

Towards a Marine Cadastre in Israel

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SUMMARY

Israel is a coastal State. In more than 95% of its land, land settlement already exists.

The Director General (DG) of the Survey of Israel launched an initiative to promote marine cadastre in Israel in order to cover the entire area of sovereignty by formal land settlement.

The water areas of Israel are the lake of Kineret (Sea of Galilee), The Dead Sea, The Red Sea (The Gulf of EILAT – called also The Gulf of Aqaba) and the Mediterranean Sea.

The lake Kineret and part of the other water areas were taken care of in the past as internal waters in the regular process of land settlement.

The southern part of the Dead Sea and the Salt Pans are now undergoing a process of land settlement and their boundaries will be defined by coordinates.

The Israeli Territorial Sea in the Red Sea has also been land settled. All these three Israeli water areas which are considered either internal waters or Territorial Sea were taken care of as a continuous extension of the land cadastre.

A plan for the "land" settlement and creation of a marine cadastre in the Territorial Sea of Israel in the Mediterranean Sea has been launched in 2009 to define a coordinate based marine cadastre.

These efforts are incorporated also in the process of promoting a coordinate based cadastre (CBC) in Israel.

The activities of the Survey of Israel in this area refer to the authorized boundaries of the settled blocks including the technical and geographical components of the issue. The leading Agency that is responsible to the legal side of settlement and registration is the Department for Land Registration under the Ministry of Justice. In addition, the Israeli Land Authority is responsible for the management of all the State owned lands including the water areas. Therefore, the initial technical feasibility preparations should be followed by coordinated cooperation between these three Government Agencies.

The final settlement of a marine cadastre depends on the final delimitation of maritime boundaries between Israel and its neighbors. As long as these boundaries are not concluded, the plans cover the area except the blocks that border the international maritime boundaries.

This article elaborates on the above mentioned situation and plans regarding a marine cadastre which will accomplish a cadastral coverage over the sovereign area of Israel.

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GENERAL BACKGROUND

Israel is a maritime State. The country connects between The Mediterranean Sea and The Red Sea. In Addition, the State has a share in the Dead Sea and contains the Sea of Galilee as an internal lake.

The traditional cadastre, since the beginning of the cadastral survey by the British authorities in 1920, referred only to a land cadastre. This trend continued after the independence of the State of Israel in 1948. Today, the land settlement covers more than 95% of the land area of Israel. The current rate of growth of the population of Israel is very fast, probably the fastest in the western world. This is reflected by fast urbanization, reducing the open and green areas, as well as by utilization of the space above and beneath the ground. This trend is an important reason for the initiative of implementing a spatial cadastre (3D cadastre) in Israel (Shoshany et al, 2004). Another phenomenon of the growth of population and of the fast urbanization is the exploitation of the coastal areas. One of the measures taken to protect the coastal area is the Law of Protection of the Coastal Environment, the reference coast line for which was defined by the DG of the Survey of Israel (Srebro, 2008). In addition, there are fast development and activities in the sea itself including enlargement of Ports, construction of new Marinas, Power stations, cables for communication, licensing gas and oil drills etc.

In addition, there is a trend to construct part of the infrastructure along the coast in the sea, including a network of gas pipes. This trend is augmented by the exploration of new large gas fields in the sea opposite the Israeli coastline. Biological industry in the sea is also growing, including fish growing sea ranches. Long range planning takes into account potential construction of artificial islands, as well as an airport and roads in the Mediterranean Sea opposite the coast.

A few years ago, due to this situation and the anticipated development, the DG of the Survey of Israel decided to begin activities towards establishing a marine cadastre as a continuation to the land cadastre seawards.

THE SCOPE OF MARINE CADASTRE

The definition of the term marine cadastre has two interpretations following different scopes and concepts (Binns et al, 2003).

One reference to marine cadastre is similar to the land cadastre, referring to boundaries: A Marine cadastre 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 neighboring or underlying rights and interests (Robertson et al, 1999).

The other definition covers a wider scope: A marine information system, encompassing both the nature and spatial extent of the interests and property rights, with respect to ownership, various rights and responsibilities in the marine jurisdiction (Nichols et al, 2000).

Furthermore, the concept of marine cadastre is developed further on to a scope of multipurpose Marine Cadastre in the US by NOAA Coastal Services Center and the Mineral Management Service (MMS) as shown in their homepage (www.csc.noaa.gov/mmc) and by the FGDC Marine Boundary Working Group.

