A Glue That Withstands Heat? The Promise and Perils of Maritime Domain Awareness

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Abstract. Maritime Domain Awareness (MDA) is often heralded as a sort of silver bullet, allowing resources to be employed effectively across maritime security agencies, but also different jurisdictions. MDA is believed to be a core enabler for international maritime security cooperation and is seen as one of the most important tools in addressing maritime security threats, such as piracy, illegal fishery, smuggling or maritime terrorism. This chapter traces the origins and evolution of MDA. I then provide a short history of developing regional MDA in the form of inter-governmental information sharing centres. My reconstruction documents the gradual evolution of MDA structures leading up to an emerging transnational network set up over the past two decades. The succeeding sections then ask a range of questions towards MDA seeking theoretical and empirical evidence for and against its core premises. What kind of evidence exists so far, which would justify the claims that MDA is a core enabler for transnational cooperation, increase effectivity and addresses the capacity gap? What kind of theoretical premises might support such conclusions?

Keywords. Maritime security, Maritime Domain Awareness (MDA), piracy, terror, transnational cooperation

Introduction

Like other areas of international security also the maritime domain has been increasingly influenced by what Elizabeth Nyman (2019) has called "techno-optimism": the hope that new forms of data gathering, sharing and analysis enabled by recent technological advancements, such as satellite, communication or computer technology may allow to overcome the capacity gap in enforcing law at sea and responding to maritime insecurity. These new technologies and infrastructures are known as Maritime Domain Awareness (abbreviated in the following as MDA). MDA is often heralded as a sort of silver bullet, allowing resources to be employed effectively across maritime security agencies, but also different jurisdictions. MDA is believed to be a core enabler for international maritime security cooperation and is seen as one of the most important tools in addressing maritime security threats, such as piracy, illegal fishery, smuggling or maritime terrorism.

This chapter firstly traces the origins and evolution of MDA looking at core developments that shaped the idea and its implementation. I then provide a short history

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of developing regional MDA in the form of inter-governmental information sharing centres. My reconstruction documents the gradual evolution of MDA structures leading up to an emerging transnational network set up over the past two decades. The succeeding sections then ask a range of questions towards MDA seeking theoretical and empirical evidence for and against its core premises. What kind of evidence exists so far, which would justify the claims that MDA is a core enabler for transnational cooperation, increase effectivity and addresses the capacity gap? What kind of theoretical premises might support such conclusions?

The core objective of the chapter is to provide an introduction to MDA for the general reader. The second objective is to provide context to the policy related debates on MDA by discussing its core premises as well as the relations between MDA initiatives. Thirdly, examining existing evidence as well as theoretical perspectives aims also at injecting reflexivity in the debate. I conclude in arguing that MDA entails a quite substantial shift in terms of how the sea is known and governed. This calls for more substantial research on the consequences and effects of that transformation.

1. The emergence and rise of MDA

Historically, the collection and analysis of security related maritime data was the domain of naval intelligence. Naval intelligence bureaus were the offspring of WW2 and assumed a growing role informing the nuclear security strategies of the Cold War. While naval intelligence bureaus continue their work today, MDA can be understood as an attempt to move the knowledge production on security related issues at sea out of the realm of national intelligence. It can be understood as an attempt to de-sovereignize knowledge and produce it in a wider transnational space that would benefit all countries in managing their seas and ocean resources and dealing with transborder crimes and the governance of the high seas. This shift from national maritime intelligence towards global maritime domain awareness can be seen as influenced by six transformations.

Firstly, with the adoption of the UN Convention of the Law of the Sea (UNCLOS) the responsibility of nation states was significantly extended. "With the signing of UNCLOS, maritime nations assumed the obligation to protect not only their traditional territorial seas, but also their new 200-nautical-mile Exclusive Economic Zone (EEZ)" (Doorey, 2016, p.127). Detailed maritime knowledge now became a matter of states worldwide given the need to govern and secure the new vast spaces for which countries were for. Given the immensity of the majority of EEZs, these cannot be adequately surveilled from the land. A binocular doesn't do the trick. It requires substantial naval assets to patrol or other forms of surveillance technology. Yet, the majority of countries had weak capacities to do so. This raised the question of how that capacity gap can be filled and how countries could be better assisted to fulfil their obligations under UNCLOS and other maritime conventions.

