KMI International Journal of Maritime Affairs and Fisheries • Volume 3 Issue 2 December 2011 pp.103-116 •

Policy suggestion to Official Development Assistance of Korea towards sustainable development of developing countries in marine sectors

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ABSTRACT

This paper aims to assess major contributing factors to problems that developing countries are facing at the present time, and to suggest the way in which those factors are addressed to build Korean ocean policy towards developing world. Five types of economic failure found in developing countries were investigated to understand difficulties and needs of them, including poverty, state bankruptcy, financial difficulty, civil war, and structural transition. Those state failures could bring great socioeconomic impacts on Korean interests, such as national security, economic stakes, international crimes, infectious diseases, and resource wars. In conclusion, five bullet points that Korea needs to fully address in making international ocean policy are suggested: 1) focusing more on human and social assets; 2) protecting social and environmental problems; 3) streamlining assistance institution; 4) improving national image; 5) management based on sustainability. As a G-20 chairmanship nation in 2010, Korea should be serving a bridge between developed and developing world to make them better off the sustainable international cooperation in marine sectors.

Key words: Ocean policy, Sustainability, Developing country, Korea, Official Development Assistance (ODA)

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1. Introduction

Marine policy of Korea toward developing countries should be seen as an integral part of the overall cultural, political and economic relations and the industrialized nations' responsibility to address main root causes of the increasing gap between rich and poor countries. The developing countries' socio-economic problems are the result of high rate of human population growth, economic policies that fail to solve social problems and protect the environment and its resources, insufficient scientific knowledge, and weakness in institutional and legal systems. Narrowing the gap and improving the lives of people in the developing countries may now be perceived as being in the best interest of the industrialized states[1].

The consequences for Korea, however, of good or bad economic performance among poor countries go beyond direct economic returns. As a general outcome, economic failure abroad raises the risk of state failure as well. When foreign states malfunction, in the sense that they fail to provide basic public goods and services (health, education, courts, police, surveillance, and enforcement of natural resource sustainable rates of exploitation) for populations, their societies are likely to experience steeply escalating problems that spill over to the rest of the world. Failed states are seedbeds of violence, terrorism, international criminality, mass migration and refugee movements, environmental destruction, drug trafficking, and disease. Poor economic performance abroad has the potential to translate into state failure that, in turn, jeopardizes significant interests of developed countries. As Korea is increasingly interested in engaging more resources to help failed states, it will have to spend more time helping them achieve economic success to avert state failure. As many other developed nations, Korea has certain economic policy instruments at its disposal to help prevent state failure abroad.

The global foreign aid landscape is changing rapidly. For example, traditional donors such as Japan are no longer overwhelmingly dominant in terms of volume, and so-called "emerging donors" are becoming increasingly influential. Among these, China, India, Korea and Thailand are key funding sources of foreign aid to poorer nations. These emerging donors are significantly diverse among themselves and distinct from the traditional donors[2]. Although a full-scale investigation of emerging donors has not to be introduced, a variety of opinions has already been represented. Non-democratic countries like China have begun to deteriorate development policy through their activist aid programs that seek only money, access to natural resources, and international votes without consideration of environmental integrity[3]. Emerging donors are also criticized for seeking their own narrow

1 Sachs, Jeffrey D., (2001) The Strategic Significance of Global Inequity, Washington Quarterly, Summer.

2 Sato, J. *et al*. (2011) "Emerging Donors" from a Recipient Perspective: An Institutional Analysis of Foreign Aid in Cambodia. World Development, Vol. 39, No. 12, pp. 2091-2104.

3 Naim, M. (2007) Rogue aid. Foreign Policy, March/April, pp. 95-96.

interests to the detriment of the development of the recipient countries. However, a more amiable opinion can be found that Chinese aid has strengthened trade links in Africa, thereby allowing improved growth in terms of trade and increasing both the export volumes and public revenues of recipient countries[4]. Thus, it is critical for Korea to have a strong strategic design of foreign assistance, not to follow the previous bad examples. Unfortunately, Korea had not designed any policy measures and strategic initiatives to deal with these problems for decades.

This study's major objective is to assess main factors that contribute to problems developing countries are facing at the present time and how they could affect marine-related Korean international policy toward this group of nations. Understanding difficulties and needs of the developing world is a key for successful economic and other relations at the time of growing globalization, demands for development, and increasingly urgent needs of coastal resources. The challenge is to define appropriate role for Korean marine policy that will enable the country to improve its relations and image in developing countries.

Korean chairmanship of the G-20 Summit in 2010 represents an opportunity to bring the development issues to the forefront of global economic policy discussion, and Korea can serve as a bridge between the developed and developing worlds through its own experience and expertise.

2. Strategic significance of inequalities in economic and marine environmental management

At the time when Korea and many other industrialized countries enjoyed significant economic growth during last decades, many developing countries, particularly located in Africa, suffered an outright decline in welfare. Is there a "strategic significance" to global inequities in income levels and economic growth, and, if so, which policy might Korea pursue to address these strategic concerns? The similar question may be posed in regard to Korean ocean policy toward developing countries having in mind continuing deterioration of their marine and coastal environments and declining possibilities to produce food of aquatic origin for their growing populations. In many poor countries, in spite of great potential of their coastal resources, technological, economic and managerial capabilities to use them do not exist. In order to gain badly needed hard currency they export or allow for foreigners to exploit their marine resources, thus feeding and giving away jobs to the rich industrialized markets. As a result, malnutrition due to a deficit of food is deepening

4 Woods, N. (2008) Whose aid? Whose influence? China, emerging donors and the silent revolution in development assistance. International Affairs, Vol. 84, No. 6, pp. 1205-1221.

in the developing countries. Coastal lands in these countries are increasingly cleared of mangroves, invaded by urban sprawling growth and suffering of increased water pollution from land-based sources. Expanding aquaculture in many Latin American and Asian countries is export-oriented and serving industrial countries' markets that are indifferent what is the origin and social cost of imported seafood even if its production is affecting natural ecosystems in the exporting countries.

Korea's interests in successful economic growth abroad are multifaceted. Some of these interests are economic: the economic success or failure of developing countries determines the gains from trade and investment that Korea reaps in its economic relations with those countries.

3. Types of economic failure in developing countries

3.1 Impact of poverty

Poor countries are paradoxically too poor to achieve sustained economic growth. To attract foreign investment and technology so needed to assure growth there are minimum standards of health, education, and infrastructures, including ports, shipyards, processing and storage facilities, roads and utilities. In many impoverished countries (Sub-Saharan Africa, Indochina region, Bangladesh, Haiti, some Central American countries and others) these conditions cannot be met. High dependence of poor populations on timber used for cooking their food leads to increased pressures on mangrove forests that are also cut for smoking fish and other meats. Because population in hinterlands cannot find jobs, education and health care, there is an increased migration to the coastal zones where frequently the last resort job and source of food are coastal artisanal fisheries, low-paid port, and coastal tourism services-related employment. In many coastal developing countries the number of artisanal fishermen is already excessive as their pressures on fishery resources becomes unsustainable and leads to over exploitation and degradation of coastal ecosystems. Increasingly, the development of the off-shore oil and gas resources is seen by the coastal populations as an opportunity for them to gain additional benefits from foreign corporate contributions, such as taxes paid by international corporations to the local governments.

3.2 State bankruptcy

This situation occurs when the state cannot service its current foreign debts. Bankrupt states cannot provide basic public services, maintain troop loyalties, and use state revenues to buy off political opposition figures, or make budget transfers to keep allied parties or region within a governing coalition. Most telling examples of state failure are

financial problems of the West African countries including Guinea-Bissau, Guinea-Conakry, Sierra Leone and Liberia. Administrative workers of these states receive their salaries with a half year delay and this governmental failure causes frequent strikes and work stoppages in these states. It is also forcing state employees to corruption, stealing of state property, and distortions in the foreign donor-financed development projects.

3.3 Financial difficulties

It is a continued reversal of capital flows and the absence of short-term private-sector loans that leads to an increased contraction of the economy despite long-term solvency and generally adequate economic conditions. These crises affected Mexico (1995), Indonesia, Korea and Thailand (1997) and in certain cases (Indonesia) provoked dramatic regime change and internal violence. Lack of capital, in turn, affects investment and continuation of various marine projects initiated by industrialized nations as well as development of the coastal infrastructures and other projects funded both by the government as well as by the private sector. Repayment of excessive debts and foreign financial obligations causes the same type of problems.

3.4 Civil wars and public unrest

Civil wars are the result of the state failure and are direct contributors to the collapse of the social systems, local economies, and rational management of the coastal resources. In the Persian Gulf over 6-8 million barrels of oil were spilled, killing 15,000-30,000 sea birds and contaminating mangroves and coral reefs[5]. Catastrophic oil or other chemical spills are only some of the direct effects to the marine resources. Degradation of the coastal resources as a result of overpopulation and malnutrition is also a concern. As a result of poor governance and public unrest, it is very frequent that the coastal resources cannot be properly allocated and protected. Some segments of the coastal population are claiming more direct benefits for them to be delivered by foreign corporations exploiting these resources. There are rampant illegal and pirate fishing operations in the 200-mile Exclusive Economic Zone and territorial waters of poor developing countries and flourishing clandestine exports of seafood and prohibited products. These originate from protected or endangered species like marine mammals, turtles and other protected marine organisms. The collapsed states cannot control their borders and this allows drug smuggling and transfers of illegal migrants[6]. Wars also result in massive emigration of affected

5 Vanasselt, W, (2004), The Collateral Damages of War. November/December 2004, Vol. 2, No.10

6 Kaczynski, V.M, Djassi, S. (2006) Illegal activities in marine Protected Areas: The Case of Guinea-Bissau, West Africa, paper presented during International Conference on Economic Globalization and Environmental Policy, Warsaw School of Economics, Warsaw May 24-25, 2006.

populations from one country to another and flight of trained specialists from war engulfed countries and subsequent inability of governments to negotiate agreements on conditions that would assure rational resource use by foreign operators. The war-torn and cash-starved countries accept frequently unfair access conditions of foreigners to their coastal resources. These agreements provide very few benefits to the local populations and further degrade marine resources.

Violent secessionist movements are statistically much more likely if the country has valuable natural resources. Examples include Aceh (Indonesia), Biafra (Nigeria), Ivory Coast, Sri Lanka, Philippines, Cabinda (Angola), Katanga (ex-Congo), and West Papua (Indonesia).[7]

3.5 Crisis caused by structural transition

Systemic transitions in many developing states and post-Soviet bloc countries destabilize societies in many ways. Transition from communism in Eastern Europe and Russia, recovery from war (especially from defeat), transition from colonial rule to state sovereignty, from authoritarian rule to democracy, and succession struggles after the collapse of a long-standing regime (for example, the fall of Suharto after 32 years in power in Indonesia) are good examples. The CIA study found that the most dangerous political condition leading to future state failure was a state in transition. "Partial" democracies are more likely to fail than authoritarian or fully democratic regimes. The Russian marine living resource deterioration and outright decimation in certain seas took place during the transition period, and even today the Russian Far East fishing industry is unable to recover from the total collapse of valuable Okhotsk Sea and Bering Sea fish and invertebrate stocks after collapse of the Soviet Union.

4. Impacts of state failure on Korean strategic interests

4.1 National security

Nearly in all cases of US military interventions abroad since 1960 have taken place in developing countries that previously experienced a case of state failure. In many cases, the linkages from economic collapse to state failure to the US military engagements could not be clearer in such cases as Vietnam, Haiti, Panama, Lebanon, Somalia, Yugoslavia,

7 Bannon, I. and Collier P., (2003). Natural Resources and Conflict: What We Can Do? In: Natural Resources and Violent Conflict: Options and Actions, The World Bank, Washington, D.C.

Colombia, and presently Afghanistan and Iraq. Security considerations include rebel activity, terrorist attacks, sea-piracy, illegal sea migration, arms proliferation, and drug trafficking.

4.2 Economic stakes

Korea has significant economic stakes in developing world that are jeopardized by the state failure. The total Korean foreign direct investment was US$ 19.4 billion in 2009 of which 33 % is placed in developing countries. About 72 % of Korean exports go to the developing countries (2009) and it is quickly growing[8]. However, business operations are heavily affected by host-country instability, poverty, and corruption. The volume of fish imports in 2008 from developing countries (excluding China and Russia) was equal to 52% of total imports[9]. Korean fishing operations mostly in the 200 mile Exclusive Economic Zone of the developing countries produced at least 650 thousand metric tons in 2008, i.e. over 35% of the total Korean catch.[10]

4.3 International crime and drug smuggling

The state failure is both the cause and consequence of international criminality, at-sea piracy, money laundering and international drug trafficking. Failed states are easy prey for criminal groups, terrorists, pirates and mafias (Yemen, Indonesia, Columbia, Russia, Sierra-Leone, Guinea-Bissau and others). The diamond trade by the guerilla groups in Sierra-Leone helped terrorist organizations such as Al-Queda to raise funds to support their terrorist activities in many European and Asian countries as well as in the United States.

4.4 Environmental degradation

Tropical deforestation, overfishing, soil erosion, loss of biodiversity and long-term climate change are caused in part by population pressures in poor agrarian regions and failed governance that lead to clear cutting of forests, pollution and illegal occupation of lands. Environmental regulations in failed states are generally not enforceable or are easily corrupted (Ivory Coast, Guinea-Bissau, Guinea-Conakry, Cambodia, Russia, Indonesia, South Africa, Columbia).

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8 Website of KEXIM (Korea Export & Import Bank) Overseas Economic Research Institute. Data available at http://keri.koreaexim.go.kr/05_invest/01_statistics/investTotal_year.jsp (in Korean)

9 Korean Ministry of Food, Agriculture, Forestry and Fisheries (MIFAFF), 2008, Fisheries Export–Import Statistics (in Korean)

10 Website of Korea Overseas Fisheries Association. Data for 2008 available at http://www.kosfa.org/data1/data1.asp (in Korean)

4.5 Infectious diseases

Many poorest countries, especially societies with state failure, are subject to horrific conditions of disease. The disease is both a cause and consequence of economic and political failures. Collapsed states lack the financial and institutional means to deliver vital public health services. Disease burden and spread of multi-drug resistant strains across international borders are cause of destabilization in whole regions. Between 2000 and 2020, 68 million people will die of HIV/AIDS, 55 million of them in Sub-Saharan Africa[11]. Ignorance, superstition, a refusal by too many governments to face the facts, and plain embarrassment combine to make it hard to respond to the crisis.

4.6 Resource wars and conflicts

Conflicts over valuable resources, including fish and other coastal natural assets become an increasingly prominent feature of the global landscape. Often intermixed with ethnic, religious, and tribal antagonisms, such conflicts have posed a significant and growing threat to peace and stability in many areas of the world. The discovery of off-shore oil and gas in Africa added a new dimension to this violent panorama: from that point on, major outside powers acquired interests of their own. For example in the Caspian Sea, five nations: Azerbaijan, Iran, Kazakhstan, Russia and Turkmenistan are disputing the rights to undersea reserves[12]. As a result, these coastal states are unable to manage valuable sturgeon and other living resources that are in the state of nearly total extinction.

5. Marine policy challenges for Korea

5.1 Foreign aid as a policy tool

There is an absence of policy framework for translating Korean interests in foreign economic performance into marine policy actions and addressing preventable or remediable cases of foreign economic failure. These actions must include Korea's marine policy initiatives as this country's foreign assistance was very modest and has mostly targeted countries not in a poverty trap and poorly timed (usually too late). To address poverty trap, a large-scale and sustained aid transfers from Korea and other rich countries targeted on the crises in health, education and basic infrastructures will be highly advisable.[13]

11 State of the World Atlas, The Penguin. Seventh Edition, p. 112-113
12 Klare, Michael T. (2002), Resource Wars: The New Landscape of Global Conflict, A Metropolitan/Owl Book.
13 Sachs, Jeffrey, D. (2005), The End of Poverty: Economic Possibilities of Our Time. Penguin Press.

Industrialized countries did nothing significant to help the poorest of the poor in Africa to break out of the poverty trap. However, there is an urgent need to address the poverty, state bankruptcy and other maladies affecting societies and economies of the developing World.

