

# UNCLOS' POTENTIAL INFLUENCE ON A MARINE CADASTRE: DEPTH, BREADTH, AND SOVEREIGN RIGHTS

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## *ABSTRACT*

The United Nations Convention on the Law of the Sea should influence the marine cadastres of ratifying nations in several ways. Not only will UNCLOS dictate for those nations the extent, volume and nature of the rights ratifying nations should include in their marine cadastres, but also the ways in which the outer limit of the marine cadastre is constructed.

Land cadastres have traditionally represented property rights in two-dimensional parcel form, with the boundaries of each parcel coinciding with the ownership boundaries of each plot of land. In this way, cadastres have usually represented property rights in a bundled format, with many different types of rights existing within each unique parcel. Typically, one of these rights is the right to exclude others from the property. However, in a marine environment, individual ownership of a “parcel” is not the norm. International law (e.g.: UNCLOS, or customary international law), public rights, and government ownership more frequently take precedence over any private rights that do exist in the water column or the seabed. “This absence of the traditional parcel in a marine setting, and the lack of an individual owner holding many simultaneous rights, makes a bundled portrayal of rights in a marine cadastre ineffective and inaccurate when it comes to decision-making.” [Ng'ang'a, S., M. Sutherland, S. Cockburn and S. Nichols, 2001] Furthermore, few marine activities can be said to take place on the “surface” of the water. Most ocean activities are inherently volumetric. It is possible that two marine rights that do not intersect at the surface of the water will do so at some point far below, in the water column or even within the seabed. The most useful cadastres for the management and portrayal of ocean rights will need to reflect the volumetric nature of property rights in the ocean.

This paper will discuss UNCLOS' role in marine cadastre development and its profound influence on the concept of ocean property rights.

## 1. Introduction

Cadastrals have long been established on land to record the boundaries of property and ownership, and indeed the terms “cadastral surveying” and “legal surveying” are often used interchangeably within the geomatics community. The development of the land cadastre that accompanied the European settlement of North America may be a useful analogy for the development the authors see as necessary of a Marine Cadastre. The first mapping by Europeans was exploratory, locating the principal physical features: only later, when the basic topography was mapped could practical mapping of townships, farms, mines and woodlots be undertaken by way of a cadastre. So too in the marine field; most EEZs have had basic exploratory mapping, and preparations for Continental Shelf submissions to the CLCS will have established the principal physical features of the seabed to the Outer Limit of a Coastal State’s jurisdiction. Together, the EEZ and the juridical Continental Shelf, where one can be established, constitute a known and finite area within which Coastal States exercise specified jurisdiction or other sovereign rights. Within this area, some Coastal States have already begun to issue exploration licences, which will add to the many existing, and often confusing, boundaries in the marine environment. Participants at a recent FIG workshop believe that this solidifying of offshore zones brought on by UNCLOS means that it is time to construct a Marine Cadastre.<sup>1</sup>

The development of a marine cadastre should be considered by many coastal nations for several reasons:

A marine cadastre would help clarify jurisdictional complexity in Coastal Zones, would provide the basis for identifying and involving the wide variety of stakeholders involved in co-management of Coastal Zones, would be the basis for managing construction of structures and required easements and rights-of-way, and could help prevent ownership issues from becoming contentious. For many GIS users, the ability to call up a fundamental cadastral layer would permit rapid and appropriate application of their special subject matter within a legally defined zone.<sup>2</sup>

Definitions of a Marine Cadastre are still tentative and reflect the newness of the subject and the struggle researchers are engaged in. One definition is “[a] system to enable the boundaries of maritime rights and interests to be recorded, spatially managed and physically defined in relationship to the boundaries of other neighbouring or underlying rights and interests.”<sup>3</sup> Another description, specific to GIS, defines the marine cadastre as “[a] database that would support a GIS layer that at its display level would show the physical locations of boundaries and limits, and at a deeper level would be supported by information on legal and legislative elements of rights, responsibilities, and restrictions to the areas circumscribed by those

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<sup>1</sup> Sutherland, M. 2003. The Outcomes of the UNB-FIG meeting on Marine Cadastre Issues, University of New Brunswick, Fredericton, NB, Canada.

<sup>2</sup> Monahan, D., Nichols, S., and Sherin, A. 2003. *Fundamental contents of coastal GIS- the case for a marine cadastre*. In Coastal GIS 2003. Genoa, Italy, October 16-18, 2003. P. 1

<sup>3</sup> Williamson, I.P., Leach, J. and Rajabifard, A. (2001) *Marine Cadastres*. Position paper submitted to 7th Meeting of the Permanent Committee on GIS Infrastructure for Asia and the Pacific (PCGIAP), Tsukuba, Japan. Retrieved from the World Wide Web October, 2003. P. 1  
<http://www.sli.unimelb.edu.au/maritime/publications/PCGIAP-Cadastral%20WG-Marine%20Cadastre-2001.pdf>

boundaries.”<sup>4</sup> A third is “...an information system that not only records the interests but also facilitates the visualisation of the effect of a jurisdiction’s... laws on the marine environment (e.g. spatial extents and their associated rights, restrictions, responsibilities, and administration).”<sup>5</sup> Clearly, the concepts that are most useful in establishing a marine cadastre vary by jurisdiction, differ significantly from certain land-based cadastral concepts, and are, most of all, still developing and changing.

