# The Needs for Building Concept and Authorizing Implementation of Marine Cadastre in Indonesia*

TS 9 – Marine Cadastre and Coastal Zone Management
Johanes P. Tamtomo
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*An Ongoing Research

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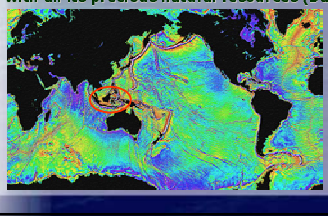
## Introduction

During the three decades, Indonesian marine development has always been positioned as a peripheral sector. This is ironic, because:

- Almost 70% of its territory consists of seas with its enormous economic resources and important geopolitics position as a main gate between Pacific Ocean and Indian Ocean (Kusumastanto, 2003);*
- As an archipelagic state, Indonesia has 24.3 million hectares coastal zones and 81,000 kilometers coastal lines together with all its precious natural resources (Dahuri et al., 2001);*



* Significance of natural resources and geopolitics as well as geo-economics of Indonesia was explained in more detail & complete by Ministry of Economic and Industrial Affairs in his keynote address, yesterday (4th Oct. 2004)

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## *Mare Liberum* vs. *Mare Clausum* vs. The Heritage of Humankind

There has been a long debate between the schools of *"mare liberum"* and *"mare clausum"*, that is the opinions that:

*"the sea is a common property, and therefore the ocean space as a common, available to all but owned by none"* → led to the tragedy of the commons, the common property dilemmas

and that of *"the sea is a closed sea, an exclusive property"* → hegemony (of certain countries) upon world's seas and oceans

Meanwhile … it arises a doctrine of: *"the sea is the heritage of humankind, every nation has the same right, it shall be managed carefully, it shall be sustain ably developed"*

*With UNCLOS 1982 → the territorial sea & EEZ of a state*

Then … *"the sea is simply as the land, in certain limitations there have been inherently attached some (people's, society's, state's) rights and responsibilities"*.

In respects to the last doctrine, there have been developed some concepts of marine cadastre during a recent decade.

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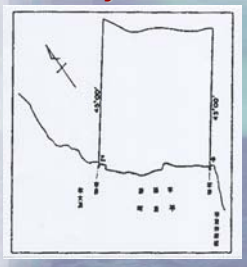
## Parceling Sea Space (Sea Column) … Why Not?



The boundary systems of sea space use and utilization have been recognized since long time ago. Surveying, mapping & registration of sea parcel or sea partition are not new today. In Japan, for instance, the documents concerning use rights and sea tenure rights have been recognized since the Feudal Era (1603 – 1867).

An attachment of registration document of a sea parcel of Fisheries Cooperative Associations (FCAs), License No. 5072, first registration 27 March 1928 (Ruddle, 1992: 20)

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## Other sea parceling and partitioning




Some sea parceling and partitioning in Indonesia: a) parcel of aquaculture; b) parcel of ship navigation; c) parcels of sea-sand mining (Rais, 2002.a)

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## Sea Parceling in the U.S.A.


*Private property exists within the boundary of the park. Please respect property owner's rights; do not trespass*

a) Mineral Management Services; b) Florida Marine Sanctuary Boundary; c) Marine Boundaries in Virgin Islands (US-NOAA, 2004)

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## Building Concept and Proposing Authorization of Marine Cadastre: the Philosophical Backgrounds

There are at least three philosophical backgrounds why the marine cadastre is worthwhile proposed:

(a) The shifting paradigm from 2-D Cadastre towards 3-D Cadastre or Space Cadastre (Kaufmann and Steudler, 1998; Hoogsteden and Robertson, 1999; Ng'ang'a et al., 2000), and from good (terrestrial) governance to good ocean governance (Nichols et al., 2001);

(b) The shifting epistemological under layer of marine development from Michael Redclif's sustainable development concept towards Feyereban, Friberg and Hettne's strengthening of local knowledge concept. With this epistemological development characterized by the local wisdom, the (communal) property rights upon marine resources are acknowledged, so that the increase of moral hazard caused by the open access regime of marine resources during the New Order era (Soeharto's) administration could be avoided (Kusumastanto, 2003);

(c) The shifting paradigm of social exclusion (centralistic authoritarian) towards social inclusion (citizens as the main stakeholder and indigenous knowledge are recognized) in coastal and marine resource development (Budiharsono, 2001);

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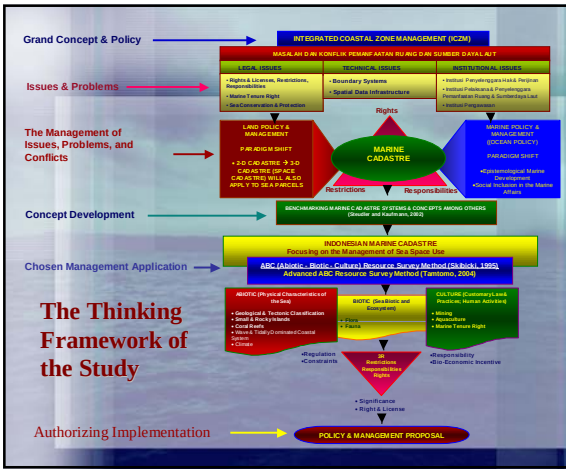