State bankruptcy can be dealt with outright cancellation of external debt. In case of illiquidity, the postponement or timeout on debt servicing might be appropriate. Continuing hemorrhaging of debt service payments during liquidity crisis can cause an extremely sharp collapse of economic output (East Asia in 1998 - as an example).

The crisis of transition can be solved by providing help in crucial moments that are expected to prevent the collapse or attract political forces to the reform program. Foreign assistance should build signals of the long-term durability of the new government.

Korea has never wielded foreign assistance as an effective instrument of its foreign policy. The Government plans to spend 0.25% of GNP[14] in foreign assistance that in 2009 equals to 0.09 % of GNP, or US$ 802 million[15] but most of this aid was "tied"[16] and only small percent in assistance was directed to poorest countries. Although Korea increased recently its ODA (Official Development Assistance) to Africa , doubling its support to the region through "Korea's Initiative for Africa's Development,"[17] the consequences of this stringency are undermining the long-term vital interests of Korea. There is an urgent need to rebuild country's national capacity to support economic development abroad particularly helping sub-Saharan Africa to escape from poverty trap that leads to a downward spiral of disease, falling living standards, and increased conflict during past 20 years.

The new approach in the Korean marine policy toward the developing countries should consider, between other countries, the following challenges.

5.2 Food security

Despiteseriousness of food security threats in poor countries, little was done in increasing their capabilities to improve the use of their coastal living resources for the benefit of the local populations. The Korean marine policy should include this issue as an important agenda item for the nearest future.

5.3 Marine and coastal environmental deterioration

Through trade and overseas operations, Korea contributes to the accelerated deterioration of the coastal and ocean resources in some developing countries. The Korean

14 "Korea to increase dev. aid for Bangladesh", The Daily Star, Dhaka, Vol. XX, No. 223., August 28, 2010
15 Korea's role in global development, The Brookings Institution, No. 36, August 28, 2010
16 Tied aid means it must be used to procure goods and services from the donating country.
17 The Brookings Institution, ditto

imports of environmental products are not restricted (with few exceptions like tuna-dolphin interactions, turtles and few other species) by the damage this trade is generating in exporting countries. The country impacts other ecosystems by the importation of products and raw materials from developing countries. While Korea has stopped a number of damaging practices that affect Korean environment at home, the country is still benefiting from the continuation of those same practices carried out by foreign companies overseas. In short, Korea is either buying or degrading other people's environments and then consuming them by Korean consumers. Korean new marine policy should address and prevent these negative tendencies.

5.4 Using marine resources as an engine of growth in coastal countries

Marine and fresh water resources in developing countries have a great potential as an engine of economic growth, employment, and a source of food for the local populations. In spite of declining agricultural and industrial growth and increasing number of the poor in Africa and other continents, there are grounds for at least some cautious optimism. One main reason is that among the leadership and governments of the African continent and outside donors that support them (the World Bank, UNDP, International Monetary Fund, African Development Bank and others) there is growing awareness of this potential. Korea should support projects leading to increased coastal countries' capabilities to take advantage of their marine and coastal resources.

5.5 Population growth and resource depletion

Rapid growth of population and migration to the coastal areas throughout entire Sub-Saharan region are associated with increased demand for seafood, space and other coastal resources. This contributes to depletion of the ocean and coastal living resources caused by intensifying fishing (particularly by the foreign fleets), disappearance of the mangrove forests, urban pollution, poor sanitation, and declining quality of water. If not addressed by governments and civic society at large, such environmental deterioration takes place wherever human beings congregate in large numbers, suggesting that problems will become even more of a challenge in the future as urbanization continues and coastal urban areas grow in population and size. Important marine policy objective is to design precautionary measures that coastal states of Africa must take to prevent these negative trends.

5.6 Transformation of Korean cooperation policy toward the developing countries

Marine policy of Korea should act in concert with the substantial transformation of the West's policy toward poor developing coastal states such as those situated in

Sub-Saharan Africa. It should promote joint sub-regional initiatives in this regard to the international cooperation in marine resource use and improvement of the investment climate that is needed for foreign companies to integrate their typical offshore activity with the coastal states' economies. These policy reforms should be combined with the change of orientation from pure business approach in relations with the coastal developing countries to more active participation in the reform programs of the coastal states. There is a need for increased responsibility of foreign operators in protection and sustainability of exploited marine resources in the coastal waters of the developing countries.

6. Conclusions and recommendations

Korea's economic interests in developing countries are focusing on natural resources such as water, air, fish, forests, minerals, sources of energy, and foodstuffs. It also includes human and social assets − from worker commitment to community support − as well as economic resources, such as a license to operate, a receptive marketplace, and legal and economic infrastructure.

Contemporary social and environmental problems affecting developing countries are creating risks and opportunities for Korea that fundamentally change the playing field and require a new marine policy for the Government, individual firms, industries, and business itself.

The new marine policy approach towards the developing countries and a concept of aid for the coastal states needs to be re-evaluated and streamlined as it is currently fragmented (approximately 30 Korean institutions are in charge of implementing of ODA programs).

Korean aid policy will improve an image of the country in the developing World contributing to the private sector's profitability, higher shareholder value and its favorable social, human, and environmental impacts in developing countries.

Korean companies can become more profitable by applying the new concept of cooperation with the developing coastal states that foresees elimination or reduction of any illegal activity in their coastal waters, integration of investments with the local economy and social-economic programs that benefit local populations.

The new policy concept of corporate sustainability when working in the developing country environment allows to compare the behavior and business ethics of Korean corporations running business in highly industrialized activities in emerging economies in the world.

Received: Oct. 4, 2011
Reviewed: Nov. 29, 2011
Accepted: Dec. 23, 2011

References

Bannon, I. and P. Collier. 2003. "Natural Resources and Conflict: What We Can Do?" In Natural Resources and Violent Conflict: Options and Actions. The World Bank.

Kaczynski, V. M. and S. Djassi. 2006. Illegal activities in marine Protected Areas: The Case of Guinea-Bissau, West Africa. International Conference on Economic Globalization and Environmental Policy, Warsaw School of Economics, Warsaw May 24-25 2006.

Klare, T. Michael. 2002. Resource Wars: The New Landscape of Global Conflict. A Metropolitan/Owl Book.

KEXIM Economic Research Institute database. Website of Korea Export & Import Bank Overseas Economic Research Institute. available at http://keri.koreaexim.go.kr/05_invest/01_statistics/investTotal_year.jsp

KOICA. 2009. 2008 KOICA Aid Statistics, Available at http://stat.koica.go.kr

Korean Overseas Fisheries Association. 2009. Website of Korean Overseas Fisheries Association. Data for 2008, available at http://www.kosfa.org/data1/data1.asp (in Korean)

Korean Ministry of Food, Agriculture, Forestry and Fisheries (MIFAFF). 2008. Fisheries Export −Import Statistics (in Korean)

Naim, M. 2007. Rogue aid. Foreign Policy, March/April, pp. 95-96.

Sachs, J. D. 2001. The Strategic Significance of Global Inequity, Washington, D. C.

_____. 2005. The End of Poverty: Economic Possibilities of Our Time. Penguin Press.

Sato, J., H. Shiga, T. Kobayashi and H. Kondoh. 2011. "Emerging Donors" from a Recipient Perspective: An Institutional Analysis of Foreign Aid in Cambodia. World Development, Vol. 39, No. 12, pp. 2091-2104.

State of the World Atlas. The Penguin. Seventh Edition.

Vnasselt, W. 2004. The Collateral Damages of War. November/December 2004, Vol. 2, No. 10

Woods, N. 2008. Whose aid? Whose influence? China, emerging donors and the silent revolution in development assistance. International Affairs, Vol. 84, No. 6, pp. 1205-1221.

KMI International Journal of Maritime Affairs and Fisheries • Volume 3 Issue 2 December 2011 pp.117-138 •

Legal Issues Related to Armament of Vessels*

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ABSTRACT

While the number of piracy in the Strait of Malacca and Indonesia is showing a pattern of decline, the number of piracy in the waters of Somalia is rapidly increasing. The waters of Somalia, linking the Suez Canal and the Indian Ocean, is a passage for a dense traffic of large containers and tankers, but the passage of these vessels also makes it a tempting target for the Somali pirates.

The material and human losses from the frequent occurrence of piracy have led the international community to reach a resolution through the UN Security Council, and efforts are being made to repel piracy using warships and military airplanes.

Although the UN states' deployment of warships was partially effective in eradicating piracy, its employment showed limited effect in achieving the complete eradication of piracy.

On the 23rd of May, 2011, the IMO adopted the 「*Interim Guidance To Shipowners, Ship Operators, and shipmasters on the use of Privately Contracted Armed Security Personnel on board ships in the High Risk Area*」 as a measure to prevent losses from piracy.

Two main types of prevention measures can be considered to prevent losses from piracy. The first is to install weapons on the ships or to arm the crews with weapons to repel pirates. The second is to embark PMSC(Private Maritime Security Companies) PCASP(Privately Contracted Armed Security Personnel) onboard the ships, at the request of the shipping companies, to deter pirate attacks.

This article will deal with a legal review on each measure to repel piracy.

Key words: Repel piracy, Embarkation of PCASP on Ship, Armament of Vessels

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* This article was presented at 「The 5th Seoul International Maritime Forum」 on 28 September 2011.

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1. Introduction

While the number of piracy in the Strait of Malacca and Indonesia is showing a pattern of decline, the number of piracy in the waters of Somalia is rapidly increasing. The waters of Somalia, linking the Suez Canal and the Indian Ocean, is a passage for a dense traffic of large containers and tankers, but the passage of these vessels also makes it a tempting target for the Somali pirates.

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The following pages contain a legal review on each measure to repel piracy.

2. Arming the Ships/Crews with Weapons[4]

2.1 International Laws

The right to protect one's life and property in the face of imminent danger is recognized by the domestic laws of all nations and the international laws. For instance,

1 MSC.1/Circ.1405(23, May 2011), Interim Guidance To Shipowners, Ship Operators, and shipmasters on the use of Privately Contracted Armed Security Personnel on board Ships in the High Risk Area.
Key contents are as listed:
① Risk assessment, ② Financial condition, maritime experience, selection criteria for private security company, ③ Insurance coverage for ship owner/crews/3rd party (injury, medical), scope of mortgage, other insurance issues regarding the accidents, injury, and losses resulting from the usage of firearms, ④ Management of firearms, ⑤ Guidelines for weapons employment

2 Private Maritime Security Companies(PMSC), Major PMSCs include *Shield Consulting*, *G4S*, *Control Risk etc.*, *Shield Consulting* has the largest PMSC market share in the Republic of Korea.

3 The 'PCASP' is short for 'Privately Contracted Armed Security Personnel'. The increased threat to commercial shipping by Somalia-based pirates has led to extended use of armed guards and a marked expansion in the number of firms offering armed maritime security services for vessels transiting the High Risk Area (HRA).

Republic of Korea Criminal Law Article 21[5] defines the rightful protection and the Charter of the UN Article 51[6] guarantees the right of 'self-defence.'

However, there are no clear provisions in the international laws that govern the armament of ordinary ships/crews or their possession of weapons regarding the exercise of rightful protection or self-defence.

2.1.1 United Nations Convention on the Law of the Sea (UNCLOS)

The nationality of a ship is determined by the UN Convention on the Law of the Sea (UNCLOS). Article 91 of the UNCLOS (Nationality of Ships) states that "① Every State shall fix the conditions for the grant of its nationality to ships, for the registration of ships in its territory, and for the right to fly its flag. Ships have the nationality of the State whose flag they are entitled to fly. There must exist a genuine link between the State and the ship. ② Every State shall issue to ships to which it has granted the right to fly its flag documents to that effect".[7]

Therefore the flag state exercises exclusive jurisdiction over the ships sailing under its flag, and this jurisdiction includes permission to embark the ships with weapons or to arm the crews with weapons. In sum, the flag state's domestic laws determine the permission on the ships' possession of weaponry.

2.1.2 Hague Convention (VII) relating to the Conversion of Merchant Ships into War-Ships[8]

Employment of merchant ships as armed warships, a practice known as privateering, was defined illegal by the 1856 Declaration of Paris. However, a series of naval warfare in the late 1800s brought up the issue of merchant ships' conversion into warships, and in the 1907 Hague Conference, a treaty was signed to allow the conversion of merchant ships into warships when certain conditions are met. For instance, the ships must bear the external marks which distinguish the war-ships of their nationality (Article 2), the commander must be in the service of the State and duly commissioned by the

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4 This Chapter mainly *rely on* Dong-Wook Kim, "Whether armament of merchant vessels allowed?" Dok-Do Research Journal, vol.7(Autumn, 2009)

5 "Actions taken to prevent unlawful infringement on oneself or others, with sufficient reason, shall not be punished."(Criminal Law Article 21 Clause 1)

6 "Nothing in the present Charter shall impair the inherent right of individual or collective self-defence if an armed attack occurs against a Member of the United Nations, until the Security Council has taken measures necessary to maintain international peace and security."(Charter of the United Nations Article 51)

7 Neal R. Grandy, 「UNCLOS 1982 A Commentary, Volume Ⅲ」(The Hague : Martinus Nijhoff Publisher, 1995), pp.103-104.

8 1907 Hague Convention Ⅶ Relating to the Conversion of Merchant Ships into Warships(Validated on the 26th of January 1910 by 34 nations excluding the United States), N. Ronzitti, 「The Law of Naval Warfare-A Collection of Agreements and Documents with Commentaries」(Dordrecht : Martinus Nijhoff Publisher, 1988), pp.111-126.

competent authorities, and his name must figure on the list of the officers of the fighting fleet (Article 3), and the crew must be subject to military discipline (Article 4).

These conditions are equivalent to the content of Article 29 of the UNCLOS, which describes the definition of warships. The Hague Convention is effective to this date and is closely related to the UNCLOS regarding the conversion of merchant ships into warships during peacetime and wartime.

2.2 Relevant Laws of the Republic of Korea

2.2.1 「Regulations on firearms, blades, and explosives」

Republic of Korea's 「Regulations on firearms, blades, and explosives」 prohibits the possession of firearms, blades, and explosives unless approved by the government.[9] In addition, permission is required for import and export of firearms and explosives.[10]

2.2.2 「Customs Laws」

Section 2 of the Customs Laws (Ships and Aircrafts) defines the arrival and departure procedures of foreign merchant ships and aircrafts. When a foreign merchant ship or aircraft arrives at an open port, the captain of the ship/aircraft must report the names of the passengers and crews, their possessions, materials to be embarked or disembarked, and other goods as set by the presidential order, to the customs official without delay(Article 135).

The customs officer can request the shipping company or airline to submit information regarding 'drugs' or 'firearms, blades, and explosives' before a deadline. In this case, the shipping company or airline must comply with the request(Article 137-2 Clause 1).

2.2.3 Application in Practice

The captain of a foreign ship should submit information regarding 'firearms, blades, and explosives' by the request of the customs officer prior to entering the port of the Republic of Korea. Unreported or smuggled 'firearms, blades, and explosives' will be treated according to the Customs Laws, and the treatment may be referred to the police through the joint investigation team when needed.

The rules regarding weaponry possession differ for each nation. In countries that permit weaponry possession, crews of foreign ships arriving at port must make a report according to set procedures. However, there are cases in which crews that disembark from ships return to their country using aircrafts. In the past, these 'disembarked crews' were

9 「Regulations on firearms, blades, and explosives」 Article 10 (restriction on possession)
10 *Ibid.* Article 9

found in possession of weaponry onboard returning aircrafts. In the Republic of Korea, the possession of unreported weaponry by the disembarked crews are also strictly governed by the 「regulations on firearms, blades, and explosives」.

