

## ***Coastal Informatics: Web Atlas Design and Implementation***

### **AUTHOR BIOGRAPHIES**

#### **Paul Alexander**

Paul R. Alexander studied Anthropology and received his B.A. from California State University, Monterey Bay and his M.A. from the University of Chicago. Using his background in Digital Anthropology and research methodologies, he now develops software in conjunction with researchers and scientists. Alexander was previously employed by the Marine Metadata Interoperability project, which is supported by an NSF grant to “To promote the exchange, integration and use of marine data through enhanced data publishing, discovery, documentation and accessibility.” While with the project he worked extensively on the community website, both developing functionality and writing guidance for the community. Currently, Alexander is a web and user interface developer with the Stanford Center for Biomedical Informatics Research, working on BioPortal, a project housed in the National Center for Biomedical Ontology that stores, indexes, and build relationships between publically accessible ontologies.

#### **Robert Bailey**

Robert Bailey is Manager of the Oregon Coastal Management Program in the Department of Land Conservation and Development. From 1982 to 2003 he was Ocean Program Administrator working on a range of state and national ocean policy issues under five governors. From 1995- 2000 he led the Pacific Northwest Ecosystems Regional Study a \$6 million multidisciplinary assessment of coastal ecosystem process funded by NOAA’s Coastal Ocean Program. In 2004-2005 he was a member of the National Academy of Sciences Ocean Studies Board Sea Grant Review Panel. He has served on numerous regional and nation committees regarding marine and coastal science, policy and governance. Mr. Bailey was elected as a City Commissioner in Oregon City, Oregon, 2003-2006. He was born and raised on the Oregon coast and is a 1968 graduate of Portland State University in Earth Science. He is married with three grown children.

#### **Kathy Belpaeme**

Kathy Belpaeme studied biology at the Free University of Brussels, Belgium. She worked as a Ph.D. researcher for 3 years, focussing on mutagenetic effect of marine pollution. In 1999 she began working in the field of Integrated Coastal Zone Management. In 2001 she was instrumental in setting up the Coordination Center on Coastal Zone Management for Belgium, where she currently works. The Coordination Center’s main objective is to stimulate and promote integrated management of the coastal zone in Belgium. The Center is collaboration between different authorities at local, regional and national level.

#### **Marcia Berman**

Marcia Berman came to the Virginia Institute of Marine Science in 1989 to direct the Comprehensive Coastal Inventory, a GIS and remote sensing program. The Coastal Inventory is charged with mapping conditions along the 16,100 km of tidal shoreline in Virginia. This effort has expanded to include the state of Maryland and parts of North Carolina and Delaware. Marcia’s research interests in applied coastal science include the development of GIS based decision support tools to enhance coastal

management at the local and regional planning levels within the Chesapeake Bay Watershed. Her work has spanned subjects such as shallow water use conflict, ecosystem risk assessment, shoreline erosion control, and assessment of climate change impacts to coastal landscapes. Marcia is a coastal geologist by training with a B.S. in Geology from Northeastern University, Boston, MA, and a M.S. degree in Oceanography from the School of Oceanography at Old Dominion University in Norfolk, Virginia.

### **Luis Bermudez**

Luis E. Bermudez received his B.S. in Industrial Engineering from Universidad de los Andes, Colombia an MS. and Ph.D. in Hydroinformatics from Drexel University, Philadelphia, US. He leads technical initiatives related to coastal research at the Southeastern University Research Association (SURA). The coastal research program advances the understanding of coastal phenomena by deploying cutting edge information technology (IT) for data integration in support of ocean observing efforts and advancing distributed modeling test-bed efforts. Previous to SURA he was a software engineer at the Monterey Bay Aquarium Research Institute (MBARI) and leading the technical work at the Marine Metadata Interoperability project. Before MBARI, he was involved with moving forward standardization efforts for data interchange and semantics with the Consortium of Universities for the Advancement of Hydrologic Science (CUAHSI). Luis participates in various standardization-working groups at the Open Geospatial Consortium (OGC) and World Wide Web Consortium (W3C). He leads the OGC Ocean Science Interoperability Experiment, participates in OGC Sensor Observation Service (SOS) working group, and is member of the Semantic Sensor Network working group.