The US Maritime Cadastre is an information system supplying web services, based on authoritative data sources, integrating legal, physical, ecological and cultural data and information in a common GIS, as well as rights, restrictions and responsibilities.

The Canadian approach refers also to the multipurpose nature of the marine cadastre and supporting it by a Marine Geospatial data Infrastructure as part of the Canadian Geospatial Data Infrastructure (Sutherland M., 2003).

The Israeli approach until now as practiced in the Sea of Galilee, the Dead Sea and the Red Sea was to adopt the limited scope of marine cadastre referring to the boundaries of property rights and rights of use to be registered. This is also the recommendation for the Israeli marine area in the Mediterranean Sea.

THE MARINE AREAS

The UN Convention on the Law of the Sea 1982 (United Nations, 1983) (Hereinafter: "The Convention") supplies a general reference regarding sovereignty and rights of a State in the sea. The Convention defines a few relevant maritime zones with reference to these rights:

Internal waters of a State include waters between the actual coastline and the baselines along the coasts. A State has full sovereignty in Internal Waters and its rights over Internal Waters are identical to its rights over the land area. In the case that internal waters from the baselines landwards are established there is a right of innocent passage (The Convention, Article 8).

The Breadth of the Territorial Sea of a State covers the area between the baselines along the coasts and a limit not exceeding 12 Nautical Miles (NM) measured from the baselines (The Convention, Article 3) (see figure 1).

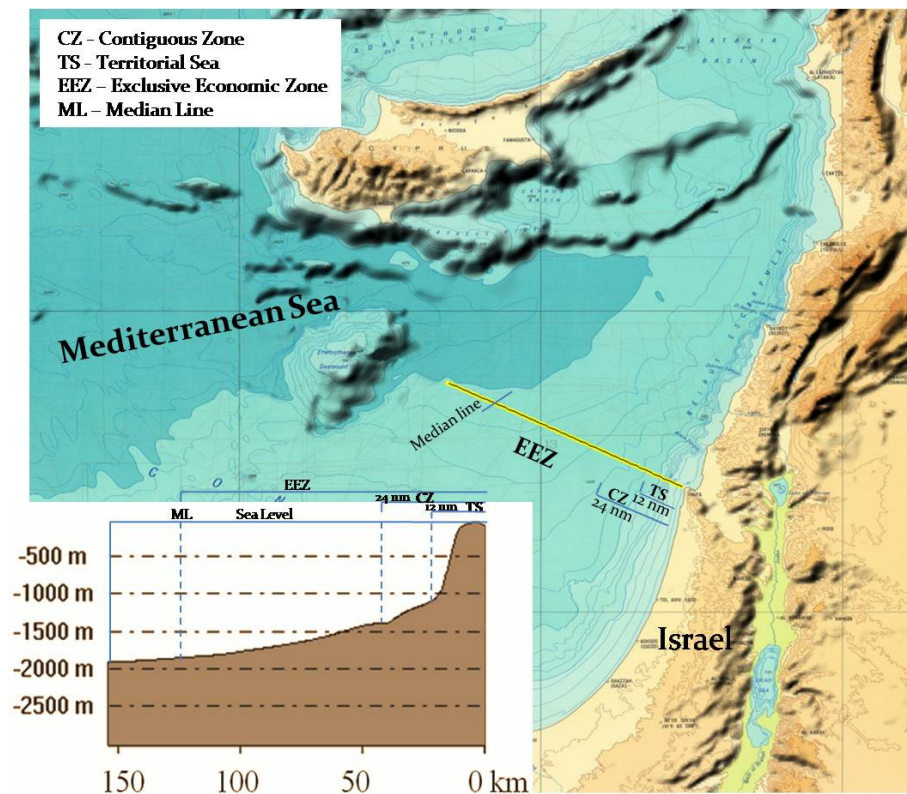


Figure 1: Israeli Maritime Zones Profile in the Mediterranean Sea

A state has full sovereignty over its Territorial Sea including the air space over the Territorial Sea and the subsoil (The Convention, Article 2). Vessels of other States have rights to innocent passage in the Territorial Sea of a State (The Convention, Article 17).

The Contiguous Zone is up to 24 NM from the baselines (The Convention, Article 33). The rights of the State in this area refer to prevention and punishment of infringement of customs, fiscal, immigration or sanitary laws and not to sovereignty.