While seeking to explore how UNCLOS will influence the implementation of a marine cadastre, it is useful to first revisit traditional definitions of a land cadastre in order to determine what is applicable to the marine case and to be able to build upon the existing infrastructure, and also to determine in which ways a Marine Cadastre must, by nature of the environment in which it operates, depart from the land-based model.

## 2. Global Model of the Land-Based Cadastre

Typically, in the traditional terrestrial-based sense, cadastres have been records of interests in land, the geographic units of which have been ownership parcels. The cadastre has traditionally consisted of two parts – registers and maps.<sup>6</sup> “The Fédération Internationale des Géomètres (FIG) statement on the cadastre has been widely accepted and is now an established principal of land administration systems.”<sup>7</sup> The cadastre can currently “... be explained as a parcel based and up to date land information system consisting of a record of interests in land. These interests encompass issues such as rights, restrictions, responsibilities and jurisdictions (FIG, 1995).”<sup>8</sup> Along the same lines in 1975, John McLaughlin defined a cadastre as “a parcel-based record of interests in land encompassing both the nature and extent of these interests.”<sup>9</sup> This is the definition from which this paper will begin its examination of current marine cadastre issues.

When we break McLaughlin’s definition of a land cadastre into its elements, we arrive at the following:

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<sup>4</sup> Monahan, D., Nichols, S., and Sherin, A. 2003. *Fundamental contents of coastal GIS- the case for a marine cadastre*. In Coastal GIS 2003. Genoa, Italy, October 16-18, 2003. P. 6

<sup>5</sup> Ng’ang’a, S., S. Sutherland, and S. Nichols (2002). *Data Integration and Visualisation Requirements for a Canadian Marine Cadastre: Lessons from the Proposed Musquash Marine Protected Area*. ISPRS Commission IV, Symposium 2002, Ottawa, Canada, July 9-12, 2002. P. 2. Retrieved from the World Wide Web October, 2003.

<http://www.isprs.org/commission4/proceedings/pdffpapers/506.pdf>

<sup>6</sup> Williamson, I. (2003). *The Cadastral Concept*. Land Administration 451-418/607 Lecture 4, 2003, PowerPoint Presentation. Retrieved from the World Wide Web October, 2003.

<http://216.239.41.104/search?q=cache:94F7PIBEYAwJ:www.sli.unimelb.edu.au/subjects/451/418/Lecture%25204%2520-%2520Cadastral%2520Concept%2520-%25202003.ppt+definition+of+a+cadastre+McLaughlin&hl=en&ie=UTF-8>

<sup>7</sup> Widodo, M. S. (2003). *The Needs for Marine Cadastre and Supports of Spatial Data Infrastructures in Marine Environment – A Case Study*. In Proceedings of FIG Working Week 2003, Ecole National de Sciences Géographiques (ENSG) and IGN Marne la Vallée, Paris, April 13–17, 2003. Retrieved from the World Wide Web October, 2003. P. 1

[http://www.fig.net/figtree/pub/fig\\_2003/TS\\_20/TS20\\_3\\_Widodo.pdf](http://www.fig.net/figtree/pub/fig_2003/TS_20/TS20_3_Widodo.pdf)

<sup>8</sup> Ibid. P. 3. [http://www.fig.net/figtree/pub/fig\\_2003/TS\\_20/TS20\\_3\\_Widodo.pdf](http://www.fig.net/figtree/pub/fig_2003/TS_20/TS20_3_Widodo.pdf)

<sup>9</sup> Ng’ang’a, S., S. Sutherland, and S. Nichols (2002). *Data Integration and Visualisation Requirements for a Canadian Marine Cadastre: Lessons from the Proposed Musquash Marine Protected Area*. ISPRS Commission IV, Symposium 2002, Ottawa, Canada, July 9-12, 2002. P. 2. Retrieved from the World Wide Web October, 2003.

