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LIMNOLOGY AND OCEANOGRAPHY

BULLETIN

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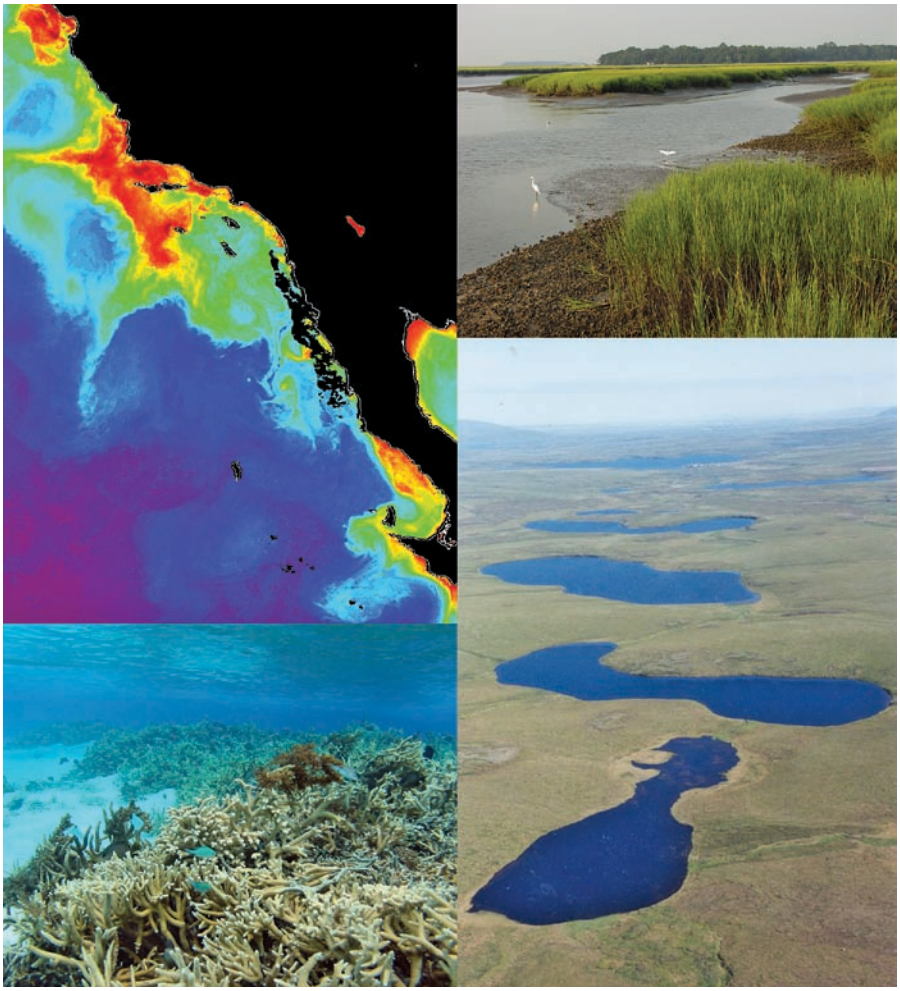

Diverse aquatic biomes are represented in the U.S. Long- Term Ecological Research (LTER) network of sites (e.g., clockwise from upper right: George Coastal Ecosystems, Arctic lakes, Moorea Coral Reef, California Current Ecosystem).

ARTICLES & FEATURES

Aquatic Research in the U.S. LTER Network by M. Ohman and J. Hobbie 74

Beyond the Ivory Tower: *The Washington Post's* Juliet Eilperin by A. Sponberg 79

Ethics Forum: Conflicts of Interest by E. Weissberger 80

ASLO NEWS

Message from the President by C. Duarte 80

Message from the Business Office by H. Schneider Lemay 81

Public Affairs: Criterion 2… let us help you! by A. Sponberg 82

ASLO sponsors congressional briefing on global fisheries crisis 82

2008 Election Results 82

ASLO Needs YOU! Volunteer for ASLO Committees 83

L&O Featured Article 84

L&O Outstanding Reviewers: Steven Bouillon and Alan Shanks 85

Getting to know your *L&O Methods* Associate Editors: Larry Madin and Clare Reimers 85

ASLO MEETING HIGHLIGHTS

Call for Meeting Proposals 86

Aquatic Sciences 2008 86

ASLO Award Presentations 87

Another Memorable Meeting in St. John's 87

Student Presentation Awards 87

ASLO 2009: The Marine Environment Laboratories of the International Atomic Energy Agency, Monaco (IAEA-MEL) by M. Betti 88

ASLO MEMBER NEWS

ASLO members honored: Tommy Dickey, Mary Ann Moran, Ed DeLong 89

BOOK REVIEWS

Post-Embryonic Development of the Copepoda. Reviewed by S. Gasparini 89

Our Changing Planet. Reviewed by P. Falkowski and S. Ruskin 90

Books Received by J. Dolan 91

The Limnology and Oceanography
Bulletin

The American Society of Limnology and Oceanography is a membership-driven scientific society (501(c)(3)) that promotes the interests of limnology (the study of inland waters), oceanography and related aquatic science disciplines by fostering the exchange of information and furthering investigations through research and education. ASLO also strives to link knowledge in the aquatic sciences to the identification and solution of problems generated by human interactions with the environment.

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AQUATIC RESEARCH IN THE U.S. LTER NETWORK

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THE LONG-TERM ECOLOGICAL RESEARCH NETWORK

As "water is the lifeblood of the biosphere" (Williams et al. 2008), it is hardly surprising that 18 of the 26 research sites in the U.S. Long-Term Ecological Research (LTER) network include aquatic processes as either the predominant theme or as an important theme of the site's research. Our purpose here is to provide a brief overview of the organization of the National Science Foundation (NSF) -supported U.S. LTER network, to touch on some of the scientific questions that motivate the sites' and the network's science, and to highlight some of the developing initiatives that should be of interest to aquatic ecologists. We will do this through the lens of marine and freshwater research, appropriate to the ASLO audience, although the LTER network provides an excellent forum for interactions with terrestrial ecologists.

Ecological processes unfold on a landscape that is influenced not only by present, but also by historical conditions. John Magnuson (1990) evoked the metaphor of the "invisible present" to underscore the importance of pre-existing, yet oft undetected ecological conditions, whose footprint can markedly alter the structure of natural assemblages and pathways of biogeochemical cycling. Slowly moving environmental changes, and processes with time lags, remain invisible to the typical 1-2 year investigation. The funding structure of most science in the U.S. is not conducive to addressing the longer-term changes that may be key determinants of the present (and future) state of the system. As one of many examples, consider the altered macrophyte biomass and species richness that developed a decade or more after the invasion of the exotic rusty crayfish into Trout Lake, Wisconsin, at the North Temperate Lakes LTER site (Fig. 1).

The LTER program of NSF grew out of recognition of the need to address long-term ecological processes over broad spatial scales, together with several events in the 1960's. First, Gene Likens and Herb Bormann suggested in 1964 that the experimental watersheds of the U.S. Forest Service's Hubbard Brook site could be used for studying the concentrations of various materials in stream water in addition to the measure of stream flow under various management schemes. Second, the U.S. organized a 5-year study of intensive sites or biomes (deciduous forest, grassland, desert, western coniferous forest, and tundra) as its contribution to the International Biological Program (IBP), which took place from 1970 to 1975. A theme of the IBP sites was documentation of the cycling of carbon, nitrogen, and phosphorus. Ecosystem models and centralized databases were developed as tools for synthesis and understanding; data and synthetic understanding were summarized in a series of 16 books. These NSF/Forest Service and IBP projects demonstrated the value of intensive research sites where a variety of information was assembled in a single site, hypotheses developed, and experiments carried out. After a number of workshops, NSF began the LTER program in 1980 with an emphasis on long-term studies

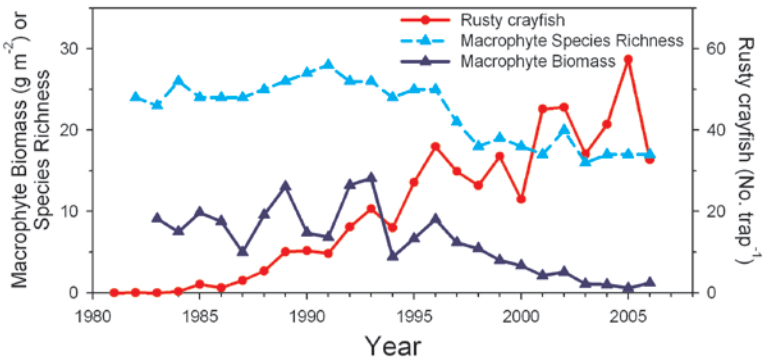


Fig. 1. The relationship between the abundance of the exotic invasive rusty crayfish *(Orconectes rusticus)* and native macrophyte species richness and biomass in Trout Lake, Wisconsin, from the North Temperate Lakes LTER site. Experimental manipulations demonstrated that the rusty crayfish cause reductions in macrophyte species richness and biomass largely by herbivory. (from NTL-LTER database: http://lter.limnology.wisc.edu and adapted from Carpenter et al. 2007).

that would last for decades. Today there are 26 sites (Fig. 2) in a variety of habitats ranging from the poles to the tropics and from deserts to coral reefs. Two projects are located in urban areas of Baltimore and Phoenix. Many of the projects include aquatic ecology components. In ten, the aquatic questions are the main focus; in an additional eight aquatic questions are one of the foci. Sites are supported by three offices within NSF: the Division of Environmental Biology (Biological Sciences Directorate), the Division of Ocean Sciences (Geological Sciences Directorate), and the Office of Polar Programs. Site projects are described at www.lternet.edu, with a brief synopsis below for each of the aquatic-related sites, and a more complete history in Hobbie et al. (2003; also see other articles in the same issue of *Bioscience*).

