Life in the World's Oceans: Diversity, Distribution, and Abundance

Edited by A. D. McIntyre. 2010. Census of Marine Life (COML) and Wiley-Blackwell Publisher, Oxford U.K. Cloth.

This book should be noted by naturalists for many reasons, and for more than the strong Canadian input. It wants to make for "a stepping stone in the process of describing Earth's marine biodiversity and its importance to humanity". The late editor Alasdair McIntyre and his team provides us with a nicely designed, readable and very clean text about the otherwise rather very confusing and widely unknown members of the world's ocean ecosystem. The known and the unknown get described (but unfortunately not much more beyond that). The text of 361 pages packed with world-class information presents a beautiful lay-out, photos, diagrams and maps on the state-of-the-art of many aspects of the world's oceans: a real subject of global crisis and major relevance to mankind. Canadians know this first hand from their own coastal and fisheries experience. The Census of Marine Life (COML) concludes a 10 years research initiative, widely driven by taxonomists and NGOs (e.g., Sloan Foundation, Foundation TOTAL) carrying a huge budget. It fits well into the times of Industrial Globalization and provides a new conceptual template doing science beyond just national views (a great and worldly opportunity, but that was tragically lost again when COML went back some years ago into establishing national/regional nodes). This book reports COML having over 130 participants from the entire world (but many members from Central America, Indonesia, Philippines, Central Africa and similar poor regions are greatly missing; Russia and specifically India and China (!) are widely under-represented). Over 2600 scientists from fourteen teams work on specific research subjects that carry such elusive abbreviations like NAGISA, CReefs, GOMA, POST, COMARGE, CEDAMAR, CMARZ, MARECO, CENSAM, CHESS, ArcOD, CAML, ICOMM, TOPP, OBIS, HMAP and FMAP (for all of their specific and very interesting details I highly encourage the reader to inquire further online and at the great COML website www.coml.org).

The book starts out with a nice and creative Foreword (but which ignores mention of the relevance of a global economy, nature conservation, sustainability and climate change). Virtually endless fascinating highlights and world record datasets can be found in this book of six sections (Oceans Past, Oceans Present-Geographic Realms, Oceans Present-Global Distributions, Oceans Present-Animal Movements, Oceans Future, Using the Data) and 17 chapters. My personal highlights are for instance the sophisticated movement analysis of Pacific Sturgeons, various global GIS data maps of ocean features, fascinating polar and deep sea research, hot vent conservation, global microbe and plankton studies, DNA Bar coding, global profiles of species abundance and diversity, species accumulation curves, chemosynthetic ecosystems, "Direct human intrusions in the deep-sea", and some exciting dispersal maps of sharks, turtles and some seabirds (the general seabird and colony subject is unfortunately widely under-represented in COML). The opening chapter dealing with the History of Marine Animal Populations (HMAP) is truly stunning, but makes for a rather soft read. The digital compilation of over 22 million records covering over 100 000 species in OBIS (www.iobis.org) must represent the COML flagship, and a true world heritage! The World Ocean Registry of Marine Species (WORMS; www.marinespecies.org) is another global (!) mile stone, and many more globally unique data sets are presented! The Yeti Crab (one of the many new species found during COML) has already reached a global celebrity status (but not that its conservation is therefore in any better shape, so far). The book concludes with a six page index.

COML and its workers and publishers must be congratulated indeed; never before in the world history (!) has such an ocean view and detail be presented! It is therefore entirely clear that such a huge global project cannot be without its inherent flaws. I find twelve fundamental problems in this COML project and its summarizing book: the underlying science model, a general lack of even the simplest ecology (e.g., carrying capacity), lack of emphasis on metadata and scientific transparency, lack of relevant statistical methods to derive generalized knowledge, no emphasis on students, wider ignorance of climate change, virtual exclusion of Chinese issues, tolerance of even more economic growth, exclusion of (ocean) ethics, ignorance of the human role and in regards to population growth, a lack of conservation focus, and many smaller but essential conceptual inconsistencies. Despite minute details on taxonomic issues, COML and its book are widely behind on how to derive truly generalized knowledge from such a huge mass of data, and which is usually achieved with the help of modern statistical methods such as non-linear algorithms, data mining and predictive modelling (instead of the linear regressions that are mostly celebrated in this book, if at all. A few Bayesian applications will provide joy though only to the interested. Most of the species distribution and sampling data do <u>not</u> come from a thorough and statistically valid and reviewed research design, do not deal with detectability and auto-correlations, nor correct and test for habitat preferences, build resource selection functions or quantify their patterns (all which makes for the essence of a science-based Adaptive Management, and which is known for well over three decades). But in the Abyssal Marine Life chapter there is a rather interesting bathymetric ecological niche description linked with phylogenetic trees; this avenue should be the future for such type of investigations. Ocean Acidification, Marine Protected Areas (MPAs),

