

Coastal Informatics: Web Atlas Design and Implementation

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Chapter 19

Supporting a Successful Atlas

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ABSTRACT

The content and technical features of coastal web atlases (CWA) were presented in the introductory chapters of the book and the previous two chapters visited user-oriented issues involved in creating and improving a usable atlas, including user requirements, audience definition, learning from use of the atlas, etc. However, in the absence of confirmed long-term resources or a guaranteed income stream to fund the on-going development and maintenance of an atlas, how do you secure the long-term viability and success of a CWA where the intention is that the atlas is not just a one-off “display,” but can develop organically? Several issues arise, including governance, institutional support, partnerships, funding and continued promotion. Ideally, these issues should be resolved prior to the web atlas being created, especially funding and institutional support (human and technical resources), if the atlas is to be successful in the long run, and not just another short-term ‘project’ that disappears from view when support dwindles. Also, over time, as atlas projects mature into on-going, demand-driven, sustainable information services, institutional and funding arrangements evolve as well. This chapter looks at some of the issues involved in attaining and maintaining long-term support for a successful online atlas.

PARTNERSHIPS AND INSTITUTIONAL SUPPORT

Establishing strong partnerships should be a precursor to creating the coastal web atlas as a service. Successful partnerships will span content

providers, major user groups, the atlas developers, and those hosting the service. Identifying key partners is only the first step. Securing their commitment, especially in the long-term, is even more important.

The web atlas developer must determine who, among potential partners, can provide the strongest support, especially in a sustainable way.

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Many organizations may come forward wishing to participate as partners, but not all will have the institutional capacity to be an effective long-term partner. Assessing the value of potential partners, i.e., what they can bring to the atlas, is a task for the developer or owner of the project.

One useful tool may be a simple “Statement of Intent” or Memorandum of Understanding (MoU) to which potential partners are requested to subscribe prior to joining the web atlas project. This approach was used in the UK, where the initial partners to a coastal/marine spatial data infrastructure (SDI) project – the Marine Data and Information Partnership (MDIP) – were required to sign a Statement of Intent setting out a range of basic principles to which all MDIP partner organizations were expected to accede. While MDIP has since been replaced by a new initiative, the Marine Environmental Data and Information Network (MEDIN), it is worth reviewing the terms established for MDIP in 2005, as these reflect sound principles to be followed in developing a Coastal Web Atlas that involves multiple contributors and supporters. Of course, an MoU or similar statement of principles is of less value unless enforcement measures are also included, and neither MDIP nor MEDIN have such requirements.

Participants in the Marine Data and Information Partnership (MDIP) were asked to commit to the following principles:

- To accept that there are benefits to be gained from improved harmonization of and access to marine data and information.
- To implement the agreed recommendations of the Expert Group.
- To accept that the specific purpose of the Partnership is to provide a mechanism for long-term stewardship and access to UK marine and coastal data.
- The Partnership will include UK Government holders of marine data at its core, but is open to all marine data providers on an equal basis.
- Long-term stewardship will be achieved by convergence to a set of agreed data management and dissemination standards, protocols and operating procedures.
- The management structure of the mechanism will provide overall governance, standards and procedures, data stewardship audits, etc.
- Contributors will work towards the mutually agreed standards and procedures of the Partnership.
- Contribution to the Partnership will not restrict commercial use and exploitation of contributors’ data by themselves, but data or information contributed within the framework will be available for use for the public good.
- Some contributors will act as Data Archiving Centers (DACs), undertaking to receive, hold, conserve, undertake long-term stewardship / custodianship and make available, data submitted by data holders. Identification of DACs will be against criteria agreed by the Partnership.
- The Partnership will establish the standards and procedures and liaise with the leading key data providers in the harmonization of the overall approach.
- Key data providers will ensure selected data holdings conform to the standards and provide them to the MDIP to facilitate wider use.
- Once established and deployed, the Partnership will expand in coverage by enlarging the contributing base and the links to contributors.
- The establishment of the Partnership is in three parts: (a) the creation of the management structure, (b) the data related implementation by key Government data providers, (c) and the development of the proposed “Gateway.”

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- The Partnership management structure will drive improvements in web-based access to the data.
- In all aspects of its operation, the Partnership will strive to be an exemplar of best practice in distributed use of data.

The terms of such agreements can be as specific or as general as required by the atlas developer. They should set out clearly what is expected of partners, and there may be different classes of partnership with different levels of expectations, i.e., for content providers versus promoters, user groups, etc. One very important class of partner is the funding body.