AQUATIC SCIENCE SITES

The first funded (in 1980) of the current aquatic projects was North Temperate Lakes. Another freshwater site, Arctic, followed in 1987 along with an estuarine-marine barrier island site (Virginia Coast Reserve). Palmer Station (1991) concentrates on the marine waters near the Western Antarctic Peninsula, while Plum Island Ecosystem (1998) includes rivers, salt marshes, and estuaries. Three coastal projects were funded in 2000: Florida Coastal Everglades (freshwater and estuaries), Georgia Coastal Ecosystems (salt marshes and estuaries), and Santa Barbara Coastal (kelp beds). The last two sites funded (2004) were California Current Ecosystem (coastal upwelling) and Moorea Coral Reef (tropical coral reef), both in coastal ocean waters. In addition, eight other LTER sites have freshwater subprojects: Andrews Forest, Coweeta, and Niwot Ridge (all added in 1980), Bonanza Creek and Hubbard Brook (1987), Luquillo (1988), McMurdo Dry Valley (1993), and Baltimore Ecosystem (1997). Sites are not immortal: following the review process, some have been dropped from the network

Each of the LTER sites has its own hypothesis-driven research program. We encourage readers to explore individual sites' websites to probe these in greater detail. In addition, each site makes measurements of five key variables to facilitate cross-site comparative studies and synthetic research across different biome types. The five core measurements are: pattern and control of primary production; spatial and temporal distribution of populations selected to represent trophic structures; patterns of inorganic inputs and movements of nutrients; pattern and control of organic matter accumulation and decomposition in surface layers and sediments; and patterns and frequency of disturbances. The LTER Network Office, located at the University of New Mexico, helps coordinate the network and facilitate cross-site analyses and communication.

Large-scale manipulative experiments are a prominent part of many LTER projects, including the Arctic, North Temperate Lakes, Hubbard Brook, and Coweeta sites. Experiments manipulate such factors as tree cover in whole watersheds, nutrients in lakes and streams, predators, and grazers. It may take many years for ecosystem responses and sometimes new equilibria develop. An example is a phosphate fertilization experiment in an arctic river, near the Arctic LTER site, where climate warming is expected to increase availability of P over the next century. Continuous drip-additions each summer increased dissolved P over ambient and, as expected, the algae forming a biofilm on the rocks increased followed by an increase in biomass of the scraper insects. After 8 years the experiment was scheduled to end (Fig. 3). Suddenly, it was noticed that the moss *Hygrohypnum,* which was always present but very rare, had increased its biomass; several years later it completely covered the rocks of the stream. This moss now has changed the P cycling, primary productivity, and insect communities of the stream. Large-scale manipulations are more challenging in marine systems but the Plum Island Estuary LTER has recently supported a low-level nutrient addition to the incoming tidal waters of salt marsh.

Other common elements across sites include extensive participation of graduate students and often undergraduates, as training is a key aspect of site research. LTER sites are an excellent vehicle for graduate research because of the extensive supportive data available. Modeling (in several different forms) is an important research tool at the LTER sites. Many sites conduct cooperative research in association with government agencies (e.g., U.S. Forest Service, National Oceanic and Atmospheric Administration, Department of Energy, National Park Service, National Wildlife Refuges), and with private organizations. Sites

Fig. 2. Locations of the U.S. LTER sites. The sites where aquatic processes are the dominant research focus are in red, those where aquatic processes are one element of the research program are in blue, other sites in brown. AND – Andrews Forest, ARC – Arctic, BES – Baltimore Ecosystem Study, BNZ - Bonanza Creek, CAP – Central Arizona - Phoenix, CCE – California Current Ecosystem, CDR – Cedar Creek, CWT – Coweeta, FCE - Florida Coastal Everglades, GCE - Georgia Coastal Ecosystems, HBR – Hubbard Brook, HFR - Harvard Forest, JRN – Jornada Basin, KBS – Kellogg Biological Station, KNZ – Konza Prairie, LUQ – Luqillo, MCM – McMurdo Dry Valleys, MCR – Moorea Coral Reef, NTL – North Temperate Lakes, NWT – Niwot Ridge, PAL – Palmer Station, PIE – Plum Island Ecosystem, SBC – Santa Barbara Coastal, SEV – Sevilleta, SGS – Shortgrass Steppe, VCR – Virginia Coast Reserve.

also develop outreach programs to communicate site science to the communities and regions in which the sites are located and nationally. LTER science often enters the public policy arena. Sites have a commitment to Schoolyard LTER – the integration of ecological science into K-12 curricula in collaboration with teaching professionals. In addition, a children's book series includes My Water Comes from the Mountains (Niwot Ridge, author T. Fourment), The Lost Seal (McMurdo Dry Valleys, author D. McKnight), and the forthcoming Sea Secrets (California Current Ecosystem and Palmer Station, authors M. Cerullo and B. Simmons), with more on the way.

Cyberinfrastructure, including effective information management, is a vital part of each site's activities. Digital data access is one of the keys to developing a truly integrated research program and fostering collaboration both within and among sites. Also, since LTER data are in the public domain and party to NSF's data sharing policies, the data are made accessible to others across the scientific community. The LTER network has paid close attention to metadata and adopted the Ecological Metadata Language (EML) as the standard for all sites.

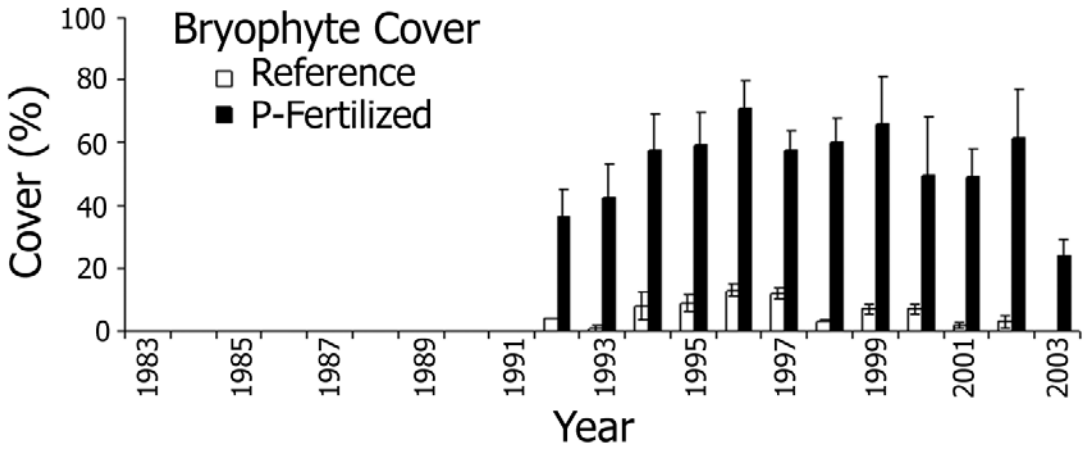
A recent cross-site comparative effort known as EcoTrends has capitalized on the long-term datasets across the U.S. LTER sites, together with additional U.S. Forest Service research sites. This project brings together time series treating climate, biogeochemical variables, disturbance regimes, and biotic indicators from diverse biomes, as a foundation for intersite comparisons. The time series and preliminary analyses will soon be published in a volume entitled Long-term Trends in Ecological Systems: A Basis for Understanding Responses to Global Change (D. Peters et al. editors). Currently under development is a companion website that will make the EcoTrends data available and will regularly update the time series.

The network of LTER sites, which now extends across diverse aquatic and terrestrial biomes, is well suited to addressing a suite of contemporary ecological questions that must be studied on multiple spatial scales and in different environments. Such issues include anthropogenic climate change; modifications of the frequency and amplitude of disturbance regimes; ecosystem changes induced by invasive species (e.g., Crowl et al. 2008); spatial and temporal connectivity of populations and ecosystems (Peters et al. 2008), and others. As Peters et al. point out, such issues are most effectively addressed with the benefit of a 'network of networks' that harnesses the detailed, site-specific knowledge that is vital to understanding local processes, but places such local studies in the context of larger-scale drivers and both upstream and downstream ecosystem processes.

For modest incremental costs, substantial value can be added when new experiments and observations are made in the deeper context of ongoing research at the LTER sites. The sites are also excellent places to validate new technologies. Developing initiatives of interest to the aquatic community will surely benefit from the research infrastructure in place in the LTER network. Biodiversity programs, including Tree of Life and ecological genomics studies; Ocean Carbon and Biogeochemistry (OCB) programs, including ocean acidification research; the Ocean Observatory Initiative (OOI); National Ecological Observatory Network (NEON); Global Lake Ecological Observatory Network (GLEON), and others can readily leverage the site science in the LTER and other research networks and benefit from the present made 'visible' there.

An earlier generation's quest for 'pristine' ecosystems as the subject of ecological study has given way to the realization that anthropogenic influences are nearly ubiquitous. The interactions of humans with natural systems has emerged as a growing area of study in its own right. A number of LTER sites have long addressed topics at the intersection of the natural and social sciences, but a new perspective has emerged from the LTER network on the research frontiers in this arena. It is widely appreciated that humans depend upon a variety of services from natural ecosystems, but it is not well understood how changes in ecosystem services may feed back to alter human decision-making and other aspects of behavior. These human decisions may then alter both the long-term 'press' and short-term 'pulse' of external drivers that alter ecosystem structure (Fig. 4). The concept of this feedback loop is at the heart of a new initiative on Integrated Science for Society and the Environment (ISSE, Collins et al. 2007) that seeks to develop a new perspective on integrating human and natural system research.

Fig. 3. Percentage of total bryophyte coverage in the Kuparuk River, near the Arctic LTER site. Phosphate fertilization began in 1983. Phosphate (as phosphoric acid) was continuously added as a drip for 6-8 weeks every summer to increase the concentration of dissolved P in the river over ambient by 0.3 µmol/L. After 8 years the experiment was scheduled to end, when it was noticed that bryophyte cover had increased dramatically. Modified from Slavik et al. 2004.



The U.S. LTER network (www.lternet.edu) is complemented by a network of International LTER sites (www.ilternet.edu), which extends the concept of long-term site-based research in different formats in different countries. Approximately 40 countries have LTER networks in place, with others under development, though scientists in different countries may interpret the LTER approach in different ways. The international alliances facilitate collaborative research on still larger scales.

WANT TO KNOW MORE?

Where do you learn about specific scientific results from the LTER sites? Many thousands of scientific publications are available (http://search.lternet.edu/biblio/), including eleven monographs published in a series by Oxford University Press and several by other publishers. But wittingly or not, you are probably already using LTER-based science in your research, teaching, and science communication.