the failed Convention of Biological Diversity (CBD) targets for 2010 and the role of indigenous people are mentioned but usually just in passing, if at all. But even worse, the major problem of our time, CLIMATE CHANGE, got just a very small mention in this 10 years project. Perhaps some taxonomists don't want to be bothered and "just like to count the deckchairs on the Titanic" instead? In that case, they should never be in charge of natural resources and sustainability projects or drive huge and global budgets. It is assumed that with ongoing taxonomic efforts and with its (slow) pace a more complete count of the world's biodiversity could perhaps be available by the year 2250. But where would the needed resources come from, who can wait until then, and should we really pursue that anyways, and while other problems are more pressing? Strategic Conservation Planning holds here the answer, already used for years (a concept that basically was not used by COML nor in this book).

Serious inconsistencies are found in COML and its book: OBIS-SEAMAP www.seamap.env.duke.edu) and SCAR-MARBIN (www.scarmarbin.be) host leading marine webportals and data technology, but together with its co-authors and great programmers (some are easily among the best in the world on this issue) they are almost not mentioned. Co-authorship and project participation rules are a little unclear in this text and appear very hierarchical (e.g., just for granted PIs, but not for all workers and students. For instance, M. Costello authored major publications on Open Access with OBIS but is hardly mentioned in this book; many important ocean scientists and institutions are missing). Readers will find it unclear how other great and accompanying publications from COML match with this book (the Introduction from F. Grassle makes the wider context a little clearer though). Metadata, a hugely discussed item for databases and laboratory work in COML and elsewhere, and a widely recommended assurance for transparent science and decision-making, virtually fell out of the text entirely. Ongoing major initiatives like the International Polar Year (IPY), OOS, GEOSS and GBIF, and even the Rio Convention, are either not mentioned, or compatibilities and overlaps are not discussed or resolved well. But one of the biggest contradictions in COML and its book here can be seen in the TOPP project: public Open Access to all data have been the leading scheme for years in COML and got efficiently promoted with its huge global PR machinery setting a great global role model on public data sharing. However, this subject is suddenly not boldly mentioned in the book any further, and in the TOPP chapter (they just distribute locked-up PDFs, mpgs, etc. instead and apparently to quickly satisfy public data delivery pressures while their own high profile publication writing gets delayed now for a decade). Despite the fact that TOPP mentions to follow Animal Care IACUC requirements from Stanford University etc, such egoistic understandings of animal science simply presents a breach of trust with the entire global community, does not actually serve the animals well, and for a much better and more sophisticated and ongoing review and possible use of the data. Good synergies and intentions are "blocked" and conservation decisions not done for over 10 years now. These issues must not be taken lightly because major institutions and stakeholders are directly involved in COML and participate (e.g., Woods Hole Oceanographic Institution, Rockefeller University, UC Davis, Dalhousie University, NOAA, Forschungsinstitut Senckenberg, Alfred Wegener Institut, Scripps Institution of Oceanography, Rutgers University, Smithsonian Institution, Ifremer).

This book is also surprisingly quiet on global strategic issues with the oceans such as biodiversity copyrights, military applications of mapping and submarine 'hearing devices', territorial and fish stock disputes, a better ocean management and law, institutional failure and liability. "The deep-sea floor is no longer considered a desert". But the lucrative nodule mining section, as well as the widely unregulated fishing issue on sea mounts, must appear somewhat naïve when considering that a global resource conflict is at hand here and that an otherwise very advanced MPA discussion exist already elsewhere (classic MARXAN, SITES and optimization work is nowhere mentioned). It comes as no big surprise that the Norwegian government, Bergen University, once more funds text sections that boldly promote the "continued exploration of the global ridge system" and that New Zealand promotes "Knowledge Transfer to Stakeholders" (=Industry; instead of focussing primarily on a global protection scheme for sustainability). Modern whaling and most oil and offshore gas exploration and shipping issues also are virtually not covered in this book (in a time when Sea Sheppard style conflicts are high on the agenda elsewhere).