### **Valerie Cummins**

Valerie Cummins is the director of the Coastal and Marine Resources Centre, University College Cork, which has a staff of over 30 researchers. Her research interests cover a range of coastal governance issues including public participation, intuitional aspects of geomatics, capacity building for coastal management, and the science and policy interface and ecosystems frameworks. She is currently reading for a PhD on organizational tools for sustainability science in coastal zone management. She was instrumental in securing funding for the development of the Marine Irish Digital Atlas and has overseen the project since its inception. This activity led to her being a co-founder of the International Coastal Atlas Network. She contributes to the editorial panel of the international Marine Policy journal published by Elsevier and is a member of the Marine Geography Commission of the International Geographic Union.

### **Edward (Ned) Dwyer**

Edward (Ned) Dwyer has a M.Sc. and a Ph.D. in remote sensing and image processing technology. He has worked in the area of terrestrial and marine remote sensing applications for many years using data from both optical and synthetic aperture radar sensors. Since joining the CMRC in 2002 he has been the project manager of the Marine Irish Digital Atlas, with particular responsibility for metadata specification and data acquisition. He is also researching climate observation systems in Ireland in regard to the Global Climate Observing System requirements. He is currently the co-chair of the International Coastal Atlas Network and an occasional lecturer on remote sensing and GIS topics at University College Cork.

### **Declan Dunne**

Declan Dunne has a B.Sc. in Computer Systems from the University of Limerick and a M.Sc. in Applied Science (Modeling and Numerical Computing) from University College Cork. Since joining the Coastal and Marine Resources Centre in 2002 he has worked on numerous Irish and European Union (EU) research projects involving computer science and geomatics expertise. Research interests include geospatial data integration, delivery and visualization using OGC standards. He developed the web-mapping GIS engine and database for the Marine Irish Digital Atlas. He was responsible for development of geospatial data and metadata web services for the EU Framework Program-6 InterRisk project using OGC standards, and lead architect and developer of a pan-European coastal observational data management system for the FP-6 ECOOP project. He is currently team leader and developer for the Geological Survey of Ireland funded Griffith Geomatics for Geosciences project which will advance standards-based data management solutions for geological data.

### **David Green**

David R. Green wears many hats at the University of Aberdeen, Scotland: Director of the Centre for Marine and Coastal Zone Management (CMCZM), Director of the Applied Geospatial Technology (AGT) and Geographic Information Systems (GIS) M.Sc. Programmes, and Director of the Marine and Coastal Resource Management Degree Programme. He is currently the Editor-in-Chief of the *Journal of Coastal Conservation: Planning and Management* (JCCPM) and Vice-Chair of the European Centre for Nature Conservation (ECNC) Scientific Advisory Board, as well as past Editor-in-Chief of the British Cartographic Society's Cartographic Journal, past Chairman of the UK Association for Geographic Information (AGI), and past President of the EUCC-The Marine and Coastal Union. David is also External Examiner for Kingston University's GIS programme, the UNIGIS programme at Manchester Metropolitan University (MMU), and Falmouth Marine School's (FMS) marine programme. He has edited a number of international books on ICZM and GIS, on landscape ecology and GIS, and on GIS in education.

### **Tanya Haddad**

Tanya Haddad is a geospatial data and web application developer at the Oregon Coastal Management Program. She is a former NOAA Coastal Management Fellow, and has a B.S. in Biology and Environmental Science from Tufts University, and a M.E.M. degree in Coastal Environmental Management from Duke University. Since joining the Oregon Coastal Management Program in 2000 she has worked on numerous geospatial data and web information projects relating to coastal zone management and marine spatial planning. She is the chief information architect of the Oregon Coastal Atlas project and is involved in all facets of its maintenance and growth. In her spare time she is an avid sailor and loves to travel. Research interests include all aspects of coastal/marine geospatial data integration, delivery and visualization, in particular via the Internet using open-source tools.