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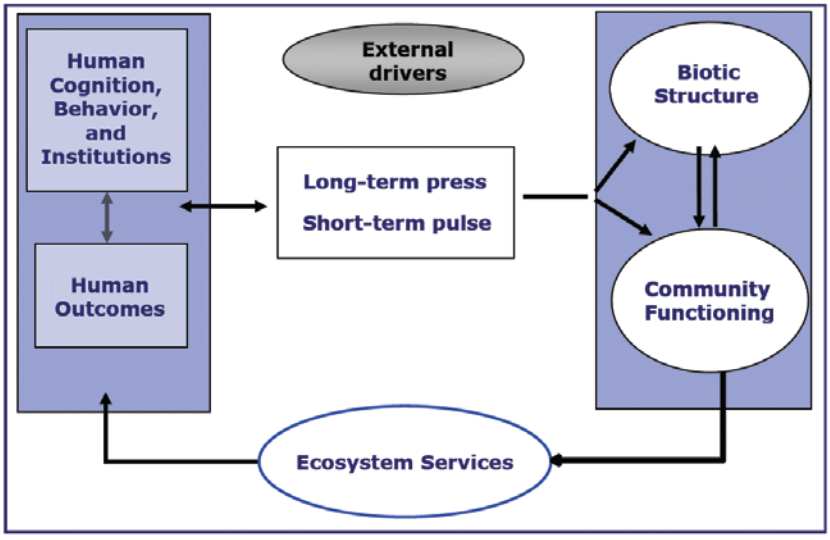
Fig. 4. Feedback loop from the ISSE (Integrative Science for Society and the Environment) planning document (Collins et al. 2007). Ecologists have traditionally addressed the effects of "press" (e.g., climate change, nitrogen deposition, or other progressive long-term variation) and "pulse" (e.g., episodic wind mixing or floods) disturbances on biotic structure and community functioning, and more recently have considered consequences for ecosystem services. The ISSE initiative examines the relationship between altered ecosystem services and human responses, which can then feed back to alter the external drivers.



APPENDICES

Of the 26 sites in the U.S. LTER network, here we briefly describe the biome, central location, research themes, and website URL for those where aquatic processes predominate (ten) and the additional eight sites where aquatic processes are one part of the research program. They are listed roughly from north to south, and west to east.

A. U.S. LTER sites where aquatic processes are the dominant research focus:

- Arctic (ARC) - Arctic tundra, 68.6° N, 149.6° W. Moist arctic tundra site underlain by permafrost, located in the northern foothills of the Brooks Range, Alaska. Effects of environmental change on the ecology of tundra, streams and lakes, with particular attention to the effects of warming and nutrients. http://ecosystems.mbl.edu/ARC
- **California Current Ecosystem (CCE)** – Coastal upwelling, 32.8° N, 120.3° W. Temperate latitude coastal upwelling ecosystem. Mechanisms, both physical and biotic, generating ecosystem state changes in the pelagic environment with particular attention to nonlinear responses of the planktonic food web. http://ccelter.sio.ucsd.edu

- **Santa Barbara Coastal (SBC)** – Kelp Forest, 34.4° N, 119.9° W. Giant kelp forests on shallow water subtidal rocky reefs, including the foundation kelp species and diverse associated communities. The effects on kelp forests of both ocean-derived and coastal watershed influences, including runoff and associated transport of sediments, nutrients, and organic matter. http://sbc.lternet.edu
- **Moorea Coral Reef (MCR)** – Coral Reef, 17.5° S, 149.8° W. Complex of coral reefs and coastal lagoons that surround the island of Moorea in French Polynesia, which includes examples of all major coral reef types. Long-term consequences of disturbance and changing climate regimes in structuring coral reef ecosystems. http://mcr.lternet.edu
- **North Temperate Lakes (NTL)** - Temperate Lakes, 46.0° N, 89.7° W. Two distinct lake regions in Wisconsin, one forested but sparsely settled, the other agricultural, but urbanizing. How biophysical setting, climate, and human activity (including changing land use and cover) interact to shape lake characteristics and dynamics over time. http://lter.limnology.wisc.edu
- **Florida Coastal Everglades (FCE)** - Oligohaline ecotone, 25.5° N, 80.8° W. Confluence of freshwater and estuarine ecosystems, with freshwater marsh at the upstream end and estuarine mangroves and seagrass estuary ecosystems at the downstream end. The relative importance of water source, water residence time, and local biotic processes in controlling population and ecosystem dynamics. http://fcelter.fiu.edu/
- **Georgia Coastal Ecosystems (GCE)** – Salt marsh and estuary, 31.4° N, 81.4° W. Upland, intertidal, and submerged habitats along an onshore-offshore gradient, centered in Sapelo Island, Georgia. Mechanisms by which variation in the quality, source and amount of both fresh and salt water create temporal and spatial variability in estuarine habitats and processes. http://gce-lter.marsci.uga.edu
- **Virginia Coast Reserve (VCR)** – Barrier islands, 37.3° N, 75.9° W. Dynamic, regularly disturbed landscape along the Atlantic side of the Delmarva Peninsula that includes 14 barrier islands, shallow lagoons with extensive mudflats, tidal marshes, and mainland watersheds. How long-term environmental change and short-term disturbances control the dynamic nature of coastal barrier landscapes. http://www.vcrlter.virginia.edu
- **Plum Island Ecosystem (PIE)** – Coastal plain estuary, 42.8° N, 70.9° W. Coupled watersheds and estuary of Plum Island Sound, Massachusetts, within the cold-temperate Acadian biogeographic province. How inputs of organic matter and nutrients from land, ocean, and marshes interact with external drivers to determine spatial patterns of estuarine productivity and trophic structure. http://ecosystems.mbl.edu/PIE
- **Palmer Station (PAL)** – Ice-dominated pelagic ecosystem, 64.7° S, 64.0° W. Western Antarctic peninsula, including nearshore zone influenced by glacial meltwater, continental shelf within the seasonal marginal ice zone, and open ocean. Documenting the response of the pelagic ecosystem to regional warming and uncovering the mechanisms of responses of seabird and plankton communities. http://pal.lternet.edu

B. U.S. LTER sites where aquatic processes are one element of the research focus:

- **Bonanza Creek (BNZ)** – Boreal forest, 64.8° N, 148.0° W. Boreal forests of inland Alaska, at two sites: Tanana River floodplains with associated upland forests and wetlands; and a network of upland forested watersheds. Major controls over forest dynamics, biogeochemistry, and disturbance and their interactions in the face of a changing climate. http://www.lter.uaf.edu
- **Andrews Experimental Forest (AND)** - Pacific Northwest forest, 42.2° N, 122.3°. Western Cascade range of Oregon in the drainage basin of Lookout Creek. Forest, stream, and watershed dynamics; including old-growth forests. How land use, natural disturbances, and climate variability affect three key ecosystem properties: carbon dynamics, biodiversity, and hydrology. http://www.fsl.orst.edu/lter
- **Niwot Ridge (NWT)** - Alpine tundra, 40.0° N, 105.4° W. Rocky Mountains, Colorado, including cirque glacier, alpine tundra, glacial lakes and moraines, cirques and talus slopes, patterned ground, and permafrost, all above 3000 m. Causes and ecosystem responses of climate change in high-elevation, seasonally snow-covered catchments, especially alpine tundra and alpine lakes. http://culter.colorado.edu/NWT/
- **Coweeta (CWT)** - Temperate deciduous forest, 35.0° N, 83.5° W. Eastern deciduous forest of the southern Appalachian Mountains, western North Carolina, with mixtures of 'northern' and 'southern' taxa. Effects of human practices and disturbance, as well as environmental gradients, on biogeochemical cycling in forest and stream ecosystems at numerous scales. http://coweeta.ecology.uga.edu
- **Baltimore Ecosystem Study (BES)** – Urban ecological system, 39.1° N, 76.3° W. Metropolitan Baltimore, Maryland as an ecological system. Focus on (i) the structure and change of the urban ecosystem; (ii) fluxes of matter, energy, capital, and population; and (iii) how ecological information affects the quality of the local and regional environments. http://www.beslter.org
- **Hubbard Brook Experimental Forest (HBR)** - Deciduous northern forest, 43.9° N, 71.8° W. Forest and associated aquatic ecosystems within the White Mountain National Forest, central New Hampshire. Effects of land development, air pollution, climate change, introduced species, water supply and quality, and carbon management on nutrient cycling and forest ecosystems. http://www.hubbardbrook.org
- **Luquillo Experimental Forest (LUQ)** - Tropical rain forest, 18.3° N, 65.8° W. Rain forest and associated river systems on the island of Puerto Rico. Long-term dynamics of tropical forest ecosystems characterized by large-scale, infrequent disturbance (e.g., hurricanes, landslides, drought), rapid processing of organic material, and high habitat and species diversity. http://luq.lternet.edu

- **McMurdo Dry Valley (MCM)** - Polar dry valley, 77.0° S, 162.5° W. Ice-free dry valley near McMurdo Sound, Antarctica. Perennially ice-covered closed-basin lakes, ephemeral streams, soils, and glaciers. Influence of climate legacies on the structure and function of the dry valley ecosystem, and the role of contemporary material transport in ecosystem structuring. http://www.mcmlter.org

BEYOND THE IVORY TOWER: *THE WASHINGTON POST'S* JULIET EILPERIN

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***Editors' Note:** This is the first installment of a new column for the L&O Bulletin called "Beyond the Ivory Tower". Each issue of the Bulletin will feature either a professional communicator or research scientist who has made a significant contribution to communicating aquatic research beyond the ivory tower of academic research to audiences such as the media, lawmakers, resource managers, or the general public.*

In March 2008, Juliet Eilperin, author and reporter for *The Washington Post*, participated in the panel discussion on "Does Science Really Matter?" at the Ocean Sciences 2008 meeting (further details in the last issue of the *L&O Bulletin*). Eilperin has been a reporter at the *The Washington Post* since 1998 and has reported on key political events such as the impeachment of former President Bill Clinton and four national congressional campaigns. Since April of 2004 she has covered the environment for the national desk, reporting on science, policy, and politics in areas including climate change, oceans, and air quality. In 2006, she authored the book "Fight Club Politics" and is currently writing a book about sharks.

Following the panel at Ocean Sciences 2008, Eilperin spoke with ASLO about why she thinks scientists are afraid of the media and to offer tips as to how our community can overcome that fear. When asked about the infrequency with which scientists initiate contact with the media, Eilperin noted, "What they do is often fairly complicated and difficult to simplify for a lay audience. As a result, a lot of people in academia have concerns about how their work would be portrayed [by the media]." To further complicate matters, scientists are often used to working in private on projects as opposed to public forum. "As a result," she said, "it is understandable that they'd be hesitant."

Regardless, Eilperin feels strongly that scientists who have receive government funding have an obligation to talk to the media, public, and policymakers. Unfortunately most scientists are not trained in communicating beyond their peer group. Eilperin does not believe formal training is necessary, however. Instead, she advises scientists to "imagine you're at a cocktail party and someone who is smart, but not an expert in your field, asks you about your work." Researchers can also develop these skills simply by explaining their work to a friend who doesn't have a scientific background. If scientists can use these tips to envision how to communicate about the work, Eilperin says, it's not that difficult to make the jump to more formal communication with members of the media.