The Exclusive Economic Zone (EEZ) of a State is up to 200 NM from the coastal baselines beyond which are the High Seas (The Convention, Article 57). The rights of a State in this area refer to living resources like fishing. In addition, there are specific rights for mineral resources and to exploitation of the seabed and sub surface which refer to the Continental Shelf which may exceed the EEZ. There are rights of freedom of navigation as well as over flight rights over the EEZ. A State has only limited sovereignty rights over the EEZ to use specific resources (The Convention, Article 56).

Other zones which are specified in The Convention beyond 200 NM like with reference to the Legal Continental Shelf and other areas (see also Nichols, 2003) are not relevant to Israel because in the case of the State of Israel the EEZ is less than 200 NM. Thus, the State of Israel has both rights to living resources (referring to the EEZ) and rights to non living resources (referring to the Continental Shelf) in its EEZ.

Various types of rights are dealt with regarding the maritime zones including navigation rights, customary rights, public access rights, fishing rights, riparian rights, development rights, mineral resources rights and seabed use rights (Sutherland, 2009).

The application of The Convention in Israeli waters: Israel is not a party to The Convention, but views the majority of its provisions as customary law.

The requirements for a Marine Cadastre

The first question that we have to refer to is: Why do we need a marine cadastre?

The answer to this question is the same as for the land cadastre. It is required in order to settle ownership rights and rights of use. The Israeli cadastre does not stop at the coast line. The more the marine space is utilized the more settlement of these rights is and will be required. Since the rights are attached to a specific space, the accurate definition of this space is important. Due to lack of geographic features on the surface of the sea the proper way is to define the geographic spaces by coordinates. So, the recommended method of delimitation and registration of rights is by a coordinate based marine cadastre. This is also a preliminary answer to the question how to implement the marine cadastre.

The marine cadastre should support State and regionally driven marine spatial planning initiatives like fishery, transportation, recreation, energy production out of wind and wave use, marine agriculture, communication cables, gas pipelines, protection of marine ecosystems etc., encompassing both property rights and rights of use. Marine boundaries are not demarcated but delimited by coordinates. This delimitation should avoid confusion, disagreement and conflicts.

The second question which we have to refer to regarding the application of a Marine Cadastre is: To which area should the marine cadastre apply?

The responsibility for the answer to this question refers to a few Government agencies. The ownership of State lands in Israel is under the Israeli Land Authority. The registration of lands is under the responsibility of the Land Registry in the Ministry of Justice and the responsibility for the delimitation of lands for registration, as well as the delimitation of the International borders of Israel, is of the Survey of Israel. The Ministry of Foreign Affairs has its relevant responsibility for the international borders of the State. Thus, the final decision regarding the registration in the sea will be a result of cooperation and consultation between a few Government Offices. The decision of the DG of the Survey of Israel regarding this question was to begin technical preparations for a marine cadastre as a preliminary work for the final marine cadastre. According to his view, the first priority should refer to the areas which are under full sovereignty of the State. This should be the area over which a marine cadastre would be applied first. This decision is based on the relevance of the cadastre to ownership and development rights. Ownership rights in a State are covered by its rules which are applicable to its sovereign areas. These areas refer to the land area, the internal waters and the Territorial Sea of the State. In the future, the question of applying a marine cadastre in the Israeli EEZ should be dealt since there are limited sovereign rights in this area, but practically the current main task in the EEZ area is the delimitation of concession areas.

Following the experience of the US, Canada and Australia, the Israeli Marine Cadastre should be applied definitely to the Israeli EEZ in the Mediterranean Sea, though referring to limited rights. So it is only a matter of priority to apply the marine cadastre at first only to the Israeli Territorial Sea area.

In addition, the current choice refers only to the marine cadastre while an Israeli Marine Spatial Data Infrastructure should cover the Israeli marine areas to the full extent of the Israeli EEZ.

The third question is: When to implement a marine cadastre?

The answer to this question is: as soon as possible. This is justified by the low cost and the high speed of the "land" settlement process when an area is owned by the State and is still mostly free of rights, and is characterized by low density of manmade features. The planned activities and the continued process of development and exploitation of land along the coast, which is also reflected in the fast growing value of lands along the coast, indicate that in the future the creation of a marine cadastre will be much more costly and will take much more time due to construction of various installations and utilities.

PRACTICAL ANALYSIS OF THE IMPLEMENTATION OF THE MARINE CADASTRE

As already indicated, Israeli Waters include four areas: The Mediterranean Sea, The Red Sea, The Dead Sea and The Sea of Galilee.

The Sea of Galilee is an internal lake in Israel. It already went through the land settlement process, divided to 4 blocks as seen in figure 2.