Next consider the level of institutional support that is required and made available to the web atlas project - and the resulting product and service - in order that it is both successful and sustainable. Institutional support includes issues such as who pays for the atlas development, who hosts the resulting atlas during development and who helps in promotion initially and over time. Ideally, a web atlas should progress from being an interesting 'project' to becoming a viable and appreciated information service embedded in the work program and information infrastructure of those institutions who need, or can benefit from, access to the information provided by the atlas, whether government, academia, research, businesses or citizens. Long-term viability has implications for funding, either via an assured funding agreement, typically with a government body, or via an income stream arising from services provided to users.

What is the ideal level of partnership and institutional support required for a successful CWA? Firstly, key partners are the data owners or custodians who have content to be offered by the atlas. Without content there is no atlas, and without good quality content that is relevant to targeted users, the long-term success of the atlas will be threatened. An important partner in delivering and maintaining a successful web atlas service is

the atlas "owner" or official custodian. Ownership is a significant motivation for that partner to maintain the initiative. In some cases, multiple organizations are responsible for maintaining an atlas, sometimes from different sectors, i.e., an academic or research institution may be the owner/operator of the atlas, new services can be developed by different sources (public or private), while a government agency or a private company provides hosting. Where there is no clear "ownership," the atlas may suffer. Such institutional arrangements should be formally agreed at the outset, then monitored for continued relevance and perhaps even changed as the atlas matures, so that all those involved know specifically what is expected of them.

Sustained institutional support will depend to some extent on how well the atlas meets the expectations of users, current or potential, which should have been identified in the early stage of atlas development. For example, an atlas that provides easy and transparent access to quality-controlled information of specific value to a government department or other institutions in fulfilling their mandate(s) is far more likely to succeed than one that simply presents an interesting collection of information to a wide audience. This is because the mandated requirement often underpins the request from the atlas owner or custodian for sustainable funding streams in order to support those requirements. Assessing use of the atlas via metrics acceptable to funding bodies is equally important in securing continued financial support.

Many nations around the globe are now involved in creating formal national Spatial Data Infrastructures (NSDIs), of which coastal and marine information should be an important element for all coastal states. If the CWA can be institutionally embedded in SDI initiatives, there is greater opportunity for securing long-term support and success while promoting the focus on coastal/marine information requirements within the NSDI. This raises issues relating to data standards, interoperability of web services, and data

or information policy, some of which were visited in earlier chapters.

It should be noted that different authors, leading to confusion in interpretation, often use the terms “data policy” and “information policy” interchangeably. In this chapter, the term data policy is used in reference specifically to policy issues affecting data or datasets, e.g. policy on data and metadata standards, exchange formats, and other aspects of maintaining data collections. The term information policy is used to encompass both the underlying data policies and wider policy issues regarding provision of information to various communities of users, such as managing intellectual property rights (IPR), legal obligations, rights and responsibilities relating to information infrastructure (national or organizational), etc.

Where government information is provided in a web atlas, various requirements may come into play, for example relating to pre-existing metadata and systems interoperability standards. If the atlas is proposed as an official contribution to a national SDI, which could help secure funding and longer term, sustainable support, then such action is an important consideration in both atlas design and implementation, with implications for partnerships and other institutional arrangements. For example, government agencies might be required by statute to collect, store and/or present their data holdings according to a prescribed set of standards which do not apply to academic or research institutions or other potentially valuable data providers. Resolving such issues is not merely technical, but involves policy and related institutional issues. Longhorn (2004, 2005, 2009) reports on the status of coastal and marine SDI activities in key countries from which lessons could be learned relating to Coastal Web Atlas development as part of such initiatives.

INTELLECTUAL PROPERTY RIGHTS

Any information service, especially one present on the Web that will have wide access, needs a well-developed and transparently documented information policy. In such policy statements, a key issue is that of intellectual property rights (IPR) relating to the content. IPR exists to protect the value of the content for the original owners or content providers. Various levels of IPR exist, from ‘public domain’, determined under various national Freedom of Information acts, to strongly protected rights subject to internationally agreed conventions. Public domain is a legal definition meaning that the copyright holder, (i.e., the originator of the content), has surrendered all rights to the content, which can then be used freely by anyone for any purpose, usually without even requiring attribution.

A more formalized type of public domain involves “copy left” schemes, such as those promoted by the Creative Commons initiative (Creative Commons, 2009) for content and the Free Software Foundation’s GNU General Public License (GPL) and adaptations of that license for software (Free Software Foundation, 2007). Using these licenses, both data (content) and the software used to access, process or present that data can be made widely available, at no cost to the user, as long as other terms are adhered to, such as attribution or making available to the general public any value added to a computer program.