Of course, some scientists are the first to admit they are not, and never would be, good communicators or spokespeople. Eilperin acknowledges that concern and agrees that some scientists are much more skilled than others at communicating to a general audience. She dismisses concerns from junior scientists, however, that their limited credentials hinder their ability to be a good spokesperson. "Much of a person's ability to communicate is personality-driven." Eilperin says she has worked with both established and junior scientists that were excellent communicators. As for those who lack the skills themselves, they need not be left without a voice or venue for disseminating their research results to the public. Eilperin advises that they get to know someone – such as a credible reporter with an interest in their field –who over time may be able to translate and disseminate the results of their work for them.

In today's digital world, there are many venues through which scientists can reach the public, including "letters to the Editor," feature stories in newspapers, podcasts, radio interviews, and television appearances. The array of opportunities can be overwhelming and make it harder for scientists to figure out whom to approach about getting a story out. Eilperin says it is easiest for scientists to start by working with the local media, be it newspaper or radio. Local reporters, she says, are "willing to take the time to work with you and give you the play time." With time, and the experience gained by working with the local media, scientists will be better poised to reach out to the major news outlets.

Eilperin acknowledges that it is not always easy to talk to reporters, but says "scientists should be aware that they have a public obligation to make their work known to a general interest audience." She believes the most effective and "least painful" way to do that is to talk to credible reporters. She also thinks there is a role to be played by professional scientific societies such as ASLO in fostering better communication between scientists and the media. Some societies regularly reach out to individual reporters to let them know about the cutting-edge research and who in their society to talk to. (ASLO members can also contact the ASLO Public Affairs Office for assistance contacting reporters.)

Finally, for students who are interested in non-traditional careers that enable them to "bridge the gap" between science and the media, Eilperin advises that they start by writing for trade publications (e.g., *Science*). Trade publications are most likely to publish a scientists' writing. From there, she says, "you can work your way out to get assignments and see what kind of reception there is for your work."

THE ETHICS FORUM: CONFLICTS OF INTEREST

ASLO Professional Ethics Committee; ***Eric Weissberger****, Committee Chair, U.S. Environmental Protection Agency, Atlantic Ecology Division, 27 Tarzwell Dr., Narragansett, RI 02882 USA; weissberger.eric@epa.gov*

Conflicts of interest may arise in many situations in the world of science. For example, you may be serving on a job search committee and receive an application from a graduate school friend. A journal editor may send you the paper of a former student to review. You may receive funding from a power company to determine the effects of discharge from their new power plant on stream animals. What exactly is a conflict of interest? What problems can arise from conflicts of interest? What can be done to mitigate such conflicts?

There are several definitions of conflicts of interest. Two from Maurissen et al. (2005) are as follows:

1) An individual has a conflict of interest when there is a conflict between his/her private or institutional interest and his/her official duties in a position of responsibility or trust.
2) An individual is in conflict if he/she owes a duty of loyalty or responsibility to two distinct entities or individuals, both of which are likely to be affected by the scientific activity in which the individual is engaged.

Interests can be financial (e.g. employer-employee relationships, funder vs. funding recipient) or non-financial (e.g. family, student, or colleague relationships) (Maurissen et al. 2005).

Harm can result from conflicts of interest in the form of bias. In the scenarios presented above, you may favor your friend from graduate school regardless of his or her qualifications. You may recommend your former student's paper for publication even though the methods may be flawed. You may feel obliged to leave out any adverse affects of the power plant on stream animals for fear of jeopardizing future funding. These biases may lead to unfair decisions.

The best way to deal with conflicts of interest is to avoid them. For example, if one of the job candidates is a friend, you may ask to be exempt from reviewing his or her application. You may wish to recuse yourself as a reviewer of a manuscript if you are acquainted with the author. If you are interested in the effects of the power plant on stream animals, you may wish to seek funding from sources other than the power company.

Conflicts of interest cannot always be avoided, however. In specialized scientific fields, it is common for most people working in that field to be acquainted with each other to some degree. Therefore, an editor seeking reviewers for a manuscript will have a difficult time finding a reviewer who is both familiar with the field and unacquainted with the author. If a power company needs to assess the impacts of a new power plant on stream animals, the scientist hired will inherently have a conflict of interest as his or her salary and research are being funded by an entity with a vested interest in the outcome of the study. In such cases where conflicts of interest cannot be avoided, they should at the very least be disclosed. A member of a search committee should disclose any relationship with a job candidate. A reviewer should inform an editor of any relationship he or she has with the author. A researcher should divulge all sources of funding, making apparent the interests of all funding bodies. When conflicts of interest cannot be avoided, disclosure of the conflicts will allow outsiders to gauge the possibility of bias in process or outcome, and interpret the results accordingly.

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ASLO NEWS

MESSAGE FROM THE PRESIDENT

Carlos M. Duarte*, IMEDEA (CSIC-UIB); Miquel Marqués 21, 07190 Esporles, Mallorca, Spain; carlosduarte@ifisc.uib.es*

PRINCIPLES TO GUIDE OUR FUTURE

This is my first letter as president of ASLO, following the term of my predecessor Sybil Seitzinger, who has done a terrific job, building upon the work of her predecessors to bring the Society to the strong and healthy status it now enjoys.

My first concern in writing this letter is a very primary one: to do so with the minimum possible number of errors, as I believe I am the first ASLO President whose mother tongue is not English (Spanish in my case). This tells you something about the growth of diversity within ASLO, but I shall address this important topic in my next message. The most important message I wish to report today refers to recent decisions by the Board, which is on course to complete a strategic plan to guide ASLO's future. The actions following from this strategic plan

will be guided by a simple set of principles, which commit the ASLO Board to strive to:

- improve recruitment and retention at the undergraduate, graduate, and early career levels to strengthen the demographics of practitioners of the aquatic sciences. Student and early career programs have been strengthened already and will continue to receive support.
- learn what services members want and offer these services at a reasonable cost. A survey with this aim will soon follow.
- take action to promote forward-thinking science, thereby foreseeing developing challenges, and ensure the continued relevance of our sciences to knowledge and society.
- seek to improve communication, cooperation, and exchanges with other relevant societies, towards promoting forward-thinking consistent with the ASLO mission statement.
- offer equitable services to all members (independently of geographic location, stage of career development, and disciplinary interest within the aquatic sciences).
- provide science products of the highest quality and made as widely and openly available as possible.
- make decisions based on the best knowledge available.
- ensure financial stability by building resilience against unforeseen negative financial events.

These principles will be used to outline a series of actions to guide a strong ASLO into the future. Indeed, ASLO is strong already: ASLO journals received a superb rating by ISI's impact factor, with *L&O* ranking top within its category and *L&O Methods* continuing to raise its profile among the top journals in aquatic sciences. Kudos to our editors and their editorial boards!

The Orlando Ocean Sciences meeting was, at about 4,000 registered participants, the largest meeting ever organized by ASLO, who acted as leading organizer to this meeting organized in concert with AGU and TOS, and was followed by an excellent summer meeting in St. John's, Canada. The call for registration and abstract submission for the Nice Aquatic Sciences meeting (Jan 25-30, 2009) is already open, and the program looks quite exciting! Make sure to join us in Nice!

It is also now time to start planning for the fourth ASLO meeting outside of North America (after Copenhagen 2000, Santiago de Compostela 2005, and Nice 2009). ASLO meetings outside North America are essential to achieve our mission by providing equitable services to members, including those outside North America, and fostering the diversity of the ASLO membership.

A call for proposals for ASLO an ASLO meeting outside of North America to be conducted between June 2012 and February 2013 has been sent to all ASLO members, and is also included in this issue of the *Bulletin* (see page XX). If you have an idea for a venue that has the potential to gather a large contingent of aquatic scientists from regions poorly served by previous meetings outside North America, please take the time to formulate a proposal, including input from ASLO members near that venue, and submit it to Helen Schneider, at the ASLO business office (business@aslo.org) by the deadline of October 31, 2008.

The call for nominations for the 2009 ASLO Awards will soon be launched. Please note that ASLO will expand its slate of Awards to include a new Education Award as of 2009. This will be a named award that will give due credit to those who have devoted their efforts and talents to educate aquatic scientists. If you have a suggestion of a prominent aquatic scientist who excelled at education that the award could be named after, please contact John Downing, downing@iastate.edu, chair of the awards committee.

Carlos M. Duarte, ASLO President

MESSAGE FROM THE BUSINESS OFFICE

***Helen Schneider Lemay**, ASLO Business Office, 5400 Bosque Blvd., Suite 680, Waco, TX 76710-4446; Tel.: 254-399-9635 or 800-929-2756, Fax: 254-776-3767; business@also.org*

It's that time of the year-time for you to renew your ASLO membership. Very shortly, you will be receiving a reminder to renew via e-mail. Renewing online is easy and quick…and reduces the printing and postage costs for the society. That, in turn, helps to keep your dues as low as possible. Of course, if you prefer to receive a hard copy renewal form, we would be happy to send one to you and one will be sent automatically if you do not renew using the online form.

Renewal rates have not increased this year for any membership category. The Student Member, No Journal option has, however, gone down to $10.00, making this option more affordable for students. Please pass the word and sign up your friends and students!

We encourage you to be an active member in ASLO by volunteering to serve on a committee. This is a great way to get your voice heard and help support the society. More information about ASLO committees is available in this issue (See page XX).

The business office also handles the conference management for ASLO meetings. We enjoyed seeing so many of you in St. John's in June. There also are exciting ASLO conferences coming up – 2009 Aquatic Sciences Meeting in Nice, France, and the 2010 Summer Meeting in Santa Fe, New Mexico (joint with NABS!) – and hope you are making plans to attend. The 2010 Ocean Sciences Meeting will be held in Portland, Oregon in January and is organized by AGU. Members are afforded a reduced registration rate for meetings, so be sure to keep your membership current. NEW!!! You are now able to join or

renew as you register for the 2009 ASM in Nice and pay one fee for both.

The renewal form will also include sign up for committee involvement in ASLO committees. We hope that you will volunteer! The strength and growth of ASLO is due to the wonderful volunteers who serve the society.

Watch for new benefits for members, interesting and stimulating meetings and excellent journals in 2009!

And, please, let us know if we can be of assistance to you!