2.3 IMO's Standpoint

2.3.1 Revised guidance on Combating Piracy agreed by IMO Maritime Safety Committee

On the 5th of June, 2009, IMO Maritime Security Committee (MSC) issued a recommendation for revision which stated that the "flag states should strongly discourage the carrying and use of firearms by seafarers for personal protection or for the protection of the ship."[11] The possession of arms on a ship is very likely to worsen the already dangerous situation, and the treatment of weapons which require special training and attitude may increase the possibility of accidents on the ship. It is the IMO's unchanging standpoint that the possession and usage of weapons should be restrained.[12]

2.3.2 Opinions of Nicolaos L. Charalambous, Deputy director of maritime security and facilitation of the IMO

Nicolaos Charalambous, Deputy Director of maritime security and facilitation of the IMO, stated in his interview with the media on the 19th of May, 2009 that "arming merchant ships against Somali pirates will only boost competition in the arms race in the international waters and cannot be the solution to the piracy problem".[13] He rhetorically asked "are you hoping to turn the entire sea into an engagement zone?" in expressing his opinion against the armament of ordinary ships.[14]

2.4 Others

2.4.1 Insurance Problem

In the case of tankers, an engagement between its crews and the pirates is very

11 Revised guidance on Combating Piracy agreed by IMO Maritime Safety Committee, Maritime Safety Committee-86th session: 27 May-5 June 2009. "The MSC agreed that **flag States should strongly discourage the carrying and use of firearms by seafarers for personal protection or for the protection of the ship.** Seafarers, it was agreed, are civilians and the use of firearms requires special training and aptitudes and the risk of accidents with firearms carried on board ship is great. Carriage of arms on board ship may encourage attackers to carry firearms or even more dangerous weapons, thereby escalating an already dangerous situation. Any firearm on board may itself become an attractive target for an attacker. Carriage of firearms may pose an even greater danger if the ship is carrying flammable cargo or similar types of dangerous goods."

12 MSC/Circ.623/Rev.3 ANNEX(29 May 2002), p.9.

13 Chosun Ilbo Online Edition, 2009. 5. 19(2009-7-7 Search)

14 *Ibid.*

likely to result in a large-scale fire and heavy losses on the ship. Therefore, the armament of ships will face resistance from the ship owners and complicate the solution. Also, we cannot rule out the possibility that the pirates will attempt to employ weapons with larger firepower to overwhelm the armed ships.

The possibility of accidents on merchant ships carrying firearms or possibility of other accidents such as tanker fire resulting from the exercise self-defence may reduce the issuance of insurance by insurance companies or limit the purchase of insurance policy.

In the Republic of Korea, a majority of shipping insurance excluding those for small vessels of 500T or less employs the ITC-HULLS institution agreement (1983) drafted by the Institute of London Underwriters of the United Kingdom.[15] The agreement defines risks resulting from war to be exempt from the company's responsibility, and excludes such risks from the insurance coverage unless supplemental provisions were added. Likewise, the armament of ordinary ships will lead directly to the increase in insurance costs and may also tempt some insurance companies to deny underwriting the contracts.

2.4.2 Recent Trends in the U.S. Domestic Laws

On the 19th of June 2009, Frank LoBiondo, a Republican house representative from New Jersey, submitted a bill titled 'United States Mariner and Vessel Protection Act of 2009(HR 2984 IH).'[16] The essence of the bill is to permit the embarkation and possession of weaponry onboard the ships of U.S. nationality against external aggression including pirate attacks, to acknowledge the exercise of self-defence, and to exempt the captain, ship owner, and ship operator from responsibility when such actions are taken.[17]

The U.S. plans to institute an international agreement with identical contents through the IMO after the bill's enactment, and the debate regarding the 'armament of ships' is expected to expand.[18]

2.5 Semi-Conclusion

The continued attacks on ships by pirates in the Somali waters have sparked the debate on the armament of ordinary ships, with the U.S. leading the debate. The hijacking of U.S. ship *MV Maersk Alabama* and the hostage-taking of its captain Richard Philips have led the U.S. congress to submit the bill 'United States Mariner and Vessel Protection Act of 2009(HR 2984 IH)' which permits the armament of ordinary ships and their crews

15 Choong Bin Lim / Manager at Duyang Ltd. "Guide to Shipping Insurance", http://blog.naver.com/im_chung-bin/3003132922(2009-7-14 search)

16 United States Mariner and Vessel Protection Act of 2009(HR 2984 IH), 111st session of Congress.

17 Ibid. Sec. 70122(Authority of use force)

18 Jae Sun Choi, "US grants defense rights to civilian ships/crews against pirates", KMI Briefing on Dokdo and maritime territory #09-69(2009. 6. 29)

and exempts criminal responsibilities when self-defence is exercised. Such measures taken by the United States may eventually lead to the adoption of an international agreement that acknowledges the armament of ordinary ships and their crews.

However the resistance from ship owners and the possibility of accidents resulting from the possession of firearms remain to be solved. Damages on dangerous cargo such as tankers may result in large-scale accidents, and such dangers may lead to higher premiums on insurance contracts and even result in certain insurance policies not being contracted.

UNCLOS defines the possession of armaments by a ship to be dictated by the laws of the ship's flag state. However, the opinions of weaponry possession differs for each country, and the Republic of Korea strictly adheres to its laws that require foreign ships arriving in Korean ports to make advance reports. The difference in each country's stance regarding the armament of ships and the possession of weaponry poses a burden on the international agreement on the issue. The ship owners' uneasiness about higher insurance premiums and the possibility of large-scale accidents resulting from the change are also acting as deterrent factors to an international agreement.

3. Embarking PCASP on Ship

3.1 IMO's Interim Guidelines on PCASP (Privately Contracted Armed Security Personnel)

Similar to its standpoint on arming the ships, IMO initially had a negative opinion about embarking armed personnel on merchant ships. This was because PCASP embarkation may prompt the pirates to arm themselves with heavier weaponry and result in larger losses. However, as the losses from piracy escalated and the number of shipping companies that embarked security personnel on their ships increased, the IMO started recommending the practice of 'Best Management Practice' (BMP)[19] and prepared a set of guidelines on the employment of armed security personnel.[20]

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19 Interim Guideline selected in the 89th MSC of IMO. Contains ① Status of deployed ships in the Gulf of Aden, ② Securement of anti-piracy equipment such as barbed wires, ③ Employment of Citadel, ④ Recommendations on the embarkation of security personnel.
According to the Ministry of Land, Transportation, and Maritime Affairs, ROK ships have been embarked with PCASP since 2008, and all vulnerable ships with speeds of less than 15 knots and side heights of less than 8 meters from the surface of water have been embarked with PCASP since the hijacking of Samho Jewelry in January 2011

20 The recommendations are not intended to endorse or institutionalize the use of PCASP and do not address all the legal issues that might be associated with their use onboard ships. *IMO briefings MSC 89th meeting.*

Currently, there exist no international laws that govern the employment and selection of Privately Contracted Armed Security Personnel (PCASP). The embarkation of armed security personnel, in the absence of international laws to influence the establishment of domestic laws, is dictated by the policy and laws of each respective state.[21] Therefore, each flag state should institute domestic laws to employ armed security personnel. The laws shall include issues regarding the employment of PCASP and their possession of weapons, and also include guidelines and legal documents offered by the IMO. In the Republic of Korea, such laws are not yet in place. The laws regarding the embarkation of PCASP should be established in advance to prevent an absence of relevant guidelines if the shipping companies should determine that the embarkation of PCASP is required. In order to establish the laws, the relevant current laws should first be reviewed to check that there are no potential conflicts among the laws. Secondly, foreign laws, customs, and legal documents of international organizations (such as IMO) should be reviewed to draft the PCASP laws or to add relevant contents to the existing laws (R.O.K. Law on the International Ships & Port Facility Security : ISPS).[22] Thirdly, the first draft should be reviewed through open hearings and the likes to gather the opinions of related parties. Fourthly, the gathered opinions should be incorporated into the laws.

IMO's Interim Recommendations for Flag States demand that the employment of PCASP be made considering the domestic laws, and urges the establishment of procedures for embarking the PCASP. We should therefore establish legal grounds for the PCASP to

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21 States show their opinions regarding the embarkation of PCASP and their possession of weapons differently. *For example*, In **France**, The embarkation of PCASP is prohibited, but the possession of weapons is actually permitted. In **Germany**, there is no written law that defines the embarkation of PCASP and the possession of weapons, but Germany has so far never approved of such requests. **Japan** also prohibits embarkation of PCASP and the possession of weapons. The **United States**, under the principle of self-defense, allows embarkation of security personnel at the discretion of ship's owner. It also permits the possession of weapons under the supervision of the Department of Homeland Security.
International Chamber of Shipping(ICS) and European Community Shipowners Associations(ECSA) July, 2011. (refer to appendix)

22 Republic of Korea does not have laws on this subject. It is practical to apply the related 'R.O.K. Law on the International Ships & Port Facility Security' with revisions to define the regulations on the embarkation of security personnel on all ships traveling in dangerous areas.
The following are sample clauses of the *revised* R.O.K. Law on the International Ship & Port Facility Security (ISPS)
Article # (Embarkation of maritime security agents)
① The owners of ships designated by presidential order and traveling through dangerous areas shall embark maritime security agents.
② Ships not pertaining to the first clause may embark security personnel considering the degree of danger and the ship owners' assessment of danger.
③ In accordance to clauses 1 and 2, the maritime security agents may embark the ships with designated weapons in possession, after obtaining permission from the minister of land, transportation, and maritime affairs.
④ Required issues relating to the embarkation of security personnel in accordance with clause 1 shall be set by the presidential orders, and the weapons embarkation procedures and storage shall be dictated by the orders of the minister of land, transportation, and maritime affairs.

board the ships with weapons in possession. However, even if individual nation's laws permit the embarkation of PCASP, the laws of the nations whose ports or coasts the ship travels through must also be conformed to. If the debarkation of armed PCASP is not permitted in the visiting ports, it will bring about numerous limitations on the employment of PCASP. In the Somali waters excluding the Area of Operations of the naval ships operating in the Gulf of Aden, PCASP is the sole response measure against piracy. IMO also recognizes this practical fact and has drafted guidelines on the employment of PCASP. However, the most pressing problem with employing PCASP is their arrival and departure to and from the states. If a state does not permit the possession of weapons, the ships embarked with PCASP may have to bypass that state and carry the PCASP to the next state that permits their debarkation, even if there is no need for the presence of PCASP any more.

International treaties including the UNCLOS do not contain clauses related to the embarkation of PCASP. However, ship security firms receive inspections on the legality of the weapons that they utilize based on UN's tracking system for deterring illegal weapons. Currently, the embarkation of PCASP is treated by the relevant nation's domestic laws. The embarkation/debarkation of PCASP, their entrance into territorial waters, and their arrival into the nations are governed by the laws of the state to which the ship belongs and the state to which the waters belong.

Ship security firms use individual treaties (contracts) with individual states to solve legal problems. For instance, states around the Somali waters such as Oman, Yemen, and Djibouti generally prohibit the possession of weapons under domestic laws, and forbid the entrance of ships embarked with PCASP. However, in accordance with the individual treaties signed with each nation, ship entrance is selectively permitted in certain cases. For example, Pakistan requests the ships to seal the weapons before entering for customs. The ship security firms sign the treaties on the possession of weapons with each state and pay licence fees to each state. In most cases, weapons are carried after the permission from the police or relevant authorities is given.

In most cases, however, there are numerous limitations on the embarkation/ debarkation of PCASP and their entrance into the state or its territorial waters. In order the employ the PCASP in accordance with the guidelines of the IMO, an effort should be made at the IMO level to persuade the relevant states to permit the embarkation/debarkation of PCASP or their entrance into the states' territories. At the least, an IMO resolution is required that demands the signing of treaties between the flag states and the states where the embarkation/debarkation of PCASP will occur.

3.2 Capability Assessment and Selection Criteria of Private Security Firms

The guidelines on the employment of PCASP and shipping firms provide recommendations on assessing the capabilities of private security firms and their setting

their selection criteria. Private security firms are requested to provide information on the firms' weapons, their actual experience on sea, and even the comments of previous customers, in addition to the information on the traits and experience of their employed personnel. The insurance firms may also demand documents on the security firms' training data to assess the appropriateness of their training system.

Regarding this issue, a Norwegian war insurance firm, DNK (Den Norske Krigsforsikring), published detailed guidelines on the selection of private security firms. DNK drafted a checklist of 66 items that the shipping companies should consider when selecting a private security firm. According to Svein Ringbakken, a managing director at DNK, approximate 50 private security firms are currently operating but only a handful pass the guidelines provided by DNK's checklist[23]. A thorough capability assessment is required for employing a capable private security firm, but the adoption of overly strict criteria, as show cased by the DNK managing director's comment, will eliminate most of the options for choice. IMO's guidelines in this case may be a blockade for new firms attempting to enter the industry. In addition, the IMO guidelines only list the documents to be submitted by the private security firms but do not provide specific assessment criteria, and this may lead to differing selection criteria for each state. Therefore, there is a need for IMO guidelines to specify the selection criteria on private security firms. Making an agreeable checklist similar to the one developed by DNK at the IMO level. Providing the checklist as an appendix to the guidelines can be a solution. In particular, because it is crucial to prove that the private security firms are providing appropriate training to their personnel, the criteria for the education on ship-boarding and rules of engagement are requested to be submitted by the flag states. These criteria too should be added as an appendix to the guidelines rather than remaining as random suggestions from each flag state.

4. Embarking Police/Military personnel on the ships

4.1 Debates on the Embarkation of Police/Military Personnel on Ships

4.1.1 Whether active duty military personnel can act as security agents on board merchant ships

Whether active duty military personnel can act as security agents on board merchant ships depends on the domestic laws of each state. The international laws and the Laws of the Republic of Korea do not prohibit the boarding of merchant ships by

23 Republic of Korea Shipping Insurance Organization. Mailing Service 2011. No.31.

military personnel, and this can be interpreted as tacitly permitting such activities. In the case of Belgium, a squad (approx 8 ppl) of special forces were decided to embark a merchant ship to repel piracy and guarantee the safe passage of the ship in the Gulf of Aden.

4.1.2 Whether the embarkation of military personnel makes the ship a warship

Even if military personnel are on board a merchant ship for its safety, the legal status of the merchant ship does not change to a warship or a government ship. UNCLOS Article 29 (Definition of warships) states that a warship "is a ship belonging to the armed forces of a State bearing the external marks distinguishing such ships of its nationality, under the command of an officer duly commissioned by the government of the State and whose name appears in the appropriate service list or its equivalent, and manned by a crew which is under regular armed forces discipline." According to this definition, a merchant ship embarked with military personnel cannot be viewed as a warship under the command of an officer, and the military personnel can be interpreted as merely conducting missions of protecting the ship from the pirates.

4.1.3 Whether it violates the Innocent Passage

The presence of active duty military personnel conducting ship protection activities on board a merchant ship does not affect the ship's right of innocent passage in the territorial waters of a foreign state. However, if the ship enters the territorial waters with the intention of entering a port, the ship must adhere to the state's domestic laws. In cases where relevant laws are nonexistent, a mutual agreement that defines the permission, procedure, and obligations of the state and the armed ship can be used as a basis to enter the port.

Article 19 of UNCLOS defines a passage to be innocent 'so long as it is not prejudicial to the peace, good order or security of the coastal State.' The same article lists 12 activities which cannot be considered an innocent passage. However, the embarkation of military personnel on merchant ships to protect the safety of the ship does not violate any of the 12 listed activities which include: First, the use of threat against the sovereignty, territorial integrity, or political independence of the coastal state; Second, any exercise or practice with weapons of any kind; Third, any act aimed at collecting information or propaganda to the prejudice of the defence or security of the coastal state; Fourth, activity contrary to the customs, fiscal, immigration or sanitary laws and regulations of the coastal state.

4.1.4 Whether the coast guard can board a ship as security agents

Whether the coast guard can board a ship and act as security agents depends on the domestic laws. The embarkation of coast guard on merchant ships to protect the ships from pirates should follow the conferment of authority to conduct missions in international

seas, but in the Republic of Korea, the laws do not grant such authority to the coast guard.

The coast guard, unlike the police which was established by law, was established by the presidential order. The laws relating to the missions of the coast guard do not define them for activities that can be conducted outside the waters of the Republic of Korea's jurisdiction.

However, recently the 'Coast Guard Agency Laws' were initiated to provide a legal foundation for the establishment of coast guard agency, and these laws may provide a basis for clear definitions of the coast guard's mission scope, waters under management and the likes which may allow the embarkation of coast guard personnel on merchant ships.