IPR protection enacted in national legislation typically adheres to the articles of the Berne Convention for the Protection of Literary and Artistic Works administered by the World Intellectual Property Organization (WIPO, 1979) and/or TRIPS, the Agreement on Trade-Related Aspects of Intellectual Property Rights administered by the World Trade Organization (WTO, 1994). While the Berne Convention protects the intellectual property rights for content generally, the TRIPS agreement extended such protection specifically to computer programs and compilations of data. In

Europe, further protection is offered specifically to electronic databases via the European Union's Directive on legal protection of databases of 11 March 1996 (European Commission, 1996), which took effect across the EU Member States in January 1998.

Where a global web atlas is concerned, which might contain content from multiple nations operating under multiple – and not always consistent – IPR regimes, complex issues may arise regarding access to, and use of, the data in the atlas, especially with regard to downloading data from the atlas. Even a coastal atlas developed within a single nation will typically have content providers from many sectors of society, including government, academia, research, business and citizens' groups. The information policy adopted for the atlas, relating to IPR for such diverse providers, needs to be carefully considered so that potentially valuable content is not excluded due to inadequate IPR protection, while access is not adversely restricted due to overly protective IPR terms. Thus, web atlas developers need to understand the information policies, both current and evolving, in their home countries and in the legal jurisdictions in which other important content providers may be located. Trends change, rules change, legislation changes – a successful CWA that survives for a number of years may need to adapt its original information policies accordingly.

Unfortunately, implementing a CWA information policy that adequately addresses IPR issues is only the first step. Much more difficult to achieve is intellectual property control, technically. Most on-line services today offer some degree of intellectual property management using only access control, via for example licenses with terms to which users have agreed prior to using the service, or perhaps by 'click use' on-line license regimes created by companies (such as Amazon.com or eBay.com) or government agencies (e.g., the UK's Office for Public Sector Information). Unless a data resource is fully in the public domain, i.e., can be used by anyone in any way that they wish, IPR

rights apply to greater or lesser extent, as per the content owner's intention. These range from being quite openly available via a Creative Commons license, to strictly controlled for many resources, with every view, access or record downloaded incurring some charge.

In the geospatial realm, progress has been made in recent years relating to IPR management, via the work of the Open Geospatial Consortium, Inc. working group on Geospatial Digital Rights Management (GeoDRM), which met from 2004 to 2006, and published a GeoRM Reference Model (Vowles, 2006). This work was later taken up by the International Organization for Standardization (ISO) Technical Committee 211 (ISO/TC 211) which deals with geographic information standards at global level, who released a draft standard for "Geographic information - Rights expression language for geographic information - GeoREL," in August, 2008 (ISO, 2008). Various sectors of the geospatial community - GIS vendors, commercial spatial data providers and organizations offering their spatial content for a fee - are investigating how best to implement GeoREL.

ATLAS PUBLICITY

When developing a web atlas, the priority of many initiators is to think carefully about the content of the atlas, navigation ease and visual layout. However, having an interesting, good-looking atlas that is easy to navigate is not enough. People need to be aware of the existence of the web atlas, and promoting the atlas is just as important as development and presentation. Information that is unused because potential users do not know about it is information wasted.

In most of the examples described in this book, there is no printed version of the atlas available. The atlas is thus not a tangible product for people to lay their hands on, and the on-line version is the only product people can see - and they can see it only by knowing that it is there! Therefore, it

is important to promote the web atlas, which can be done in several ways. For instance:

- officially launch the web site, possibly linked to a related event,
- contact the press and send out press releases;
- write articles for specialized and non-specialized magazines, e-newsletters, etc.;
- make presentations at relevant conferences, workshops and seminars;
- post announcements on relevant electronic mailing lists, including those that address potential users with an interest in the coastal environment, to libraries, etc. ;
- create gadgets or “give-aways” to promote the web site, such as post cards or high-quality prints of striking content from the atlas.

Some examples for promoting web atlases follow.