Helen Schneider Lemay,
ASLO Business Manager

PUBLIC AFFAIRS: CRITERION 2… LET US HELP YOU!!

***Adrienne Sponberg**, ASLO Public Affairs Director, P.O. Box 8785, Silver Spring, MD 20907, asponberg@aslo.org*

While we all know that ASLO excels at providing venues for sharing research results within the aquatic science community, ASLO also strives to provide that information beyond our circle of peers to the general public, the media, and policymakers. In fact, the ASLO mission states that a purpose of ASLO is to "advance public awareness and education about aquatic resources and research." ASLO took a significant step towards achieving that goal by establishing a Washington, D.C. based office in 2000. While the office's name and specific charge has changed over the years, the purpose remains the same: to communicate aquatic science to the world at large.

Many ASLO members have participated in policy outreach activities sponsored by ASLO such as congressional visits, write-in campaigns, policy workshops, and poster exhibitions geared towards policymakers. While much of the past work of the Public Affairs Office has focused on getting current information regarding aquatic science into the hands of policymakers, ASLO is actively working to broaden our reach. The ASLO Public Affairs Office, along with the Informal Education and Outreach (IEO) Subcommittee, are seeking ways to improve our outreach to other audiences, such as the media and the general public, both in the United States and abroad. Many of you participated in an ASLO/COSEE survey regarding your outreach activities earlier this year. The IEO Subcommittee is carefully examining the survey responses and will be making recommendations to the Board regarding ways to best meet the needs as expressed by the ASLO membership through the survey. An article summarizing the results will also be published in the December issue of the *L&O Bulletin*.

Regardless of the target audience, ASLO continues to seek partnership with you, its members, for outreach activities. After all, you're the experts! As many funding agencies (including the National Science Foundation, through Criterion 2) are emphasizing outreach and "broader impacts" in their grant requirements, ASLO wants to remind you that its Public Affairs Office is available to assist members with these activities. We recently partnered with ASLO member Jim Kitchell to organize a briefing on the global fisheries crisis for policymakers in Washington, D.C. (see story immediately below). He provided the Powerpoints and substance for the talk, while ASLO took care of the logistics such as obtaining congressional sponsorship of the briefing, distributing invitations, and arranging for a room and catering. The ASLO Public Affairs Office has also provided hands-on communications workshops on-site for graduate programs with an interest or mission to provide interdisciplinary training for their students.

If you're interested in working with ASLO on outreach projects, please contact me at asponberg@aslo.org. We're always looking for new ways to work with our members and would love to hear from you!

ASLO SPONSORS CONGRESSIONAL BRIEFING ON GLOBAL FISHERIES CRISIS

***Adrienne Sponberg**, ASLO Public Affairs Director, P.O. Box 8785, Silver Spring, MD 20907, asponberg@aslo.org*

This July, the ASLO Public Affairs Office teamed up with member Jim Kitchell to brief policymakers in Washington, D.C. on the global fisheries crisis. The briefing was largely based on Kitchell's plenary talk at the St. John's Aquatic Science Meeting. More than 25 staff from the U.S. Senate, U.S. House of Representatives, Fish and Wildlife Service, National Oceanic and Atmospheric Administration, and marine conservation organizations attended the briefing. During his talk, Kitchell reviewed some key scientific concepts for staff, including how fishery managers calculate maximum sustainable yield (MSY) – a key variable in fisheries management. The bulk of his talk focused on how models incorporating ecology and economics could be used to evaluate the outcomes of different policy options. Congressional staff found the briefing very informative, as indicated by the extended question and answer period following the presentation, multiple requests for copies of the presentation, and feedback following the briefing.

The briefing was a joint venture between ASLO and Kitchell, allowing ASLO to fulfill its mission to advance understanding of aquatic science while enabling Kitchell to address the broader impacts requirements of his research grant. If you're interested in working with ASLO's Public Affairs Office on similar projects, contact me at sponberg@aslo.org.

2008 ELECTION RESULTS

We had a stellar slate of nominees for the 2008 election, as shown by very close races for all Board positions. Thanks to all who ran for office! Congratulations to the newly elected Board members:

- Debbie Bronk, President-Elect (2008-2010)
- Patricia Matrai, Treasurer (2008-2011)
- Jim Cotner, Member-at-large (2008-2011)
- Michelle Wood, Member-at-large (2008-2011)
- Kimberley Keats, Student Board Member (2008-2011)

Departing Board members are Past-President Jon Cole, Treasurer Lynda Shapiro, Members-at-large Marta Estrada and Patricia Matrai (but Paty will be transitioning to Treasurer), and Student Board Member Alex Poulain. Our very sincere thanks for all the effort you have contributed to the society!

ASLO NEEDS YOU! VOLUNTEER FOR ASLO COMMITTEES

To better engage the entire ASLO community with the governance of the society, we are writing to you to explain a change in how ASLO committees will be populated from now on. Committees are very important to ASLO; they both provide vision for the future and oversee specific activities. There are two kinds of committees: ad hoc Committees and Standing Committees. Ad hoc committees are voted into existence by the Board to solve a particular, current problem within a specific amount of time. These committees are not expected to endure over time.

The eight standing committees (http://www.aslo.org/information/committees.html) were voted into existence by the ASLO membership; their continued existence is a requirement of the bylaws. These committees are:

- Awards and Citations Committee, with its 5 subcommittees (G. Evelyn Hutchinson Award Subcommittee, Raymond L. Lindeman Award Subcommittee, A.C. Redfield Lifetime Achievement Award Subcommittee, Ruth Patrick Award Subcommittee, John Martin Award Subcommittee);
- Education and Human Resources (with its 3 subcommittees (ULTRA/Web-based lectures Subcommittee, Informal Education and Outreach Subcommittee, and Image Library Subcommittee);
- Finance;
- Meetings;
- Nominations;
- Professional Ethics;
- Publications; and
- Public Policy.

The Board must approve the members of all committees. The term of office on these committees varies but is typically about 3 years, with committee members serving staggered terms. Thus, the Board is always looking for new members to serve on committees. The process of identifying new committee members has always been open, but informal. Sometimes ASLO members volunteer and when an opening occurs they are selected. Sometimes ASLO Board members suggest names of people whom they think would be interested or fill a critical niche. The problem is that rather few members volunteer and the current Board members are only aware of a small number of people.

The Board would like to formalize a much more open process to fill committees by inviting the entire ASLO community to nominate individuals or themselves to serve on committees. On the web site (http://www.aslo.org/forms/committees.html) there is a form that shows the upcoming vacancies on committees and the current membership. To nominate someone else or yourself, all you need to do is fill in the names, the contact information, and submit a brief CV. The Board will select individuals from this web site, contact them about their willingness to serve, and make the final decisions on committee memberships. Hopefully this will result in a much larger pool of willing candidates and expand the diversity of people who serve on ASLO Committees. As another way to increase the pool of potential committee members, we will be adding a line to registration renewals that asks you to self-identify your own expertise and interest and willingness to serve on particular committee.

Committees play a crucial role in providing guidance to the Board and carrying out the activities of ASLO. As a volunteer-run society, ASLO's future depends on the active participation of its members. We hope you will share your ideas and enthusiasm for ASLO by volunteering for a committee!

More than 25 staff from the U.S. Senate, U.S. House of Representatives, Fish and Wildlife Service, National Oceanic and Atmospheric Administration, and marine conservation organizations attended Jim Kitchell's briefing.

L&O FEATURED ARTICLE

***Everett Fee**, Limnology & Oceanography Editorial Office, 343 Lady MacDonald Crescent, Canmore, AB T1W 1H5, Canada; lo-editor@aslo.org*

Beginning with the May 1999 issue of *Limnology and Oceanography*, selected articles have been made freely available for reading or download on the *L&O* Website a few weeks in advance of when the printed issue is mailed. Featured Articles receive no special attention in the printed issue. A paper may be featured for different reasons (e.g., to draw attention to an exceptional piece of research or to promote an area of research that the Associate Editor feels *L&O* readers should be more aware of). Each Featured Article is announced in the *Bulletin*, as well as to the LO-Feature Mailing List, and is accompanied by an introduction to the article by the Associate Editor who handled the paper discussing its significance.

The Featured Article for the May 2008 issue of *L&O* is:

Karlsson, Jenny Ask and Mats Jansson. 2008. Winter respiration of allochthonous and autochthonous organic carbon in a subarctic clear-water lake. Limnol. Oceanogr. 53(3): 948-954.

This article can be read online at http://aslo.org/lo/toc/vol_53/issue_3/0948.pdf.

Introductory comments by Roland Psenner (L&O Associate Editor)

Natural sources and sinks of CO_2 are a fiercely debated topic among ecologists and everybody interested in the fate of greenhouse gas emissions. It has been known for more than two decades that pelagic bacteria use dissolved organic carbon of terrestrial origin (Tranvik 1988) and lakes are generally considered to be CO_2 emitters (Cole et al. 1994). Del Giorgio and Peters (1994) and Carpenter et al. (2005) showed that dissolved organic carbon from the terrestrial catchment is an important part to the carbon budget of lakes. In a recent review, Battin et al. (2008) summarized work showing that microbial processes also result in the outgassing of carbon dioxide from fluvial networks, which transport, transform, or store nearly 2 Pg of organic carbon per year; since most of this respired carbon originates from terrestrial vegetation, it is now generally accepted that freshwaters are net heterotrophic systems. But in this issue's featured article Karlsson and coworkers (2008) demonstrate that what may be true on a global scale can be quite different in an individual lake.

Lake Almberga is a small clear-water lake surrounded by a birch forest in Northern Sweden (68° latitude) with an average DOC concentration of ~4 mg L^{-1}. During winter, when the lake is ice-covered for more than 6 months and the penetration of photosynthetically active radiation is near zero primary production is not a factor in the carbon budget. Further simplyfying the carbon budget, the lake never became anoxic; thus, methane was absent from the water column. Sampling of dissolved and particulate carbon at frequent time intervals, at several depths, and at the sediment surface allowed the authors to distinguish between pelagic and benthic respiration. To quantify the external and internal carbon sources, they inferred the $d^{13}C$ content of the respired organic carbon from the intercept of Keeling plots (the inverse of dissolved inorganic carbon concentration plotted against $d^{13}C$; Karlsson et al. 2007). Knowing the $d^{13}C$ signature of allochthonous carbon allowed them to distinguish between different sources in the carbon budget of the lake. In combination with production/respiration measurements during the ice-free period, the authors present us with a detailed carbon budget for the lake.