The Thinking Framework of the Study

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## Marine Issues and Conflicts
## (Legal, Environmental, and Economic Reasons Why a Marine Cadastre is Worthwhile Implemented)

### a. Conflict Grounds

- **Root of the Problems:**

(1) the increasing demands of natural resources and environmental-coastal services caused by the increasing number of population and its living quality;

(2) the non-sustainable management practices;

(3) the human behavior (ignorance, poor knowledge, poverty, and greedy); and

(4) the three kind of failures: market and property right, policy, and information failures.

*(Clark ,1992: Cicin-Sain and Knecht, 1998; and Kay and Alder, 1999),*

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## • Matrix of Conflicts and Endangers

**There are 29 recognized activities on coastal waters and if each action is put orderly in an activity matrix, there will be found 100 pairs of activities are conflicting each other and 60 activities are endangering one to another**

***(Cicin-Sain and Knecht, 1998)***

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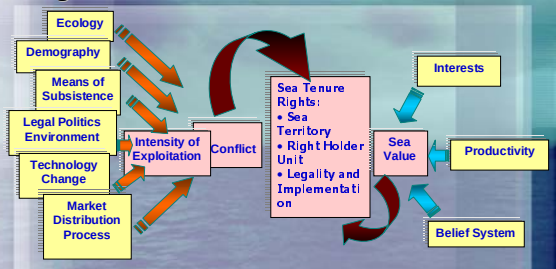
## Unclear Recognition Status of Sea Tenure Rights




- **Factors Determining the Existence of a Sea Tenure Right (from Patji and Salipi, 1996)**

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## Benchmarking Marine Cadastre Concepts and Systems: the Definition

- A marine cadastre in Indonesia is thoughtfully defined as a public information system concerning letters, registers, and both textual and spatial data and documents pertaining to the interests, rights and leases, responsibilities and restrictions, including the data on values, taxes, and legal relationships as well as legal actions associated to a sea parcel.
- It is conducted following the agenda of integrated coastal and marine resources management within the land policy and ocean policy framework. As well as in the land cadastre, the marine cadastre is also been built based on the three pillars or benchmarks, as follows: (a) the legal pillar (3R : rights, restrictions, and responsibilities); (b) the technical pillar (surveying, mapping, and spatial data infrastructure); and (c) the institutional pillar (formal and informal institutions and human resources).

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## Benchmarking Marine Cadastre Concepts and Systems: The Domain of a Marine Cadastre

As a part of legal system (legal cadastre), the marine cadastre is also meant to serve the guarantee of legal certainty in sea-space development planning, sea-parcel rights and leases, and public access to and from the seas. There are at least three activities directly and indirectly related to a marine cadastre, those are:

- Upland activities: Contribute about 70% of pollution in the coastal and marine areas from nutrient run-off (soil erosion), household wastes to industrial disposals. Nevertheless these are not the domain of a marine cadastre
- Coastal activities: Meet land cadastre and marine cadastre into one complex and frail region called coastal areas, where the seas, the beaches, and small islands are the domain of a marine cadastre;
- Ocean activities within the territorial seas: Give more complicated management where many government authorities and private companies perform their actions, together with the traditional and modern fishermen. These will need careful and sound integrated arrangements, among other thing, by the help of a marine cadastre.

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## Benchmarking Marine Cadastre Concepts and Systems: Some Technical Points of References

There are several points of references pursued in building spatial data infrastructures of a marine cadastre system.

- *Firstly*, since spatial information is defined as information represents a position in the surface of the earth in forms of coordinates of geographical objects, then it should have agreed on a certain national standard coordinate system as well as its map projection and geodetic datum chosen. In order to make all maps in Indonesia compatible, Rais (2003, p: 27-28) suggests that we better use geocentric coordinate system with Indonesian National Geodetic Datum DGNI 1995 and ellipsoid reference of WGS 1985 (a = 6,378,137 m and f = 1/295.34).

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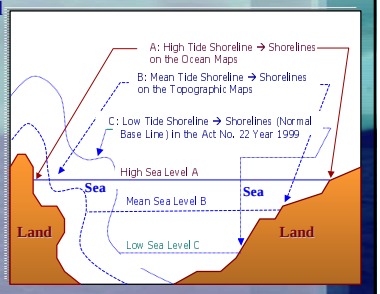
## Benchmarking Marine Cadastre Concepts and Systems: Some Technical Points of References

- *Secondly*, there should be clear legal definition of a base point, a reference point, and a maritime boundary point. It should also be legally defined what a base line is, and when to use normal and when to use straight base line, and also what methodology used for determining the boundary between administrative regions.