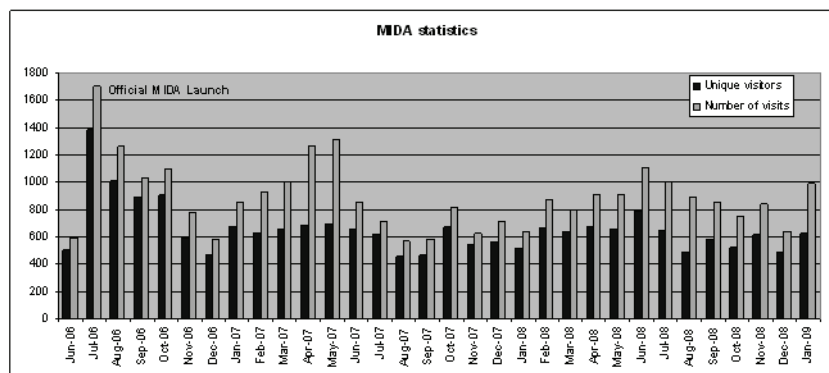
The Marine Irish Digital Atlas (MIDA) organized an official launch linked to an international workshop of the International Coastal Atlas Network (ICAN). The launch took place on 25 July 2006 at University College Cork. It celebrated four years of development and data collection and the beginning of MIDA’s next phase of integrating new technology, tools and information.

Prominent speakers at the launch were Prof. Gerard T. Wrixon, President, UCC; Joe Breen, Head of Aquatic Services, Environment and Heritage Service, Northern Ireland; and Valerie Cummins, Director, CMRC. A press release was sent out. The Irish Times, the main Irish quality newspaper, published the news on 26 July 2006 through their Marine Correspondent (Lorna Siggins) based on her experience with the atlas. Also, there have been articles published in other newspapers and magazine before and after the launch.

The MIDA team clearly saw a huge increase in visitors to the web site in July of that year and the impact of the launch public relations lasted for about three months as shown in Figure 1. Since then there has been no further major publicity event and no more obvious “bounces” in the number of users that might have resulted from such activity, indicating that publicity needs to be ongoing and continuous, not a one-off activity.

The launch of the Belgian Coastal Atlas (De Kustatlas) in 2005 was linked to the presentation of a photo atlas published by the consultancy involved with the development of the online atlas, Aquaterra. There was also a press release and a presentation. A set of postcards with aerial photographs of the coast was printed, mentioning the web address. These postcards were distributed to key players and sold in book shops on the coast.

Figure 1. Usage statistics for MIDA post-launch. (©2009, University College Cork. Used with permission.)



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This promotion certainly helped to bring the Belgian web atlas to the attention of the public, but there was another and far more important factor, in the opinion of the developers - the atlas was also published as a book (Figure 2). The printed atlas was released the year before, in 2004. Tangible products like a book have proven very useful to draw the attention of a wide audience, scientists as well as politicians, managers, etc. Not only locally, but also at conferences and exhibitions, books or other printed material will draw the attention much more efficiently than yet another computer screen display. Visitors can touch the book and browse through it at their own pace.

The same experience can be found with the atlas for the Venice lagoon (http://atlante.silvенеzia.it/en/index_ns.html), which was also published first as a printed atlas, and only in a second phase developed as a web application.

FUNDING FOR COASTAL WEB ATLASES

Many agencies are responsible for the management and conservation of the coastal and marine environment, arising out of a commitment to meet international agreements under a wide range of conventions, as well as national or regional legislation, as in the European Union. High quality environmental information in an atlas can be crucial for sound management decisions, for monitoring the effects of these decisions, and reporting the results to constituents and stakeholders. Ideally an agency has a line item within its budget to support an atlas as an integral part of the agency mission, i.e., covering salaries, benefits, hardware and software upgrades, and appropriate fees for materials, supplies, and licensing. In some cases, atlases are funded long-term by an institution or network of partners, but the focus may be on innovation and technology developments rather than user requirements, data delivery and updates (O’Dea *et al.*, 2007). There is certainly a need

Figure 2. The Belgian Coastal Atlas – De Kust Atlas Vlaanderen België. (© 2004. Used with permission.)



to fund atlases on a long-term basis in order to guarantee their stability and ultimate effectiveness.

The reality is that funding is often extremely volatile, with a CWA being funded as a project, only for initial development and perhaps a short pilot operational period, thereby running the risk of going quickly out-of-date due to the lack of resources for site maintenance beyond the initial development stage. Ideally, a CWA should be seen as an important addition to information infrastructure, not simply as another ICT project. There are many negative impacts associated with unstable funding, as pointed out in O’Dea *et al.* (in prep.), as well as in Chapter 15, including: (1) staff turnover results in lost expertise; (2) inability to fund maintenance of projects (always needing to move to the next new funded activity); (3) short-term (often annual) budget cycles of many agencies who typically will not or cannot commit to long-term partnerships, making maintenance even more difficult. As a result, atlas managers and administrators are often forced into diverting their time and resources to seeking funding to maintain and grow atlases.