So in a peculiar way, COML and its book chooses not to deal with several relevant issues of our time. But this must come as no surprise when private foundations and their financial supporters drive the science, and whose leaders openly promote nuclear energy, quick techno-fixes, a healthy industry, or when they actually represent "Big Oil". The ugly faces of a wrongly understood philanthropy, science and industrial globalization come to bear here. With this book, it's written in stone.

A take-home lesson from this book is that science, just done by NGOs and with much private foundation money, cannot always be in everybody's interest. To better achieve it requires instead a public debate, inclusion of ethics and social science, a truly effective global governance system and considerate decision-making with a global sustainability vision so that everybody benefits (these details are actually fully within the proper definition of science: "For the benefit of the people"). COML's declared "Quantum Leap"

(a term already used up by IPY last years) must therefore remain rather dubious. What is that new knowledge really used for, and by whom, and for what type of management, society, and sustainability?

Even despite the major taxonomic focus in COML, this book further fails to critically review and discuss how subjective, personal, and even widely meaningless some taxonomic and DNA efforts can be and ever have been (e.g., ongoing species disputes for decades to come and just depending on the methods used and the individual researcher), and that it will NOT provide us with relevant sustainability progress any time soon and while we have to handle 9 billion people over the coming 50 years on this earth and its widely over fished oceans. The polar bear (a major marine biodiversity component), it is said, will no sea ice left in just less than 40 years from now; and some southern populations are already gone.

An all-inclusive cost-benefit analysis of COML is still waiting to be done as well as assessing if it all was worthwhile (while the book just states untested: COML surpassed already all expectations). Along these lines, the Canadian-author chapters on FMAP (Future of Marine Animal Populations), supposed to be a modelling project, is disappointing, dangerous even for its ignorance. It just celebrates an old-fashioned (and widely wrong and mechanistic) view that entirely ignores the required pro-active, cumulative and precautionary approach to sustainable management, complexity, economic growth, human population growth, lacking resources and climate change even, but that we would have to fully understand the ocean history first. Thus, it only elaborates on linear synthesis and statistical filter methods, but does not really show any (spatial) future projections or informed ecologically-complete scenarios (but which are widely done elsewhere already for decades and what makes for "good practice"; e.g., in IPCC). That oversight I find scary. Does FMAP really promote "business as usual" and no change in procedure? The Coral Reef (CReefs) chapter is more informative and progressive on that matter, but fails us also by not dealing with the real underlying causes: Promotion of an Global Economic Growth that creates waste, over-consumption, decay of governance structures and climate change.

Despite all the high-tech, data, online efforts and many new findings, this COML book leaves naturalists and the global community here alone with the reality and the future. It still represents an outdated "first world" science view that is widely based on narrow niches, fragmented, and odd and descriptive world views, and with many scientists who either ignore more powerful alternative approaches, do not communicate to each other, or who prefer to marginalise progressive colleagues, wiping others off the agenda and themselves out of budgets. In the year 2010, one must entirely disagree with statements like "For biodiversity research, the strategy must be to first identify a set of indices to assess changes in biodiversity, and make the connections between those changes and potential stressors" (Even IUCN already moved beyond this concept some years ago). By now, we know much better. Time is a critical feature for an achieving Sustainability Management. More traditional research just buys time, does not solve the underlying cause, and keeps explorative issues going, or makes them even stronger. Instead, we must focus on a pro-active sustainability science and which caters predictions and optimizations to assess problems before they occur, and as much as this is still possible to keep mother earth afloat (we are widely out of resources).

We know by now that one must not leave the economy just to the economic scientists; e.g., in so-called elite institutions. And this book shows us that one must not leave the biodiversity to many of such taxonomic and marine-scientist authors neither. With such global science effort summaries, the end of an era, it's now time we and our children head to the safety boats instead and while not much is left in the oceans anymore. We are already widely beyond "peak fish" but still need a Science-based, Pro-active, Sustainable, Steady State Management (These are all terms COML choose not to deal with; Who is to justify this to the next generation?).

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