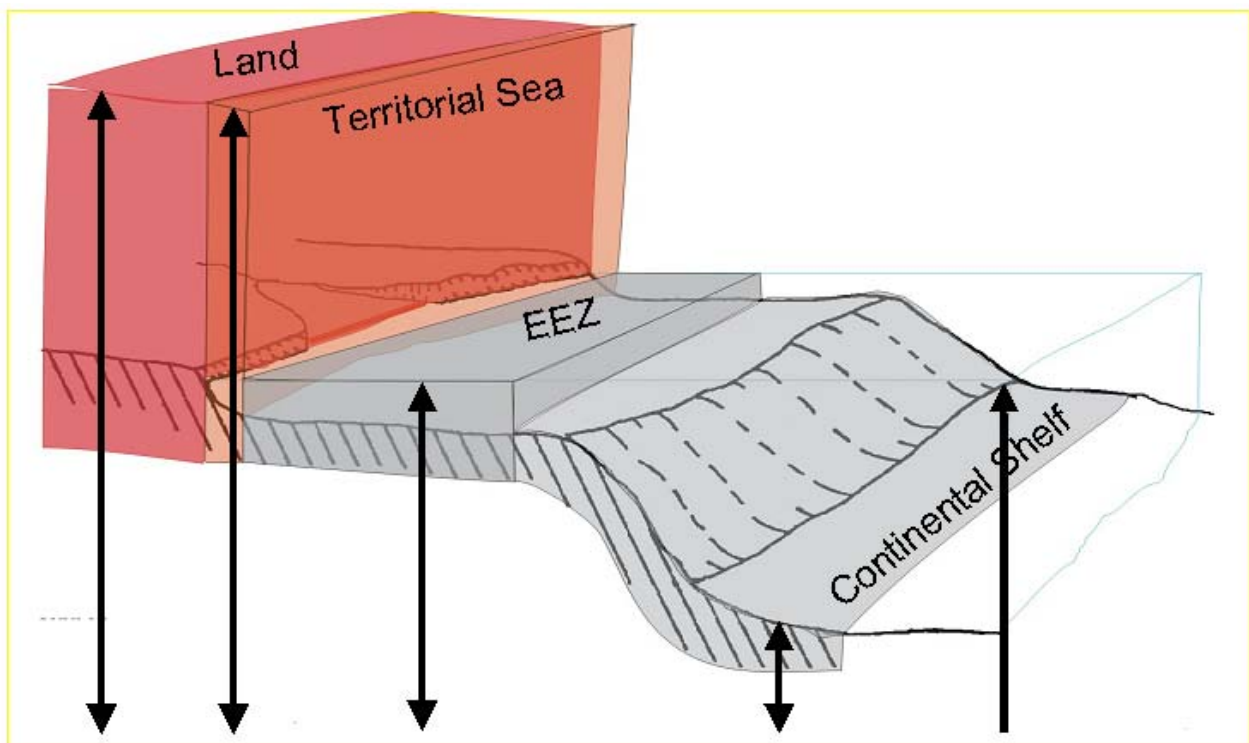
<http://www.isprs.org/commission4/proceedings/pdffpapers/506.pdf> Citing McLaughlin, J.D. (1975), *The Nature, Function and Design Concepts of Multipurpose Cadastres*. Ph.D. Thesis, University of Wisconsin.

1. A Parcel-based record
2. Of interests in land
3. Encompassing the nature and extent of these interests

To begin to define or evaluate a marine cadastre, we assess each of these elements of the land cadastre definition to see whether it is applicable in the marine environment. If not, we must determine why not and whether these differences are significant enough to alter the cadastral definition for marine areas.

### 3. A Parcel-Based Record and UNCLOS: Breadth and Depth

The United Nations Convention on the Law of the Sea (UNCLOS), may have a profound influence on how the offshore parcel is defined. Firstly, UNCLOS specifies how a ratifying nation's limits are to be drawn. Secondly, UNCLOS specifies the depths or layers at which a ratifying nation begins and ceases to have rights in ocean space. This is illustrated by the following diagram, in which a ratifying nation has rights over air space within the Territorial Sea, but once the Continental Shelf is reached, the nation's rights only begin at the seafloor.



**Figure 1: Black arrows illustrate the vertical extent of a Nation's sovereign rights in the specified UNCLOS zones. Right hand arrow points to the water surface.**

In short, UNCLOS will influence both the total depth and breadth of a nation's marine cadastre, and the breadth and depth of certain individual zones within that cadastre. The

concept of cadastral depth is more complex in the marine environment than it is on land, as the following paragraphs will illustrate, not least because the land-based cadastral system was developed for an area where nations had absolute jurisdiction. Similarly, evidentiary tools are being used under UNCLOS that have not traditionally been used for the determination of a nation's boundaries. These will be discussed in section 5.

Traditionally, the representation of an ownership parcel in a land cadastre is two-dimensional, i.e. x and y, northings and eastings as if the parcel were on the surface of the land. This is illustrated each time we hear the expression "a plot of land." The development of a multipurpose cadastre concept has, however, included a three dimensional spatial unit representing unique, homogeneous, contiguous interests.<sup>10</sup> In a three-dimensional cadastral concept, the traditional view is of rights in three dimensions being tied to the parcel as it exists on the land surface. In other words, the traditional three-dimensional parcel simply extends the usual two-dimensional ownership parcel vertically both skyward and into the earth. Information is requested (or queried) and distributed based on the parcel about which information is desired. In some senses the multipurpose cadastre has also represented a fourth dimension – time. One example of this fourth dimension in a land-based multipurpose cadastre would be time-shared interests.<sup>11</sup>

In both the 2D and 3D cases above, the parcels discussed are usually based on individual ownership rights. In other words, these parcel representations and definitions exist at least in part because the ownership of a piece of property generally comes with certain associated rights. One typical example of such a right is the right to exclude others from the property.<sup>12</sup> Other rights, such as easements or leasehold rights can usually also be tied to a two-dimensional cadastral parcel because they have typically been granted by a current or past owner of that parcel. Therefore, if we examine a particular land-based cadastral parcel and the records associated with it, we can evaluate what rights have specifically been granted to persons or legal entities other than the owner of that parcel. This is the reason that a parcel has been the traditional unit about which queries can be made in a cadastre.