On an annual basis, respiration in Lake Almberga was nearly four times larger than primary production, supporting the general view that freshwaters are CO_2 sources to the atmosphere. Winter respiration was more than a quarter of the annual respiration; i.e., even under cold conditions and without delivery of fresh organic matter, winter respiration equaled total annual in-lake primary production. The following table summarizes the main findings:

From the fact that the variation in the $d^{13}C$ of respired inorganic carbon was closely related to the $d^{13}C$ of sediments, the authors inferred that sediments were the main site (~80%) of respiration during winter. They also show that at shallow depths the dominant source of winter respiration was organic carbon from benthic algae, but in deeper parts of the lake sedimented organic carbon was more important. Interestingly, winter respiration of organic carbon from benthic algae was about 50% of summer primary production.

They concluded that the pelagic zone is heterotrophic throughout the year while the benthic habitat is in metabolic balance in summer but is the main site of respiration during winter. These results demonstrate that carbon budgets are spatially and temporally complex and future efforts must distinguish

Table 1. Simplified relations between respiration and production, benthic and pelagic zone, and seasons in Lake Almberga.

Annual respiration	4x annual primary production
Winter respiration	Annual primary production
Phytobenthos winter respiration	½ total winter respiration
Phytobenthos winter respiration	½ phytobenthos summer production
Pelagic zone	Permanently heterotrophic
Benthos	Heterotrophic on average
Benthos	In metabolic balance during summer

not only between allochthonous and autochthonous carbon sources, but also between benthic and pelagic zones and, last but not least, between seasons.

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OUTSTANDING *L&O* REVIEWERS

***Everett Fee**, Limnology & Oceanography Editorial Office, 343 Lady MacDonald Crescent, Canmore, AB T1W 1H5, Canada; lo-editor@aslo.org*

Peer review is a crucial component of modern science. The fact that *L&O* is able to utilize the services of the best scientists as reviewers allows it to be a leading journal in the aquatic sciences. However, these individuals seldom get the recognition they deserve for this selfless work. Therefore, each issue of the *Bulletin* will cite outstanding reviewers that Everett Fee, *L&O* Editor, feels deserve special recognition for their overall reviewing efforts. The ASLO membership extends its sincerest appreciation and thanks these two outstanding scientist(s).

STEVEN BOUILLON

Steven Bouillon holds a postdoc position at the Netherlands Institute of Ecology and the Vrije Universiteit Brussel. His research has focused on understanding foodwebs in mangrove ecosystems and on aquatic biogeochemistry in tropical estuaries and mangroves. Application and development of stable isotope techniques have played a central role in this research. He will shortly take up a research professorship at the Department of Earth and Environmental Sciences of the Katholieke Universiteit Leuven (Belgium), where his work will focus more on the biogeochemistry of tropical river basins and lakes.

ALAN SHANKS

Alan L. Shanks is Professor of Marine Biology at the University of Oregon's Institute of Marine Biology. His research interests are in biological oceanography, especially larval dispersal and transport. He is particularly interested in how larval behavior coupled with physical oceanography establishes patterns of dispersal and how this intern affects subsequent settlement and recruitment.

GETTING TO KNOW YOUR *L&O* AND *L&O METHODS* ASSOCIATE EDITORS

***Paul Kemp,** University of Hawaii at Manoa, 1000 Pope Rd, Honolulu HI 96822, USA; lomethods-editor@aslo.org*

The next time that you browse an issue of *L&O* or *L&O Methods,* we hope that you will take a moment to peruse the list of Associate Editors (AE) on the inside of the *L&O* front cover and on the *L&O: Methods* website (http://www.aslo.org/lomethods/). These are the people whose hard work determines what is published in *L&O* and *L&O: Methods*. ASLO acknowledges the important work that these people do for the society; AE's are featured in each issue of the *Bulletin*.

The role of the AE is that of an impartial judge -- to fairly assess the reviewers' comments and guide the author's next steps. About every two weeks an AE is assigned a new manuscript. His or her first task is to select reviewers; this delicate job requires profound knowledge of both science and politics (the often conflicting relationships among people in a society). When the reviews are received, the AE digests that input along with his or her own assessment of the manuscript to arrive at a decision. It is unfortunately quite common for reviewers to recommend very different fates for a paper, which puts the AE in the uncomfortable position of having to make at least one of the reviewers and perhaps the author unhappy. For *L&O*, the AE's final job is to edit accepted manuscripts, suggesting wording and organizational changes to improve clarity. The *L&O: Methods* AEs often undertake this task as well, completing a thorough additional review focusing on improving the presentation of the authors' work.

L&O and *L&O Methods* AEs work at the highest level of our profession. Being an AE is a very demanding job, and we are extremely fortunate that these people devote so much time to the ongoing challenge of making *L&O* the leading journal in the aquatic sciences. *L&O: Methods* is only in its 6th year of publication and is already ranked #3 of 17 limnology journals and #6 of 48 oceanography journals, in large part thanks to the dedicated efforts of its Associate Editors.

LIMNOLOGY AND OCEANOGRAPHY: METHODS

CLARE REIMERS

Clare E. Reimers is a professor in the College of Oceanic and Atmospheric Sciences of Oregon State University, and her laboratory is located within OSU's Hatfield Marine Science Center (Newport, OR, USA). Her areas of specialization are benthic biogeochemistry and applied electrochemistry with emphasis on in situ measurements of redox conditions in natural waters and sediments, and the marine carbon cycle. Her present projects involve the development and demonstration of benthic microbial fuel cells as power sources for ocean instrumentation, and the application of an instrumented platform for measuring rates of benthic oxygen exchange over sandy regions of the Oregon shelf. For *L&O Methods*, Dr. Reimers often supervises the review of articles that have a focus on in situ pore water and benthic flux measurements. Several articles have also presented improved laboratory methods for the selective quantification of chemical species or phases in sediments, or descriptions of new optical or electrochemical microsensors.

LAURENCE P. MADIN

Larry Madin is the Executive Vice President and Director of Research, and a Senior Scientist, at the Woods Hole Oceanographic Institution (WHOI) in Woods Hole, MA. Previously he has been Chair of the WHOI Biology Department, and Director of the WHOI Ocean Life Institute. His principal research interests are in the biology of oceanic and deep-sea zooplankton and fishes, with special emphasis on medusae, siphonophores, ctenophores and pelagic tunicates. Madin was among the first biologists to use SCUBA and submersibles for the in-situ study of the oceanic plankton. At *L&O Methods* he handles manuscripts on the various methodologies of zooplankton research, including sampling, analysis, and modeling.

Pete Jumars (University of Maine Darling Marine Center) receives the Distinguished Service Award.

ASLO MEETING HIGHLIGHTS

CALL FOR PROPOSALS FOR AN ASLO MEETING OUTSIDE NORTH AMERICA

The call for abstracts for the Nice meeting (Jan 25-30, 2009) has been launched and it is time now to start planning for the fourth ASLO meeting outside of North America (after Copenhagen 2000, Santiago de Compostela 2005, and Nice 2009). ASLO meetings outside North America are essential to achieve our mission by providing equitable services to members, including those outside North America, and fostering the diversity of the ASLO membership.

ASLO will welcome proposals for an ASLO meeting outside of North America to be conducted between June 2012 and February 2013. Proposals should include information on the venue and its suitability to gather ASLO members, tentative costs, and capacity. Proposals should provide evidence that the meeting will be affordable to members and that the venue has the capacity to accommodate participants (attendance to previous ASLO meetings outside North America has ranged from 1,500 to 2,500 participants).

Cornelia Wuchter (Woods Hole Oceanographic Institute) receives the Raymond L. Lindeman Award from Seitzinger (left) and ASLO Awards Committee Chair John Downing.

Susan Knight (University of Wisconsin Trout Lake Station) accepts the Citation for Scientific Excellence Award on behalf of her late husband, Thomas M. Frost.

Value-added components for the proposals include the availability to external co-funding for the conference, the potential to gather a large contingent of aquatic scientists from regions poorly served by previous meetings outside North America, and the potential to include outreach activities aimed to raise awareness of the general public on aquatic sciences.

The proposals will be reviewed at the next ASLO Board meeting at Nice, in January 2009.

Please submit your proposals to Helen Schneider, at the ASLO business office (business@aslo.org) by October 31, 2008.

AQUATIC SCIENCES 2008: ASLO AWARD PRESENTATIONS

During the Aquatic Sciences meeting in St. John's, ASLO presented seven of its members with the society's highest honors. Images from the award presentations are below. Note: the full citation for each award winner is available in the June issue of the *L&O Bulletin,* online at http://aslo.org/bulletin/issues/08_v17_i2.pdf.

AQUATIC SCIENCES 2008: ANOTHER MEMORABLE MEETING IN ST. JOHN'S

***M. Robin Anderson**, ASM 2008 Co-chair, Fisheries and Oceans Canada, 80 East White Hills Road, PO Box 5667, St. John's, NL A1C 5X1, Canada, M.Robin.Anderson@dfo-mpo.gc.ca*

In June, St. John's, Newfoundland welcomed ASLO members back for another memorable meeting. Over 600 participants met to explore linkages between scientists of course, and also between disciplines and approaches, between ecosystems and environments both freshwater and marine. Many of the 34 special session and 9 general sessions focused on cross habitat or cross disciplinary linkages in lakes, rivers and oceans. Plenary speakers James Kitchell, Peter J. le B. Williams, Elizabeth Canuel, Warwick Vincent, and Ron O'Dor developed ecosystem and diversity themes and interactions at and across edges and boundaries.

Student and early career activities were an exciting highlight, bringing together young aquatic scientists for both professional and social interactions. Many became honorary Newfoundlanders by kissing the cod and downing a shot of screech. Yes bye!!!

All in all the science was exciting, the interactions dynamic, and the experience memorable. Even the weather cooperated – we all saw the sun and many saw whales and icebergs too! Thanks to everyone who helped make this meeting such a success! Hopefully we will see you all in another 25 years.