Some Typical Shorelines and Normal Base Line (modified from Rais, 2003: p. 13)

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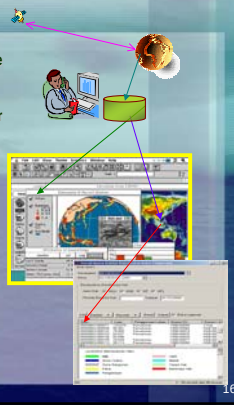
## Some Technical Points of References

*Thirdly*, in choosing technology for developing a GIS system for a marine cadastre, it should be considered some aspects, such as: data standardization, interconnectivity among GIS systems, GIS capabilities or features whether or not it is facilitated with some advanced applications for example, a DSSS (Decision Support System) or an EWS (Early Warning System) in addition to capabilities that have already attached in most of GIS tools in the market today. Related to standardization in the information systems, a marine cadastre should adopt the NSDI (National Spatial Data Infrastructure). Until today, there have been produced many geospatial data by different institutions, but the information generated still could not answer and or solve the problems arise.



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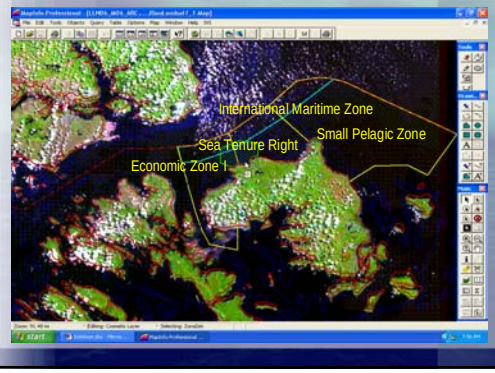
## Management Application of Sea Use Assessment

**Using MapInfo© Professional 7.0 (Delineation ABC 'Boundary' & MapBasic © Professional 7.0 (Zone Assessment Using Topology Relationship Analysis)**

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## Clustered Analysis to Delineate the Boundary of the Distribution of Abiotic-Biotic-Culture Data

**Using Principle Component Analysis (PCA): linear combination of k: principle component from p: original variable. If $\underline{X}' = [X_1, X_2, \ldots, X_p]$ has variance $\Sigma$ with eigenvalue: $\lambda_1 \geq \lambda_2 \geq \ldots \lambda_p \geq 0$.**

**The linear combinations of:**

$$Y_1 = l'_1 X = l_{11}X_1 + l_{21}X_2 + \ldots + l_{p1}X_p$$
$$Y_2 = l'_2 X = l_{12}X_1 + l_{22}X_2 + \ldots + l_{p2}X_p$$
$$\vdots$$
$$Y_p = l'_p = l_{1p}X1 + l_{2p}X_2 + \ldots + l_{pp}X_p$$

**Have:**

$$Var(Y_i) = l'_i \Sigma l_i \qquad i = 1,2, \ldots, p$$
$$Cov(Y_i, Y_k) = l'_i \Sigma l_k \qquad i, k = 1,2, \ldots, p$$

**Therefore the linear combinations are the value of $Y_1, Y_2, \ldots, Y_p$, those who are not correlated and have large variance and covariance (Boer, 2003).**

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## Components of Total Economic Values to Boundary the Economic Zones

$$NPV_1 = \frac{(B_d - C_d) + (B_e - C_e) - M}{(1-r)^t}$$

$$NPV_2 = \frac{(B_0 - C_0)}{1} + \frac{(B_1 - C_1)}{(1+r)} + \frac{(B_2 - C_2)}{(1+r)^2} + \ldots \frac{(B_n - C_n)}{(1+r)^n}$$

$$B/C - ratio = \frac{\sum_{t=1}^{n} \frac{B_t}{(1+r)^t}}{\sum_{t=1}^{n} \frac{C_t}{(1+r)^t}}$$

$$IRR = i^+ + \Delta(i^+ - i^-)\left\{\left|\frac{NPV^+}{NPV^+ - NPV^-}\right|\right\}$$

**(TEV) = (DUV + IUV + OV) + (EV + BV)**

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## Concluding Remarks

- The atmosphere of the shifting paradigm in Indonesian politics scheme has changed many living styles and behaviors of the citizens. The demands for visible good governance escalate and look more and more transparent. The same thing goes to the demand for ***good ocean governance***, this is not only because of the largest part of Indonesian territories consist of seas, the shifting paradigm in the coastal and marine resource issues, but also because of inherent interest and use conflicts upon them;
- The need for development of a sound marine cadastre system, and also the need for authorizing implementation of it, might be unquestionable; nevertheless, it will surely need legal supports for its implementation and law enforcement.

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