental analysis and evaluation, in environmental design and behavior, and on related questions on the formulation of environmental and health policy. These questions reflect an overarching concern with the effects of the natural and built environments on the health and social well being of humans.

### **Ph.D. In Urban And Regional Planning**

The doctoral program in Urban and Regional Planning seeks to train researchers and professionals who will further our understanding of how planning and policy-making can best improve the social, economic, and environmental characteristics of our communities and regions. The curriculum emphasizes the analytic, applied planning, and policy skills required of contemporary researchers. Specializations include community development and social policy, land use policy, economics and public policy, environmental policy and planning, transportation policy, community health planning, **and urban design and behavior.**

## **University of California, Los Angeles**

### **1. Environment Science and Engineering**

D. Env (Doctor Environmental Studies)

**Started:** 1971

**Focus:** To train future environmental professionals to have a broad understanding of the technical, political, and socioeconomic aspects of environmental problems

**Students:** 40

**Faculty:** 5 Core, 20 Associated

ESE is focused on training future environmental professionals to have a broad understanding of the technical, political, and socioeconomic aspects of environmental problems while recognizing the need for each student to have a strong background in a specific scientific or engineering discipline.

The program is administered by the UCLA Interdepartmental Environmental Science and Engineering (ESE) Program, seeks to provide students with a broad understanding of the environment, and the technical and managerial skills of environmental problem-solving. The curriculum consists of formal coursework and interdisciplinary research and is capped with an eighteen to twenty-four month internship in government agencies, national laboratories, industry, or environmental non-profit organizations. More than 180 graduates of the D.Env program now hold permanent positions, many in leadership roles in the environmental profession.

Emphasis is on rigorous science, sound methodologies, and attention to fundamentals. Research may involve laboratory or field studies; or, they may utilize existing databases. Research and instruction recognize the cross connections between **soil, water, air, and biota**, as well as the interdependence of human and ecological health. Equally important, the curriculum emphasizes the interactions and interdependencies between science, economics, and law in the protection of the environment and public health.

**2. Environmental Health Science  
MPH, M.S., Ph.D.**

**Focus:** Focused on the protection of human health from biological, chemical and physical hazards in the environment

**Students:** 45

**Faculty:** 18

**Resources:** UCLA Center for Occupational and Environmental Health

The Department of Environmental Health Sciences focuses its research and educational activities on the protection of human health from biological, chemical and physical hazards in the environment.

Graduates are trained to be capable of identifying and measuring agents of environmental concern; evaluating the health, environmental, and all other aspects of such agents; developing means for their effective management; and evaluating alternative policies directed at improving and protecting environments. Such training is accomplished through several degree programs, which offer specialized study in selected academic areas of environmental health sciences including air quality, environmental biology, environmental chemistry, environmental management, industrial hygiene, toxicology, **and water quality**. Graduates of the department pursue careers in the private or public sector as researchers, educators, managers, policymakers, and/or practitioners.

**3. School of Urban Planning  
M.S., PhD**

**Started:** 1969

**Focus:**

**Students:** 70

**Faculty:** 27

The department's faculty and alumni are recognized intellectual and professional leaders in the provision of public services, transportation, housing and community development, **environmental regulation and resource management**, and regional and international development.

Urban Planning at UCLA is interdisciplinary and has developed an extensive network of affiliation with other campus units. Students are taught applied, action-oriented, and problems-solving research. The department's definition of planning is not limited to the administration of governmental regulations and programs and includes the thought that planners must be involved with questions of political choice. Its graduate programs provide students with a comprehensive and theoretical understanding of multiple forces that shape a community's well being. Through the course work and internships, students acquire the professional skills needed to guide the complex, interrelated processes of social and economic change on any geographic scale.

**4. Environmental Law and Policy Program  
JD**

**Started:**

**Focus:**

**Faculty:** 2 Main

**Students:**

**Resources:** Frank G. Wells Environmental Law Clinic Environmental Law Society and the Journal of Environmental Law & Policy

The main focus of this program is Environmental Law. The Environmental Law course covers major federal statutes such as CERCLA, NEPA, and the Clean Water Act, and exposes students to the law, policy, and politics of environmental regulation. Other courses offered include Land Use Regulation, deals with the relationship between law, planning and development, and Public Resource Law, examining recent trends in land and resource conservation. Other environmental law courses offered at UCLA Law include Toxic Torts, Private Land Use Planning, Directed Research in Environmental Law and Real Estate Finance, and Environmental Law: Regulation of Land Use/Mexico-U.S. Border Zone.