This traditional view of property rights has customarily been illustrated by American Common Law as a "bundle of sticks" which consists of many strands, each representing a separate right in the property.<sup>13</sup> Recently, however, complicated zoning regulations,

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<sup>10</sup> Ng'ang'a S. M., S. Nichols, M. Sutherland and S. Cockburn (2001). "Towards a Multidimensional Marine Cadastre in Support of Good Ocean Governance: New Spatial Information Management Tools and Their Role in Natural Resource Management." Paper #TS 12.3, in *Proceedings of the International Conference on Spatial Information for Sustainable Development*, ISK, FIG, and UN Habitat, Nairobi, Kenya, 2-5 October 2001. P. 8. <http://www.ddl.org/figtree/pub/proceedings/nairobi/nganga-nichols-sutherland-cockburn-TS12-3.pdf>

<sup>11</sup> Ibid. <http://www.ddl.org/figtree/pub/proceedings/nairobi/nganga-nichols-sutherland-cockburn-TS12-3.pdf>

<sup>12</sup> *Kaiser Aetna v. United States*, 444 U.S. 164, 176 (1979). Retrieved on September 14, 2001 from the FindLaw website on the World Wide Web.

<http://caselaw.lp.findlaw.com/scripts/getcase.pl?navby=case&court=US&vol=444&invol=164>.

*Loretto v. Teleprompter Manhattan CATV Corp.*, 458 U.S. 419 (1982). *Fundamentals of Modern Real Property Law, Third Edition*. Rabin, E.H., and R.R. Kwall. The Foundation Press, Inc., Westbury, New York. 1992.

<sup>13</sup> Ng'ang'a, S., M. Sutherland, S. Cockburn and S. Nichols (2001). "Toward a 3D Marine Cadastre in Support of Good Ocean Governance." Presented at *Registration of Properties in Strata*, International Workshop on 3D Cadastres, Delft, Netherlands, 28-30 November 2001. Citing *Kaiser Aetna v. United States*, 444 U.S. 164, 176 (1979). Retrieved on September 14, 2001 from the FindLaw website on the World Wide Web.

<http://caselaw.lp.findlaw.com/scripts/getcase.pl?navby=case&court=US&vol=444&invol=164>. And Black, H.C., 1990, *Black's Law Dictionary, 6<sup>th</sup> Edition*. (6<sup>th</sup> Edition by The Publisher's Editorial Staff – Coauthors J.

easements, leases, and other use rights have spurred some authors to advocate the “unbundling” of these property rights in order “...to clarify today’s complicated ownership scheme. Cadastre 2014 (3.2) promotes the division of rights into ‘legal land objects’ as follows: ‘If a law defines phenomena, rights, or restrictions which are related to a fixed area or point of the surface of the earth, it defines a land object.’”<sup>14</sup>

The question, then, is whether the traditional definition of a cadastral parcel is applicable in a marine zone defined by UNCLOS. “[I]n the oceans, where resources and activities, and therefore rights and restrictions, can co-exist in time and space and can move over time and space, the definition of a parcel is... complex.”<sup>15</sup> First, we must recognize that individual ownership of a complete, traditionally-defined cadastral “parcel” is not the norm in ocean space. Government ownership, public rights, and international law may more frequently have a direct influence on the private rights that do exist in the water column, and may certainly eliminate, for instance, an individual’s right to exclude others from his or her property.<sup>16</sup>

Second, “...few marine activities can be said to take place on the “surface” of the water. Nearly everything marine actually takes place in a volume of water. Most marine rights, such as aquaculture, mining, fishing, and mooring rights and even navigation have an inherently three-dimensional nature, which [could make] a two-dimensional definition of these rights legally inadequate.”<sup>17</sup> The overlapping nature of the many rights that may exist in ocean space further complicates the definition of a marine cadastre parcel. “It is entirely possible that any two marine rights intersect not at the surface of the water, but at some point far below, in the water column or even within the seabed. In order to control and regulate marine activity, a more accurate portrayal of rights in the water column is required.”<sup>18</sup> The effectiveness of governance and decision-making in marine space may be significantly improved by an unbundled, or distinct portrayal of rights in a marine cadastre.

In short, there are at least two elements of a traditional land cadastre parcel that are usually lacking in marine space.<sup>19</sup> The first is individual ownership of an entire volume of space. The second is a quantity of activities that can be said to be tied to, or take place on, a two-dimensional “plot.” In most jurisdictions, marine rights are myriad and are superimposed in such a way that it is extremely difficult to disentangle them.<sup>20</sup> Another complication is added

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R. Nolan and J. M. Nolan-Haley, Contributing Authors M.J. Connolly, S.C. Hicks, M.N. Alibrandi), West Publishing Company, St. Paul Minnesota.

