Photo credit: Phyllis Grifman

"*Ships*, Trains and Automobiles"

Ship to Shore: Linking Science to Policy

Few industries affect our daily lives in such a profound manner as marine transportation, but for most of us, the industry is all but invisible. More than 90% of the world's cargo is moved by water and done so in the most fuel-efficient manner of all modes of transportation. Yet, unless we live near a seaport or happen to see these enormous vessels disgorging thousands of container boxes, or crude oil being pumped to our refineries, or a ship loading scrap metal which was the 1984 Mazda you scrapped last year, we have little reason to notice how our world relies on this vital system. But if you look around, we see that many of the goods we treasure and depend upon came to us from afar by ship.

Since the 1980s, the Sea Grant Program has emphasized the importance of engaging with maritime cargo movement and seaports. This makes sense as the twin Ports of Los Angeles and Long Beach constitute the biggest seaport in the country, handling almost 50% of all imports to the U.S. Soon after Congress enacted the Shipping Act of 1984, USC Sea Grant held a major national conference on the Act and its implications for the shipping industry. In subsequent years, we sought to help researchers by hosting workshops around the country asking port and harbor managers to share with us the critical research they needed to improve their productivity and competitiveness.

More recently over the past decade, USC Sea Grant has worked closely with the Ports of Los Angeles and Long Beach, conducting studies on intergovernmental relations, project feasibility, and seaport security. USC Sea Grant's connection to the world ocean is especially apparent in our port and marine transportation work, since our ports are part of an international system; USC Sea Grant visits Asia on an annual basis to interact with academic colleagues at universities in two of the country's most vital trading partners, Korea and Taiwan. More detailed descriptions of all aspects of USC Sea Grant's work on ports and marine transportation are included in the "In Depth" section of this *Urban Mariner*.

The marine transportation industry poses many challenges for coastal and environmental managers, yet when more than 900,000 jobs in Southern California rely on the movement of international trade through these two busy seaports, our responsibility to engage such an important aspect of the marine world is evident. As such, USC Sea Grant makes it a priority with the ports and marine transportation industry to find ways to balance business with environmental and social concerns such as air quality and other port greening measures, land-use and marine spatial planning, opportunities for public education, and planning for climate change.

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At the Helm: From USC Sea Grant

Please welcome USC Sea Grant Extension Leader Dr. James Fawcett "at the helm" of this tenth issue of the Urban Mariner, *USC Sea Grant's Urban Ocean Report!*

For the past 30 years, a small cadre of Sea Grant researchers and outreach professionals has engaged seaports and the marine transportation industry on all the coasts of the U.S. Yet, in the past decade, both professionals and the public alike have recognized more clearly that our ports have become vital cargo links to this ever-more-globalized and just-in-time world. Concentrated in huge "load center" ports, the environmental impact of the industry is similarly concentrated. For Sea Grant researchers and extension professionals with the background to engage the industry, proximity offers unique opportunities to assess port activities, facilitate discussion between port users and the port itself, and between publics of all kinds. Most importantly, Sea Grant professionals working in this realm—because of their academic base and funding—can remain the neutral third parties capable of bringing various parties together, whether in conferences, one-on-one discussions, or occasionally in dispute resolution. It is a fact that ports impact their surroundings, sometimes dramatically. Sea Grant steps in where we can to help facilitate discussion between conflicting interests, assist with strategies for balancing interests, including the interests of the environment, and revealing new ideas about port management and design.

Previous issues of the *Urban Mariner* can be found at: http://urbanmariner.urbanocean.com.

What is Sea Grant?

Sea Grant is a nationwide network--administered through the National Oceanic and Atmospheric Administration (NOAA)--of 33 university-based programs that work with coastal communities. The Sea Grant Program at the University of Southern California has served the Southern California coastal region since 1972, funding research, transferring results to government agencies and user groups, and providing information about marine resources, recreation and education to the public.