Second, the understanding of security at sea shifted towards a broader recognition of the transnational dimension. Power projection to ensure the unhindered flow of people and goods, and interstate disputes over boundaries and resources were seen as the main security issues at sea in the post WWII era. This fundamentally changed in the 1990s. The general revolution in post-Cold War security thinking and the promulgation of widened and broadened security concepts and agendas drew attention to transnational crime, terrorism and migration as potentially high-level threats (Bueger and Edmunds, 2017). This general trend in the maritime domain was also triggered by a number of

particular security problems that started to surface during that time. Paradigmatic was the escalation of piracy in the Straits of Malacca and Singapore in the early 1990s which exposed the vulnerability of major international shipping lanes to crime (Chalk, 1998). These incidents revealed that piracy had become much more significant and could not be addressed as a petty crime or dealt with by the industry, port authorities, or national security agencies on their own. This form of piracy was recognized as a regional and international security problem that potentially affects all nations. Piracy spurred particularly interest in forms of regional cooperation investments in the collation of piracy incident data (Beckman, 2002; Bueger, 2015a).

Thirdly, concerns over extremist violence at sea and maritime terrorism gained salience and further fuelled this kind of thinking. Events such as the bombing of the US navies' USS Cole in 2000 and the September 11th, 2001 attacks led to the re-evaluation of the risks of maritime terrorism (Bateman, 2007; Murphy, 2010). It also raised new awareness for other, potentially connected, maritime crimes, such as global smuggling networks and their role in the proliferation of weapons and source of revenue for extremist groups. In consequence the US and other states started to seek new forms of collaboration to address the threat collectively. The revision of the Safety of Life at Seas (SOLAS) convention, the introduction of the International Ship and Port Facility Security (ISPS) Code, and the Proliferation Security Initiative are examples of such responses (Klein, 2011). Data sharing was seen as a core component of such new avenues for cooperation (Klein, 2011). The focus of surveillance activities, moreover, shifted from monitoring military vessels to shipping and other maritime activities with potential security implications. In the age of terrorism any kind of ship or maritime activity could be potentially related to terrorism or its facilitation.

Fourthly, technological developments allowed for the collection of new data on the maritime and processing it. When the increase in shipping volume made new navigational aids to avoid collisions necessary, in the 1990s the Automatic Identification System (AIS) was introduced to complement radar in detecting and identifying commercial vessels.[2] AIS became mandatory through the IMO for a large portion of the commercial fleet by December 2004. The functionality of AIS, initially limited by its short range, was extended through satellite technology which from the 2010s allowed for tracking global ship movement in real time. Other data relevant for the maritime, including data from meteorological, customs, borders or environmental and fishing agencies became increasing available in electronic format and searchable through databases. Moreover, data storage and transfer capabilities as well as calculating power and programming languages were significantly improved allowing for the easier and faster processing of large amounts of data. The popularization of the world wide web and mobile technology also increased information technology literacy allowing systems to be operated increasingly by non-specialists. Hence more data was collected, processes and made available.

Fifthly, the new capacities in collecting and processing large amounts of data combined with the concerns over transnational security threats triggered new thinking about surveillance and intelligence. This gave rise to a new law enforcement paradigm, that is, intelligence led policing. This paradigm is associated with the move beyond reactive responses to incidents and the hope to overcome capability gaps through the

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[2] For an overview on AIS and related tracking technology see Eriksen, Høye, Narheim, and Meland (2006), Christophersen (2009) and Nyman (2019)

systematic analysis of patterns that allow to detect potential threats and offenders (Mcgarrell and Freilich, 2007). The analysis of incident data provides important potential clues on where and when an offense is likely to occur which can then be used to develop dedicated intervention strategies. This allows using naval assets more effectively through targeted interceptions of potentially offending vessels, as well as targeted communication of deterrence messages.

Sixthly, significant efforts were made to promulgate the ideas of MDA and associated practices of information sharing, systematic data collection, fusion and analysis through capacity building projects. Starting out from the mid-2000s the U.S., UK, Japan, the EU, and the International Maritime Organization (IMO) launched significant training and support activities for countries, in particular in piracy-infested regions. Programs run through the US Defense Security Cooperation Agency or regional naval commands, the EU's Critical Maritime Routes Programme or the IMO's capacity building efforts all focus on MDA as a core aspect of maritime security.