4.2 Review for embarking Police/Military personnel on a ship

Embarking military personnel on ships as armed security agents will not be a legal problem if relevant domestic laws are instituted to provide a basis for treating such issues. Generally, a ship falls under the jurisdiction of the flag state and a ship of a certain nation is governed exclusive by the jurisdiction of that nation. However, in the case of police, there is a need to clearly define the scope of mission, jurisdictional sea area under control and other related matters. A general consensus of the population in favor of anti-piracy and ship protection efforts is required, and the responsibilities of the shipping companies and their scope of liability in the case of actual force employment should be clearly defined. Therefore, this measure should be reviewed and considered in a long term.

5. Conclusion

As we have discussed above, it is practically difficult to repel pirates by arming the ship or its crews with weapons. This view is in accordance with the media interview given by Nicolaos Charalambous, Deputy director of maritime security and facilitation of the IMO, in which he stated that "arming merchant ships against Somali pirates will only boost competition in the arms race in the international waters and cannot be the solution to the piracy problem."

The option of embarking PMSC[24] PCASP[25] on the ships to prevent pirate attacks, as can be inferred from the guidelines selected by the IMO, is the preferred option to be chosen by its member states.

A notable IMO member state, Norway has chosen the IMO guidelines on the embarkation of PCASP and is actively enacting. DNK, a Norwegian war insurance company,

24 Private Maritime Security Companies(PMSC)

25 Privately Contracted Armed Security Personnel(PCASP)

has proceeded to publish detailed guidelines on the selection of PMSC. As Norway's Provisional Guidelines[26] indicate, the use of PCASP can be different from each shipping company.

The member states of IMO shall in the future establish domestic laws to provide legal grounds for the employment of PCASP according to IMO's guidelines, and also prepare procedures for obtaining permission to employing PCASP.

Received: Oct. 5, 2011
Reviewed: Nov. 29, 2011
Accepted: Dec. 23, 2011

26 Provisional Guidelines-Use of Armed Guards on Board Norwegian Ships

References

Choi, Jae-Sun. 2009. "US grants defense rights to civilian ships/crews against pirates". KMI Briefing on Dokdo and maritime territory #09-69. (29 June)

Chosun Ilbo Online Edition. 2009. (19 May)

Grandy, R. Neal. 1995. *UNCLOS 1982: A Commentary, Volume Ⅲ.* The Hague: Martinus Nijhoff Publisher.

International Chamber of Shipping(ICS) and European Community Shipowners Associations (ECSA). 2011. (July)

Kim, Dong-Wook. 2009. "Whether armament of merchant vessels allowed?". *Dok-Do Research Journal*, Vol. 7(Autumn).

Lim, Choong-Bin/Manager at Duyang Ltd. "Guide to Shipping Insurance". (http://blog.naver.com/im_chungbin/3003132922)

MSC.1/Circ.1405. 2011. Interim Guidance To Shipowners, Ship Operators, and shipmasters on the use of Privately Contracted Armed Security Personnel on board Ships in the High Risk Area. (23 May)

Republic of Korea Shipping Insurance Organization. Mailing Service 2011. No. 31.

Revised guidance on Combating Piracy agreed by IMO Maritime Safety Committee, Maritime Safety Committee-86th session: 27 May-5 June 2009.

Ronzitti, N. 1988. *The Law of Naval Warfare-A Collection of Agreements and Documents with Commentaries.* Dordrecht: Martinus Nijhoff Publisher.

United States Mariner and Vessel Protection Act of 2009(HR 2984 IH), 111st session of Congress.

Appendix

Flag State	Authorization of arms on board, employment of private armed guards on board and use of firearms		Terms and Conditions	National Official Guidance	Other commentaries
	Security personnel on Board	Possession of weapons on board			
Bahamas	Not recommended neither prohibited It is a decision to be made by the ship operator after due consideration of all risks	Possibility under Bahamian Law But it is also a decision to be made by the ship operator after due consideration of all risks. In addition to that, a firearm license is required	The ship-owner should be able to demonstrate its due diligence (in selecting the security service provider with professional standing); • the security company should be licensed by its national authorities and have licenses from local Port authorities to bring arms on board; • if force is used it shall be the minimum necessary in the circumstances and proportionate according to the threat.	Guidance from the Bahamas Maritime Authority (BMA Information Bulletin No.128 "Guidance to ship-owners on carriage of armed personnel for vessel protection): http://www.bahamasmaritime.com/downloads/Bulletins/128bulltn.pdf	Recommendation to fully follow BMP3's requirements; The Bahamas Government will not accept liability for any matter arising from the use of private armed security personnel on board. It is the sole responsibility of the ship-owner or agents contracting such services (cf. insurance)
Belgium	It is not per se forbidden neither by the general applicable Belgian laws, nor by the Belgian criminal Code	It is not per se forbidden neither by the general applicable Belgian laws, nor by the Belgian criminal Code	Each ship owner has to decide according to general applicable Belgian laws and Belgian criminal Code. The person using weapon has to have a gun license/ firearms certificate. It is not permitted to use certain arm (as automatic firearms) .	General Belgian laws and Belgian criminal Code	Political and practical options are under discussion

Cyprus	No provision in national legislation	No provision in national legislation	X	X	A change of policy regarding private armed guards must be done after due consideration of all the risks involved and definitely after carefully assessing the reliability of a private security services company and its armed guards as well as the rules of engagement of such armed guards. JCSA is strongly in favour that individual states must amend their national legislation in order to provide the necessary legal framework which will regulate the use of private armed guards, as well as to allow for the arrest, prosecution and sentencing of captured pirates in "fast-track" procedure. JCSA is currently working closely with the Cyprus Government towards that direction, something which will provide the means for Cyprus to protect its interests as a Maritime Nation against Piracy. JCSA is pushing the Cyprus Government to become even more involved in all international fora towards the establishment of an international legal framework that will guarantee a uniform and effective confrontation of Pirates.
Denmark	Possibility to apply for permission to use armed guards	Prohibition unless there is authorization from the Justice Department	The application to use armed guards (with the Danish Justice Department which consults with the DMA) must specify: -The details of the vessel, the owner, the guards, the employers and their weapons, the route and the possible alternative; -Anti-piracy measures on board, convoy/escort; -MSCHOA/UKMTO notification; -if the crew has been offered to disembark. It has previously been necessary to substantiate a specific and extraordinary threat against the ship in question. Based on an application, the shipping companies now have the possibility of obtaining a firearms certificate for using armed guards on board Danish ships, provided that the general threat assessment for the area is perceived to require this, and as long as the specifics of the case, also in terms of compliance with Best Management Practices, do not otherwise speak against it.	X	The overall responsibility for the security and safety on board remains with the Master; he has the authority to decide when the arms are to be used. The shipowner and the Master are both for their part responsible for the safety and security of the private security guards.

Finland	A private security company will get a licence for performing a job where carrying a gun is necessary for self-defence. Permission for private armed guards onboard ships could be issued as from today for so called short guns (revolvers and smaller guns) for protecting the vessel.	The interpretation of the private security service is that heavier firearms can be used if the client contracts is established for acting as guard for persons (seafarers) on-board the vessel. This restriction can also be circumwented if the safety guard is educated by an army unit on the use of shotguns and rifles.	X	The approval procedure is based on the Firearms Act (1/1998) and the Government Decree on Private Security Services (543/2002). Licences are issued by the Police Administration.	Referring to TraFi (Maritime Administration) the armed guards can't be employed according to the STCW-regulations and they can't be regarded as passengers. Their position in the crew list must be safety officer or safe guard. The Master remains overall responsible for the safety and security onboard. The FSA opinion is that the right to make decisions about using arms belongs to the safety guard but the captain is also in the position to interpose his veto (however it should be taken into account that a Master doesn't necessarily have the appropriate military experience). The FSA opinion is that we must continue pursuing a policy to get government guidance. The optimal solution would be if the government decided to send units from the Finnish Army onboard. Unfortunately we don't have any military bases in the region.
France	**Prohibition**	**Prohibition BUT** Authorization can be granted under certain conditions determined by decree	X	General French Laws (Act n° 83-629 of 12th July 1983: this law lists the allowed activities of private surveillance and does not include the maritime activities; decree n° 95-589	Recommendation to fully follow BMP3's requirements.
Germany	Requests never approved by German Flag State **BUT** it is not forbidden per se neither by the general applicable German laws, nor by the German Criminal Code (might be methods of self defence)	Requests never approved by German Flag State **BUT** it is not forbidden per se neither by the general applicable German laws, nor by the German Criminal Code (might be methods of self defence)	Each shipowner has to decide according to general applicable German Laws and German criminal Code. The person using a weapon has to have a gun licence/firearms cerificate. It is not permitted to use automatic firearms.	General German laws and General criminal Code	Political and practical options are under discussion.
Greece	**Prohibition**	**Prohibition**	X	Existing Greek legislation	Proposal of UGS on a draft law concerning the employment of private armed guards on board Greek-flagged vessels will be submitted tot he government for examinaion and possibly adoption in the summer recess committee by the Parliament. In accordance with the proposed legislation, private armed guards will be allowed on board, subject to a precise authorisation and under strict conditions. The above measure is optional for shipowners.

Hong Kong	**Recommended but experienced security consultants only (not considered as security guards; possibly signed on as supernumeraries;) to assist the crew in following BMP's requirements and give confidence to all on board**	**Not recommended (risk of escalation of violence and risks to the crew); But in case of no naval protection: possibility to obtain authorization to carry weapons The ship owners have to request a letter for the carriage of weapons on board. Conditions: 1. Possession of weapons only by the Master or person authorized by the owner; 2. Take into consideration: - criteria of choice of the security consultants; - legal situation and liabilities; - request agreement of other parties involved in the voyage; - briefing of the crew.**	Training and certification in Hong-Kong	Marine Department Security Advisories No. 14 (which supersedes No.4)	Recommendation to join Chinese naval convoy escort; Recommendation to fully follow BMP3's requirements ;
Isle of Man	Neither recommended or prohibited. It is a decision to be made by the ship operator after due consideration of all the risks.	No prohibition. A Manx firearms licence is not required for the carriage of firearms on board a Manx ship unless in Manx territorial waters. When in port, local laws concerning the carriage and use of firearms must be complied with. When in the territorial sea, due account should be taken of any applicable laws.	The decision to use armed guards should not be made without first conducting a thorough risk analysis in cooperation with the vessel's insurance underwriters, charterers and legal counsel. The risk assessment does not need to be approved by the Registry. Vetting and selection of a Private Security Provider remains the responsibility of the ship owner. The Master's overriding authority for safety and security of the vessel should be established with the PSP.	Industry Circular No. 16, April 2011: Piracy Counter Measures. http://www.gov.im/lib/docs/ded/shipregistry/survey/industrycirculars/industrycircular16piracycounte.pdf	All Manx vessels are requested to register with MSCHOA prior to entering the risk area. The use of BMP when in the risk area is recommended. Security operatives should have the same health and safety protections as crew. Use of firearms on vessels with dangerous cargoes requires special consideration, mitigation measures should be put in place. Procedures and facilities should be put in place for stowage and control of firearms/ammunition on board.

Italy	Adoption of Decree-law n.107 of 12 July 2011 that allow, in article 5, to place armed guards (governmental or in case of unavailability private contractors) on board Italian flagged vessels. DL n.107 entered into force on 12 July 2011, the same day of its publication on the Italian Official Journal.	No provision in national law.	X	On request of the shipowners who bear the entire cost, it is possible to embark armed guards on board from the Naval Forces that may also appeal to personnel of others military forces, and use of arms to ensure the protection of the ship and crew. In case of unavailability of governmental guards, private contractors can be embarked.	Detailed rules and terms of reference for armed guards will be stipulated within 60 days from the entry into force through a Decree of the Ministry of Internal Affairs concerted with the Ministry of Defence and the Ministry of Transport that will fix the requirements for the possess, use, purchase and transport of arms and munitions on board.
Japan	Prohibition	Prohibition	X	Japanese Firearms and Swords Control Law (which in principle prohibits the possession of arms and swords in Japan)	Possibility of discussion on the issue in Japan if the current increasing level of violence of piracy acts isn't rectified
Liberia	No prohibition • Within the master's discretion • only if the Administration's requirements are satisfied	No prohibition Within the master's discretion	Owner or Master shall conduct risk assessment as described in MSA 03/2011 and the Guidance; Owner must take appropriate measures to verify the credibility and experience of the company, as detailed in MSA 03/2011 and the Guidance. Provisions relating to PCASP should be included in an Appendix to the Ship Security Plan (SSP). The appendix should include the following features: • Procedures pertaining to application of additional anti-piracy measures • Watch keeping and vigilance • Communication procedures with the PCASP • Use of defensive measures • Use of passive/non lethal devices • Authority of the Master (PCASP embarked on the vessel are at all times subject to the overriding authority of the vessel's Master) • Activation of PCASP and the risk of escalation.	Guidance from the Bureau of Maritime Affairs of the Republic of Liberia: 1. Maritime Security Advisory – 03/2011 : http://www.liscr.com/liscr/Portals/0/SecurityAdvisory_03-2011.pdf "Interim IMO Guidance on the use of Privately Contracted Armed Security Personnel on Board Ships in the High Risk Area" 2. "Piracy: Guidance for Liberian Flagged Vessels Regarding 3rd Party Security Teams 2011" 3. Liberian maritime regulations 10.296 and Section 296 which specify that ship's Master shall assume full responsibility for the safety of the members of the crews and passengers, and has to take all necessary and appropriate steps in connection therewith).	Recommendations to the ship owner: • Due diligence • Training of crew and PCASP • To discuss in detail the insurance coverage that the maritime security company holds • Assure that a Use of Force Continuum is established as part of the contract with the PMSC

Lithuania	No legal disposition to place armed guards (private or state) on merchant ship.	No legal ground to arm ship's crew.	X	X	After the IMO guidelines for armed guards on board are published, the Lithuanian Shipowners do expect to start their talks with officials and to investigate possibilities to place armed guards on board.
Netherlands	No prohibition *per se*	According to Dutch law, it is forbidden to have fire arms on board a Dutch flagged ship.	X	X	In practice this means that Dutch law does not permit to place a private armed team on board with sufficient weapons to act in case of a piracy attack.
Norway	No prohibition (the Act of 16 February 2007 states that actions should be taken by the master in order to avoid and prohibit piracy and this could include the use of force, e.g. private armed guards on board flag state vessels)	No prohibition	Private guidelines with detailed regulations have been published. by The Norwegian Shipowners' Mutual War Risk Club (DNK) . According to the guidelines the DNK has to be notified in advance when the ship owner considers using PSC. According to the Regulation on weapons, the shipowner needs a license issued by the local police. The license is issued for a period of six month. The license is a general permission given to the company to have private armed guards on board the companies' Norwegian flagged vessels.	*Act of 16 February 2007 No.9 relating to Ship Safety and Security (The Ship Safety and Security Act) art. 39 and 40. *Amendments to the Regulation of 22 June 2004 No. 972 concerning protective security measures on board ships and mobile offshore drilling units	In the amended regulation that came into force 1 July 2011: -The Master remains in command and has the last word in all cases; -The ship owner has the overall responsibility for the safety and security on board; -Each party to the contract agrees to bear the responsibility for its own people and property without the right of recourse against the other contracting party;