This lake is considered as a land area and is not covered by The Convention. Furthermore, due to the temporary lowering of the level of water of the lake, the outer strip of the lake already partially dried, and each one of the four blocks consists today of both water area and land area.

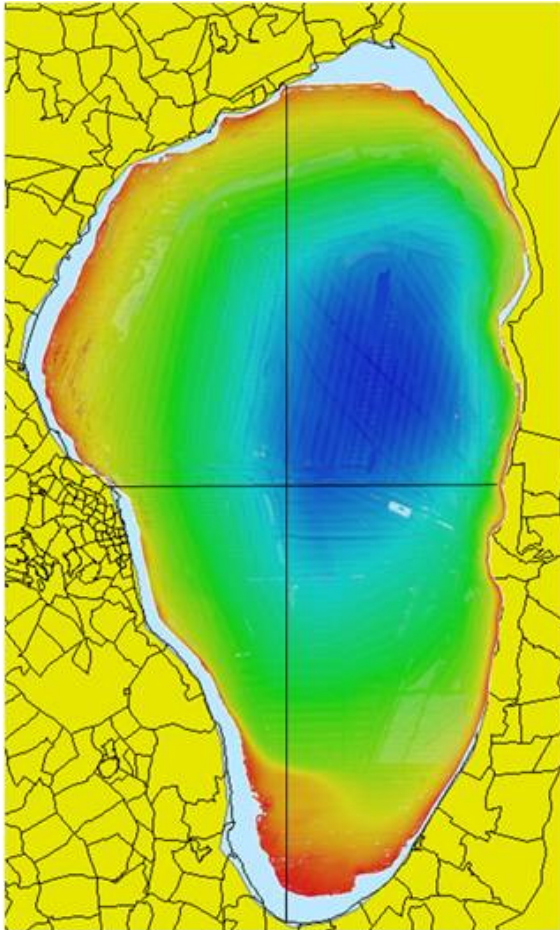


Figure 2: Land settlement in the Sea of Galilee (four blocks)

The northern part of the Dead Sea is an international lake in which the maritime boundary between Israel and Jordan was defined and concluded following the 26 October 1994 Treaty of Peace between the two States (Israel-Jordan Peace Treaty, 1994). What used to be the southern part of the Dead Sea, has contracted and dried and practically doesn't exist as a sea or a lake but as salt pans under the sovereignty of Israel and Jordan on each relevant side, with reference to the international boundary (see figure 3).

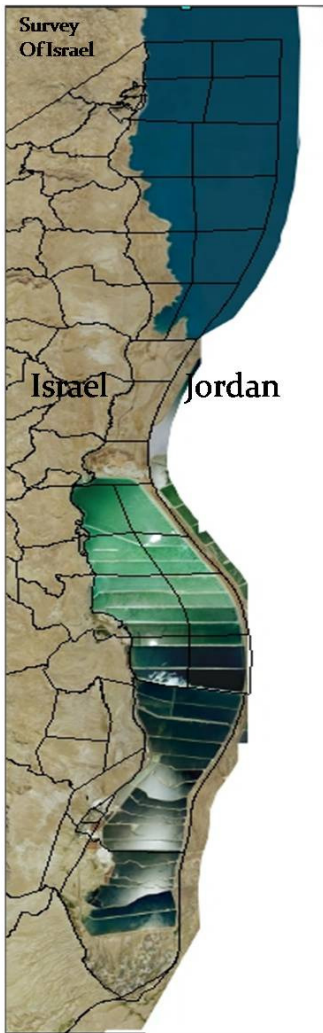


Figure 3: The Dead Sea and Salt Pans blocks

The Israeli Salt Pans' area is considered and dealt to day as a land area. The Israeli waters of the Dead Sea are actually internal waters. The settlement in this area is dealt with like land settlement over the land area. The cadastre in this area is practically, these days, undergoing a settlement process and the limits are defined by coordinates, so it can be considered as a practical (not a legal) coordinate based cadastre.

The Israeli waters in the Gulf of Eilat (called also the Gulf of Aqaba), which is a branch of the Red Sea, are considered, fully, in the Israeli Territorial Sea. They lie between the coastline and the International Maritime Boundary between Israel and Jordan, which was concluded in 1996 following the 1994 Treaty of Peace (Israeli-Jordanian Maritime Boundary Agreement, 1996). The southern limit of this area has not been defined yet because Israel and Egypt have not agreed yet on a maritime boundary in this gulf, but following Article 15 of The Convention it should be delimited along the equidistance line going from the terminus of the

land boundary at Taba (Srebro, 2009) up to the median line along the Gulf of Eilat. Since all the Israeli waters in the Red Sea are under Israeli sovereignty, a marine cadastre in this area is applicable. Actually, all of the area has already been settled as an extension of the land cadastre (see figure 4).