<sup>14</sup> Ng'ang'a, S., M. Sutherland, S. Cockburn and S. Nichols (2001). "Toward a 3D Marine Cadastre in Support of Good Ocean Governance." Presented at *Registration of Properties in Strata*, International Workshop on 3D Cadastres, Delft, Netherlands, 28-30 November 2001. Citing Bevin, T. (1999). Cadastre 2014 Reforms in New Zealand. In the Coastal Cadastre: Onland, Offshore. Proceedings from the New Zealand Institute of Surveyors & FIG Commission VII Conference, Waitangi, New Zealand, p. 99-111.

<sup>15</sup> Ng'ang'a, S., S. Nichols, and D. Monahan (2003). *The Role of Bathymetry Data in a Marine Cadastre: Lessons from the Proposed Musquash Marine Protected Area*. In Proceedings of the Hydrographic Society of America (THSOA) U.S. Hydro 2003 Conference, Biloxi, Mississippi March 24-27, 2003. P. 12. Retrieved from the World Wide Web October, 2003. [http://www.thsoa.org/hy03/9a\\_1.pdf](http://www.thsoa.org/hy03/9a_1.pdf)

<sup>16</sup> Ng'ang'a, S., M. Sutherland, S. Cockburn and S. Nichols (2001). "Toward a 3D Marine Cadastre in Support of Good Ocean Governance." Presented at *Registration of Properties in Strata*, International Workshop on 3D Cadastres, Delft, Netherlands, 28-30 November 2001.

<sup>17</sup> Ibid.

<sup>18</sup> Ibid.

<sup>19</sup> This is not to say that they never exist.

<sup>20</sup> Cockburn, S. and S. Nichols (2002). “Effects of the Law on the Marine Cadastre: Title, Administration, Jurisdiction, and Canada’s Outer Limit.” In *Proceedings of the XXII FIG International Congress, 2002*.

when we consider that it is not possible to physically demarcate boundaries on location offshore but can only do it “by proxy” on charts and other publications (see also section 5).

One potentially helpful device to ensure that the user of a marine cadastre may query relevant information without being hampered by a traditional parcel definition would be a user-defined marine parcel (UDMP) for query purposes. This user-defined marine parcel would allow the user to make queries based on the following: a) a particular area designated by the user where all rights in volumetric ocean space<sup>21</sup> could be viewed by defining the area of interest on the surface of the water; b) a particular volume of ocean space could be user-defined including surface-area and depth values (in this instance, for example, if a user was only interested in water-column rights, they would not have to view the information contained in the cadastre that pertained to seafloor rights); or c) a user-defined parcel could be defined based on either volume or area coupled with the particular right a user wanted to view (for example, a user could query a particular fish stock in a specified volumetric space). If rights in the marine cadastre are unbundled, this third option suggests the ability to view each property right as its own separate cadastral “parcel.” The time-varying elements in these user-defined parcels could be time-flagged to add a fourth dimension to the marine cadastre. This fourth dimension may be particularly useful for the management and governance of leasehold and license rights, such as aquaculture leases or fishing licenses.

UNCLOS explicitly enumerates the rights, restrictions and responsibilities a ratifying nation has vis-à-vis offshore areas, and gives rights to other nations as well (e.g.: innocent passage, construction of pipelines and cables). This is in contrast to most land areas where the jurisdiction of the state is complete. A coastal nation will most likely only control spatial cadastral information as to the rights defined by UNCLOS in UNCLOS zones. To what extent is the cadastral system developed under absolute jurisdiction applicable to this marine environment?

#### **4. Interests in land : UNCLOS and Sovereign Rights**

Comparing the interests that exist in marine space with those on land in many ways illustrates the difference between a land and marine cadastre. One primary function of a land cadastre is to facilitate the administration of property rights. The types of information that may be desirable in a marine cadastre to facilitate effective governance of ocean space are different from those contained in a land cadastre. A land cadastre typically contains information such as who has title to a particular parcel of land, who has easements across that land, zoning information, and possibly leasehold or use rights. The desired contents of a marine cadastre may include the following: shipping lanes, oil and gas leases, fisheries information, conservation information, geophysical information,<sup>22</sup> and information relating to rights in aquaculture, navigation, First Nations’ interests, cable laying and flood control, as well as

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Presented at the XXII FIG International Congress, Washington DC, USA, April 24, 2002. P. 2.  
[http://www.fig.net/figtree/pub/fig\\_2002/Js12/JS12\\_cockburn\\_nichols.pdf](http://www.fig.net/figtree/pub/fig_2002/Js12/JS12_cockburn_nichols.pdf)

<sup>21</sup> This would include at least air, water surface, water column, seabed and subsurface space.