The law school has also arranged for our students interested in environmental law to take related classes in other academic departments. Examples of such courses are seminars in Environmental Studies (Geography Dept.); the Global Environment & Development (Geography Dept.); and Politics, Institutions and the Environment (Dept. of Urban Planning). . Environmental law externships are also offered and include internships at the California Attorney General's office, in the Environmental or Natural Resource Sections, the Natural Resource Defense Council, and the Earthjustice Legal Defense Fund. Students spend an entire semester working for the agency or organization and receive full law school credit.

**CSU Hayward, CSU Fresno, CSU Sacramento, San Francisco State University, San Jose State University, and CSU Stanislaus**

**1. Marine Science**  
MS

As part of the Moss Landing Marine Laboratories (MLML), these schools offer a Master of Science Degree in Marine Science. The degree provides the opportunity for students to acquire a practical and theoretical education in the marine sciences to prepare them for careers as marine technicians, scientists, and teachers. The program at Moss Landing Marine Lab provides extensive field and laboratory for advanced study in the marine sciences.

MLML is operated by a consortium of six campuses of the California State University: CSU Hayward, CSU Fresno, CSU Sacramento, San Francisco State University, San Jose State University, and CSU Stanislaus. Classes at MLML are open to qualified upper-division undergraduate and graduate students enrolled through consortium campuses.

**University of Southern California**

**1. Marine Biology and Biological Oceanography**  
PhD

**Focus:** Formal study of Marine Science

**Students:** N/A

**Faculty:** 14

**Resources:** Wrigley Institute for Environmental Studies

The graduate program in the Marine Biology and Biological Oceanography Program is administered through the Department of Biological Sciences and leads to the Ph.D. degree in Biological Sciences, with emphasis in marine biology. The program includes formal courses, a selection of topical seminars, undergraduate teaching opportunities, and practical experience working with faculty on their ongoing research projects --culminating in individual research topics leading toward a degree.

Upon admission, students are assigned an initial faculty advisor who, in collaboration with the faculty guidance committee, ensures that each student has an adequate background to study in his/her chosen area. Early in the program of study, students begin working with one or more faculty members to develop a topic of independent research. Ph.D. candidates take a written and oral qualifying examination, typically in their fourth or fifth semester. Following this examination, doctoral students devote most of their academic time to their research. The final defense of the dissertation is typically taken in the fifth or sixth year.

### **University of San Diego**

#### **1. Marine and Environmental Studies Program MS**

**Focus:** Combining Marine Science and Environmental Studies to create a broad understanding of natural processes.

**Students:** NA

**Faculty:** Six Full- Time, Twelve Adjunct

**Resources:** Hubbs-Sea World Research Institute

The degree involves a combination of course work and research, which culminates in a thesis. USD faculty are primarily involved in research in paleoclimatology, marine geochemistry, marine biology, locomotion and fluid dynamics, physiology, and ecology and provide students with a scientific approach to environmental studies. Students also work at Hubbs where research is focused on the ecology and physiology of marine turtles, birds, and mammals; other areas of expertise include bioacoustics and aquaculture. Research opportunities in Southern California abound from the coasts and estuaries of San Diego County to offshore and island environments. In addition, the deserts of Southern California, which include inland water bodies and former research, may focus on more distant areas.

# National

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## University of Rhode Island

### **Department of Marine Affairs**

M.A./M.M.A.(Masters of Marine Affairs) /Ph.D.

**Started:** 1969

**Focus:** Management, Policy and Legal Aspects of Coastal/Ocean Space and its uses

**Students:** 70 M.A. and M.A.A.; Ph.D. program started in 1998

**Faculty:** Eight Core, Three Joint Appointments

**Resources:** Center for Marine Conservation, Graduate School of Oceanography

### **Concentrations:**

1. **Coastal Management:** "The coastal zone, an environment where land, sea, and air meet, is of major interest to this Department; it is heavily populated and utilized. Conflict of use problems abound, and the physical environment is under substantial pressure from a multiplicity of human uses. Research in coastal management has been conducted in a variety of areas including coastal zone law, waterfront development, tourism, recreation management, the special problems and opportunities of island countries, and coastal hazards".

2. **Ocean Governance, Law, and Policy.** "Governmental and intergovernmental efforts to protect the marine environment, mitigate conflict of use situations, manage multi-use environments, and to provide opportunities for human use of ocean and coastal areas may be of great significance in determining the future availability of resources and the state of the marine environment. Attempts to bring into line the realities associated with natural systems and jurisdictional boundaries drawn by people are a major part of advancing more effective ocean use management systems. The 1982 United Nations Law of the Sea Treaty and the subsequent 1995 L"N Convention on Highly Migratory and Straddling Fish Stocks represent attempts to change traditional management systems at the international level. A substantial body of domestic legislation and a number of programs provide a framework for management efforts at the national level".