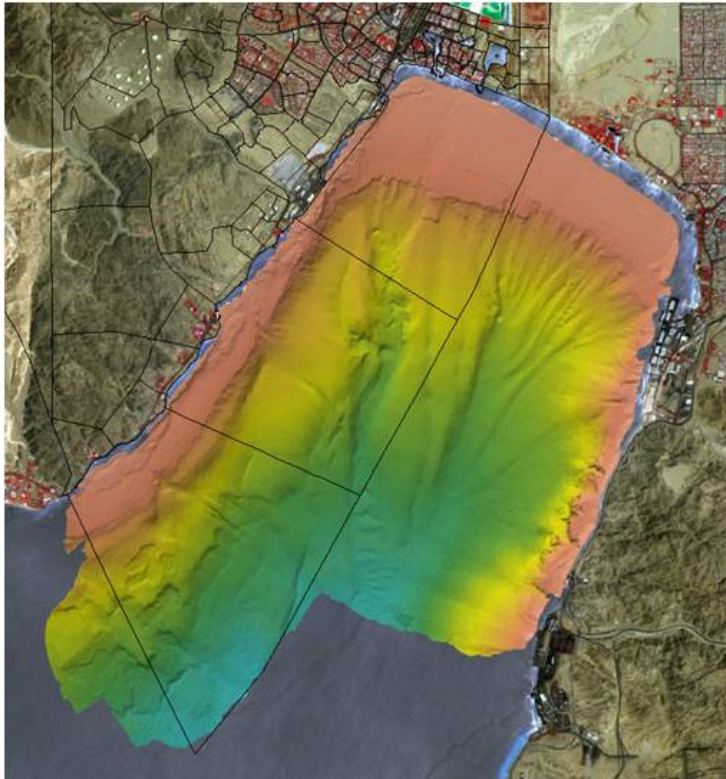


Figure 4: Marine Cadastre in the Red Sea (three blocks)

Parallel relevant activities at the Survey of Israel

The basic definition of the marine cadastre includes the delimitation of the cadastral blocks. Since the delimitation refers mainly to coordinates on the water surface, the amount of physical features that are included in the block plans will be very scarce, if any. But, since the relevance of the cadastral delimitation, beyond the cases of special installations and artificial islands, is to the seabed, a proper mapping of the seabed, including physical features in the relevant area, is an important contribution to the cadastral division and to its application.

At present, most of the blocks will have no such information. The blocks that will include some features will be the first line of blocks which are near to the coast and a few blocks where gas or oil drilling sites plus transportation pipes or infrastructure cables may exist as well as fish growing sea ranches.

Two other relevant activities are carried out for the last years. One is a production of a series of hydrographic charts. The Survey of Israel has prepared 10 hydrographic charts covering the

Israeli Territorial Sea in the Mediterranean Sea. This includes one 1:250,000 chart, three 1:100,000 charts and seven large scale charts, in a frame of cooperation with the Ministry of Transportation for the purpose of safety of navigation, containing a lot of data in the marine area that can support the marine cadastre. The source data is collected by the Survey of Israel, the Geological Survey of Israel and the Israel Oceanographic & Limnological Institute. An additional hydrographic chart is being prepared for the Gulf of Eilat.

Another activity refers to the National Bathymetric Project that is executed by a few agencies including the Geological Survey of Israel, the Israel Oceanographic & Limnological Institute, the Survey of Israel and others.

As analyzed by Ng'ang'a (Ng'ang'a et al, 2003) bathymetry may have significant role in marine cadastre. This refers to the wide scope of marine cadastre, including safety of navigation, laying telephone cables, exploring and drilling for offshore oil and gas, location of underwater mineral deposits and understanding the geological processes. But, it has a potential, that has not yet been implemented in combination with other geographic information, to support marine boundary delimitation and property rights. Bathymetry mapping is presented in this article in figures 2 and 4.

In addition, if the development of use of mineral resources on the seabed, or may be construction of special marine projects, like artificial islands, develops, there should be an implementation of 3D or a multi-dimensional cadastre.

Both options require the implementation of a coordinate based cadastre (CBC) in the marine cadastre. Therefore, taking into account the present supporting technologies and infrastructure at the Survey of Israel, the definition of the marine cadastre should be based on coordinates.