One recommendation made by O’Dea *et al.* (in prep.) is that different financial models should be examined to determine the best methods for continued CWA support. Consideration should be given to sponsorship by key organizations; obtaining multiple funding streams; providing “subscriber only” areas for advanced functionality (at a cost); or developing spin-off initiatives, such as the publication of a CWA in print media. Table 1 provides some suggestions as adapted from Dwyer & Wright (2008), where the discussion was primarily on the International Coastal Atlas Network (ICAN) as a whole. Oftentimes it is advisable to partner regionally with other atlases to seek regional funding instead of acting alone. In this way collaborators can investigate appropriate program announcements and different individuals can take the lead on writing and submitting grant proposals. However, there are implications to implementing this strategy that include both challenges, as well as opportuni-

ties, such as meeting the objectives of differing funding programs, and coordinating proposal development, submission and project execution, if the proposal is successful. These issues should not be underestimated and also apply to single atlas development proposals which seek funding from multiple sources.

In a proposal it is often best to highlight not only the driving factors for initial CWA development, i.e., why it *was* needed at the outset, but also the continuing benefits that are still to be derived from atlas availability, i.e., why it is *still* needed. Chapter 1 discussed some of the driving factors for initial CWA development, in most cases worldwide, e.g. speedy access to multiple sources of coastal data and information and more efficient use of time by avoiding individual contact with different data holders. Some factors that might be considered generically as future benefits in creating a CWA (after unpublished notes from the Institutional

Table 1. Some potential funding programs for coastal Web atlases

<p>Networking and Workshops</p> <p>National</p> <ul style="list-style-type: none"> • Irish Marine Institute, Sea Change Networking Initiative (http://www.marine.ie/home/funding/FundingCalls/closedcalls/NetworkingInitiative.htm) • United States, National Science Foundation, Office of International Science and Engineering, (http://www.nsf.gov/od/oise/about.jsp) <p>International</p> <ul style="list-style-type: none"> • European Science Foundation, Research Networking Program (http://www.esf.org/activities/research-networking-programmes/rnp-call-for-proposals.html) • European Union, Seventh Research Framework Program, Coordination and Support Activities http://cordis.europa.eu/fp7/ • European Union, Competitiveness and Innovation Framework Program 2007-2013 (CIP), Policy Support Program (PSP), Geographic Information (http://ec.europa.eu/ict_psp) <p>Technical Development</p> <p>National</p> <ul style="list-style-type: none"> • United States, National Science Foundation, Office of Cyberinfrastructure (http://www.nsf.gov/dir/index.jsp?org=OCI) <p>International</p> <ul style="list-style-type: none"> • European Science Foundation – COST (http://www.cost.esf.org/index.php) • European Union, Seventh Research Framework Program – Environment and ICT themes (http://cordis.europa.eu/fp7/dc/index.cfm) • INTERREG, European Interregional development programs. (http://ec.europa.eu/regional_policy/index_en.htm) <p>Outreach and Training</p> <p>National</p> <ul style="list-style-type: none"> • United States, The William and Flora Hewlett Foundation (http://www.hewlett.org/programs/environment-program) <p>International</p> <ul style="list-style-type: none"> • IOC’s IODE Project¹ – Ocean Teacher Program (http://www.oceanteacher.org) • International Geographical Union (IGU), Commission on Coastal Systems – (http://www.igu-ccs.org) • Europe, EUCC – Coastal & Marine Union – CoastLearn Project (http://www.coastlearn.org) • European Science Foundation - Marine Board (http://www.esf.org/research-areas/marine-board.html)
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Capacity Breakout group of ICAN Workshop 1, O’Dea *et al.*, 2007) include:

- Demonstrate added value of atlases by exploiting opportunities to highlight best practices which can increase efficiencies and save money.
- Heightened visibility of certain partners, for example universities, can help market and build credibility for projects.
- Highlight emerging trends in e-government/digital government and knowledge-based economies, whereby CWA content can provide geospatial underpinning for many government activities affecting the coastal and marine environments.
- Articulate how a CWA will continue to help deliver government policy, e.g. implementing a national or regional ICZM mandate.
- Open data licenses can lead to new products, which increases economic development.
- Leverage data acquisition, e.g., added opportunities to secure resources to get more or better datasets.
- Reduce unnecessary duplication, e.g. sharing computer code, as well as data.

It will also be useful to consider focusing on one or two high-profile issues in order to attract funders/advocates (Dwyer & Wright, 2008). One such issue would be climate change *impact*, especially decision support for coastal communities vulnerable to climate change, island nations threatened by sea level rise, and the like. An atlas team can make a strong case by articulating the practical, applied products that it makes available. For example this can include available solutions to help an agency or organization do better what they are *already* mandated to do, provision of the knowledge gained as a result of working closely with partners on a common, proven approach, etc. It will also be helpful to ascertain real numbers

in terms of who is using and benefiting from the atlas, i.e., how many users, who and where they are, how much money they are saving as a result of using our atlases, etc.