Taken together, these developments enabled the advancement and institutionalization of a new way of producing knowledge about security at sea. International and regional inter-governmental collaboration, transnational thinking, the shift from monitoring military to civil vessels, the availability of new data and the promises associated with new processing and sharing technology are the core drivers of the shift towards global MDA. The next section discusses how these trends manifest in the design and creation of institutional structures for MDA on a regional level.

2. The evolution of regional MDA structures

The evolution of regional MDA infrastructures, as argued above, is closely related to the issue of modern piracy as one of the most visible and immediate maritime security threats. Triggered by concerns in the shipping community, public records and statistics on maritime crime incidents were originally collated by the International Maritime Organization (IMO) starting from the 1980s (Bueger, 2015b). Complementing this work, the industry-led International Maritime Board (IMB) which is an arm of the International Chamber of Commerce started to compile incident data with a focus on piracy and fraught, both to increase political pressure, but also to assist mariners in stress (Bueger, 2015a). Starting to record incidents systematically from 1983, the IMB also installed a live reporting centre in 1991.

When seeking a regional response to the rise of piracy incidents in the Strait of Malacca and Singapore in the late 1990s, regional and international actors agreed on an innovative mechanism through which data on piracy would be collected and analysed (Ho, 2009; Bueger, 2015a). A multilateral agreement was negotiated for that purpose and in 2004 the Regional Cooperation Agreement on Combating Piracy and Armed Robbery Against Ships in Asia (ReCAAP) was signed. When the agreement entered into force, an Information Sharing Centre was opened in Singapore. The agreement and the centre, at its time, were an innovative intergovernmental mechanism. Yet, its primary function was the sharing of information between countries and its mandate was limited to piracy, rather than the full spectrum of maritime security issues. One of the major origins of broader regional MDA attempts, is to be found in the Mediterranean Sea region.

Following a 2002 agreement to improve maritime security at a regional sea power symposium for the Mediterranean Sea, the Italian navy started a pilot project to exchange data between 20 countries of that region. In 2006, the Virtual Regional Maritime Traffic

Centre (V-RMTC) was launched with a Data Fusion Centre based in Santa Rosa, close to Rome. The centre was initially created to exchange shipping data of countries in the Mediterranean – an important resource, before satellite based AIS made such data more readily available. Through the network, incident data was also shared; and reports based on this data made available to the network members. As a core feature, the V-RMTC enabled a range of new communication channels on the basis of secured real-time transmission of text messages from sender to receiver (chat) and encrypted email. This provided the capacity to work in different informal configurations. The centre shares data in 'communities' that are composed of different countries. In order to join a community a formal request needs to be approved by all participating states. The centre operates four such communities. The largest community launched was the Trans-Regional Maritime Network. In addition to the 24-member wider Mediterranean Community, five states joined the network, that is Argentina, Brazil, Peru, Singapore, and South Africa (followed by India in 2018). Singapore signed a data sharing agreement with the network in 2010.

In 2009 an Information Fusion Centre (IFC) was launched in Singapore operated by the Singapore navy (Bueger, 2015a). Drawing on the experience of the Italian model, it introduced an innovation that would complement the virtual data exchange: the physical presence of International Liaison Officers at the centre. These officers would provide an additional resource, both for the exchange of information, but also for interpreting maritime incidents in the light of national data and perspectives. The officers were not the least necessary given that many countries in the Southeast Asian region did not possess the capacities to make governmental data available electronically. The Singaporean regional model was decisive in influencing discussions on similar infrastructures in other regions.

In East Africa and the Western Indian Ocean region, regional MDA structures were developed as part of the response to the rise of piracy incidents off the coast of Somalia starting from 2005. The International Maritime Organization initiated a series of meetings in 2008 and 2009 to facilitate the negotiation of an agreement similar to ReCAAP (Warbrick, McGoldrick, and Guilfoyle, 2008). The negotiated agreement, known as the Djibouti Code of Conduct (DCoC), was adopted in 2009, but it was legally non-binding. The core objective of the agreement was to install an information sharing network on piracy for the states of Eastern and Southern Africa and the Arab Peninsula based on three regional centers. The agreement was supported by substantial capacity building activities by the IMO and the EU. In 2017 the focus of the agreement was widened through the so-called Jeddah Amendments to include all major maritime security issues.