### **David Hart**

David Hart is the Geographic Information Systems Specialist at the University of Wisconsin Sea Grant Institute. Through this position, he conducts research and outreach that supports sustainable coastal development along the Great Lakes. David's current research occurs at the intersection of geographic information science,

urban planning, and environmental management. He has developed methods for discovery, inventory, acquisition, integration, and analysis of local geospatial data for use in decision-making about regional-scale issues. Prior to moving to Wisconsin in 1993, David served six years at the New Orleans City Planning Commission as project manager for the City's Multipurpose Land Information System. He earned a Ph.D. in Land Resources from the University of Wisconsin-Madison, a Master degree in Urban and Regional Planning from the University of New Orleans, and a B.S. in Natural Resources Policy and Management from the University of Michigan.

### **Alejandro Iglesias-Campos**

Alejandro Iglesias-Campos is a GIS analyst at the University of Seville involved in the development of different projects for the implementation of the Water Framework Directive in coastal zones, the generation of environmental indicators for ICZM and the implementation of the Coastal and Marine Information System of Andalusia. Since 2005, he has worked at the European Environment Agency's Topic Centre on Land Use and Spatial Information, working in GIS support and coastal and marine management, and planning activities for different European and international projects. Additionally, Alejandro is the technical representative for the Ministry of Environment of the Junta de Andalucía at the ETC-LUSI and the EEA, and is also responsible for liaison with the Spanish National Ministry of Environment, Rural and the Marine, and other national authorities. He holds an M.Sc. in Physical Geography, Coastal Management and Water Information Systems, with an Advanced Study Diploma for Doctoral Studies from the University of Seville, Spain.

### **Anthony Isenor**

Anthony W. Isenor currently works for Defence Research and Development Canada, an agency operating under the Canadian Department of National Defence (DND). He has extensive experience in geospatial data sets, metadata standards, data vocabularies, and data structures, and is currently working on applied research examining how technologies can influence user trust, within the context of maritime situational awareness. Nationally, Anthony is involved in efforts to implement information management solutions within the DND meteorological and oceanographic office and parent organization. Internationally, he is a member of North Atlantic Treaty Organization (NATO) research group investigating techniques to achieve semantic interoperability (group designation IST-075) among NATO coalition forces, and a second group investigating enabling technologies for NATO maritime situational awareness (group designation SCI-211). Anthony received his B.Sc. in physics and M.Sc. in physical oceanography from Dalhousie University in Nova Scotia, Canada.

### **Kathrin Kopke**

Kathrin Kopke graduated with honors from the M.Sc. in Ecosystem Conservation and Landscape Management at University College Cork in 2005 and then joined the CMRC. She has carried out research in the area of Integrated Coastal Zone Management (ICZM) including an investigation of a coastal Brownfield site, a recreational carrying capacity study in Cork Harbor as well as being involved in the facilitation of the Cork Harbor Forum, a stakeholder group for the Harbor. Kathrin also contributes to projects within the coastal governance group, particularly in regard to adaptation to climate change in coastal communities. In 2007, Kathrin joined the Marine Irish Digital Atlas (MIDA) team as the Atlas data manager. Her work involves

working with GIS technologies and Open Source web-based mapping techniques and the supervision of GIS internships with CMRC. Kathrin is involved in the outreach and education work of the International Coastal Atlas Network (ICAN).

### **Yassine Lassoued**

Yassine Lassoued is a computer science and GIS researcher interested in several fields, notably: geographic data integration, ontologies, metadata and data quality, and the use of Artificial Intelligence (AI) for data and metadata integration. Yassine graduated from the National Civil Aviation Faculty (Toulouse - France) with an engineering degree in Computer Science and Air Traffic, as well as a M.Sc. in computer science and Artificial Intelligence (AI), in 2000. In 2005, he graduated from University Aix-Marseille 1, with a Ph.D. in Computer Science and GIS. During his PhD, he worked as a temporary researcher and teacher in Universities Aix Marseille 1 & 2, and the Institute of Advanced Internet Applications. After graduation he joined the Coastal and Marine Resources Centre in 2006 as a researcher in the GIS team. He has extensive background in data integration, metadata and data quality, OGC and ISO standards, as well as the Arc Marine Data model.