Poland	No legal disposition to place armed guards (private or state) on merchant ship.	No legal ground to arm ship's crew.	X	X	There is no need for such legal dispositions in Poland. This is due to the fact that almost all ocean-going vessels which are owned and/ or operated by the Polish Shipowners are registered under the 3rd country Flag therefore, the problem of crew security and safety is regulated and/or remains under scrutiny and control of the respective Flag State administration.
Portugal	No legal disposition allowing for the presence of armed guards on board	No legal disposition allowing the existence and the use of weapons on board.	To adopt this measure a specific permission from the Portuguese Administration is required.	X	X
Singapore	No prohibition.	No prohibition. With a caveat that carriage and use of firearms and ammunition on board Singapore registered ships is not encouraged.	The MPA Shipping circular No. 11 of 2011 refers to the interim guidance in IMO document MSC.1/Circ.1405, 23 May 2011. Owners embarking PCASP should keep the Registry informed of their decision via email	Maritime and Port Authority of Singapore Shipping Circular No. 11 of 2011, 10 June 2011 http://www.mpa.gov.sg/sites/port_and_shipping/circulars_and_notices/shipping_circulars_detail.page?filename=sc11-11.xml	There may be scenarios that ship owners are considering the use of armed guards for ships transiting the piracy High Risk Area due to the increased threat by Somalia-based pirates. However, the use of PCASP should not be considered as an alternative to Best Management Practices (BMP) and other protective measures. While the crew of a Singapore-registered ship, or their hired armed security personnel may lawfully bear arms, they will still be liable under Singapore's laws if they use their arms on board the ship without lawful excuse, as a person on board is not exempted from criminal liability in respect of any office that he commits on the ship.
Spain	Royal Decree 1628/2009 on private security and weapons allows to take on board Spanish flag ships (both merchant and fishing vessels) armed private security guards to accomplish protection tasks (preventing and repelling attacks), if such ships are outside the Spanish territorial waters and confront a situation of particular risk to persons and property.	The Order PRE/2914/2009 developed Royal Decree 1628/2009 by setting the conditions for the possession, control, use and acquisition of war weapons' by private security companies, as well as the characteristics of authorized weapons. According to this Order, these services may only be provided by security companies established in Spain, registered in the Spanish Interior Ministry and authorized to provide monitoring and protection activities and services. The security guards must make limited use of such weapons, with the sole aim of preventing and discouraging from possible attacks, but may, if necessary, use the weapons in order to repel an armed aggression in a properly and proportional way.	X	Royal Decree 1628/2009, on private security and weapons. Order PRE/2914/2009.	X

U.K	No restrictions or regulations currently exist and the recommendations contained in MSC.1Circ.1406 are expected to be used as a basis for national control measures.	The Government's legal advice indicates that the carriage of weapons onboard UK ships is controlled by UK firearms legislation and licensing requirements, any carriage of weapons on ships by PCASP at the present time would likely contravene these existing laws.	None are specified	Carriage is currently 'Not recommended'. Both Chamber and UK Government are moving to a more neutral stance and the carriage of weapons onboard ship, under exceptional and limited conditions is likely to permitted in the future under an exemption scheme.	It is acknowledged that some UK ships currently embark PCASP. UK Government and the Chamber wish to decriminalise the use of PCASP whilst ensuring robust control measures are put in place to regulate their activities. The widespread use of PCASP is not encouraged.
USA	Possibility under the principles of "self-Defence" and "Defence of others" (Ship owner's decision)	The U.S. State Department grants temporary licenses under ITAR regulations, and the Department of Homeland Security enforces the requirements. http://www.gpo.gov/fdsys/search/home.action. Selection "Code of Federal Regulations" on right side banner, then "2011" then "Title 22 – Foreign Relations", then "Chapter 1 – Department of State", then "Subchapter M – ITAR Regulations". ITAR Regulations are found at 22 CFR 120-130; specific applicability of Section 22 CFR 123.	Weapons: only fifty caliber or less and not fully automatic; ISPS Code: to take into account the ISPS Ship Security Plan conditions (the U.S. requires that private armed guard protection be part of the Ship Security Plan approved by the Coast Guard); U.S. Coast Guard approval: conditions have to be reviewed and approved by the U.S. Coast Guard; No U.S. government insurance requirements.	Port Security Advisory (3-09) on Guidance on self-Defence or Defence of others by U.S. Flagged commercial vessels operating in high risk waters http://homeport.uscg.mil/mycg/portal/ep/home.do. At search block in upper right hand corner of home page input "port security advisory"; then scroll down to PSA 03-09 to open file	The master has the responsibility for and control of private armed security guards including when the force is used; Liability for use of force is dependent on the circumstances of each case; Security guards are not part of the crew and are treated as passengers for the purpose of safety; Within the Ship Security Plan approval process, the owner is responsible for performing background checks on personnel; The Coast Guard Authorization Act (section 912) provides substantial, but not complete, immunity for monetary damages for any injury or death caused by such force to any person engaging in an act of piracy (...).

INTERNATIONAL CHAMBER OF SHIPPING (ICS) AND EUROPEAN COMMUNITY SHIPOWNERS ASSOCIATIONS (ECSA) JULY 2011

KMI International Journal of Maritime Affairs and Fisheries • Volume 3 Issue 2 December 2011 pp.139-162 •

TAC Assessment of Multiple Species and Single Fishing Gear†

- case study on mackerel and jack mackerel caught by the large purse seine fleet -

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ABSTRACT

This paper provides a total allowable catch assessment model for single fishing gear and multiple species fishery in South Korea. To estimate appropriate allowable biological catch of mackerel and jack mackerel caught by the large purse seine fleet within the territorial waters of South Korea, this paper uses an extended Beverton-Holt yield per recruit model and a biomass-based cohort analysis. The extended Beverton-Holt yield per recruit model adds two terms, a relative bycatch index (w_i) and a relative instantaneous fishing mortality index (a_i), to the original Beverton-Holt model. The reason for adding new terms is because the bycatch of those species caught by the large purse seine fleet is able to affect the instantaneous fishing mortality as well as the recruitment of each species. In conclusion, this paper suggests that the current allowable biological catch level of mackerel needs to be lowered to prevent overfishing of jack mackerel with the small stock due to bycatch.

Key words: TAC Assessment Model, Multiple Species, Single Fishing Gear, Korean TAC System, Allowable Biological Catch, Mackerel, Jack Mackerel

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† This study was sponsored by Korea-America Joint Marine Policy Research Center established by Korea Maritime Institute and University of Rhode Island. Authors partially revised and supplemented a research report, "a study on assessment of TAC for multiple species and multi-gears", published in 2005.

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*** John M. Gates, a professor and fisheries specialist, University of Rhode Island, passed away in 2010. One of his great joys was use of mathematical programming. Although he is not near us, he will be remembered as a gentle, kind, and endearing man who was charmingly absentminded.

1. Introduction

The territorial waters of South Korea are in a temperate marine zone. More than 200 species are found in the territorial waters of South Korea and approximately 37 fishing gears have fished off there. As a result, multiple species have been caught by multiple fishing gears so that most Korean fishing gears have targeted multiple species.

Meanwhile, the Korean government has enforced Total Allowable Catch (TAC) system since 1999 and also has gradually extended TAC species. Particularly, multiple species[1] with high commercial value will be added to the list of TAC species in the near future (Ryu *et al*., 2002; Ryu, Nam, and Gates, 2006). Therefore, assessment models of TAC set-up suitable to multiple species fisheries of South Korea will be needed.

The Korean TAC assessment model is based on the Allowable Biological Catch (ABC) estimation designed to ensure that Spawning Stock Biomass (SSB) remains at or above the precautionary biomass level (Kell *et al*, 2006). Data used in the analysis depend on biological information for individual species and its past catching history (Baik *et al*., 2004). In particular, the TAC assessment model[2] has only considered single species and single fishing gear. It has not considered interactions[3] among multiple species and multiple fishing gears.

As a result, it is not easy to explicitly estimate ABCs of the targeted TAC species. It is able to over- or under-estimate the ABCs of the targeted TAC species. The reason for this is because it treats as exogenous variables such as biological, technical and economic interactions, and environmental factors. As an example, the TAC of the sardine has especially been higher than its catch proportion since the TAC system began in 1999. The environmental factor such as a sudden rise of water temperature has been rarely reflected in the TAC of the sardine. In addition, in most Korean TAC species with high bycatch rate, the TACs used since 1999 appear to have been inadequate to conserve the resource of TAC species by not reflecting the omission of bycatches. Thus, this paper provides an extended TAC assessment model considering technical interactions[4] to re-estimate TAC

1 Among multiple species (e.g., hairtail, flounder, puffers, redlip croaker, conger eel) with high commercial value, squid officially added to the list of TAC species in 2007. Also, the Korean TAC species are 11 species in 2012.

2 The Korean TAC assessment model, which does not consider technical interactions such as the bycatch component, uses the single species Beverton-Holt yield per recruit model to most TAC species (Beverton and Holt, 1957).

3 Interactions – (a) biological interaction is the interaction between fish stocks, and within fish stocks, caused by predation and food competition, (b) economic interaction is the competition between fleets, e.g. between an industrial fishery and an artisanal fishery. The more one fleet catches of the limited resource the less will be left for its competitors. (c) technical interaction means that the fishery on one stock creates fishing mortality on other stocks because the fishery is either a multiple species fishery or because of inevitable bycatches (Venema, 1998).

4 This paper just provides a type of multiple species and a fishing gear with a technical interaction considering a bycatch component, but hereafter, this case study needs to provide several types like a single species & multiple fishing gears and multiple species & multiple fishing gears considering three interactions.

levels for multiple species (i.e., mackerel and jack mackerel) caught by a single fishing gear (i.e., the large purse seine fleet).

The purposes of the paper are first to set up a TAC assessment system considering technical interactions, as an auxiliary and precautionary means, for overcoming limitations of the TAC assessment model, and for rational operation of the Korean TAC system, secondly, to develop an extended TAC assessment model for estimating significant TAC of multiple species selected. Finally, the paper from results analyzed suggests policy directions of the Korean TAC system.

Table 1. The Korean TAC System: 9 Species and 5 Fisheries (1999~2003)

Fishing Gears	Species	1999		2000		2001		2002		2003	
		TAC (ton)	Catch Proportion (%)	TAC (ton)	Catch Proportion (%)	TAC (ton)	Catch Proportion (%)	TAC (ton)	Catch Proportion (%)	TAC (ton)	Catch Proportion (%)
Large Purse Seine	Mackerel	133,000	115	170,000	49	165,000	96	160,000	79	158,000	74
	Jack Mackerel	13,800	47	13,800	68	10,600	90	10,600	100	11,000	100
	Sardine	22,660	42	22,600	3	19,000	0.6	17,000	0	13,000	0
Off-Shore Trap	Red Snow Crab	39,000	65	39,000	78	28,000	69	28,000	64	22,000	92
	King Crab	-	-	-	-	-	-	1,220	78	1,000	61
Diver	Purplish Washington Clam	-	-	-	-	9,500	64	9,000	59	9,000	52
	Fun Mussel	-	-	-	-	4,500	33	2,500	57	2,500	65
Village	Cheju Island Top Shell	-	-	-	-	2,150	90	2,058	96	2,150	91
Off-Shore Gill Net Trap	Blue Crab	-	-	-	-	-	-	1,550	97	13,000	38
Total		208,460	93	245,400	51	238,750	81	231,928	72	231,650	70

Source: Ryu, J., Nam, J., and Gates J. M., 2006. Limitations of the Korean Conventional Fisheries Management Regime and Expanding Korean TAC System toward Output Control System, Marine Policy 30: 510-522.

The paper is organized as follows. Section 2 shows the theoretical approach of TAC assessment about multiple species and single fishing gear with a technical interaction based on a modified Beverton-Holt yield per recruit model and a surplus production model. Section 3 provides the basic structure of an extended TAC assessment model. Section 4 analyzes the optimal ABC level of the single gear and multiple species case using the extended yield per recruit model and biomass-based cohort analysis and also discusses and compares the ABC levels analyzed by the extended TAC assessment model to the current Korean TAC assessment model. Section 5 contains concluding remarks about implications and limitations of the Korean TAC system for single gear and multiple species assessment.

2. Theoretical approach of multiple species and single fishing gear

Most analyses of multiple species fisheries have ignored the effects of joint catch due to a premise that the each unit of effort is directly applied to each species. The premise is reasonable, because the bycatch component of a species is small relative to the targeted catch of the species (Pascoe, 1995). However, the Korean fisheries have experienced high bycatch rate among TAC species.

Table 2. Bycatch Rate (bi)oftheKoreanTACSpecies

(unit: %)

Fishing Gears	Species	1977	1980	1985	1990	1995	2001	Average
Large Purse Seine	Mackerel	14.35	6.58	16.71	8.9	35.28	23.26	17.5
	Jack Mackerel	19.84	64.61	33.18	45.1	58.38	57.07	46.4
	Sardine	12.1	26.34	17.09	8.63	6.65	8.93	13.3
Off-shore Trap	Red Snow Crab	-	-	-	-	0.05	3.22	1.6
Diver	Fun Mussel	40.13	16.16	27.01	35.97	7.99	7.06	22.4
Village	Cheju Island Top Shell	59.63	47.17	53.51	67.81	75.42	74.67	63.04
Off-shore gill net trap	Blue crab	32.44	53.44	50	-	22.66	61.31	64.78

Source: Ryu, J. *et al*., 2002. A Study on Annual Expansion Program of TAC Target Species, Ministry of Maritime Affairs and Fisheries (MOMAF), 167 pp.

Analyses which do not consider technical interactions such as the bycatch component, can cause a bias in TAC estimation by species. Nevertheless, the Korean TAC assessment has used the single species Beverton-Holt yield per recruit model[5] in most TAC species (Beverton and Holt, 1957; Baik *et al*., 2004). A theoretical limitation of this model is that the instantaneous fishing mortality (F) in the model does not reflect each species' bycatch.

However, the instantaneous fishing mortality from bycatches can differentially affect yields per recruit in real world. Hence, for multiple species fisheries with high bycatch rates of target species, yield per recruit by species needs to be more accurately estimated

5 Beverton and Holt (1957) developed, as yield per recruit model, a theory of fishing of Baranov (1918) using the von Bertalanffy (1938) curve which described growth in fish length. The single species Beverton and Holt yield per recruit model can be described as

$$Y / R = F \exp(-M(t_c - t_r)) \cdot W_\infty \sum_{n=0}^{3} \frac{U_n \exp[-nK(t_c - t_0)]}{F + M + nK} \cdot (1 - \exp[-(F + M + nK)(t_L - t_c)]).$$

where Y/R represents yield per recruit in weight (g), F represents instantaneous fishing mortality coefficient, M represents instantaneous natural mortality coefficient, U_n represents summation parameters (U_0=1, U_1=-3, U_2=3, and U_3=-1), t_c represents mean age (years) at first capture, t_r represents mean age (years) at recruitment to the fishing area, W_∞ represents asymptotic weight, t_0 represents hypothetical age the fish would be zero length, K represents the Brody growth coefficient, and t_L represents the maximum age (years).

by inserting additional terms in the model. Specifically, an extended Beverton-Holt yield per recruit model for single fishing gear and multiple species adds two terms [a relative bycatch index (w_i) and a relative instantaneous fishing mortality index (a_i)] to the original Beverton-Holt model. The reason for adding new terms is that bycatch of mackerel and jack mackerel caught by the large purse seine fleet can affect the instantaneous fishing mortality and recruitment of each species. The new terms capture the changes in fishing mortality and stock of each species due to bycatches.

As previous literatures with related to multiple species and fishing gears, Murawski (1984) provided a detailed account of a single fishery and multiple species yield per recruit model which is quite similar conceptually to that presented by Beverton and Holt. Murawski also extended the model to examine the case where several fisheries exploit differing mixtures of the same stocks and applied both the single and multiple fisheries models to the Georges Bank otter trawl fishery (Murawski, 1984; Murawski, Lange and Idoine, 1991). Daan (1987) and Pascoe (1994) have developed a model where the catch of one species is a function of the effort applied to that species as well as the effort targeted on other species in the fishery. It implies that there are separate target and bycatch catchability coefficients (Pascoe, 1995). Seo and Zhang (2001) provided a multiple species yield per recruit model which uses individual catch rate of the multiple species (hair tail, small yellow croaker, white croaker and pomfret) caught by the Korean pair trawl fishery.

In addition, Anderson (1975, 1977) developed a theoretical two-species model where the catch of one species was a function of the effort directed at that species as well as the effort directed at the other species. This approach based on the surplus production model (Schaefer, 1954; 1957) provides a strong theoretical basis for the extended Beverton-Holt single gear and multiple species yield per recruit model. A theoretical multiple species and a fishing gear model can be interpreted as shown in the following Figure 1.