And finally, the inclusion of actual scenarios of prior success in the form of user profiles or stories are an added benefit to a proposal. A proposal might also show a sampling of the maps that have been created by users of the atlas. For example, with the Oregon Coastal Atlas (OCA), the administrative team has been motivated by the ways in which the Oregon coastal community has already used the atlas, sometimes beyond the intended audience of coastal resource managers and planners, and beyond the initial intention of hazards management, coastal watershed assessment, and ocean policy (to the edge of the Territorial Sea, 3 miles offshore). Below are four example stories explaining this effect (P. Klarin, pers. comm., 2001):

- (1) Staff from other state and federal agencies report using the OCA when doing permit reviews and reports, primarily because: (a) they don’t have an online system; (b) don’t have or use GIS; (c) the data that they do have are limited to that produced by their only agency; but most of all (d) they find the OCA to be easier, faster and more reliable. Oftentimes several people can discuss a particular site together, with all of them looking at the same map data on the OCA. Our OCA team member from the Oregon Coastal Management Program (OCMP), coastal planner Paul Klarin, does this all the time with various state agency staff located at coastal field offices, whenever they discuss a specific site or proposal. Klarin conferred with a coastal field representative from Waldport, on the central Oregon coast, about a coastal erosion problem at a waste treatment plant in Seaside, on the north Oregon coast. They were able to see significant changes in the shoreline between

the two communities from a series of digital orthophotos available from the OCA.

- (2) OCA team members have seen maps produced by the OCA being used by private individuals and their legal representatives in public hearings. The OCMP permit review staff has also seen OCA maps being used by individuals who are commenting on or producing permit applications.
- (3) Coastal residents who are alarmed about the potential for a tsunami are using the OCA to access and print out the tsunami inundation maps and the tsunami evacuation route maps that were recently made available in the portal.
- (4) One OCA team member has received phone calls from private individuals, some from out-of-state, who are seeking advice regarding coastal properties that they are interested in buying. While on the phone they have both used the OCA to look at the same site and talk about any special circumstances that may be evident, using the data available.

REGIONAL GOVERNANCE AND PARTNERSHIPS

Many Coastal Web Atlases are being developed in multinational environments, such as the African Marine Atlas and Caribbean Marine Atlas projects of the Intergovernmental Oceanographic Commission's IODE (International Oceanographic Data and Information Exchange) Program. Web portals will also be part of the developing European Marine Observation and Data Network (EMODNET) promoted by the European Union. Managing the institutional relationships between multiple organizations based in different countries typically requires more resources than are needed for a web atlas developed in a single country. Funding also becomes more complicated, as funds from multiple sources are typically required, including contributions from individual institutions,

for which different financial terms and budgeting cycles apply, among other challenges.

In the case of the African and Caribbean Marine Atlas projects, the IOC's IODE has taken a leading management role, including securing funding and offering relevant training to the institutions involved in these projects. In the case of EMODNET development, the European Commission will be the lead organization, with funding most likely to be derived from funded projects enacted within multiple European Union programs, such as the Seventh Framework RTD Program, environmental programs and inter-regional development programs. Major projects that have a direct impact on coastal and marine information across national boundaries are already underway, such as SeaDataNet, which involves 49 partners from 35 countries and is funded for several million Euro by the EU's 6th RTD Framework Program.

The International Coastal Atlas Network (ICAN) initiative bridges the gap between many such projects, as representatives from many of these national and regional web atlas projects participate in ICAN meetings and on-going development of ICAN principles and tools. The European Environment Agency (EEA) has become a strong supporter for ICAN and Coastal Web Atlas development, having sponsored the 3rd ICAN Workshop at their headquarters in Copenhagen, Denmark, in July, 2008 and offering support for the 4th ICAN Workshop in Trieste, Italy, in November, 2009 (Wright & Dwyer, 2009). Recognizing the value of the ICAN initiative, the IOC-IODE has offered to host the 5th ICAN Workshop in Oostende, Belgium in 2010. With IOC projects now also involved in ICAN, this initiative has taken on a truly global aspect which should pay dividends in helping to create a network of federated CWAs, using common tools and standards, offering fully interoperable services.