AQUATIC SCIENCES 2008: STUDENT PRESENTATION AWARDS

*ASLO Student Representatives; **Lynn Abramson**, Office of Senator Barbara Boxer, 112 Hart Senate Office Building, Washington, D.C. 20510; **Kimberley Keats**, Ocean Sciences Centre, Memorial University of Newfoundland, St. John's, Newfoundland, A1C 5S7, Canada; studentreps@aslo.org*

The following students were selected to receive Outstanding Student Presentation Awards at the 2008 Aquatic Sciences Meeting in St. John's, Newfoundland. These highly prestigious awards were given to approximately 5% of student presentations as evaluated based on the effectiveness of the presentation, quality of experimental design, clarity of conclusions, and scientific insight. Winners will receive a certificate and a $50 award co-sponsored by ASLO and the Southern Association of Marine Laboratories. Congratulations to all recipients! Thank you to all who participated in judging student presentations; these awards would not be possible without your help. If you are interested in serving as a judge at future meetings, please send an email to studentreps@aslo.org for more information.

Oral Pres. Award Winners:

Elisa Benincã
Matthias López Correa
Stephanie Hamelin
Will Hobbs
Julie Koester
Laurel Larsen
Cory McDonald
Bailey McMeans
Leslie Smith

Poster Pres. Award Winners:

Kaven Dionne
Jennica Seiden
Anne Stuart
Justin So

Richard Eppley accepts the John Martin Award for his 1979 paper on organic matter flux, co-authored with Bruce Peterson.

Alice Alldredge (University of California – Santa Barbara) accepts the G. Evelyn Hutchinson Award from Seitzinger.

ASLO 2009: THE MARINE ENVIRONMENT LABORATORIES OF THE INTERNATIONAL ATOMIC ENERGY AGENCY, MONACO (IAEA-MEL)

Maria Betti,, Marine Environment Laboratories, 4 Quai Antoine 1er, Monaco, MC-98000, Monaco; M.Betti@iaea.org

The IAEA Marine Environment Laboratories (IAEA-MEL) in Monaco will celebrate their 50th anniversary in 2011. Established in 1961 as part of the IAEA's Department of Research and Isotopes, IAEA-MEL is the only marine laboratory within the United Nations system. For almost 50 years the Laboratory has been carrying out an IAEA-focused core program in promotion of nuclear and isotopic techniques to improve the understanding of marine radioactivity. IAEA-MEL also responds to regular requests for technical assistance from other UN agencies and programs, e.g. UNEP, IOC (UNESCO), FAO, WHO and WMO, as well as giving assistance and support to United Nations Member States through training courses and technical cooperation projects.

The Monaco Laboratory began as the International Laboratory of Marine Radioactivity. It was first located within the well-known Oceanographic Museum in Monaco. In 1988 the Laboratory occupied temporary premises in the football stadium, Stade Louis II and Aigue Marine. Its permanent home on the Port Hercule in Monaco were inaugurated in 1998. The new facilities considerably expanded and enhanced the quality of laboratory space. In 1991 the name of the Laboratory was changed to its present one: The Marine Environment Laboratories, a name which better reflects the laboratory's raison d'être.

The laboratory is an example of both the environmental awareness and concern of the International Atomic Energy Agency as well as the marine scientific traditions and interests of the Principality of Monaco. One its primary goals is the transfer of modern scientific and industrial methods and knowledge from developed to developing countries. Thus, the primary aims of the IAEA-MEL are to help Member States understand, monitor and protect the marine environment and to co-ordinate technical aspects of international ocean protection, training and assistance programs.

The Laboratory has a significant practical training and equipment responsibility on behalf of United Nations Member States and is also an international center for analytical quality control services for radioactive and non-radioactive marine pollutants. The IAEA-MEL combines technical co-operation services (quality control services, equipment installation and maintenance, etc.) and highly applied research and development carried out for and with United Natiions Member States. The continuing strong commitment to the Laboratory by the Principality of Monaco is evidenced by its provision of new expanded premises in 1998.

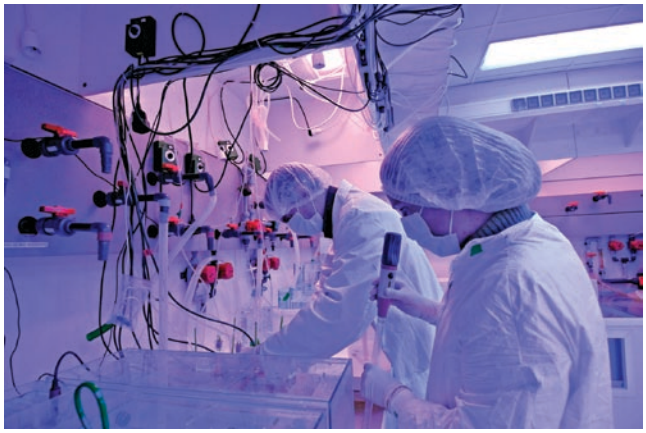
The main objectives of the Marine Environment Laboratories are to provide Member States of the United Nations with:

- Research for the protection of the marine environment from radioactive and non-radioactive pollution.
- Applications of nuclear & isotopic techniques for tracking oceanic processes, understanding marine ecosystems and assessing pollution impacts.
- Expertise, training & reference materials for monitoring of marine environments.
- Strategic partnerships with international organizations and other UN ocean agencies (IOC/UNESCO, UNEP, UNDP, IMO) to deliver the UN-WSSD programs on sustainable development of the ocean.

Nancy Rabalais (Louisiana Universities Marine Consortium) accepts the Ruth Patrick Award.

John Hobbie (Woods Hole Oceanographic Institute) accepts the A.C. Redfield Lifetime Achievement Award from outgoing ASLO President Sybil Seitzinger.

Laboratory work in the IAEA Marine Environmental Laboratory in Monaco



In recent years, the MEL has carried out worldwide radioactivity baseline studies which have covered the Atlantic, North & South Pacific, Indian, Arctic and Antarctic Oceans and the Mediterranean, Black and Caspian Seas. Regional environmental 'hotspots' such as the Gulf, the Irish, Kara and Caspian Seas, New Caledonia and the Mururoa and Fangataufa Atolls have also been investigated in detail. MEL scientists participate in many international oceanographic programs and research projects. The lab has developed unique marine radio-ecological datasets which enable us to model and predict radionuclide pathways and risks through marine food chains. Recently, MEL has cooperated with 52 Member States and our results have appeared as IAEA Reports. Scientists working at MEL regularly publish standard research publications in international peer reviewed journals. Member States need to know that the marine environmental research they support is of the best scientific quality, relevance and independence.

Nowadays, MEL's work has become focused on the applications of nuclear and related technologies to address problems associated with coastal zone management, climate change and ocean acidification impacts on marine biodiversity, impacts of contaminants on seafood safety and trade, and sustainable aquaculture.

ASLO MEMBER NEWS

TOMMY DICKEY RECEIVES PRESTIGIOUS AWARD FROM U.S. NAVY

University of California Santa Barbara (UCSB) oceanographer Tommy Dickey has been awarded a prestigious Secretary of the Navy and Chief of Naval Operations Chair in Oceanographic Sciences. The research chair, a lifetime appointment, is awarded to two distinguished oceanographers every four years. Recipients also serve as advisors to the Chief of Naval Research. The Office of Naval Research Program recognizes pioneering academic leaders in oceanography with collaborations across scientific disciplines. It provides $1.2 million over four years for multidisciplinary research and encourages the development of future ocean researchers through graduate student support. Dickey, a professor in the Department of Geography, is principal investigator of UCSB's Ocean Physics Laboratory. His primary research interest is interdisciplinary oceanography, with an emphasis on upper ocean dynamics and bio-optical variability. He has used new technologies in the deployment of physical, chemical, biological, and optical instrumentation on autonomous platforms in coastal and deep open-ocean settings around the world. Dickey's innovative research has spanned and linked the sub-disciplines of physical, optical, geological, chemical, and biological oceanography. Dickey has served as an Associate Editor for both *L&O* and *L&O Methods*.

AMERICAN SOCIETY OF MICROBIOLOGY HONORS ED DELONG AND MARY ANN MORAN

The American Society of Microbiology (ASM) honored two ASLO members, Ed DeLong and Mary Ann Moran, with Scientific Achievement Awards this August. Both are Fellows of the American Academy of Microbiology.

Ed DeLong, Professor in the Department of Civil and Environmental Engineering and Division of Biological Engineering at the Massachusetts Institute of Technology was honored with the Procter and Gamble Award in Applied and Environmental Microbiology. ASM selected DeLong in recognition of his achievements in the field of marine microbiology, saying he "has been at the forefront of an explosion of new information about marine microbial diversity, and he is a world leader in developing and using metagenomics to address environmental microbiological questions." One of DeLong's most important contributions is the discovery that marine archaea are among the most abundant organisms in the deep ocean, while his work in sediment microbiology led to his identification of dystrophic associations of organisms that result in methane oxidation through new kinds of metabolism. He also discovered a novel photosynthetic apparatus that opened entirely new views on photosynthesis. His genomic approaches to the study of marine microbes have paved the way for a new understanding of the complexity of marine microbiology and provided fresh insight into marine microbial bioenergetics.

Mary Ann Moran became the first recipient of ASM's D.C. White Research and Mentoring Award for her distinguished accomplishments in interdisciplinary research and mentoring. Moran, Distinguished Research Professor in the Department of Marine Sciences at the University of Georgia, has played a unique and pivotal role in combining two historically separate schools of thought – the biogeochemical approach and an organismal approach – to develop new methodologies that allow a synthesis of these perspectives. She is a world leader in the study of microbial and photochemical transformations of several types of organic substances, especially plant-derived lignins and their degradation products. Moran has also distinguished herself as a mentor and role model. She served as Graduate Coordinator in her department from 1997 to 2005, and she has mentored eight graduate students, nine postdoctoral students, 25 undergraduate students, and five high school interns. For students and trainees at every level, she creates stimulating research environments that allow young scientists to fulfill their potential and excel.

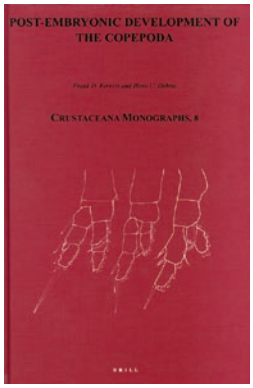
Have you or a colleague recently received an award or prestigious appointment? Send your news to bulletin-editors@aslo.org.