Supporting the Eastern and Southern African region and the Indian Ocean Commission a further MDA centre was launched in 2016 with funding from the European Union's Program to Promote Regional Maritime Security (MASE). The Regional Maritime Fusion Center in Madagascar became operational in 2018. In its structure it draws on the model of the Singaporean IFC. It is focused on collecting, fusing and sharing data on maritime security issues, and it also adopts the liaison officer model from the IFC. Moreover, the area of interest of the new centre was designed in a way that it borders that of the IFC stretching to Maldives in the East.

In 2018 the regional architecture was complemented when the government of India inaugurated a regional MDA centre. Based on the Indian Navy's Information Management and Analysis Centre that collects and shares shipping data since 2014, the country launched an Information Fusion Centre (IFC-IOR) to support the members of

the Indian Ocean Naval Symposium. With an area of interest that stretches from Western Africa to Japan and Australia, the geographical focus overlaps with both the centres in Madagascar and the IFC. India expressed an invitation to countries to send International Liaison Officers and hence aims at following the IFC template.

There are further structures and centres in planning. A centre developed in Peru has a prospective Area of Interest in the South Pacific, and a Fusion Centre announced in 2018 by the Pacific Islands Forum for the South Pacific region will be based in Fiji. Both of these platforms draw significantly on the experience of the IFC in Singapore. They will further expand the global network of regional centres.

This short and cursory history of developing regional MDA in the form of inter-governmental information sharing centres reveals first of all how a transnational and transregional global network of MDA structures is emerging. These centres, while each different in their detailed institutionalizations, all aim at putting the core ideas of MDA into practice. They inform each other in their design, but they also cooperate and share data with each other, both through their constituent national members, but also through cross-center agreements. What promises are associated with this new global network and how can we evaluate those in the light of empirical evidence and theoretical promises? This is the question I address next.

3. The promises and perils of MDA maritime domain awareness

In this section I review a series of arguments for the promises of MDA in the light of theoretical arguments from International Relations and the available evidence. I firstly investigate MDA from an instrumentalist perspective, that is MDA understood as a response to the capacity gap. Secondly, I discuss MDA from the viewpoint of the communitarian IR literature paying attention to the argument that MDA provides a positive cooperation experience which builds trust and may strengthen more general cooperation processes. Thirdly, I question MDA from a geo-political perspective, alerting to the fact that MDA does not operate outside of strategic regional interests and that a considerable competition between different MDA projects exist. Fourthly, I investigate a range of practical arguments which stand in the way of MDA and might indicate that the promises associated with this instrument might not be fulfilled.

4. Instrumentalism and the capacity gap argument

The first argument to consider is the claim that MDA substantially reduces the costs of maritime security provision and allows to reduce the capacity gap. This argument is grounded in instrumentalist thinking in the sense that actors are seen to participate in MDA because of the expected benefits.

Many products from regional MDA initiatives are available in public (such as annual and monthly reports on incidents). Yet, the costs for participating in multi-lateral MDA at the entry level are relatively low. The US platform Seavision, or the Indian Ocean Regional Information Sharing platform developed by the EU, for instance, do not charge fees, but require a basic office computer, internet connection and dedicated, trained staff. Other platforms such as the IFC in Singapore or the RMIFC in Madagascar require in addition that a liaison officer is seconded with the related costs. The costs for sensors and technically advanced MDA concerning fusion and predictive capabilities, however,

are exponential. For these advanced measures pooling resources at regional level offers significant savings.