CONCLUSION

This chapter looked at some of the issues relating to securing long-term support for a CWA, providing some guidance based on existing practice and experience with CWA developments at national and international levels. Creating effective partnerships is crucial for both initial development and securing long-term success of a CWA. Ideally, partners are committed to the project and have sufficient resources to participate fully both initially and over time. Sadly, securing sufficient resources for long-term operation of a CWA remains a problem for many initiatives. The preceding sections on funding and governance, which are closely related, hopefully provide some guidance on how to proceed with your own CWA project, especially in relation to other existing spatial information infrastructure initiatives within which the CWA may play an important role for coastal and marine communities.

Because most CWAs will comprise data sources and perhaps even information access services from multiple organizations, understanding the implications of managing intellectual property rights is an important consideration, and one which many information infrastructure projects have yet to fully address, let alone resolve. Progress is being made in this regard with new standards-based initiatives such as the Open Geospatial Consortium's (OGC) work in Geospatial Digital Rights Management (GeoDRM), now also taken up by the International Organization for Standardization (ISO) in their Geographic information - Rights Expression Language (GeoREL) draft standard (ISO 19149). However, implementations of this reference model and applications that can use GeoREL are still some years away.

Finally, we draw attention to the value and importance of publicizing the existence of a Coastal Web Atlas, as widely as possible, and as often as practicable. Potential users cannot use a resource unless they know that it exists! This obvious fact escapes many who create web services in numer-

ous realms, not only those working with CWAs. Advertise, publicize, and gain 'readership' in order to help secure long-term funding and sustainability for your CWA.

REFERENCES

African Marine Atlas. (2009). Retrieved October 31, 2009, from the African Marine Atlas web site: <http://www.africanmarineatlas.net>.

Atlas of the Venice Lagoon. (2009). Retrieved October 31, 2009, from the Atlas of the Lagoon - Venice Between Land and Sea web site: http://atlante.silvenezia.it/en/index_ns.html.

Belgian Coastal Atlas. (2009). Retrieved October 31, 2009, from the Belgian Coastal Atlas web site: <http://www.kustatlas.be>.

Creative Commons. (2009). *Creative Commons Licenses – Attribution, Share Alike, Noncommercial, No Derivative Works*. Retrieved August 6, 2009, from Creative Commons web site: <http://creativecommons.org/about/licenses/>

Dwyer, N., & Wright, D. J. (2008). *Report of International Coastal Atlas Network Workshop 3 on Federated Coastal Atlases: Building on the Interoperable Approach*, European Environment Agency, Copenhagen, Denmark. Retrieved July 29, 2009, from ICAN web site: http://ican.science.oregonstate.edu/ican3_final_rpt

European Commission. (1996). *Directive 96/9/EC of the European Parliament and of the Council of 11 March 1996 on the Legal Protection of Databases*. Official Journal of the European Community, L 77, 27.3.1996, p. 20–28. Retrieved August 6, 2009, from the European Commission web site: <http://bit.ly/40ertR>.

- European Marine Observation and Data Network (EMODNET). (2009). Retrieved October 31, 2009, from the European Commission web site: http://ec.europa.eu/maritimeaffairs/eu-marine-observation-data-network-mission_en.html.
- Free Software Foundation. (2007). *GNU General Public License*. Retrieved August 6, 2009, from Free Software Foundation web site: <http://www.fsf.org/licensing/licenses/gpl.html>
- IACMST. (2005, January). *Marine Data and Information Partnership (MDIP) Statement of Intent (Rev. 02)*. Presented to the Inter-Agency Committee for Marine Science and Technology, MDIP Steering Group meeting, London, January, 2005.
- International Oceanographic Data and Information Exchange (IODE). (2009). Programme of the Intergovernmental Oceanographic Commission (IOC) of UNESCO. Retrieved October 31, 2009 from the IODE web site: <http://www.iode.org>.
- ISO. (2008). *Geographic information—Rights expression language for geographic information—GeoREL, draft standard ISO/CD 19149*. Geneva: International Organization for Standardization.
- Longhorn, R. (2004). *Integrated Coastal/Marine Spatial Data Infrastructure*. Paper presented at the ECO-IMAGINE Conference, 13-15 May 2004, Seville, Spain. Retrieved October 7, 2009, from the Gisig web site: <http://www.gisig.it/eco-imagine>.
- Longhorn, R. (2005). Coastal Spatial Data Infrastructure. In Bartlett, D., & Smith, J. (Eds.), *GIS for Coastal Zone Management*. London: Taylor & Francis.
- Longhorn, R. (2009in preparation). Coastal and Marine Spatial Data Infrastructure. In Green, D. (Ed.), *Coastal Zone Management*. London: Thomas Telford Books.
- Marine Irish Digital Atlas*. (2009). Retrieved October 31, 2009, from the Marine Irish Digital Atlas web site: <http://mida.ucc.ie>.
- O’Dea, L., Cummins, V., Wright, D., Dwyer, N., & Ameztoy, I. (2007). *Report on Coastal Mapping and Informatics Trans-Atlantic Workshop 1: Potentials and Limitations of Coastal Web Atlases*. Cork, Ireland: University College Cork, Coastal & Marine Resources Centre. Retrieved May 7, 2009, from the ICAN web site: <http://ican.science.oregonstate.edu/node/47>.
- Oregon Coastal Atlas. (2009). Retrieved October 31, 2009, from the Oregon Coastal Atlas web site: <http://www.coastalatlant.net>.
- SeaDataNet. (2009). Retrieved October 31, 2009 from the British Oceanographic Data Centre web site: <http://www.bodc.ac.uk/projects/european/seadatanet>.
- Vowles, G. (Ed.). (2006). *Geospatial Digital Rights Management Reference Model (GeoDRM RM)*. Wayland, MA: Open Geospatial Consortium, Inc.
- WIPO. (1979). *Berne Convention for the Protection of Literary and Artistic Works*. World Intellectual Property Organization, Geneva. Retrieved August 6, 2009 from WIPO web site: http://www.wipo.int/export/sites/www/treaties/en/ip/berne/pdf/trtdocs_wo001.pdf
- Wright, D. J., & Dwyer, E. (2009). *ICAN Workshop 4 and EEA National Reference Centers Meeting in Trieste, Italy, November 2009*. Retrieved October 31, 2009 from the International Coastal Atlas Network web site: <http://ican.science.oregonstate.edu/ican4>.