This meets one of the present main initiatives at the Survey of Israel to transfer to a coordinate based cadastre. In addition, the Survey of Israel is promoting for few years an initiative of a 3D cadastre (Shoshany et al, 2004). This should be integrated, when applied, into the marine cadastre wherever required.

The implementation of a coordinate based cadastre requires that all the boundaries of a block be defined by coordinates (Srebro, 2010). A full definition of blocks by coordinates in the sea is quiet simple except for the case near the boundaries of the marine areas of the State. This case refers to the boundary between the marine area and the coastal area, if this boundary is not defined by dominating coordinates but by legal graphical documents. It also refers to the delimitation of the Territorial Sea of the State and the Territorial Sea of adjacent States (usually an equidistance line) and in the case that the median line between the State and an opposite State refers to its territorial sea and not beyond it.

THE CASE OF THE MARINE AREAS OF ISRAEL

The Sea of Galilee is as mentioned fully inside internal waters, consisting of four blocks which are still defined by graphical blocks plans. If required, the boundaries of these blocks will have to be transformed to official coordinate definition.

In the case of the Dead Sea, the eastern limit of the Israeli waters is already defined by bilateral agreed documented coordinates. Therefore, all the relevant blocks, which are at the present undergoing land settlement, will be defined by coordinates. The final delimitation of

the northern borders of the northern blocks (see figure 3) will be concluded at the settlement of the final status and delimitation of the northern part of the Dead Sea, which came under Israeli military control in 1967.

The Israeli Territorial Sea in the Gulf of Eilat has already been settled graphically. The eastern border of all the marine blocks in this area is defined by the bilateral agreed documented coordinates of the maritime boundary between Israel and Jordan (Israel-Jordan Maritime Boundary, 1996). Therefore, the existing blocks in this area (see figure 4) will be transformed to coordinate based cadastre only after the bordering land blocks along the coast will be transformed to be coordinate based. As previously mentioned the southern blocks which border the maritime boundary between Israel and Egypt will be settled only after the settlement of this maritime boundary.

The most complicated case is the marine area along the coastline of the Mediterranean Sea. The length of the coastline is around 200km, along which exist 275 settled block plans out of a total of 300 block plans (see figure 5). The borders of 60 of these blocks were already defined by coordinates.