<sup>22</sup> Williamson, I.P., Leach, J. and Rajabifard, A. (2001) *Marine Cadastres*. Position paper submitted to 7th Meeting of the Permanent Committee on GIS Infrastructure for Asia and the Pacific (PCGIAP), Tsukuba, Japan. Retrieved from the World Wide Web October, 2003. P. 1  
<http://www.sli.unimelb.edu.au/maritime/publications/PCGIAP-Cadastral%20WG-Marine%20Cadastre-2001.pdf>

public rights of access,<sup>23</sup> and municipal, county, provincial, and national jurisdiction and administration, environmental protection areas and military spaces.<sup>24</sup>

This complex assortment of private and public interests, and the ways in which they overlap and affect one another, will have an effect on the way a marine cadastre is queried. One evident separation is between government interests and other interests.

In the case of the marine cadastre, a government may maintain legislative jurisdiction, which can be defined as “[t]he sphere of authority of a legislative body to enact laws and to conduct all business incidental to its law-making function,”<sup>25</sup> as well as the right to administer the law. Administrative authority is defined by Black’s Law Dictionary as “The power of an agency or its head to carry out the terms of the law creating the agency as well as to make regulations for the conduct of business before the agency; distinguishable from legislative authority to make laws.”<sup>26</sup> Of course, governments may also hold title to the seabed and subsurface, as well as the water column above them.<sup>27</sup>

Jurisdiction, administration, and government title are not necessarily coincident, and may change depending on the resource being discussed. These government interests may be thought of as controlling forces over individual, public or group interests in a marine cadastre. Governments may also, as under UNCLOS, hold sovereign rights apart from these, such as the right to explore and exploit a particular geographic extent.<sup>28</sup>

It may further be “...indispensable to examine *in what way* [government] laws (“law” here is broadly defined to include legal truths developed via *stare decisis* in Common Law jurisdictions) have direct bearing on the marine cadastre.”<sup>29</sup> Three broad types of laws may be found as follows:

- 1) Boundary laws: these typically define a particular boundary in order to enclose a right within it. For example, these may include zoning laws, including fishing zones, or property boundary regulations.

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<sup>23</sup> Cockburn, S. and S. Nichols (2002). “Effects of the Law on the Marine Cadastre: Title, Administration, Jurisdiction, and Canada’s Outer Limit.” In *Proceedings of the XXII FIG International Congress, 2002*. Presented at the XXII FIG International Congress, Washington DC, USA, April 24, 2002. P. 2. [http://www.fig.net/figtree/pub/fig\\_2002/Js12/JS12\\_cockburn\\_nichols.pdf](http://www.fig.net/figtree/pub/fig_2002/Js12/JS12_cockburn_nichols.pdf)

<sup>24</sup> Monahan, D., Nichols, S., and Sherin, A. 2003. *Fundamental contents of coastal GIS- the case for a marine cadastre*. In Coastal GIS 2003. Genoa, Italy, October 16-18, 2003. P. 5.

<sup>25</sup> Black, H.C., 1990, *Black’s Law Dictionary, 6<sup>th</sup> Edition*. (6<sup>th</sup> Edition by The Publisher’s Editorial Staff – Coauthors J. R. Nolan and J. M. Nolan-Haley, Contributing Authors M.J. Connolly, S.C. Hicks, M.N. Alibrandi), West Publishing Company, St. Paul Minnesota. P. 810.

<sup>26</sup> *Ibid.*, P. 42.

<sup>27</sup> Cockburn, S. and S. Nichols (2002). “Effects of the Law on the Marine Cadastre: Title, Administration, Jurisdiction, and Canada’s Outer Limit.” In *Proceedings of the XXII FIG International Congress, 2002*. Presented at the XXII FIG International Congress, Washington DC, USA, April 24, 2002. P. 3. [http://www.fig.net/figtree/pub/fig\\_2002/Js12/JS12\\_cockburn\\_nichols.pdf](http://www.fig.net/figtree/pub/fig_2002/Js12/JS12_cockburn_nichols.pdf)

<sup>28</sup> 1982 LOS Convention opened for signature 10 December 1982, UN Doc. A/Conf. 62/122 reprinted in United Nations, Official Text of the United Nations Convention on the Law of the Sea with Annexes and Index (New York: UN Sales No. E83.V.5, 1983). Art. 56.

<sup>29</sup> Cockburn, S. and S. Nichols (2002). “Effects of the Law on the Marine Cadastre: Title, Administration, Jurisdiction, and Canada’s Outer Limit.” In *Proceedings of the XXII FIG International Congress, 2002*. Presented at the XXII FIG International Congress, Washington DC, USA, April 24, 2002. P. 5. [http://www.fig.net/figtree/pub/fig\\_2002/Js12/JS12\\_cockburn\\_nichols.pdf](http://www.fig.net/figtree/pub/fig_2002/Js12/JS12_cockburn_nichols.pdf)



- 2) Rights laws: these usually affirm a right without defining a *particular* boundary. First Nations' rights, and rights of access and navigation are examples of these "laws," and may in theory extend as far as the nation's waters may extend.
- 3) Formulaic laws: these describe a formula for finding a boundary within which certain rights will exist, without defining the boundary in specific terms such as coordinates. The result is that there is work left to be done in order to delimit the boundary, which may lead to some uncertainty in terms of the marine cadastre. The consummate example of this type of law is UNCLOS<sup>30</sup>, which contains sometimes complex formulas for finding boundaries, the most complicated of which is the formula for finding the limit of a nation's juridical Continental Shelf. If a nation has a juridical continental shelf beyond 200 nautical miles, as Canada does, it then must follow a complex the formula specified in Article 76 and amplified in the "guidelines" of the CLCS (United Nations 1999) to find its outer limit, and hence the outer limit of its marine cadastre.<sup>31</sup>

These laws will all have an impact on the marine cadastre. Boundary laws will specify boundaries to be contained within the cadastre, rights laws will indicate certain interests to be included in the cadastre, and formulaic boundary laws may both identify interests to be included and the location of a boundary in non-coordinate terms. Whether they define private, group, public, or government interests, the uncertainties associated with some of these laws will be further addressed in the next section.