Yields caught of either type of fish depend upon the effort used and the size of the respective population. Each species has a population equilibrium curve (PEC), as shown in Figure 1(a). Since the two populations are independent, the curves are derived from the relevant intersection between individual fishing effort and equilibrium population such that the equilibrium population size decreases as fishing effort increases. Thus, in the absence of fishing effort, mackerel has an unexploited equilibrium population size of P_3. Similarly, the natural equilibrium size of jack mackerel is P_1. As effort increases, a new equilibrium is reached at a lower population size due to the increase in catch. Particularly, when fishing effort reaches E_2, the stock species B is destroyed at zero but that of mackerel is at P_2. If fishing effort reaches E_4, the population of mackerel is depleted as well.

When each species is at a sustainable yield such as the Figure 1(b), the total sustainable yield is the sum of the two sustainable yields. For instance, when fishing effort of both species is E1, the equilibrium yields of those are Y_1 and Y_2 respectively. Therefore,

the total sustainable yield (Y_1+Y_2) at this level of fishing effort comprises those two quantities as shown in the Figure 1(c), and the revenue earned by multiplying relative prices by the sustainable yields depends upon the price of the two species and the volume of each catch.

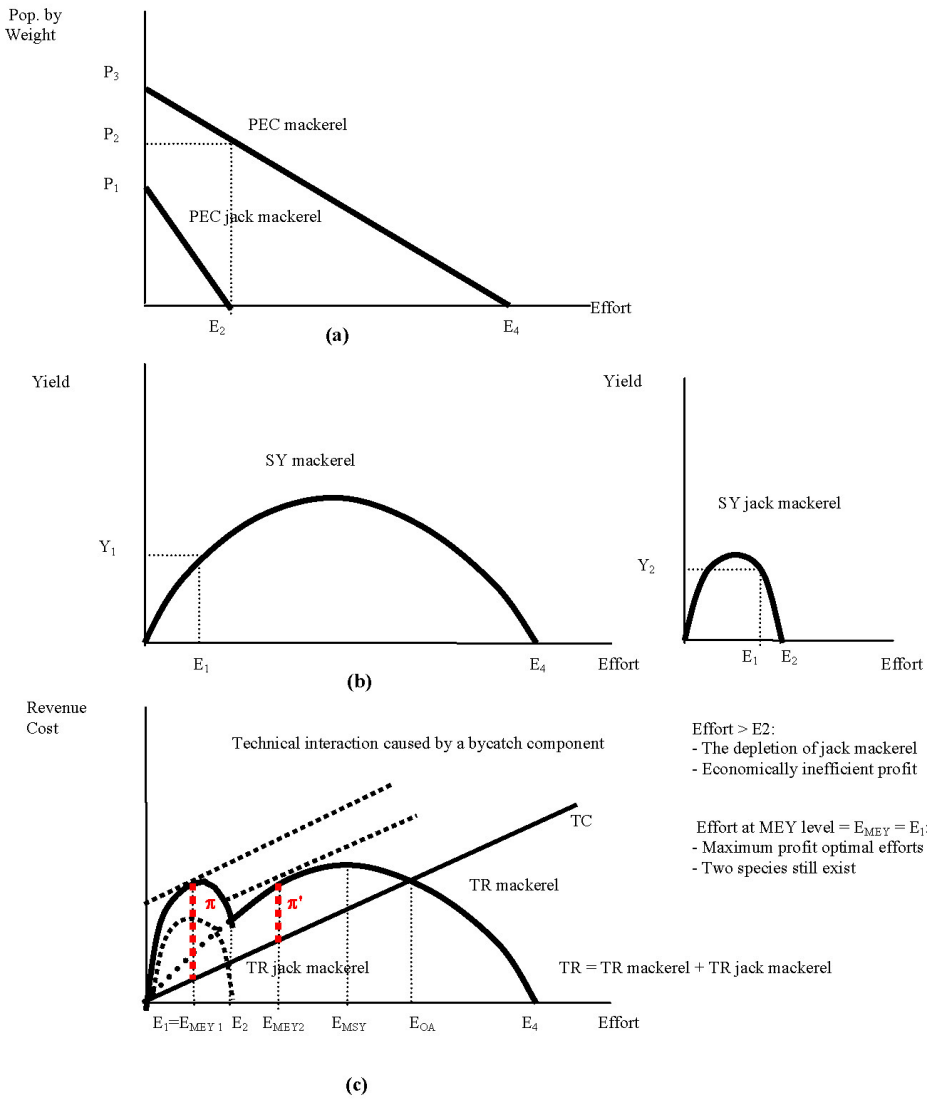


Figure 1. A Theoretical Approach on Mackerel and Jack Mackerel Caught by the large purse seine fleet with Technical Interaction

Economically, E_{MEY1} or E_1 is more efficient than E_{MEY2}, E_{MSY}, and E_{OA}, because although fishing effort is less, profit (π) of E_{MEY1} is the highest at the given the total cost (TC). In addition, both species are biologically still remaining in E_{MEY1}, but are not in E_{MEY2}. At that point with E_{MEY2}, jack mackerel is completely depleted. Also, total revenue arises entirely from the catch of mackerel. Thus, in this theoretical multiple species and a fishing gear example, E_{OA} at open-access fishery and E_{MSY} regulation destroy jack mackerel that could have been of value to another sector of society (i.e. social welfare loss) such as sports or recreational fishing. E_{MEY2} regulation also destroys jack mackerel (Anderson, 1975; 1977).

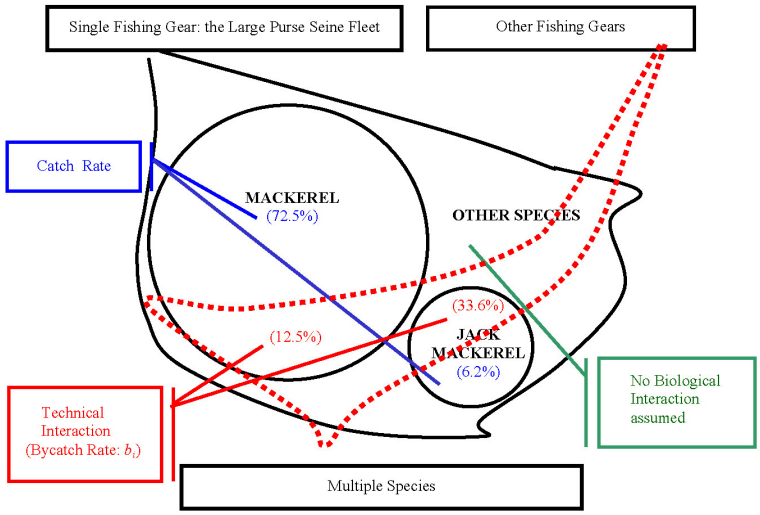
In conclusion, in a fishery with two technically-related species, exclusive focus which only considers one species without considering the bycatches of the other species, may result in depletion of one or both species. Therefore, although two species are biologically independent, bycatch between two species due to fishing activity of the single fishing gear can result in depletion of the bycatch species.

3. An extended TAC assessment model

This paper provides a case of technical interaction shown in mackerel and jack mackerel caught by the large purse seine fleet in Korean waters. Mackerel and jack mackerel caught by the fleet was averagely 72.5 percent and 6.2 percent from 1994 to 2003 respectively (MOMAF, 2004). The extended TAC assessment model applies a modified Beverton-Holt single gear-multiple species yield per recruit model and biomass-based cohort analysis.

The model assumes that first, two species are independent so that there are no biological interactions between them, secondly, they are only caught by the selected fleet and other species (e.g., sardine, squid, hairtail) caught by the fleet are ignored, thirdly, there is a technical interaction in that the fleet generates fishing mortality to stocks of non-target species besides target species, and fourthly, bycatch rate of the two species caught by other gears(e.g., the large bottom trawl, the large trawl) is considered.

The basic structure on multiple species and single fishing gear is illustrated in Figure 2.



Source: Ministry of Maritime Affairs and Fisheries (MOMAF), 2004. http://fs.fips.go.kr/index.jsp

Figure 2. The Basic Structure of Multiple Species by Single Fishing Gear

3.1 An Extended Beverton-Holt Single Gear and Multiple Species Yield per Recruit Model

To more accurately estimate annual fishing mortalities (year^{-1}) such as F_{ABC} for multiple species and single fishing gear, the extended Beverton-Holt yield per recruit model can be transformed as Eq. 1. The extended model adds a relative bycatch index (w_i) and a relative instantaneous fishing mortality index (a_i) to consider technical interactions such as bycatch component.

$$Y/R=\sum_{i=1}^{s} w_i a_i F \exp(-M_i(t_{ci}-t_{ri}))\cdot W_{\infty i}\sum_{n=0}^{3}\frac{U_n \exp[-nK_i(t_{ci}-t_{0i})]}{a_i F+M_i+nK_i}\cdot(1-\exp[-(a_i F+M_i+nK_i)(t_{Li}-t_{ci})]) \quad \text{(Eq. 1)}$$

s : the number of species
w_i : the relative bycatch index of i species (bycatch rate of i species / average bycatch rate of all species targeted)
a_i : the relative instantaneous fishing mortality index of i species (= Fi / $\overline{F_w}$)
F : the instantaneous fishing mortality rate
$\overline{F_w}$: the weighted average instantaneous fishing mortality rate of s species
M_i : the instantaneous natural mortality coefficient of i species
t_{ci} : the mean age (years) at first capture of i species
t_{ri} : the mean age (years) at recruitment to the fishing area of i species

$W_{\infty i}$: the asymptotic weight parameter of i species
U_n : the summation parameters (U_0=*1*, U_1=*-3*, U_2=*3*, U_3=*-1*)
K_i : the Brody growth coefficient of i species
t_{0i} : the hypothetical age when the fish of i species would be zero length
t_{Li} : the maximum age (years) of i species

The weighted average instantaneous fishing mortality rate ($\overline{F_w}$) which reflects a bycatch component implies the ratio of the sum of instantaneous fishing mortality rate of i^{th} species (F_i) × the bycatch rate of i^{th} species (b_i), divided by sum of b_i. $\overline{F_w}$ can be expressed by

$$\overline{F_w} = \frac{\sum_{i=1}^{s} b_i F_i}{\sum_{i=1}^{s} b_i} \qquad \text{(Eq. 2)}$$

s : the number of species (i = *1, 2, ⋯ , s*)
b_i : the bycatch rate of species i

where b_i can be estimated by its target fishing gear and total annual catch. The b_i implies the proportion of the TAC target species i which is not caught by k fishing gear for the annual total catch.

$$b_i = 1 - C_k / TC_{all} \qquad \text{(Eq. 3)}$$

C_k : an annual catch caught by k fishing gear for a TAC target species i
TC_{all}: an annual total catch caught by all fishing gears for a TAC target species i

The level of fishing mortality at F0.1 is formally defined for a given recruitment age as that level of F where (Deriso, 1987)

$$\left.\frac{d(Y/R)}{dF}\right|_{F=F_{0.1}} = \left.\frac{(0.1)d(Y/R)}{dF}\right|_{F=0.0} \qquad \text{(Eq. 4)}^{6}$$

6 This equation is used in the first order Taylor series approximation to project yield. This approximation is only valid for "small" F value. For "large" F values, higher order terms would be needed. For the case study, F is relatively low. $F_{0.1}$ means that the slope of the yield per recruit curve for the $F_{0.1}$ rate is only the one-tenth slope of the curve at its origin.

$F_{0.1}$ can be estimated by Eq. 1 and Eq. 4. In addition, F_{MAX} can be estimated by the highest level (g) of the extended Beverton-Holt yield per recruit obtained from changes in instantaneous fishing mortality. F_{MAX} means the rate of fishing mortality that produces the maximum yield per recruit. This is the point that defines growth overfishing.

3.2 An Extended Spawning Stock Biomass per Recruit Model

A spawning stock biomass per recruit (SSB/R) model has received much attention as a means to preserve reproductive potential of the population (Quinn and Deriso, 1999). The SSB/R was introduced by Shepherd (1982), Campbell (1985), Sissenwine and Shepherd (1987), Prager *et al*. (1987) and Gabriel *et al*. (1989). To estimate $F_{x\%}$ of mackerel and jack mackerel caught by the large purse seine fleet, the extended spawning stock biomass per recruit model is used as

$$\left.\frac{SSB}{R}\right|_{F=0} = \sum_{t=t_r}^{t_\lambda} m_t \cdot \exp[-M(t_c - t_r)] \cdot W_\infty \sum_{n=0}^{3} \frac{U_n \exp[-nK(t_c - t_0)]}{(M+nK)} \cdot (1 - \exp[-(M+nK)(t_L - t_c)]) \quad \text{(Eq. 5)}$$

SSB : the spawning stock biomass
R : the particular level of recruitment
t_λ : the maximum age of species
m_t : the mature proportion by age t *of species*
mackerel (m_1=0.02, m_2=0.68, m_3=0.95, m_4=0.96, m_5=1.00)
jack mackerel(m_1=0.15, m_2=0.40, m_3=0.80, m_4=0.95, m_5 = 1.00) (Baik *et al*., 2004).

In addition, when $F=F_{0.x}$, SSB/R is as follows.

$$\left.\frac{SSB}{R}\right|_{F=F_{0.x}} = \sum_{t=t_r}^{t_\lambda} m \cdot \exp[-M(t_c - t_r)] \cdot W_\infty \sum_{n=0}^{3} \frac{U_n \exp[-nK(t_c - t_0)]}{(F+M+nK)} \cdot (1 - \exp[-(F+M+nK)(t_L - t_c)]) \quad \text{(Eq. 6)}$$

where % SSB/R (or % SPR) means the proportion of SSB/R $_{F=F0.x}$ divided by SSB/$R_{F=0}$ in absent of fishing effort. To find X%, it can be derived as Eq. 7.

$$\frac{SSB/R\big|_{F=Fo.x}}{SSB/R\big|_{F=0}} = X\% \quad \text{(Eq. 7)}$$

$F_{0.x}$: the instantaneous fishing mortality of each level such as $F_{0.1}$, $F_{0.2}$, or $F_{0.3}$.

3.3 A Biomass-Based Cohort Analysis Model

To estimate biomass (B_{ij}) by cohort (age) of j species in year i and instantaneous fishing mortality (F_{ij}) of j age-species in year i, the biomass-based cohort analysis is used as Eq. 8 (Pope, 1972). However, the result of each species' biomass (B_{ij}) in this model estimated by Baik *et al*. (2004) is directly used.

$$B_{ij} = B_{i+1\,j+1} e^{(M-G_j)} + C_{ij} e^{\left(\frac{M-G_j}{2}\right)} \qquad \text{(Eq. 8)}$$

B_{ij} : the biomass in weight by cohort (age) of j age-species in early of year i
C_{ij} : the catch in weight by cohort (age) of j age-species in year i
M : the instantaneous natural mortality rate
G_j : the instantaneous growth rate of j age-species

For the last year and maximum age, the biomass-based cohort analysis can be estimated by Eq. 9.

$$B_{ij} = C_{ij} \frac{(F_{ij} + M - G_j)}{F_{ij}(1 - e^{-(F_{ij}+M-G_j)})} \qquad \text{(Eq. 9)}$$

F_{ij} : the instantaneous fishing mortality of j age-species in year i

The instantaneous fishing mortality of j age-species in year i (Fij) can be estimated by Eq. 10.

$$F_{ij} = \ln\left(\frac{B_{ij}}{B_{i+1\,j+1}}\right) - M + G_j \qquad \text{(Eq. 10)}$$

The instantaneous growth rate of j age-species (G_j) can be estimated by Eq. 11.

$$G_j = \ln\left(\frac{W_{j+1}}{W_j}\right) \qquad \text{(Eq. 11)}$$

W_{j+1} : the weight of $j+1$ age-species
W_j : the weight of j age-species

3.4 Estimation Equation for Annual Allowable Catch (ABC)

To estimate ABC of multiple species, ABC estimation equation of tier 1~3 information suitable to the Korean ABC estimation model (Baik *et al*., 2004) is used.

$$ABC = \sum_{i=0}^{I_\lambda} \frac{B_{ij} F_{ABC}}{M + F_{ABC}} (1 - e^{-(M + F_{ABC})}) \quad \text{(Eq. 12)}$$

ABC : the annual allowable catch of species
F_{ABC} : the annual allowable catch of species

Finally, to compare the current Korean ABC for single species and single fishing gear with ABC for multiple species and single fishing gear, this paper applies F_{ABC} of the two models and calculates the associated ABCs. In addition, ABC of each species caught by the large purse seine fleet is calculated by ABC of each species and recent average catch rate of each species caught by the large purse seine fleet.