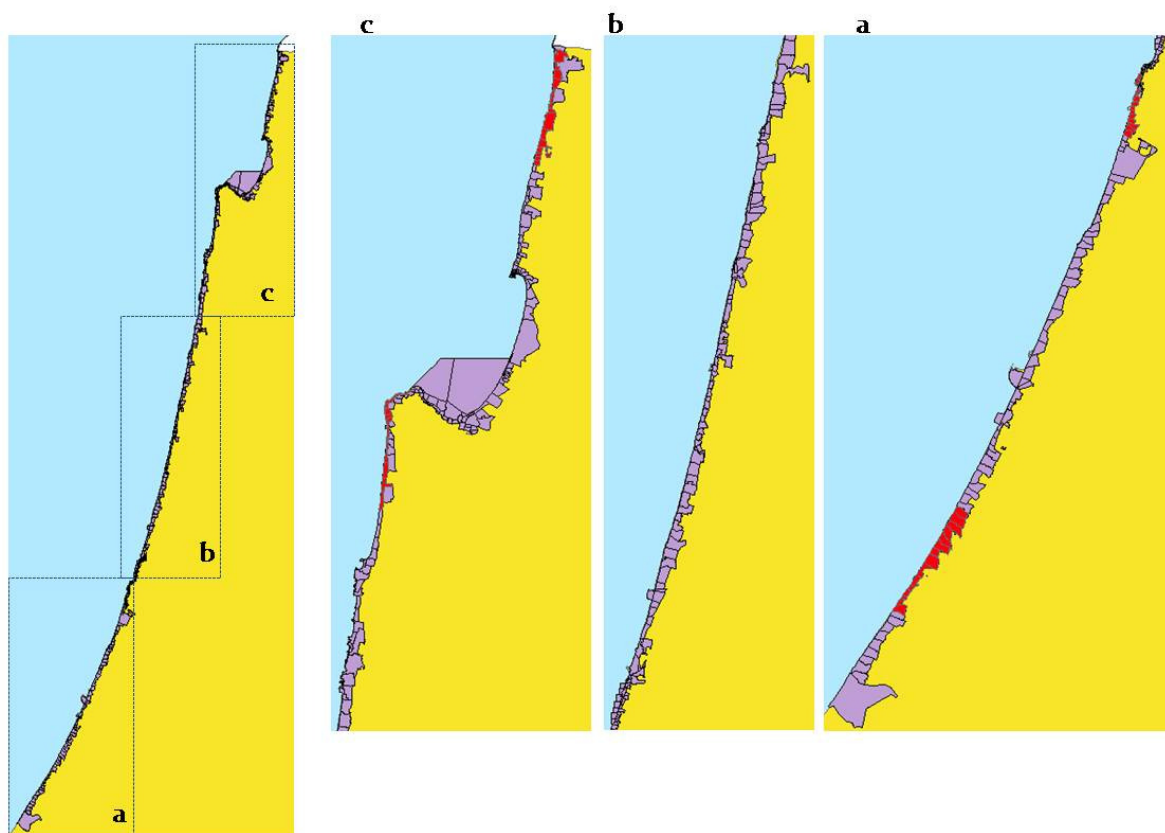


Figure 5 (a, b, c): Land blocks along the coast (In red: Coordinate based Cadastre (CBC) blocks)

The Israeli Territorial Sea Zone in this area extends to a distance of 12 NM from the base lines along the coastline. The EEZ of Israel in the Mediterranean Sea cannot cover 200NM from the coast, because the distances between the coasts of Israel and Cyprus, which are

opposite coasts, is between 120NM and 200NM so that the median line between Israel and Cyprus, following the guidelines of The Convention, which is the outer limit of the Israeli EEZ, is half way of these distances. As seen in figure 1, the Israeli Continental Shelf is not exceeding the EEZ. In order to define a marine cadastre, the Territorial Sea Zone should be sub divided to blocks. The area close to the coastline should be dealt with differently to the area which is more distant, because most of the physical features and development in the marine area is close to the coast. This refers to constructions like ports, marinas breakwater, pipelines etc. This area is also protected by the law of protection of the coastal environment (Srebro, 2008).

As a result of this, the decision was to limit the size of the adjacent blocks, while the more distant ones were designed roughly to the size of 5x5km (see figure 6).

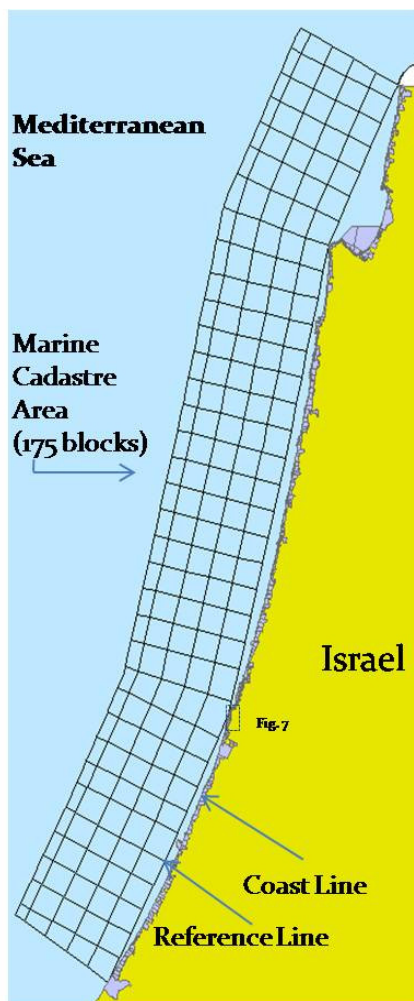


Figure 6: The suggested Marine Cadastre blocks in the Mediterranean Sea

With reference to the delimitation of the blocks by coordinates, there is the basic requirement to define the plans along the coast by official coordinates. In order to do this a pilot project of

coordinate based cadastre was launched in 2006. This project included four areas of 15 block plans each, spread along the coast in four typical environments: One in a dense urban location, one in a semi urban location, one in an agricultural location and one in an open area. The results which were published in 2008 were 60 coordinate based blocks, the coordinates of 50 of which were published to surveyors for optional use. The legal cadastre in Israel still doesn't adopt, formally, coordinates for registration (Klebanov M. and Forrai J., 2010).

This enables definition of coordinate based marine cadastre blocks neighboring the land coordinate based block plans, but these are only part of the 300 blocks along the coast line. In order to overcome this problem, the DG of the Survey of Israel decided to adopt a reference line connecting base points on the coast by straight lines, to serve as a reference line for the marine cadastre. The base points were surveyed by GPS and defined by coordinates to serve as a digital border line between the coastal blocks and the marine blocks.