### **Tony LaVoi**

Tony LaVoi is the Chief of the Integrated Information Services (IIS) Division at the National Oceanic and Atmospheric Administration (NOAA) Coastal Services Center in Charleston, South Carolina. The Coastal Services Center was established in 1995 with a mission to support the environmental, social, and economic well being of the coast by linking people, information, and technology. The Center assists its primary customers, the US coastal resource managers, by providing access to information, technology, and training. The IIS division focuses its efforts on geospatial standards and interoperability, software application and database development, programming and visualization, and network and desktop information technology support. Tony serves as the NOAA representative to the Federal Geographic Data Committee (FGDC) and the Geospatial Line of Business. He chairs both the NOAA GIS Committee and the Marine and Coastal Spatial Data Subcommittee of the FGDC. Tony has a BS in Engineering from the University of Wisconsin.

### **Roger Longhorn**

Roger Longhorn is the director of Info-Dynamics Research Associates Ltd. (headquartered in West Flanders, Belgium) and the chief editor of *GEO:connexion International* magazine. He has been involved in the information and communications technology industry since 1976. He developed marine information systems globally (1976 to 1986), then worked as an expert in information services for the European Commission (EC) until 1999, and has remained involved in several EC research and development programs since then. Roger assisted in developing the European Spatial Data Infrastructure strategy (now called INSPIRE) since 1995 to the present. He authored a practical guide to spatial data legal issues (2002) and co-authored a book on value, pricing and consumption of geographic information (2008), plus chapters in books dealing with SDI and marine/coastal information (1999, 2003, 2005, 2009). He is chair of the Global Spatial Data Infrastructure Association's Legal and Socioeconomic Committee, and Information Policy Advisor to the Coastal and Marine Union (EUCC). Roger holds B.S. and M.S. degrees in Ocean Engineering and Shipping Management from the Massachusetts Institute of Technology (MIT).

### **Hannelore Maelfait**

Hannelore Maelfait earned an M.Sc. in Biology at the University of Leuven, Belgium. She came in contact with a variety of marine related research areas during her second international Master degree in Marine Science at the University of Ghent, Belgium. Since 2005 she has been working for the Coordination Center on Integrated Coastal zone Management for Belgium, as an adjunct adviser. Within the Center she is responsible for the development of local actions within an ICZM approach to stimulate the network between scientists, policy makers and stakeholders. Furthermore she is maintaining a set of sustainability indicators for the Belgian Coast and developing communication devices to stimulate the implementation of indicators and the use of data in a local government.

### **Gonzalo Malvárez-García**

Gonzalo Malvárez-García was awarded a Ph.D. in Physical Geography in 1997 by the University of Ulster, Northern Ireland, and worked at the university as a researcher, reader and lecturer. He then took the position of principal professor at the University Pablo Olavide in Seville, Spain. Since 2007 he has been Dean of the Faculty of Human Sciences at the University. Gonzalo has led and participated in many international projects on coastal and marine management and planning, and has many scientific papers published in international journals. He has also been author of nearly 30 chapters in various books on the coastal and marine environment. Among other projects at a regional level, Gonzalo participates in the implementation of the SIGLA (Coastal and Marine Information System of Andalusia).

### **Catherine McCall**

Catherine McCall is a planner with the Maryland Department of Natural Resources' (MD DNR) Chesapeake & Coastal Program in Annapolis, Maryland. Since joining DNR, she has led a number of coastal habitat mapping and targeting initiatives including the development of a blue infrastructure assessment; marine spatial planning activities; and coastal habitat sea level rise adaptation planning. She has also been involved with a number of other programs at MD DNR related to marine protected areas, living shorelines, and coastal hazards. Catherine holds a B.S. from Pennsylvania State University and an M.S. from Georgetown University, both in biology with a focus on conservation ecology.

### **Andrus Meiner**

Andrus Meiner is the Project Manager of Regional Assessments and Geospatial Data in Natural Systems and Vulnerability, Land (NSV3) at the European Environment Agency. He is currently working on integrated spatial assessment and indicator development for the coastal zones. Specific responsibility of that task involves analysis of land cover changes and main sectoral policies with regard of their impact of state of coastal zones on European level. Andrus is also involved in development of EEA spatial data infrastructure and coordinates land use/cover information system. His professional experience includes numerous international assignments in the fields of modeling, environmental information, geospatial database development and integrated environmental assessments, he is co-author of an assessment report on state of coasts in Europe and a monograph on simulation modeling of "river catchment-coastal sea" system. Andrus is a graduate from Tartu University in Estonia and holds academic degree in environmental geography (1990). He has attended various international courses, including research fellowships in the US and Norway.