Wright, D. J., Watson, S., Bermudez, L., Cummins, V., Dwyer, N., O’Dea, L., et al. (2007). *Report on Coastal Mapping and Informatics Trans-Atlantic Workshop 2: Coastal Atlas Interoperability*. Oregon State University: Corvallis, Oregon. Retrieved July 29, 2009 from the ICAN web site: <http://ican.science.oregonstate.edu/node/46>.

WTO. (1994). *Agreement on Trade-Related Aspects of Intellectual Property Rights*. World Trade Organization, Geneva. Retrieved August 6, 2009, from WTO web site: http://www.wto.org/english/docs_e/legal_e/27-trips.pdf.

KEY TERMS AND DEFINITIONS

Copyright: Copyright is a legal term describing enforceable rights (commercial and moral) given to creators of literary and artistic works, such as novels, poems, plays, reference works, newspapers and computer programs; databases; films and musical compositions; artistic works such as paintings, drawings, photographs and sculpture; architecture; and advertisements, maps and technical drawings.

Creative Commons: Creative Commons is an that promotes “copyleft” principles to support the building of a richer public domain for content by providing an alternative to the “all rights reserved” principle of copyright with a less restrictive “some rights reserved” claim covered by various forms of Creative Commons license (see creativecommons.org).

Financial Models and Funding: Experience shows that various and sometimes multiple financial models are followed in creating and maintaining coastal/marine atlases, as with other types of information infrastructure, including public funding (by government), public-private finance, and some element of self-funding (charging users for access or value added services).

Geospatial Digital Rights Management (GeoDRM): Geospatial digital rights manage-

ment (GeoDRM) involves the use of technology to manage access to digitally stored geospatial information, based on software tools, techniques, models and standards developed by the geospatial standards community (Open Geospatial Consortium, Inc. and ISO Technical Committee 211).

Governance: The act of governance includes decisions that define expectations, grant or restrict power, and specify and enforce performance of actions relating to some theme or area of responsibility, comprising management and leadership processes to ensure consistent management and implementation of cohesive policies and processes in an accepted and legitimized decision-making regime.

Information Infrastructure: Information infrastructure refers to the communications networks and associated information technology, standards, policies and regulations that support interaction among people and systems.

Institutional Support: Institutional support comprises the components that underpin implementation and on-going operation for an activity, including sustainable funding, providing human resources, al support, promotion, information system maintenance and governance,

Intellectual Property: Intellectual property (IP) refers to creations of the mind, i.e. inventions, literary and artistic works, symbols, names, images and designs used in commerce, and is divided into two categories: industrial property, which includes inventions (patents), trademarks, industrial designs, and geographic indications of source; and copyright (see definition above).

Intellectual Property Rights: Intellectual property rights are rights granted to creators and owners of intellectual property (see above), which protect the owner’s moral and commercial interests in the works created, and include copyright, patents, trademarks, design rights, and protection of confidential information, plus special rights relating to computer software and electronic databases.