3. **Fisheries Policy, Management, and Law.** Fishing activities constitute a major use of the marine environment, and fisheries provide an important source of food, protein, and employment. Worldwide fisheries are under serious pressure from over-utilization and environmental degradation. Research has been and continues to be conducted on fisheries conservation efforts, fisheries allocation problems, and on fisheries management regimes and policy in developed and developing countries.

4. **Maritime Transportation and Ports.** World trade is very much dependent on ocean transportation systems and the ports, which service that trade. Ships and ports also have significance in terms of their actual or potential environmental impacts through matters such as oil spills and dredging. Research has focused on the impact of containerization on shipping and ports, the decline of the U .S. merchant marine, the operations of the multi- billion dollar cruise industry, and on marine insurance.

## Oregon State University

### **Marine Resource Management** M.S./M.A.

**Started:** 1974

**Focus:** physical, natural, and social science, policy and law, and technical and communications skills.

**Students:** 32

**Faculty:** 36 All with joint appointments

**Within:** College of Oceanic and Atmospheric Sciences, with graduate programs in Atmospheric Sciences, Biological Oceanography, Chemical Oceanography, Marine Geology, Marine Geophysics, and Physical Oceanography

**Resources:** Hatfield Marine Science Center

Concentrations:

- 1. Ocean and Coastal Resources:** Prepares students for positions with natural resource planning, management and regulatory agencies, or with private consulting agencies. Students learn about natural resources management, and the legal and institutional framework of coastal management, as well as the social and economic characteristics of coastal regions and people. Electives fall into four main areas: marine protected areas, coastal wetlands and/or watersheds, coastal hazards, and marine policy.
- 2. Marine Fisheries Management:** Prepares students for careers in management and development of ocean and/or coastal marine fisheries resources. Students are taught a quantitative base and that base is supplemented with courses in policy, economics, sociology, communications, and management. Electives fall into six areas: Fishery biology/ecology, aquaculture, commercial fisheries management; fishery economics, seafood production and marketing, and fisheries habitat conservation and restoration.
- 3. Marine Pollution** Prepares students for positions with government agencies and private firms. Students focus on coastal pollution (including wetlands and watersheds) or open ocean pollution. There is also a possible Minor in Earth Information Science and Technology where students use GIS and remote sensing.
- 4. Marine Recreation and Tourism:** Prepares students for positions with government tourism planning agencies, private tourism businesses, regional development agencies, aquaria, and private consulting companies. Concentrations include recreation and tourism business management or marine education and outreach.

## University of Delaware

### **Graduate College of Marine Studies, Marine Policy** M.M.P (Master of Marine Policy)/Ph.D

**Started:** 1972

**Faculty:** Five Core Professors, Six with joint appointments

**Larger Program:** Graduate College of Marine Studies, with graduate degree programs in Marine Biology-Biochemistry, Oceanography, Physical Ocean Science and Engineering

**Resources:** Center for the Study of Marine Policy (First such center established at a US University)

This program is designed to prepare students for professional work. Students are taught to analyze and manage the legal, economic, and the political aspects of Coastal and Ocean Management.

Masters students complete their degree typically in 2 years. Students take classes in International and Environmental Law, Natural Resources and Environmental Economics, Coastal Management, Comparative US Ocean Policy, and Marine Transportation. All students must take Introduction to Oceanography or Applied Ocean Science.

PhD students must include a disciplinary aspect into their research. For example, students can take classes and create a focus in the Economics Department, Anthropology Department, or Public Policy Department. All students must pick one cross-disciplinary department and pass the qualifying exams in that department as well as within the Marine Policy department.

## University of Washington

### **School of Marine Affairs Master in Marine Affairs**

The Master in Marine Affairs is a two-year professional degree. The School of Marine Affairs is located in the College of Ocean and Fisheries Science. Students concentrate in one of five areas:

- Living Marine Resources
- Coastal Zone Management
- Marine Environmental Protection
- Port and Marine Transportation Management
- Marine Societies, Institutions, Decision Processes

The School of Marine Affairs also offers a concurrent degree program with the Henry M. Jackson School of International Studies. The program also has a joint curriculum program with the School of Fisheries in Fisheries Management.