Specialist's Quarters:

Dr. James Fawcett, USC Sea Grant

For more than 40 years, Dr. Fawcett has been a man with one foot on land and the other in the sea. Currently as a faculty member and researcher in the fields of marine and urban policy at USC, he directs Marine Science and Policy Outreach for the Sea Grant Program, a unit of USC's Wrigley Institute for Environmental Studies. Concurrently he holds appointments as adjunct associate professor in USC's Price School of Public Policy and the USC Dornsife College of Letters, Arts and Sciences, teaching undergraduate and graduate students in the areas of public and environmental policy. An urbanist favoring the coast and its uses, his interests have been in intergovernmental relations, especially the intersection of economic and environmental interests in the areas of land use, coastal management and marine policy. He currently focuses on seaport policy and marine transportation as the industry confronts issues of infrastructure concentration, economic development and environmental externalities in an era of rapid change.

Dr. Fawcett's link to the ocean started in 1968, when for three years he served in the U.S. Navy as a communications officer and ship driver in the Pacific, much of it in Southeast Asia. Familiarity with that part of the world clearly helps the Sea Grant work he does almost annually in Taiwan and Korea with occasional visits to Hong Kong, Singapore and China. In the 1990s, Dr. Fawcett joined the public sector as chief of planning for the Los Angeles County Department of Beaches and Harbors. He serves on the editorial board of the Journal of Urban Regeneration and Renewal and is also the past international president of the honorary land economics society, Lambda Alpha International, now serving on its executive committee. He is a member of the American Association of Port Authorities, the International Association of Maritime Economists and other professional organizations in the maritime field. Dr. Fawcett holds both Ph.D. and master's degrees in urban planning from USC and an undergraduate degree in political science from California State University, Northridge.

In Depth: About USC Sea Grant's Marine Transportation and Ports Work

Ports and Climate Change

The climate change picture and its implications for our seaports are not entirely clear. One thing that we acknowledge is that the ports both here in Southern California and around the world will be affected by the sea level changes that will accompany climate change. Both the Ports of Los Angeles and Long Beach are engaged in sea level rise adaptation planning efforts. The Port of Los Angeles has commissioned a sea level rise vulnerability study from the Rand Corporation and is participating in an LA citywide sea level rise planning effort, entitled AdaptLA. The Port of Long Beach has been involved in AdaptLA as one of the regional stakeholders giving input into the planning process, and the Port of Long Beach has begun planning for sea level rise in partnership with the consulting firm, AECOM.

For perhaps the next 50-100 years, the current configuration of our seaports will remain viable. But, considering that the container revolution happened barely 50 years ago--a technological change drastically affecting the design and configuration of ports worldwide--will technological revolution again transform the industry in the next 50 years? If so, will that revolution once more result in the massive redesign of our seaports? In this context then, our immediate concern should be on the resilience of our seaports to enhanced storm events aggravated by slowly rising sea levels.

Port Planning

Seaports plan for growth just like cities, but their time horizons are often much shorter as the needs of port tenants change depending upon the dictates of the economy. Thus, in ports where land is leased from a port agency, every 15 or 20 years leases come due and tenants—and their needs—may change. Residents living near our ports often want to be involved in the planning process but find that their needs for quiet, security, environmental quality, and safety may be at cross-purposes with the needs of the goods movement business. In that business, time is money, and the ability to work long hours and quickly move cargo creates all sorts of "external effects" such as light pollution, noise, traffic congestion, air pollution and more. When both sides of these discussions have valid points, it's the planners who sort out the merits and deficiencies in the positions. Sea Grant cannot plan on behalf of ports, but we can sponsor meetings, seminars and conferences to bring parties together where some of these contentious issues can be sorted out. For example, Dr. Fawcett, USC Sea Grant's Marine Transportation / Seaport Specialist and Marine Outreach Coordinator, facilitated a series of meetings for a proposed deep-water crude oil terminal in the Port of Los Angeles, not taking a position, but rather providing an introduction to the issues, urging participation by all parties, and introducing the various experts who could answer technical questions on issues ranging from geology to fire protection. Sea Grant also helped facilitate a series of open houses in which the proposal was made widely available to the public to learn about the terminal.