### **José Manuel Moreira-Madueño**

José Manuel Moreira-Madueño has, since 1988, combined his scientific research with other responsibilities at the Regional Ministry of Environment of Andalusia. He is currently Deputy Director for Sustainable Development and Environmental Information, and previously served as Head of Department for Remote Sensing and Environmental Information Systems. José Manuel has many scientific publications and articles on GIS, as well as technologies for decision support and environmental management in international journals. José Manuel is responsible for the Environmental Information Network of Andalusia (REDIAM), and also teaches courses in cartography and GIS as applied to environmental management at three universities in Andalusia, Spain. He holds a Ph.D. in Physical Geography from the University of Seville, Spain.

### **Joshua Murphy**

Joshua Murphy is a Management and Program Analyst with the National Oceanic and Atmospheric Administration (NOAA) Coastal Services Center in Charleston, South Carolina. Over the past eight years, he has supported the application of geographic information systems (GIS) to coastal issues through numerous capacity-building activities. As a trainer, Josh has taught introductory and intermediate-level GIS, global positioning systems (GPS) and metadata courses to hundreds of participants within the coastal zone. As a project manager, Josh has led the development of a variety of geospatial tools, such as the Benthic Terrain Modeler and the Chesapeake Bay Oyster Larvae Tracker (CBOLT). More recently, Josh's interests lie in marine spatial planning and strategic conservation planning using a green infrastructure approach. He currently serves as the project manager for the Digital Coast initiative, a community resource for coastal geospatial data, tools, and training. Josh holds a B.S. in Geography from Penn State University.

### **Elizabeth (Liz) O'Dea**

Elizabeth (Liz) O'Dea is a geographer with a taste for environmental mapping and making spatial information widely accessible. She has a M.Sc. in Geography from Oregon State University and has worked with terrestrial, coastal and marine environments in Oregon, Washington, and Ireland. Whilst at the Coastal and Marine Resources Centre in Cork, Ireland, she worked as a designer and developer of the Marine Irish Digital Atlas. She dealt with all aspects of what it takes to create and manage a coastal atlas, including web design, data management, usability, and technology. Liz has been involved in ICAN since its inception and was the inspiration behind the original workshop series. She is currently a GIS Analyst with the Washington State Department of Ecology in Olympia, Washington, where she works with the Washington Coastal Atlas team. In her spare time she geocaches, travels, and sea kayaks whenever she has the opportunity.

### **Timothy Nyerges**

Timothy Nyerges is Professor of Geography at the University of Washington where he specializes in teaching and research related to public participation geographic information systems (GIS) and coastal GIS, focusing on land use, transportation, and water resource related issues. He received his Ph.D. from the Ohio State University in 1980 specializing in database management languages for GIS. For the past fifteen years he has had a stream of nationally-funded research projects to explore

development and evaluation of networked GIS, particularly as supported by cyberinfrastructure technology, for enabling stakeholder participation in environmental decision support. He is currently president (2009-2011) of the University Consortium for Geographic Information Science (UCGIS).

### **Eoin O’Grady**

Eoin O’Grady currently leads the Information Services and Development Section in the Marine Institute (Ireland) and is responsible for overseeing the Institute’s IT and data management systems. These includes systems to manage a wide variety of physical, biological and chemical marine data from environmental monitoring, seabed surveys, predictive modeling and fisheries survey programmes, and participation in projects such as SeaDataNet. Eoin also leads the Knowledge and Information Management programme of SeaChange the Irish national Marine Research, Knowledge and Innovation Strategy. This includes the development of information systems such as the Irish Spatial Data Exchange to support marine research and innovation. Eoin currently participates in the Irish Spatial Data Infrastructure working group. Previous to the Marine Institute Eoin has worked in a variety of software development and architecture roles for telecoms, manufacturing and financial services companies. Eoin received his B. Eng in Computer Engineering from the University of Limerick in 1995.