A range of frequently highlighted cases showcases the expected benefits from participating in regional MDA. These firstly relate to regional law enforcement. The prime example here are the successes in containing piracy off the coast of Somalia. Joint maritime domain awareness enabled through the European Union's Maritime Security Centre Horn of Africa (MSC-HOA) allowed to organize convoys, to improve the efficiency of patrols, minimize response times and offer improved protection in an internationally recognized transit corridor (Percy, 2016). While this is an example of a larger multi-national operation targeted at a particular security issue, other cases demonstrate the potential benefits on a smaller scale. This particularly concerns crimes on the high seas, or where criminals move from one jurisdictional zone to another. To provide an example from Southeast Asia. In 2016 the oil tanker Hai Soon 12 was reported missing. The facilitation of ReCAAP and the tracking work conducted at the IFC in Singapore led to a coordinated search. The vessel was eventually found in the Java Sea, albeit repainted as "Aiso" (Oceanus Live, 2016). Within less than eight hours the ship was found, and the suspects arrested. Another prominent case reveals how MDA centres can operate across regions. The stateless fishing vessel STS 50 was intercepted in April 2018. The vessel had multiple criminal records including illegal fishery, slavery and document fraud, yet authorities struggled to capture it. Interpol and the RMIFC in Madagascar provided information to the IFC Singapore. The IFC worked together with other partners to track the vessel, until finally the Indonesian navy intercepted the vessel (Gray, 2019; Low, 2018).

These cases highlight the potential instrumental benefits from participating in regional MDA. The total number of cases where perpetrators were stopped and arrested which are immediately linked to the work of MDA centres remain however limited so far and public records are only available for a handful of cases. In so far that the majority of maritime crimes and other maritime security issues are in one way or the other cross-jurisdictional and transborder, transnational MDA approaches provide a strong potential to encounter these, and hence incentivize states to join and support MDA.

5. MDA, trust and cooperation

One of the core arguments for MDA lies in its potential function to build trust and confidence between states. As the Singaporean minister of defence put it at the tenth anniversary of the IFC, referring to the exercises organized by the IFC:

> Even as technological innovations can facilitate this important work, the single most important element required for a successful mission in the maritime domain is trust among global stakeholders. MARSEC exercises like the Maritime Information Sharing Exercise and the ASEAN MARSEC Information-Sharing Exercise are good platforms for capacity and trust-building. Only with greater trust and support, can we better understand and respond to transnational challenges in the maritime domain. (Ministry of Defence Singapore, 2019, para. 11).

Several layers of reasoning provide arguments for the link between MDA and trust. Routine interaction in information-sharing provides opportunities for mutual learning and understanding. MDA provides ample of opportunities for face-to-face interactions and inter-personal relations through everyday experiences of liaison officer and community building and networking activities, such as the two exercises that the minister

refers to. In crisis situations these inter-personal relations may allow to better understand the intentions of parties, or to more rapidly respond to incidents through informal communication (for instance via WhatsApp, a tool used frequently across MDA centres for informal conversations).

Moving to a more theoretical level, it can be argued that regional MDA work is a collective securitization process in which different actors agree on shared threats and priorities. The sense-making work conducted in MDA centres forms hence an important backbone for international cooperation, since the identification of shared threats, lowers the probability that actors perceive each other as threats (Bueger and Stockbruegger, 2013). Bringing these dimensions together on a more abstract level, routine interaction, inter-personal relations, collective sense-making and working towards shared objectives are major ingredients in what has been called maritime security communities.[3] Maritime security communities are a subset of larger security relations in which actors develop a shared identity through practice and in consequence develop peaceful relations. Such a community can provide a cooperation experience which might spill over and shape the relations between states and the likelihood of their cooperation in more general terms. In this sense, MDA can provide seeds for broader regional integration and global cooperation. That the transnational interactions of MDA trigger support for further political integration, is however more an expected effect, than one that can be observed so far.

6. When knowledge is power: the geopolitics of MDA

Although MDA is generally associated with ideas of functionalist cooperation and integration it does not implies that it works in a political vacuum. MDA is not only a response to particular maritime security problems; it also has effects on the distribution of power. While these effects are often less tangible, it is noteworthy that there is a recognisable competition over who organizes MDA through which systems.

This competition is best visible in the Western Indian Ocean where different structures and systems compete over organizing MDA[4]; these are at least linked to broader geo-political interests and hegemonial claims. In the region, the US heavily advocates for using its information sharing platform Seavision. While the EU operates the counter piracy platform Mercury, it has also developed a tool called IORIS, which is supposed to provide information sharing functionality on maritime security more broadly for the region. Also, the Singapore IFC has ambitions to roll out its IRIS platform in the region.

At least six centres claim to organize or contribute to regional MDA in the Western Indian Ocean with overlapping areas of interest. This includes three centres which are part of the Djibouti Code of Conduct supported by the IMO and funded by states such as Japan or Saudi Arabia; the RMIFC in Madagascar funded by the European Union, the newly founded IFC-IOR in India, and also the Saudi Arabian centre in Jeddah has regional ambition.