Ports of Los Angeles and Long Beach. (Image credit: Hyfen, Wikipedia Commons)

In Depth: About USC Sea Grant's Marine Transportation and Ports Work

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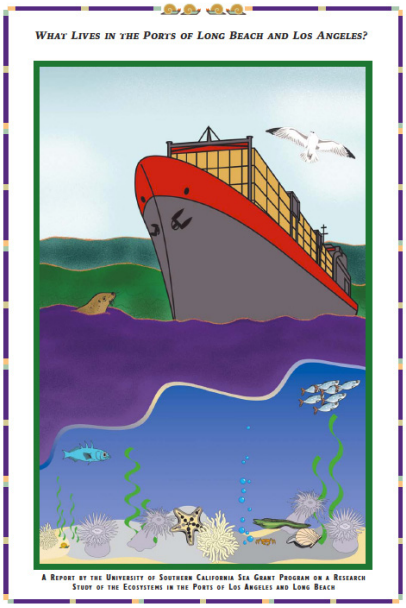
Greening the Ports

Unfortunately for now, seaports operate almost exclusively on diesel engines. Diesels provide propulsion and auxiliary power in ships, and they are found in trucks that haul container and other types of cargo, in equipment on container yards, and in locomotives transporting cargo by rail to distant destinations. Unlike their more cleanly burning gas turbine counterparts in the aviation world, seaport diesels produce an array of more pernicious air pollutants: oxides of nitrogen (NO_x), sulfur dioxide (SO_2) and diesel particulate matter (DPM or soot). NOx and SO_2 are both components of photochemical smog and the DPM is a respiratory hazard, especially its finest particles (often described as PM 2.5 or particles with a mean diameter of 2.5 microns—because those particles can reach deep into human lungs, especially the lungs of young children during vigorous play).

Because the South Coast Air Basin (a geographic area including all of Orange County and the non-desert regions of Los Angeles County, Riverside County, and San Bernardino County) fails to meet federal clean air standards, the Ports of Los Angeles and Long Beach, being significant sources of diesel air pollution, entered into an agreement with the South Coast Air Quality Management District (SCAQMD) in the past decade to develop techniques for cleaning up their contribution to overall air quality health. This program involves replacing most of the trucks hauling cargo to or from the ports with newer models having engines that meet 2007 federal air quality standards. These regulations will be tightened in future years as well.



In 2000, the Ports of Long Beach and Los Angeles conducted a biological survey to inventory the marine life in the ports. USC Sea Grant created a brochure describing the findings of the report.

Port of Long Beach Green Port flag (Image credit: Msun523, Wikipedia Commons)

The rules also specify that ships entering or leaving the two ports must limit their speed to 12 knots (13.8 miles per hour) or less within 40 nautical miles (46 statute miles) of the LA/Long Beach sea buoys. (Slower ship speeds may also reduce collisions with whales.) Both the Ports of Los Angeles and Long Beach are installing electrical connections in most berths so that ships can use shore power when in port enabling them to totally shut down their diesel engines. This will require that ships be equipped with shore power cable systems as well as require the ports to provide convenient connection boxes for shore power on the docks. Finally, in another effort to reduce emissions, the diesel yard equipment is being converted either by the use of new technology fuels, catalytic converters, or scrubbers on the largest diesel engines.

Since 2008 the two ports have also worked together on a Water Resources Action Plan, to do for port water quality what they have done for air quality. Both have made remarkable progress in cleaning up water pollution over the past 20 years, but the remaining sources of pollution can best be addressed by a joint effort, with the ports having enthusiastically taken on that challenge in cooperation with the US Environmental Protection Agency. In 2000, the Ports of Los Angeles and Long Beach conducted a comprehensive biological survey to inventory marine life in the harbors the findings of which—describing the wildlife and ecosystems in both ports—was published in a brochure created by USC Sea Grant. This survey and report are important for use as a reference to gauge ecological and biological changes over time.

While these two very significant "green port" initiatives will take significant time to accomplish, the ports of San Pedro Bay have led the way in environmental remediation for other ports both in the U.S. and around the world. Their position as the two largest container ports in the U.S. has also made the point that even the busiest seaports can make great strides toward good environmental stewardship.