For States parties to UNCLOS, the Nation's rights within each limit identified by UNCLOS are specifically defined and enumerated. In other words, UNCLOS dictates the sovereign interests that are held within each limit defined by the Convention. UNCLOS specifies, for instance, which sovereign rights exist within the Territorial Sea, versus those held in the Exclusive Economic Zone (EEZ), versus those held on the Continental Shelf. On the Continental Shelf, for instance, a nation holds the following rights:

1. The coastal State exercises over the continental shelf sovereign rights for the purpose of exploring it and exploiting its natural resources.
2. The rights referred to in paragraph 1 are exclusive in the sense that if the coastal State does not explore the continental shelf or exploit its natural resources, no one may undertake these activities without the express consent of the coastal State.
3. The rights of the coastal State over the continental shelf do not depend on occupation, effective or notional, or on any express proclamation.
4. The natural resources referred to in this Part consist of the mineral and other non-living resources of the seabed and subsoil together with living organisms belonging to sedentary species, that is to say, organisms which, at

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<sup>30</sup> 1982 LOS Convention opened for signature 10 December 1982, UN Doc. A/Conf. 62/122 reprinted in United Nations, Official Text of the United Nations Convention on the Law of the Sea with Annexes and Index (New York: UN Sales No. E83.V.5, 1983).

<sup>31</sup> The above categorization of law types affecting a marine cadastre's structure originally appears in Cockburn, S. and S. Nichols (2002). "Effects of the Law on the Marine Cadastre: Title, Administration, Jurisdiction, and Canada's Outer Limit." In *Proceedings of the XXII FIG International Congress, 2002*. Presented at the XXII FIG International Congress, Washington DC, USA, April 24, 2002. P. 5. [http://www.fig.net/figtree/pub/fig\\_2002/Js12/JS12\\_cockburn\\_nichols.pdf](http://www.fig.net/figtree/pub/fig_2002/Js12/JS12_cockburn_nichols.pdf)

the harvestable stage, either are immobile on or under the seabed or are unable to move except in constant physical contact with the seabed or the subsoil.<sup>32</sup>

A coastal nation will most likely only control spatial cadastral information as to the rights specified by UNCLOS in UNCLOS zones. This will have a profound influence on the final structure of a marine cadastre, because where other nations are allowed to play a role in the water column or on the seabed the coastal nation will not necessarily have access to all pertinent spatial data. Assuming that one purpose of a marine cadastre is to manage rights in the marine environment, this raises the question: to what extent can a coastal nation effectively manage its own rights without access to all spatial information that may have an effect on these rights?

## 5. Encompassing the Nature and Extent of These Interests: UNCLOS and Boundary Evidence

Having focussed on the nature of interests in a marine cadastre in the last section, the next element of the traditional cadastral definition to address is the way in which a marine cadastre would include the extent of those interests. We have already seen that the cadastral parcel may need to be redefined to account for the volumetric and sometimes time-varying nature of rights in the marine environment, and to deal with the frequent lack of an ownership parcel with the rights that traditionally accompany such a parcel on land.

However, there are other considerations that will also affect the spatial information contained in a marine cadastre: first, the physical *in situ* demarcation of boundaries is rarely possible in a marine environment. "On land, boundary delimitation comprises three steps: 1) definition, or specifying the "locus" of the boundary in the wording of law, 2) delineation, describing the location of the boundary on maps or by co-ordinates and 3) demarcation, the process of physically marking the geographical location of a boundary."<sup>33</sup> In a marine environment, "...demarcation is of necessity combined with delineation, and the medium most frequently used for this combination is the hydrographic chart."<sup>34</sup> "The delineated boundary on a chart or in an official GIS provides the "public notice" function that fences and survey monuments do on land."<sup>35</sup> In some cases, such as the outer limit of the juridical Continental Shelf, the Guidelines of the Commission on the Limits of the Continental Shelf (CLCS) indicate the types and amounts of bathymetry data and other scientific information that will be considered when the CLCS evaluates the scientific legitimacy of a nation's extended continental shelf claim under UNCLOS. "This represents a new approach in boundary delimitation as scientific information is actually being used to provide evidence of a juridical boundary."<sup>36</sup>

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<sup>32</sup> 1982 LOS Convention opened for signature 10 December 1982, UN Doc. A/Conf. 62/122 reprinted in United Nations, Official Text of the United Nations Convention on the Law of the Sea with Annexes and Index (New York: UN Sales No. E83.V.5, 1983). Art. 77

<sup>33</sup> Monahan, D., Nichols, S., and Sherin, A. 2003. *Fundamental contents of coastal GIS- the case for a marine cadastre*. In Coastal GIS 2003. Genoa, Italy, October 16-18, 2003. P. 3. Citing Nichols, S. (1983). *Tidal Boundary Delimitation*, Report Technical Report 103, Department of Geodesy and Geomatics Engineering, University of New Brunswick, Fredericton, N.B.