ABC of each species caught by the large purse seine fleet
= ABC of each species X recent average catch rate (2000~2003)

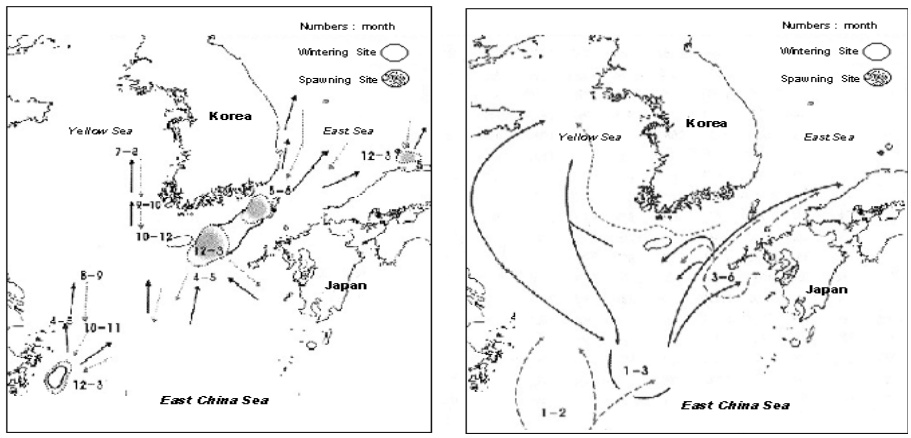
4. Analysis and results

This section analyzes the optimal TAC level for the study fishery and compares the TAC level of the extended model with that of the current Korean TAC assessment model.

4.1 Target Species and Gear

Mackerel caught in Korean territorial waters belongs to two different stocks − East China Sea and Tsushima stocks. The main spawning areas of these stocks are near the East China Sea (Dec.~Mar.), Cheju Island (Dec.~Mar.) and Tsushima Island (May~June). Mackerel mainly inhabits the Yellow Sea, the East China Sea, the East Sea and the southern waters of S. Korea. Jack mackerel inhabits the Yellow and the East China Seas, the southern waters of S. Korea, and the western waters of the Kyushu region. The main spawning areas of jack mackerel are near the middle of the East China Sea (Feb.~Mar.), the western of the Kyushu region (Apr.~Mar.), and Cheju Island (June~Aug.).

These two species live in almost the same places as shown in Figure 3. These two species are caught by the large purse seines fleets and have high potential of bycatches. Major species (i.e. mackerel, jack mackerel, sardine, squid) caught by the same fleets have been regarded as major species in the current Korean TAC system. Therefore, the multiple species and the large purse seine fleet can be an appropriate empirical model of the alternative TAC model.



(a) mackerel (b) jack mackerel

Source: National Fisheries Research and Development Institute (NFRDI) 2005. http://www.nfrda.re.kr/sea-fish-info/fis/fdata5.html

Figure 3. Migrations of Mackerel and Jack Mackerel

4.2 Analysis Data

Selection of Major Target Species Caught by the Large Purse Seine Fleet

To compare TAC of each species estimated by two models, sardine, hairtail, and squid species were excluded in this model. The reason for this is because sardine species had low bycatch and catch rates, and also hairtail and squid species did not belong to TAC target species until 2005. Therefore, mackerel and jack mackerel species with high catch rate and bycatch rate are used in this model. These two species occupy, on average, about 80% of total catches of the large purse seine fleet during the past 10 years (Table 3). In addition, the average bycatch rate of the two species shows mackerel (17.5%) and jack mackerel (46.4%), respectively (Table 2).

Table 3. Catches and Percentage Composition of Major Target Species Caught by the Large Purse Seine Fleet (1994~2003)

(unit: ton, %)

Year	Gear	Large Purse Seine Fleet				
	Species	Mackerel	Jack Mackerel	Sardine	Others	Sum
1994	Catches	197,761	35,036	35,335	42,835	310,967
	Percentage	64	11	11	14	100
1995	Catches	159,820	7,521	13,078	47,576	227,995
	Percentage	70	3	6	21	100
1996	Catches	386,877	10,790	15,837	39,833	453,337
	Percentage	85	2	3	9	100
1997	Catches	139,293	12,867	6,844	25,785	184,789
	Percentage	75	7	4	14	100
1998	Catches	148,892	15,296	5,661	35,188	205,037
	Percentage	73	7	3	17	100
1999	Catches	155,728	7,913	16,791	49,495	229,927
	Percentage	68	3	7	22	100
2000	Catches	109,025	14,288	2,161	54,514	179,988
	Percentage	61	8	1	30	100
2001	Catches	177,935	10,729	123	43,034	231,821
	Percentage	77	5	0	19	100
2002	Catches	126,519	18,965	8	36,357	181,849
	Percentage	70	10	0	20	100
2003	Catches	113,121	13,558	14	31,969	158,662
	Percentage	71	9	0	20	100
Average	Catches	171,497	14,696	9,585	40,659	236,437
	Percentage	72.5	6.2	4.1	17.2	100

Source: Ministry of Maritime Affairs and Fisheries (MOMAF), 2004. http://fs.fips.go.kr/index.jsp

4.2.1 Biological Parameters of Target Species

To compare the current Korean F_{ABC} of respective mackerel and jack mackerel with F_{ABC} of these two species, the extended TAC assessment model uses biological parameters estimated by National Fisheries Research and Development Institute (NFRDI) in 2004 except instantaneous fishing mortality (F_i) of jack mackerel. The reason for this is that $F_{current}$ of jack mackerel last year was much higher than that of it in the past years. Thus, Fcurrent of jack mackerel is assumed as 0.6. in this model (Table 4). The instantaneous fishing mortality (F_i) can be estimated from the Ricker Formula, $F_{current} = 1 - exp\ (-F_i)$.

Table 4. Biological Parameters of the Two Species

Species	Parameters											
	M (yr^{-1})	t_0 (year)	t_c (year)	t_L (year)	W_i (index)	a_i (index)	m_i	W_∞ (g)	L_∞ (cm)	K (yr^{-1})	F_i	$F_{current}$ (yr^{-1})
Mackerel	0.52	-0.428	1.01	10	0.542	0.513	0.125	2249.55	51.67	0.299	0.40	0.33
Jack mackerel	0.53	-0.809	0.53	7	1.458	1.181	0.336	1047.17	429.9	0.248	0.92	0.60

Note: $F_{current}$ represents the current levels of fishing mortality.
Source: Baik *et al*., 2004. Stock Assessment and Fishery Evaluation Report of Year 2005 TAC – based Fisheries Management in the Adjacent Korean Water, National Fisheries Research and Development Institute (NFRDI). 237pp.

4.3 Results

4.3.1 Estimation of F_x and $F_{x\%}$

This paper analyzes how $F_{x\%}$ changes from the change in F_i of the current Korean TAC assessment model and the extended TAC assessment model. This paper estimates appropriate $F_{x\%}$ and $F_{0.x}$ of two models to compare the current Korean TAC assessment model with the extended TAC assessment model. This model provides F_{MAX}, F_{ABC} and $F_{0.1}$ as F_x and $F_{50\%}$, $F_{40\%}$, $F_{35\%}$, $F_{30\%}$, *and* $F_{25\%}$ *as* $F_{x\%}$ (Table 4).

F0.1 at current mean age of first capture estimated by the current TAC assessment model was 0.17/year (mackerel) and 0.18/year (jack mackerel) respectively. $F_{0.1}$ at current mean age of first capture estimated by the extended TAC assessment model was 0.16/year. And also F_{MAX} estimated by the current TAC assessment model was 0.69/year (mackerel) and 0.58/year (jack mackerel) respectively. F_{MAX} estimated by the extended TAC assessment model was 0.86/year.

In addition, $F_{x\%}$ at the lower bound F_{ABC} estimated by the current TAC assessment model was 30% (mackerel) and 35% (jack mackerel) respectively. $F_{x\%}$ at the lower bound F_{ABC} estimated by the extended TAC assessment model was 50%. $F_{x\%}$ at the upper bound F_{ABC} estimated by the current TAC assessment model was 25% (mackerel) and 30% (jack mackerel). $F_{x\%}$ at the upper bound F_{ABC} estimated by the extended TAC assessment model was 40% (Table 5).

Table 5. Comparison of F_x and $F_{x\%}$ between Two Models

(unit: year -1, g)

Species	F_{MAX}	$F_{50\%}$	$F_{40\%}$	$F_{35\%}$	$F_{30\%}$	$F_{25\%}$	$F_{0.1}$	F_{ABC}	Y/R at F_{ABC}
The Current TACAM for Mackerel	0.69	0.18	0.23	0.26	0.30	0.35	0.17	0.30~ 0.35	84.0~ 88.1
The Current TACAM for Jack mackerel	0.58	0.16	0.21	0.24	0.27	0.31	0.18	0.24~ 0.27	30.4~ 31.7
The Extended TACAM for Multiple Species	0.86	0.27	0.38	0.45	0.53	0.64	0.16	0.27~ 0.38	77.7~ 88.5

Note: TACAM means TAC assessment model.

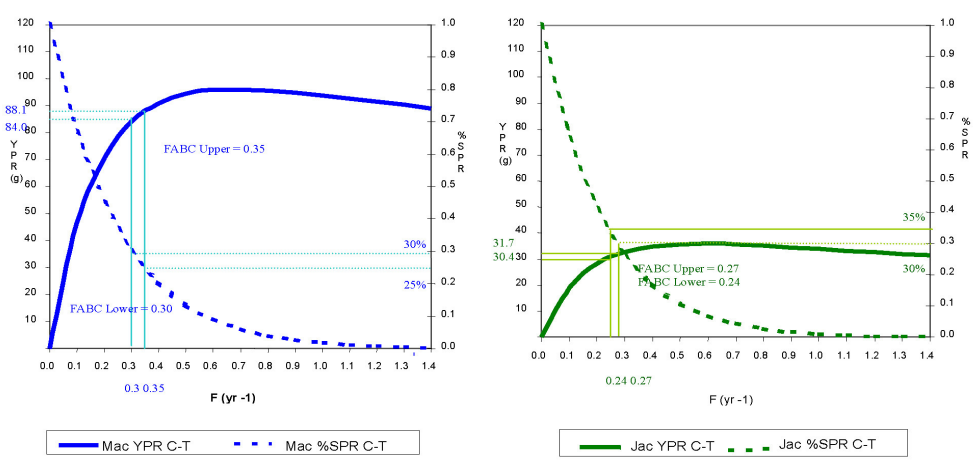
4.3.2 Estimations of Y/R (or YPR) and SSB/R (or SPR)

This paper analyzes how Y/R and SSB/R change from the change in respective F_x and $F_{x\%}$ in the models. This paper estimates an appropriate F_{ABC} through the relationship between Y/R and F_x and between SSB/R and $F_{x\%}$. This paper compares Y/R with SSB/R at F_{ABC} of the two models. F_{ABC} estimated by the current TAC assessment model was 0.30/year~0.35/year (mackerel) and 0.24/year~0.27/year (jack mackerel) respectively. Also, F_{ABC} estimated by the extended TAC assessment model was 0.27/year~0.38/year. At this point, Y/R of individual species by the current TAC assessment model was estimated as 84.0g~88.1g (mackerel) and 30.4g~31.7g (jack mackerel) respectively. Y/R by the extended TAC assessment model was estimated as 77.7g~88.5g. In addition, X% of SSB/R for individual species by the current TAC assessment model was 25%~30% (mackerel) and 30%~35% (jack mackerel) respectively. X% of that by the extended TAC assessment model was 40%~50% (Table 6).

Table 6. Comparison of Y/R and SSB/R between Two Models

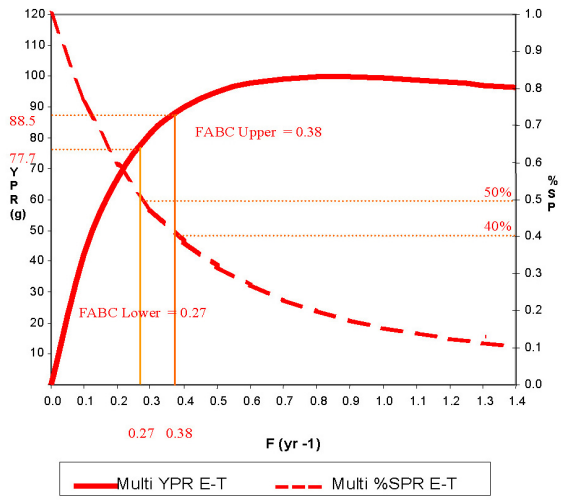
(unit: g, year^{-1})

Species	Y/R at F_{MAX}	Y/R at $F_{50\%}$	Y/R at $F_{40\%}$	Y/R at $F_{35\%}$	Y/R at $F_{30\%}$	Y/R at $F_{25\%}$	Y/R at $F_{20\%}$	FABC (year^{-1})	Y/R at F_{ABC}
Current TACAM for Mackerel	96.10	65.18	75.76	79.73	84.00	88.09	90.90	0.30~ 0.35	84.0~ 88.1
Current TACAM for Jack Mackerel	35.91	24.32	28.17	30.41	31.71	33.07	34.27	0.24~ 0.27	30.4~ 31.7
TACAM for Multiple species	99.76	77.71	88.53	92.76	95.95	98.43	99.69	0.27~ 0.38	77.7~ 88.5



Note: Mac YPR C-T (g): Mackerel's Yield per Recruit: Current Korean TACAM
Jac YPR C-T (g): Jack Mackerel's Yield per Recruit: Current Korean TACAM
Mac %SPR C-T (%): Mackerel's % Spawning Stock Biomass per Recruit: Current Korean TACAM
Jac %SPR C-T (%): Jack Mackerel's % Spawning Stock Biomass per Recruit: Current Korean TACAM

Figure 4. The Current Korean TACAM for Mackerel and Jack Mackerel



Note: Multi YPR E-T(g): Mackerel and Jack Mackerel's Yield per Recruit: Extended TACAM
Multi %SPR E-T (%): Mackerel and Jack Mackerel's % Spawning Stock Biomass per Recruit: Extended TACAM

Figure 5. Extended TACAM for Mackerel and Jack Mackerel

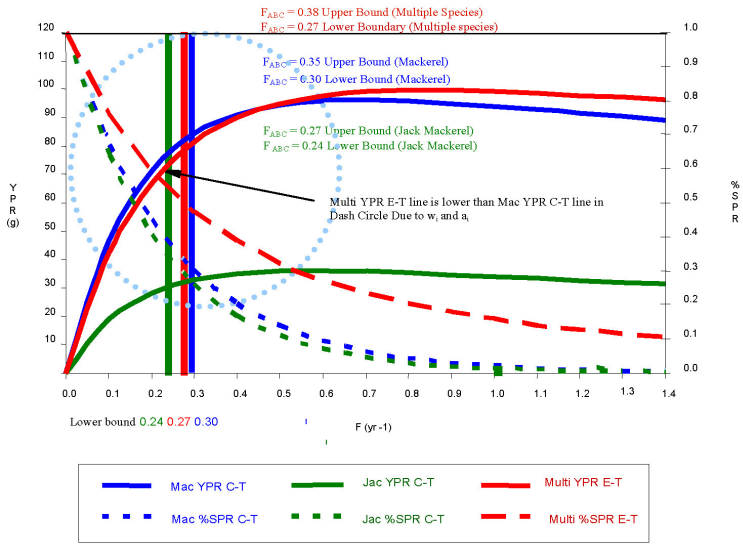


Figure 6. Comparison of YPR(or SSB/R) and % SPR between Two Models

Before explaining these results in detail, this paper needs to mention about an upper bound of F_{ABC} for multiple species estimated by the extended TAC assessment model. The upper bound of F_{ABC} for multiple species is meaningless, because the relative bycatch

index (w_i) and the relative instantaneous fishing mortality index (a_i) of mackerel with comparatively abundant stock and the lower bycatch rate cause a positive effect to the extended Beverton-Holt single gear and multiple species yield per recruit model. In other words, yield per recruit of mackerel obtained by added w_i and a_i of mackerel is much greater than that of jack mackerel obtained by them of jack mackerel. As a result, the upper bound of F_{ABC} for multiple species can be overestimated. Therefore, in the extended TAC assessment model designed to protect small bycatch species like jack mackerel, the upper bound of F_{ABC} for multiple species does not have significant meaning. For this reason, this study only focuses on the lower bound of F_{ABC} for multiple species.