In Depth: About USC Sea Grant's Marine Transportation and Ports Work

(Con't from page 4)

Marine Spatial Planning

The President's National Ocean Council published its Draft National Ocean Policy Implementation Plan in January 2012 with the objective of "Implement[ing a] comprehensive, integrated, ecosystem-based coastal and marine spatial implementation plan… and management [plan] in the United States." (US National Ocean Council, 2012). The plan envisions comprehensive plans for federal ocean areas beyond the three-mile limits of state jurisdiction in coastal waters and seaward to the extent of the country's exclusive economic zone at 200 nautical miles from the coast.

Responding to the need for implementation strategies, in 2011 and 2012, USC Sea Grant developed and co-hosted two forums on Coastal and Marine Spatial Planning at the Aquarium of the Pacific in Long Beach, attended by participants from local, state and federal agencies, business, environmentalists, and knowledgeable academics. Forty-five participants gathered for these multi-day facilitated workshops to share perspectives on critical issues in planning the use of offshore waters in the Southern California Bight. The forums allowed participants to share priorities for offshore uses, including appreciation of the needs of other sectors. While policies were not changed, discussions helped to clarify the playing field within which further discussions will take place. The forum allowed government officials to utilize the expertise of this group to conceptualize how the State of California may most effectively proceed in conducting coastal and marine spatial planning in Southern California waters.

The marine transportation system is not solely at sea; its landside impacts are felt as goods move through cities and rural areas of the nation by truck and train. (Photo credit: RegularDaddy, Wikipedia Commons).

Partnerships Across the Pacific

While seaports are more commonly the focus of our attention because of their economic as well as environmental impacts on the nation, USC Sea Grant is also invested in public education on the importance of our marine transportation system including issues involving vessels not owned or operated by U.S. companies. The marine transportation system is not solely at sea; its landside impacts are felt as goods move through cities and rural areas of the nation by truck and train. USC Sea Grant's role is particularly felt in the Los Angeles region as we attempt to understand and recommend remedies to the problems wrought by this caravan of goods in the region. USC Sea Grant's Dr. Fawcett often travels to Asia to give lectures on marine transportation, as the vast majority of the freight entering the United States through the Ports of Los Angeles and Long Beach is from Asia. Coordinating with Asian countries to promote sustainable practices in the business of marine transportation is critical for moving Southern California into a sustainable future, since Asian ships have large impacts on our ports (e.g. air quality, water quality, security).

In 2009, Dr. Fawcett lectured at universities in Taiwan and Korea on maritime logistics and on the use of commodities tracking of bulk cargoes as economic indicators. In 2010, he was again invited to Korea, where seaports are building and upgrading their port infrastructure, and he presented lectures to faculty and graduate students on the "green ports" movement in the US, particularly in the Ports of Long Beach and Los Angeles where shore power is being used for berthed ships. This information was also presented at the National Taiwan Ocean University and in September 2012, he was invited to attend the International Association of Maritime Economists in Taipei, Taiwan as a guest of the Chinese Maritime Research Institute. Following that meeting he traveled to Korea to participate in the inauguration ceremony of the new Graduate Program in Maritime Logistics at Chung Ang University (CAU) in Seoul, Korea and to speak on logistics education in the U.S. In October 2012, Dr. Fawcett was a guest speaker at a three-week executive education program on coastal and waterfront planning taught by USC's Price School of Public Policy for a group of 15 government officials from Foshan, China.

In Depth: About USC Sea Grant's Marine Transportation and Ports Work

(Con't from page 5)

A simulation of the City Dock Campus

City Dock: The Lab of the Future

Eleven universities in Southern California now share a small and inadequate marine laboratory—Southern California Marine Institute (SCMI)—in the Port of Los Angeles. Researchers need better facilities to conduct high priority marine research as well as to have a location suitable for inter-institutional collaboration. In 2007, the Port of Los Angeles approached SCMI and proposed moving the lab from an isolated location in the port to a more accessible and much larger facility. The City Dock site proposed in the Port of Los Angeles meets the requirements of the 11 institutions, yet the consortium needs leadership to make the case for such a facility. In 2008, the Port, along with the Annenberg Foundation sponsored a grant to USC Sea Grant (Dr. James Fawcett) to research and write a "visioning study" for the proposed new laboratory. After extensive interviews with marine researchers to define the needs of an expanded laboratory, Dr. Fawcett began a series of outreach meetings with the communities surrounding the ports, other non-SCMI educational institutions, and the general public to seek comments on the study. Working with the Executive Director of SCMI and his Board of Directors, USC faculty, and administrators of the other 11 institutions, Dr. Fawcett continues to serve as a liaison between USC, the Port of Los Angeles and the other parties. After four years, the Los Angeles Harbor Commission has authorized a new non-profit foundation to become the sole negotiator for the project, raising funding and building upon the groundwork laid by USC Sea Grant. This effort will continue into the future with the active collaboration of the USC Sea Grant program.