### **José Ojeda-Zújar**

José is the principal professor of coastal and marine geomorphology, management and planning, GIS and remote sensing at the University Pablo de Olavide in Seville, Spain. He is also the director of the Coastal Planning and Territorial Information Technologies research group there. José has more than 100 scientific publications in international journals, and has also had a number of scientific placements at a number of international institutions that lead research activities in remote sensing and GIS (Nottingham and Aberdeen, UK), coastal and marine policy (University of Delaware, USA) and the National Center of Scientific Research or CNRS (France), among others. José was responsible for the implementation of the SIGLA (Coastal and Marine Information System of Andalusia), which is part of the Environmental Information Network (REDIAM). He holds a Ph.D. in Physical Geography from the University of Seville, Spain.

### **Sean Padmanabhan**

Sean Padmanabhan is a Research Officer in the field of Geographic Information Systems (GIS) at the Institute of Marine Affairs, Trinidad & Tobago. With 9+ years experience in GIS, he assisted in inter-departmental and inter-organizational research; created and implemented new strategies for improving the generation, flow and dissemination of spatial data and products across both intra- and inter-organizational levels; and, developed new GIS and GIS-related marine research projects at the Institute and around the wider Caribbean Region. Sean has also been significantly involved in several regional initiatives in the Caribbean such as IODE/ODINCARSA, under which the Caribbean Marine Atlas Project falls, and the UNEP/CAR-RCU Programme responsible for the Protocol and National Programme of Action for Land-Based Sources of Pollution. He holds an M.A. in Marine Affairs and Policy/GIS, as well as an M.S. in Marine Science/Biology from the Rosenstiel School of Marine and Atmospheric Sciences, University of Miami.

### **Trung Pham**

Dr. Trung Pham is a computer science and GIS researcher. His research interests include geographic information integration, data quality and 3D GIS, and the application of GIS in environmental science, geology and urban management. His recent research activity has been focused on Web delivery and visualization of GIS data. Trung graduated from University Aix-Marseille I, with a PhD in computer science and GIS, in 2005. After graduation, he joined the CNRS (French National Centre for Scientific Research) as a post-doctoral researcher, Nantes, 2005-2007. He then worked as a researcher and teacher at University Paris Est Marne-La-Vallée, 2007-2008. In addition to his academic background, Trung has two years of experience in industry in Paris, as an engineer at IBM. He also worked in ALSY Paris as a development, maintenance and evolution engineer for the L'Oreal e-commerce websites with new Microsoft technologies (ASP.NET, C#, Biztalk, Shapepoint, SQL Server, etc.).

### **Greg Reed**

Greg Reed is the Executive Officer of the Australian Ocean Data Centre Joint Facility, a national multi-agency distributed data management system, and Deputy Director of the Ocean Data Services Group of the RAN Hydrography and Metoc Branch. Mr. Reed is an internationally recognized marine data expert and Co-chair of the IOC's International Oceanographic Data and Information Exchange (IODE) committee. He is also involved in the development of international standards for oceanographic data management and exchange. Mr. Reed is a lead author for Ocean Teacher, an online encyclopedia aimed at training students and mid-level professionals on marine data and information management. He has participated in a number of international capacity building activities as course coordinator and lecturer and in the development of marine atlas projects. He is a contributor to the African Marine Atlas.

### **Gabe Sataloff**

Gabe Sataloff is a GIS Analyst and Data Manager at the NOAA Coastal Services Center in Charleston, SC. Gabe joined the Coastal Services Center in 2008 after finishing his Masters of Environmental Studies at the College of Charleston. He got involved on the coastal atlas assessment team of the International Coastal Atlas Network in 2008.

### **Lucy Scott**

Lucy Scott coordinates national and regional data and information management activities for the United Nations Development Program (UNDP) Global Environment Facility (GEF) Agulhas and Somali Currents Large Marine Ecosystem (ASCLME) Project. Over the past ten years, she has worked in South Africa, Mozambique, Tanzania, Malawi, Comoros, Kenya, Seychelles, Mauritius, Maldives and Madagascar on a variety of projects and programs. These ranged from marine research expeditions to data management projects and the development of Geographic Information Systems, particularly for coastal resource mapping, aquaculture and conservation planning. Lucy has participated in GIS atlas projects at several scales and is currently one of five editors of the African Marine Atlas, a project involving participants from 16 African, European and North American countries. She has published in several fields, serves on the board of trustees of the Sustainable Seas

Trust and is a member of the Global Oceanographic Observing System (GOOS)-AFRICA remote sensing working group.