BOOK REVIEWS

FERRARI, FRANK D. and **HANS-U. DAHMS.** 2007. **Post-Embryonic Development of the Copepoda.** Brill, ISBN 978 90 04 15713 2, 256 p. US$ 189.00

Reviewed by ***Stéphane Gasparini,*** *Laboratoire d'Océanographie de Villefranche CNRS Université Paris6 UMR 7093, Station Zoologique, BP 28, 06230 Villefranchee-sur-Mer, France; gasparini@obs-vlfr.fr*

Copepods can be considered as one of the most abundant group of metazoans in aquatic environments, and, as for many others animal groups, copepod communities are often numerically dominated by juvenile forms. Thus, knowledge of the biol-



ogy and the ecology of copepod post-embryonic development is of primary importance to understand the functioning of aquatic ecosystems and to accurately parameterize ecological models. Paradoxically, studies focusing specifically on copepod juveniles are limited in number compared to those about adults. Additionally, these studies are very far from covering the large diversity of the group, 80% of them concern less than 20% of known copepod species. Among the reasons explaining this situation, the lack of sensitivity of existing experimental methods and inadequate sampling are regularly pointed out in the literature. But one important reason is that copepods juvenile are quite complex from a morphological point of view, making it difficult and time consuming to perform species and stages identification, even using a very good equipment. Correct and rapid identification actually requires a lot of experience while the number of trained specialists has clearly decreased during the last two decades.

For anyone who should want to correct our lack of knowledge in this domain, the book written by Ferrari and Dahms represents a very good starting point. Even if the authors do not claim to make an exhaustive review of literature, their book gathers most of what is known about copepods external morphology through the different developmental stages. It also presents the basics about juvenile (naupliar and copepodid) biology and ecology. Although this latter aspect is less deeply developed, holes in our knowledge and ideas for further studies are clearly underlined.

Because large parts of the book are quite "technical" and descriptive, reading cannot be considered as pleasant or attractive but it remains useful and informative. The chapters and paragraphs are organized around the developmental phases and stages then on body and appendage patterns rather than on taxonomic groups or ecosystems. Thus, freshwater, seawater, benthic, pelagic and parasitic copepods are not treated as distinct groups. This organisation is somewhat confusing when you are used to working with one particular subgroup of copepods (i.e. free living marine copepods for instance). However, not only is this organization totally justified for comparative and phylogenetic approaches but it also presents the advantage of enlarging mind to maybe forgotten aspect of the entire group.

My main regret is that large parts of the text, corresponding to boring, albeit useful, reference lists or morphological descriptions, should have been advantageously replaced by synoptic tables or figures. The number of illustrations is actually rather low for this kind of book. Additionally, despite the fact that a glossary is provided, reading requires a preliminary knowledge of a rather large minimum of specific vocabulary and is therefore not recommended for beginning students. One hopes that the information contained in this book will serve to build a more accessible and illustrated document in the future.

In conclusion, this book does not present innovative theory or controversial ideas (even if some very particular point will probably open discussions among specialists) but must be seen as a very good tool for all people interested in understanding external morphology of copepods for accurate identification of developmental stages, growth studies, phylogenetic studies or comparative analysis.

MICHAEL D. KING, CLAIRE L. PARKINSON, KIM C. PARTINGTON and **ROBIN G. WILLIAMS** (Eds.). 2007. **Our Changing Planet**. Cambridge University Press. ISBN 978-0521828703, 400 p. US $45.00

Reviewed by Paul G. Falkowski and Sari G. Ruskin, Institute of Marine and Coastal Sciences, Rutgers University, 71 Dudley Road, New Brunswick, NJ 08901; falko@imcs.rutgers.edu

This book is a coffee-table sized guide to what Earth observing satellites can measure and how. Edited by physical scientists, it presents 65 individually authored chapters of 4 to 8 pages each. The chapters are grouped into five main organizing themes: the atmosphere, land, oceans, ice caps, and "evidence of our tenure". The authors of each chapter present the fundamental concept of how satellites measure what they measure, and how scientists infer the physical variable they work on from the measurements. To achieve their purpose, the book provides breathtaking photographs of Earth from space, including images from satellites, the International Space Station, and other space based vehicles (including pictures taken by astronauts on and from their way to the moon). Indeed, the book is a cross between a set of National Geographic pictorial essays on Earth and a compilation of many Scientific American type of articles on science for non-scientists.

The book is touted as being accessible to "all of us, from kids to scientists" – and while that is a stretch, it certainly is a very useful guide to how satellites help us see how our planet works and what humans have done to alter natural processes over the past few decades. However, while accessible to people with a scientific background, some of the text is problematic for those without such a background. The preface, written by Piers Sellers, a climate scientist turned astronaut, is inspired. However, many of the chapters are still not well translated from the original "NASA-ese" – an arcane language that requires total recall of a plethora of acronyms. Some of the chapters end a bit abruptly, neither drawing a conclusion, nor pointing a direction for further thought. The book is a bit light on biological processes, and skewed towards physical phenomena, but regardless, the photographs are truly glorious, and taken together, are encyclopedic in scope. The publisher has made available free online support material which maybe useful for classroom use (http://www.cambridge.org/uk/catalogue/catalogue.asp?isbn=9780521828703&ss=res).

As a whole, the book is a grand attempt to further our understanding of the effects of the human footprint on Earth. Complementary copies should be sent to all members of the U.S. Congress.

BOOKS RECEIVED

John Dolan, *Marine Microbial Ecology, Station Zoologique, Laboratoire d'Océanographie de Villefranche, Université Paris6 CNRS UMR 7093, 06230; Villefranche-sur-Mer, France; bulletin-editors@aslo.org*

HILL, GEOFFREY E. 2007. Ivorybill Hunters- The Search for Proof in a Flooded Wilderness. Oxford University Press. ISBN 9780195323467. 260 p. US$ 24.95

Written as a narrative, Hill tells the story of his search in the swamps of Florida for a breeding population of a bird species last seen in Arkansas.

SUBBA RAO, D.V. (ED.) 2006. Algal Cultures, Analogues of Blooms and Applications Vol. 1. Science Publishers. ISBN 1578083923. 457 p. US$ 143.40

A nice compendium of 12 individually authored articles which review different aspects of micro-algae based on culture studies.

McCLANAHAN, TIM R. and **GEORGE M. BRANCH** (EDS.) 2008. Food Webs and the Dynamics of Marine Reefs. Oxford University Press. ISBN 780195319958. 238 p. US$ 85

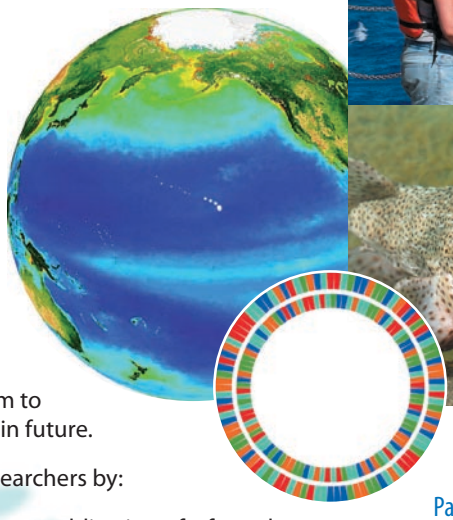
This volume consists of 9 chapters by different contributors, each focusing on distinct reef systems ranging from kelps to corals.

Eco-DĀS VIII

Ecological Dissertations in the Aquatic Sciences

East-West Center, University of Hawai'i at Mānoa

11–16 October 2008



Ecological Dissertations in the Aquatic Sciences (Eco-DĀS) VIII continues the series of symposia formerly known as **DIALOG (Dissertations Initiative for the Advancement of Limnology and Oceanography),** but takes that series in new directions. Key elements of the remodeled symposia include:

1. Fostering sustained, cross-disciplinary interactions among the top new researchers in ecological oceanography and limnology, to the benefit of both the science and the researchers.
2. Increasing the success rate of new researchers seeking funding to build their research programs, by familiarizing them with the diversity of available research opportunities, and introducing them to representatives of funding agencies with whom they will interact in future.
3. Increasing the likelihood of professional success for these new researchers by:
   a. Highlighting their initial work through high-visibility, open-access publication of a formal symposium proceedings volume;
   b. Focusing that volume on interdisciplinary and collaborative aspects of their work; and
   c. Establishing mentoring relationships between participants and established scientists.

Symposia are currently funded for fall of 2008, 2010, and 2012. The 2008 symposium will be held at the East-West Center, University of Hawai'i at Mānoa campus, 11–16 October. Applicants for the fall 2008 symposium must have received their PhD on or after 30 April 2007, or expect to receive it before 30 April 2009. The dissertation work of the applicant must deal with an important ecological problem in oceanography or limnology. Applications will include: a current resume, a letter of support from the applicant's current (graduate or postdoctoral) advisor, a personal statement regarding the applicant's goals and reasons for applying, and a substantive outline of a proposed chapter to be included in the formal symposium proceedings.

Applications are due by 30 April 2008. For more information regarding the symposium, including application requirements and procedures, see cmore.soest.hawaii.edu/eco-das/.

Funding provided by NSF with contributions from ONR, NASA and NOAA. Eco-DĀS is sponsored by the Center for Microbial Oceanography: Research and Education, the University of Hawai'i School of Ocean and Earth Science and Technology (SOEST) and the Department of Oceanography, and the American Society of Limnology and Oceanography (ASLO).

For more information:

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Above images by participants in 2007 Hawai'i Summer Session in Microbial Oceanography.

ADVANCE THE SCIENCE OF LIMNOLOGY AND OCEANOGRAPHY

Become a member today! ASLO is the leading professional organization for researchers and educators in the field of aquatic science. Visit the ASLO booth, web site or contact us at business@aslo.org

OUTSTANDING PUBLICATIONS

Limnology and Oceanography (L&O) is an internationally acclaimed scientific journal published bi-monthly by ASLO. *L&O* is dedicated to publishing peer-reviewed, original papers and is available in both print and electronic formats.

L&O: Methods is an all-electronic journal published in annual volumes containing primarily methodological manuscripts focused on the aquatic sciences.

L&O: Bulletin, the ASLO newsletter, is published quarterly and contains general interest articles, society news and book reviews.

The **ASLO Membership Directory,** containing biographical, professional and demographic information, is available in both print and in real-time via the web to current ALSO members.

WWW.ASLO.ORG

ASLO's web site contains a wealth of information pertaining to the society and its publications.

The site provides easy access to on-line editions of ASLO publications, job and funding opportunities, course offerings, programs for PhD's, meetings and events, student career information and much more.

UPCOMING MEETINGS

ASLO 2008 Summer Meeting
June 8-13, 2008 in St. John's, NL, Canada

2009 Aquatic Sciences Meeting
January 25-30, 2009 Nice, France

ASLO 2010 Summer Meeting
June 6-11, 2010, Santa Fe, New Mexico

L&O BULLETIN

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Waco, Texas 76710-4446

ASLO