The planned location of City Dock (Image credit: Jim Fawcett)

On the Horizon: Educating the Next Generation

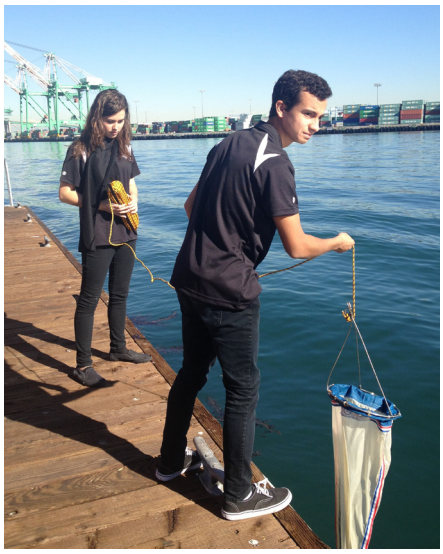
In addition to funding and facilitating research and developing partnerships to address some of the critical issues facing Los Angeles' urban ocean environment, USC Sea Grant places great importance on developing the next generation of scientists, policymakers, educators and industry leaders. Below we feature several of USC Sea Grant's efforts to educate both students and the public to be informed stewards of our ports and knowledgeable about the challenges of marine transportation.

Undergraduate and Graduate Education

In addition to his outreach and research activities, Dr. Fawcett extends his reach to the following generations by teaching courses both in the Environmental Studies Program of the Dornsife College of Letters, Arts and Sciences as well as in the USC Sol Price School of Public Policy. In Environmental Studies he teaches an undergraduate core course, Coastal and Marine Environmental Policy and in the Price School a graduate course, Coastal Policy and Planning.

Port of Los Angeles High School

Port of LA High School (POLAHS) students joined our partnership (with COSEE West and Southern California Coastal Ocean Observing System) Community HABwatch Program early in 2012. Through the Community HABwatch Program, USC Sea Grant's Education Coordinator, Linda Chilton, and USC faculty and graduate students provide local school classrooms or programs at informal science centers (like aquaria) with resource materials, local field identification guides, and technical training to be able to perform independent and routine water sampling to check for the presence of harmful algal blooms or conditions that can lead to harmful algal blooms. By joining the HABwatch program, marine Biology students at POLAHS are now responsible for collecting and analyzing plankton samples from a local dock every week. Students record changes in water conditions that may affect algal blooms. POLAHS students also work with USC Sea Grant to apply what they are learning in their marine bio and environmental studies programs by coming to Catalina Island and Wrigley Marine Lab on day trips.



Students at POLAHS collect plankton samples (Photo credit: Linda Chilton)

Science on a Sphere

The Long Beach Aquarium of the Pacific (AoP) attracts 1.3 million visitors annually and is located at the edge of the Port of Long Beach. In 2009, AoP developed an addition to the aquarium to permit an exhibit space for National Oceanic and Atmospheric Administration's (NOAA) Science on a Sphere presentation. One of the presentations is a film on marine transportation and the movement of goods. Capturing a unique opportunity to educate aquarium attendees about marine transportation, Dr. Fawcett served for 18 months as an expert advisor on a committee designing a new Science on a Sphere exhibit and film on marine transportation, aiding with thematic ideas, script review, shooting sites and helping the film makers with contacts in the two ports. The film is shown annually to thousands of visitors at the AoP and will be exhibited by other operators of NOAA's Science on a Sphere, potentially reaching over one million visitors annually. Aquarium patrons now have at least visual access and interpretation to the seaport that is visible just outside the aquarium yet largely inaccessible to visitors.

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