<sup>34</sup> Ibid. P. 3.

<sup>35</sup> Ibid. P. 3.

<sup>36</sup> Ng'ang'a, S., S. Nichols, and D. Monahan (2003). *The Role of Bathymetry Data in a Marine Cadastre: Lessons from the Proposed Musquash Marine Protected Area*. In Proceedings of the Hydrographic Society of America (THSOA) U.S. Hydro 2003 Conference, Biloxi, Mississippi March 24-27, 2003. P. 2. Retrieved from the World Wide Web October, 2003. [http://www.thsoa.org/hy03/9a\\_1.pdf](http://www.thsoa.org/hy03/9a_1.pdf)

Second, the boundaries to be contained in a marine cadastre may or may not be final, certain, or complete.<sup>37</sup> Contested or unresolved boundaries are relatively frequent in the marine environment. Other boundaries, while technically not being contested, have other forms of uncertainty associated with them. Some examples of this are certain marine areas in Canada, where both the federal and provincial governments claim jurisdiction. Historical interests may also be uncertain or in dispute.<sup>38</sup> Some interests "...are being newly recognized such as aboriginal title which may not have a strict spatial definition. The datasets of coastal tenure are also frequently incomplete either in terms of spatial coverage or types of interests."<sup>39</sup>

Third, the volumetric nature of marine interests means that the intersection of these interests may not occur on one particular surface. "It is entirely possible that any two marine rights intersect not at the surface of the water, but at some point far below, in the water column or even within the seabed."<sup>40</sup> Somehow, a marine cadastre should account for these intersections for effective marine governance.

Also, a marine cadastre should account for any hierarchy in the interests it contains. This could minimize disputes over a nation's marine environment. UNCLOS is particularly useful in this regard as it specifies not only what rights a coastal ratifying nation has offshore, but also to what extent the coastal nation's rights control or wield influence over the rights of other parties. In the Territorial Sea, for example, a coastal nation may hold sovereignty "...beyond its land territory and internal waters and, in the case of an archipelagic State, its archipelagic waters, to an adjacent belt of sea, described as the territorial sea."<sup>41</sup> However, ships of all States "...enjoy the right of innocent passage through the territorial sea."<sup>42</sup>

## 6. Conclusions

The United Nations Convention on the Law of the Sea will influence a ratified nation's marine cadastre in several ways. First, breadth: UNCLOS will affect some horizontal elements of the marine cadastre, as it specifies certain limits a ratifying nation may implement in ocean space. Second, depth: UNCLOS will affect the vertical dimension, and therefore the volumetric nature and depiction of rights in ocean space. This is true because UNCLOS is specific about the vertical extent to which a nation may exercise its sovereign rights for each particular area of ocean space from the Territorial Sea baselines seaward. Third, sovereign rights: UNCLOS will affect what rights can be included in the ocean areas of a marine cadastre, and hence what spatial information is contained therein. This is apparent in its specific enumeration of the rights a coastal nation has within each limit under the Convention. Lastly, UNCLOS has an effect on the evidence that can be used for

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<sup>37</sup> Monahan, D., Nichols, S., and Sherin, A. 2003. *Fundamental contents of coastal GIS- the case for a marine cadastre*. In Coastal GIS 2003. Genoa, Italy, October 16-18, 2003. P. 4.

<sup>38</sup> Ibid. P. 4.

<sup>39</sup> Ibid. P. 4.

<sup>40</sup> Cockburn, S. and S. Nichols (2002). "Effects of the Law on the Marine Cadastre: Title, Administration, Jurisdiction, and Canada's Outer Limit." In *Proceedings of the XXII FIG International Congress, 2002*. Presented at the XXII FIG International Congress, Washington DC, USA, April 24, 2002. P. 7. [http://www.fig.net/figtree/pub/fig\\_2002/Js12/JS12\\_cockburn\\_nichols.pdf](http://www.fig.net/figtree/pub/fig_2002/Js12/JS12_cockburn_nichols.pdf)

<sup>41</sup> 1982 LOS Convention opened for signature 10 December 1982, UN Doc. A/Conf. 62/122 reprinted in United Nations, Official Text of the United Nations Convention on the Law of the Sea with Annexes and Index (New York: UN Sales No. E83.V.5, 1983). Art. 2

<sup>42</sup> Ibid., Art. 17

boundary demarcation and delineation. It, along with the CLCS Guidelines, specifies the types of scientific information that may be used as evidence of juridical boundaries.

## **Biography**

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