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[3] The concept of maritime security communities is developed in Bueger (2013) for the more general argument on Security Communities of Practice see Adler and Greve (2009).
[4] See Bueger (2017)

The case of the Western Indian Ocean hence documents a substantial struggle over how to centralize or at least coordinate the flow of information, and the investments in that infrastructure are at least partially motivated by geo-political considerations.

7. The practical perils to MDA

A more practical level is also important to be considered: MDA might be much more difficult to put into practice than often assumed. This relates to technological challenges on the one side, and to social and organizational ones on the other.

On the technical level, much of MDA is still limited to working with AIS data. AIS remains however confined to tracking larger vessels. Activities at sea linked to yachts, dhows or smaller fishing vessels that make up in some areas the majority of maritime traffic are not captured. The alternatives to AIS, e.g. satellite or aerial data, continue to be difficult and expensive. Also, the fusion of data such as the trade data of customs or port agencies and the passenger data of border agencies into an integrated system is difficult to achieve. Integrating this data to realize visions of intelligence led policing at sea remains a major challenge.

Regional MDA is moreover difficult when there is too little capacity on a national level. The case of the DCoC is an example where effective information sharing is hindered by the fact that countries have little data to share due to a lack of national capacity. The opposite is however equally a problem. The advanced MDA platforms provide too much data, in particular on ship traffic, making it difficult to identify what is relevant and what not. Developing algorithms that allow for allocating risk categories to certain maritime activity is a partial solution to the problem, yet the question which incidents and developments require attention remains.

The list of social and organizational factors which present potential perils is long. They range from a potential mistrust between states and organizations running operations at sea, to known inter-organizational hurdles.[5] Such factors include the problem of unintended use of data. Agencies might not be willing to share data because of concerns over data privacy and confidentiality. They might also find themselves exposed to public scrutiny since the data can lead to alternative performance evaluations. Data might also be protected under dedicated laws. Data is often organization bound. Any information developed by an organization is influenced by mandates, values and traditions. Information might also be cast within organization specific categories and structures or in bespoke metrics. When such data is fused, there is a high risk of misinterpretation or data loss. In a security context data is also often classified with high administrative burdens for declassification. Resource considerations hinder cooperation. Agencies are often suspicious of initiatives that drain resources, but have unproven outcomes, especially if no additional external funding for sharing is available. This might be the case in MDA where the outcomes and effectiveness of sharing are not fully proven yet. There might be concerns over organizational identity and autonomy. Information sharing has impacts on the availability of knowledge and hence the hierarchy between agencies. Agencies might understand information sharing as a threat to their autonomy. In an international context these challenges may be exacerbated by concerns over national sovereignty or international status. Career incentives might hamper successful MDA in

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[5] For a discussion of these factors see Bueger and Edmunds (2018) as well as more generally Mcguirk, O'Neill, and Mee (2015)

that agencies might not allocate personnel with sufficient skills or motivations to data sharing activities, since inter-agency collaboration is often not planned for or incentivized in organizational career paths. These are organizational factors which are not easily overcome and highlight that MDA poses major practical challenges.

8. Conclusion

In this chapter I have reviewed the core ideas and trends that inform MDA and sketched a brief history of the evolution of regional MDA structures. As shown, over the past decade a global transnational and transregional network of networks is emerging which aims at producing security relevant knowledge about the sea. MDA remains a recent phenomenon. It is fascinating in the way that it potentially provides a new form of relations between states, grounded in data and the development of epistemic infrastructures. The practical and political effects of MDA are, however, often assumed rather than investigated. Techno-optimism prevails rather than a critical optimism that is grounded in evidence and takes the promises and the perils of MDA into account. More questions need to be asked, when and how MDA is a good investment and if it truly can improve the relations between countries, so it becomes a social bond even in situations of inter-state crisis and withstands the heat. In advancing MDA as a tool for global maritime governance also the interlinkages between security, economics and marine conservation information requirements deserve further attention. Indeed, linking maritime security to the data concerns of conservation and blue growth provides an opportunity to further advance maritime domain awareness not only for the benefits of security but broader development goals.

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