### **Karen Stocks**

Karen Stocks is a research scientist at the San Diego Supercomputer Center. Her interests include biodiversity informatics, data integration, and developing information systems for marine biogeography, seamount ecology, and oceanographic research vessel data. She is part of the Marine Metadata Interoperability project, and leads the development of the MMI Guides, a set of online resources introducing metadata topics and providing guidance on best practices for data documentation (<http://marinemetadata.org/guides>). Karen completed a Bachelors of Science degree in Wildlife and Fisheries Biology at the University of Massachusetts, and a doctorate in Biological Oceanography at Rutgers University, and has worked at the San Diego Supercomputer Center since 2000.

### **Ronan Uhel**

Ronan Uhel is the Head of Natural Systems and Vulnerability, at the European Environment Agency. He has 20 years in environmental and sustainable development information and analysis at the European and international level. He specializes in bridging between science (knowledge) and policy (actions), and in assessing the state-of-the-environment and policy effectiveness. Ronan has had coordination and editorial responsibility for many studies, reports and publications on these topics, with broad coverage from economic sectors to technologies to education. He has participated in many committees and working groups at the European and international levels on environmental governance, and has been a speaker/discussant at conferences and workshops covering all aspects of environment and development issues. Ronan's academic background is in geography, physical planning, and oceanography, with additional training in EU environmental legislation and regional policies.

### **Kuuiipo Walsh**

Kuuiipo Walsh is in her first year as Associate Director of the GIScience Certificate Program at Oregon State University (OSU). Kuuiipo brings to her role a rich and varied background in computer science, marine and coastal geographic information science, and natural resource management. Kuuiipo is not new to OSU as she works on making spatial information accessible through the Oregon Explorer, a web-based, digital library co-managed by OSU Libraries and the Institute for Natural Resources (INR). As a project manager for INR, she recently launched the Oregon Hazards Explorer, which provides online maps and spatial information about many natural hazards relevant to Oregon including coastal erosion, floods and tsunamis. Before joining INR, Kuuiipo was the Data/Metadata Librarian in Dawn Wright's Seafloor Mapping Marine and Coastal GIS Laboratory. She received her M.Sc. in Marine Resource Management from Oregon State University and her B.Sc. in Computer Science from California Polytechnic State University.

### **Dawn Wright**

Dawn Wright is a professor of geography and oceanography at Oregon State University, and the director of the Davey Jones' Locker Seafloor Mapping/Marine GIS Laboratory. Her research interests include geographic information science, coastal web atlases, benthic terrain and habitat characterization, tectonics of mid-

ocean ridges, and the processing and interpretation of high-resolution bathymetry and underwater videography/photography. She serves on the editorial boards of the *International Journal of Geographical Information Science*, *Transactions in GIS*, *Journal of Coastal Conservation*, *The Professional Geographer*, and *Geography Compass*, as well as on the US National Academy of Sciences' Ocean Studies Board, Committee on Strategic Directions in the Geographical Sciences for the Next Decade, Committee on an Ocean Infrastructure Strategy for US Ocean Research in 2030, and the Committee on Geophysical and Environmental Data. She serves on the Technical Advisory Board of the Marine Metadata Interoperability project. Dawn's other books include *Arc Marine: GIS for a Blue Planet* (with M. Blongewicz, P. Halpin, and J. Breman, ESRI Press, 2007), *Place Matters: Geospatial Tools for Marine Science, Conservation, and Management in the Pacific Northwest* (with A. Scholz, Oregon State University Press, 2005), *Undersea with GIS* (ESRI Press, 2002), and *Marine and Coastal Geographical Information Systems* (with D. Bartlett, Taylor & Francis, 2000). Dawn holds a Ph.D. in Physical Geography and Marine Geology from the University of California at Santa Barbara. She is a fellow of the American Association for the Advancement of Science.