In addition, since the maritime boundaries between Israel and Lebanon in the north and between Israel and Gaza Strip in the south were not agreed and formally concluded, the marine cadastre is planned in these areas until and including the penultimate blocks, leaving the border blocks to be settled following the future political settlement of the neighboring Territorial Sea areas. In addition, the DG of the Survey of Israel decided to prepare for settlement all the blocks from the reference line landwards, which are opposite the land coordinate based blocks which were the result of the pilot project. Examples of the blocks are given in figure 7.

The area between the coastline and the straight reference lines already holds 22 settled blocks which had already been settled due to existing land development along the coast. The marine cadastre blocks, which refer to this limited area, contain, for demonstration only, 11 new proposed blocks that will be presented graphically in a 1:20,000 scale.

The estimated number of blocks that are included in the planned marine cadastre between the above mentioned straight reference lines and the outer limit of the Israeli Territorial Sea in the Mediterranean Sea is 175 blocks. Most of these blocks, except the outer limits, cover 5x5 km (see figure 6). The blocks have also graphic representation in a scale of 1:20,000.

CONCLUSIONS

The authors adopt the definition of a Marine Cadastre regarding the definition of cadastral borders and not the wide scope of marine information.

There is a definite requirement for both, but the issue regarding a development of a marine spatial data infrastructure should and will be dealt separately. The fast land development and exploitation of lands along the coasts contribute to the trend of development of the marine areas. The Israeli sovereign rights in the marine area should be geo-referenced and referred to a cadastral infrastructure, as early as possible, in order to get more benefits at lower costs as long as there are no conflicting claims.

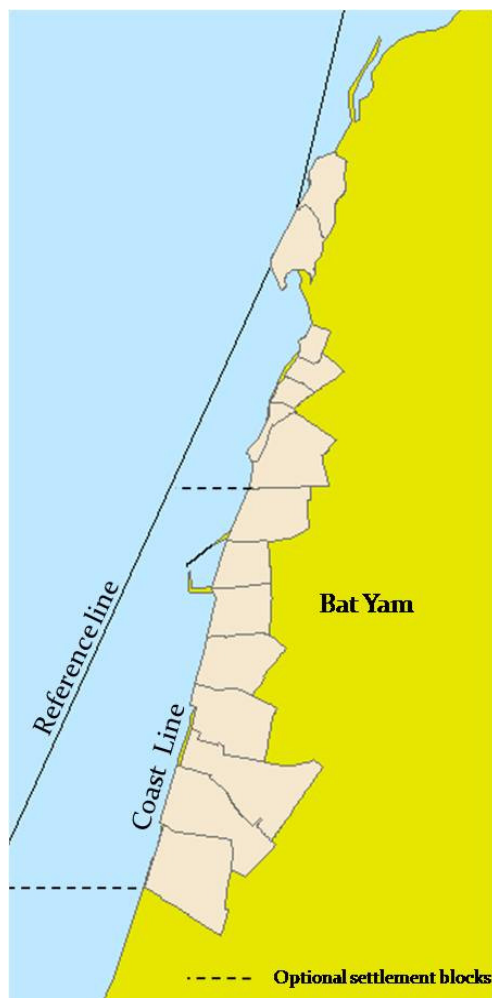


Figure 7: CBC Blocks along the coast

The article offers a plan how to define cadastral borders in the Territorial Sea of Israel in the Mediterranean Sea. In addition, it offers a way of connecting between the land cadastre and the marine cadastre. This offer will be a basis for further discussions between the Survey of Israel and between the Department of Land Settlement and Land Registration that is responsible for the legal registration and between the National Land Authority that owns most of the lands.

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BIOGRAPHICAL NOTES

Dr. Haim SREBRO received his BSc and MSc degrees from the Technion, Haifa, in Civil Engineering and Geodetic Engineering and his PhD from Bar-Ilan University. He taught at the Technion and at Tel-Aviv University. He served for 16 years as head of Photogrammetry and 16 years as Commander of IDF Mapping Unit. Since 2003 he serves as the Director General of the Survey of Israel and as Chair of the Inter Ministerial Committee for GIS. He is a Co-Chairman of the Israeli-Jordanian Joint Team of Experts since 1994, responsible for the delimitation, demarcation, documentation and maintenance of the International Boundary within the Joint Boundary Commission. Since 1974 he is a leading figure in all the boundary negotiations and demarcations between Israel and its neighbors and signed the 1994 Peace Treaty between Israel and Jordan and the Maritime Boundary Delimitation.

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