In the case of mackerel, the lower bound F_{ABC} level (0.27: red bar) of TAC for multiple species was lower than that (0.30: blue bar) of mackerel estimated by the current Korean TAC assessment model. The reason for this is that added w_i and a_i decrease the yield per recruit in the extended Beverton-Holt model. As shown in Fig. 6, red Multi YPR E-T curve for multiple species is lower than blue Mac YPR C-T curve for each mackerel within a dash-circle, meaning a valid annual fishing rate range.

To protect jack mackerel's stock, the large purse seine fleet should less catch mackerel. If F_{ABC} is set up at 0.3 level due to bycatch, jack mackerel's stock can fall. Especially, basing on the lower bound F_{ABC} level (0.24: green bar) and the lower level (30,41g) of current yield per recruit of jack mackerel, jack mackerel stock may be depleted. Therefore, if F_{ABC} of mackerel is reduced as the lower bound level (0.27) in the multiple species model, the associated bycatch reduction would be expected to improve the jack mackerel stock.

In addition, this result suggests that jack mackerel be caught at the lower bound F_{ABC} level (0.24). The reason for this is that the extended TAC model just is an auxiliary and precautionary means of the current Korean TAC assessment model for protecting bycatch species with small stock. So, the lower bound (0.24) of jack mackerel estimated by the current TAC assessment model should be maintained as a conservation measure. As shown in above, to prevent the depletion of small stock species, F_{ABC} (0.3 level) of the mackerel targeted by the large purse seine fleet can be overestimated. Therefore, in an aspect of small stock's conservation, the lower bound F_{ABC} level (0.27) of TAC for multiple species should be considered when the TAC of each species is set up.

4.3.3 ABC Estimation

The recent average catch rate of mackerel and jack mackerel caught by the large purse seine fleet is 87% and 72% respectively. ABC of each species caught by the fleet was estimated by multiplying the recent average catch rate (2000~2003) to the single species ABC (Table 7).

Table 7. Comparison of ABC between Two Models

Species	Mackerel by the current Korean TACAM		Jack Mackerel by the current Korean TACAM		Mackerel of TACAM for Multiple Species	
	Total Catch (100%)	Large Purse Seine (87%)	Total Catch (100%)	Large Purse Seine (72%)	Total Catch (100%)	Large Purse Seine (87%)
$F_{critical}$	F25%, F30%		F30%, F35%		F40%, F50%	
ABC (ton)	147,348 ~191,706	128,192 ~166,784	7,712 ~9,884	5,552 ~7,116	134,350 ~205,488	116,884 ~178,774
F_{ABC} ($year^{-1}$)	0.30~0.35		0.24~0.27		0.27~0.38	

ABC levels of mackerel and jack mackerel that can be caught by the large purse seine fleet in 2005 estimated by the current Korean TAC assessment model were 128,192ton~166,784ton and 5,552ton~7,116ton respectively. ABC level of mackerel that can be caught by the large purse seine fleet in 2005 estimated by the extended TAC assessment model was 116,884ton~178,774ton. Appropriate ABC of mackerel that can be caught by the large purse seine fleet based on the lower bound F_{ABC} (0.27) of multiple species is less than that of mackerel estimated by the current Korean TAC assessment model. This result fundamentally corresponds to the theoretical approaches mentioned to section 2.

5. Conclusion

This paper provided a type of TAC assessment model for multiple species and single fishing gear. To overcome several limitations with the current Korean TAC assessment model, this paper suggested theoretical approaches with related to technical interactions among multiple species. To examine whether or not the current TAC level of mackerel and jack mackerel in TAC target species is appropriate, the extended TAC assessment model for multiple species and single fishing gear used the extended Beverton-Holt yield-per-recruit model based on biological parameters of NFRDI (2004). As a result, this paper estimates that the current TAC level of mackerel has been somewhat overestimated and suggests that the mackerel TAC level needs to be lowered to prevent overfishing of the small stock of jack mackerel due to the bycatch rate.

The extended TAC assessment model for multiple species and single fishing gear compensates or backs up ABC estimation by species of single fishing gear by computing ABC of multiple species. For example, the average fishing mortality among multiple species due to bycatch can partially reduce a bias of fishing mortality that single species and single fishing gear assessment does not detect. Thus, the extended TAC assessment model can

be adopted as an auxiliary and precautionary means for overcoming limitations of the current TAC assessment model as well as for supporting rational operation of the Korean TAC system. Conversely, this implies that the extended TAC assessment model has a limit of estimating each ABC by species, because it does not provide an appropriate fishing mortality rate (F_{ABC}) for individual species. It just offers a certain fishing mortality combined by the multiple fishing gears, considering bycatch inflicted by fishing gears. Henceforth, when adding multiple species with high commercial value in the Korean TAC system, the Korean government needs to allocate optimal volume of target species by fishing gear, considering technical interactions such as bycatch rate as well as biological interactions such as the predator- prey relationship.

In conclusion, the results obtained by this case study accord with a prior expectation in the sense that target TACs are lower when bycatch is taken into account. Conversely, in view of the modest difference in TACs between the current TAC assessment model versus alternative extended model, it could be argued that these differences are well within the precision of model capabilities and that the gains from the added complexity are not worth the cost. While this rationale is comforting, should be tested under a range of input scenarios to determine how robust the robustness of results.

The use of F_{ABC} based on round weight of fish harvested may be questioned as a policy target for several reasons. First, F_{ABC} does not adequately consider the costs of harvest. As F goes to F_{MSY}, the marginal cost of additional harvests explodes toward infinity. The harvests of the marginal entrant are subsidized by reduced yields of existing fishermen. Secondly, along the sustainable Beverton-Holt yield curve, percentage change in total yields is equal to percentage change in numbers of fish caught times percentage change in mean weight per fish harvested ($\%\Delta Y = \%\Delta N \times \%\Delta MW$). At maximum yield per recruit, $\%\Delta N$ and $\%\Delta MW$ are equal in absolute magnitude but of opposite sign. However, in the study fishery, price per gram increases with fish size so that maximum revenue per recruit occurs at an F lower than F_{MAX} of yield per recruit (Gates, 1974). It is arguable that maximum revenue per recruit is the point at which overfishing begins, rather than F_{MAX} of yield per recruit. More investigations of this economic discussion are needed. Thirdly, the importance of revenue considerations for profitability as producers' surplus is obvious. However, the fish size-price premia imply significant gains in consumers' surplus with F value lower than the usual F_{ABC}.

Finally, this paper hopes that the extended TAC assessment model will be corresponded to suggestions of Conroy (1993) and Box (1979) cited below. *"All model results, regardless of how well the model has been constructed, should be viewed as indicative rather than as fact". "All models are wrong, but some are useful! Models are best used to compare alternative policies. Certainty is not given to us; Even a virgin fishery can collapse due to exogenous events, so how much precaution is enough?".*

Received: Nov. 29, 2011
Reviewed: Nov. 29, 2011
Accepted: Dec. 23, 2011

References

Anderson, L. G. 1975. Analysis of open-access commercial exploitation and maximum economic yield in biologically and technologically interdependent fisheries, Journal of the Fisheries Research Board of Canada, 32: 1825-1842.

_____. 1977. The Economics of Fisheries Management, The Johns Hopkins University Press Baltimore and London, p.296.

Baik, C. *et al*. 2004. Stock Assessment and Fishery Evaluation Report of Year 2005 TAC-based Fisheries Management in the Adjacent Korean Water, National Fisheries Research and Development Institute (NFRDI). p.237.

Baranov, F. I. 1918. On the question of the biological basis of fisheries, Nauchn. Issled. Ikhtiologicheskii Inst. Izv. 1: 81-128.

Beverton, R. J. H. and S. J. Holt. 1957. On the dynamics of exploited fish populations. U.K. Minist. Agric. Fish. Food Fish. Invest. (Ser. 2) 19: 533.

Box, G. E. P. 1979. Robustness in the strategy of scientific model building, in: R. C. Laurier and G. N. Wilkinson (eds) Robustness in Statistics, Academic Press, NY, pp.201-236.

Campbell, A. 1985. Application of a yield and egg-per-recruit model to the lobster fishery in the Bay of Fundy, N. Amer. J. Fish. Manage. 5: 91-104.

Conroy, M. J. 1993. The use of models in natural resource management: prediction not prescription, Transactions of the 58th North American Wildlife and Natural Resources Conference, pp.509-519 .

Daan, N. 1987. Multispecies Versus Single-Species Assessment of North Sea Fish Stocks, Can. J. Fish. Aquat. Sci. 44 (Suppl. 2): 360-370.

Deriso, R. B. 1987. Optimal F0.1 Criteria and Their Relationship to Maximum Sustainable Yield, Can. J. Fish. Aquat. Sci. 44(Suppl. 2): 339-348.

Gabriel, W. L., M. P. Sissenwine and W. J. Overholtz. 1989. Analysis of spawning stock biomass per recruit: an example for Georges Bank haddock. North American J. Fish. Manage., 9: 383-391.

Gates, J. M. 1974. Demand Price, Fish Size and the Price of Fish, Canadian J. Agr. Econ. 22(3): 1-12.

Gates, J. M., J. Ryu and J. Nam. 2004. Study on the Foundations for ITQ System Enforcement in Korea, Korea Maritime Institute (KMI), p.148.

Kell, L. T. *et al*. 2006. An Evaluation of Multi-annual Management Strategies for ICES Roundfish Stocks, ICES Journal of Marine Science, 63: 12-24.

MOMAF (Ministry of Maritime Affairs and Fisheries), 2004. http://fs.fips.go.kr/index.jsp

Murawski, S. A. 1984. Mixed species yield-per-recruit analysis accounting for technological interaction. Can. J. Fish. Aquat. Sci., 41: 897-916.

Murawski, S. A., A. M. Lange and J. S. Idoine. 1991. An analysis of technical interactions among Gulf of Maine mixed species fisheries, ICES Journal of Marine Science

Symposium 193: 237-252.

Pascoe, S. 1994. Benefits and costs of single species conservation in a multispecies fishery: the case of the Australian eastern gemfish, paper presented at the European Association of Fisheries Economists 3rd Bioeconomic Modelling Workshop, Edinburgh, Scotland, 24-25 October.

_____. 1995. Bioeconomic models and modelling: Theory and Practice, Centre for the Economics and Management of Aquatic Resources (CEMARE), Department of Economics, University of Portsmouth, p.169.

Prager, M. H., J. F. O'Bren and S. B. Saila. 1987. Using lifetime fecundity to compare management strategies: a case history for striped bass. North American J. Fish. Manage., 7: 403-409.

Pope, J. G. 1972. An investigation of the accuracy of virtual population analysis using cohort analysis. ICNAF Res. Bull. 9: 65-74.

Quinn, T. J. II and R. B. Deriso. 1999. Quantitative Fish Dynamics, Oxford University Press, Inc., 542.

Ryu, J. *et al*. 2002. A Study on Annual Expansion Program of TAC Target Species, Ministry Of Maritime Affairs and Fisheries (MOMAF), p.167.

Ryu, J., J. Nam and J. M. Gates. 2006. Limitations of the Korean Conventional Fisheries Management Regime and Expanding Korean TAC System toward Output Control System, Marine Policy 30 : 510-522.

Schaefer, M. B. 1954. Some aspects of the dynamics of populations important to the management of the commercial marine fisheries, Bulletin of the Inter-American Tropical Tuna Commission, 1: 26-56.

_____. 1957. A study of the dynamics of the fishery for yellowfin tuna in the Eastern Tropical Pacific Ocean, Bulletin of the Inter-American Tropical Tuna Commission, 2: 247-285.

Seo, Y. and C. Zhang. 2001. A Study on the Multi-gear and Multi-species Fisheries Assessment Models in Korea Waters, J. Korean Fish. Soc. 34(4): 355-358

Shepherd, J. G. 1982. A versatile new stock-recruitment relationship for fisheries, and the construction of sustainable yield curves, J. Cons, Int. Expor. Mer 40: 67-75.

Sissenwine, M. P. and J. G. Shepherd. 1987. An alternate perspective on recruitment overfishing and biological reference points, Can. J. Fish. Aquat. Sci. 44: 913-918.

Sparre, P. and S. C. Venema. 1998. Introduction to Tropical Fish Stock Assessment, FAO Fisheries Technical Paper 306/1 Rev. 2, p.407.

Von Bertalanffy, L. 1938. A quantitative theory of organic growth, Hum. Biol. 10: 181-213.

Zhang, C. and C. Baik. 2000. Proceedings of SEMINAR on TAC-based Fisheries Management II, Pukyong National University, National Fisheries Research & Development Institute, p.152.

KMI International Journal of Maritime Affairs and Fisheries • Volume 3 Issue 2 December 2011 pp.163-182 •

Legal Study on Military Activities in the EEZ

- With a Focus on Foreign Military Activities in the EEZ of P. R. China -

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ABSTRACT

Military activity in the EEZ is a very complicated issue. In view of the fact that the USA has engaged many kinds of military activity in the EEZ of the P. R. China and that these activities has led to conflicts between the two countries, this article deals with the legal issues of military activities of one country in the EEZ of another country with focus on the foreign especially USA military activities in the EEZ of the P. R. China. This article, on the basis of legal documents such as the UN Charter, the UN Convention on the Law of the Sea, and on the basis of laws and practice of related countries, analyzes the following issues: the legal status of the EEZ under international law and its impact on military activity of one country in the EEZ of another country, the relation between peace principle and military activity of one country in the EEZ of another country, the navigation of military vessels of one country in the EEZ of another country, the flight of military aircrafts of one country over the EEZ of another country, the marine scientific research conducted by military vessels of one country in the EEZ of another country, the military survey conducted by military vessels or military aircrafts in the EEZ of another country, the military exercises or arms trials held by one country in EEZ of another country, and the use of force by military vessels or aircrafts of one country in the EEZ of another country. At the end, the article summarizes the main points discussed and analyzed.

Key words: The UN Convention on the Law of the Sea, EEZ, military activity

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Preface

One main achievement of the UN Convention on the Law of the Sea 1982 is the establishment of legal regime on the exclusive economic zone (EEZ). The EEZ legal regime is a result of struggle by developing countries for marine rights of 200 nautical miles[1] , and it also reflects the compromise between developing countries and big marine powers. The developing countries try to extend their jurisdiction and marine rights to the EEZ and big marine powers try to maintain their traditional freedoms and interests in this marine area. The UN Convention on the Law of the Sea makes a balanced legal arrangement for the EEZ conferring rights on one party and at the same time imposing obligations on it. The flexible or sometimes conflicting provisions in respect to the EEZ thus lead to new disputes among the interested parties.

One of the new disputes concerning the EEZ is about the military activity of one country in the EEZ of another country. This dispute can be divided into many sub-issues such as whether a country can conduct military activity in the EEZ of another country, whether such military activity should be limited, whether such military activity should be noticed to the coastal country in advance, whether such military activity should be ratified by the coastal country etc. The dispute becomes worse with some big marine powers conducting more and more military activity in the EEZ of other countries. Take the relation between P. R. China and the USA as an example, during the past one or two decades, the USA warships, military aircrafts, spying ships or planes have conducted various military activities in the EEZ of the P. R. China, and some of these activities result in serious consequences[2]. On 1 April 2001, an EP-3, which is a spy plane belonging to USA navy, flew over the EEZ of P. R. China in the South China Sea, 70 nautical miles south-east of the Chinese Hainan Island, and continuously conducted intelligence collecting activity. Two Chinese interceptors took off to trace the EP-3. The EP-3 refused to leave, and at the end clashed with one of the two Chinese interceptors. The collision resulted in the falling down of one of the Chinese interceptors and the death of its pilot. The damaged EP-3 flew into Chinese territorial airspace and landed on Chinese Lingshui Airport. After rounds of negotiation, the USA said sorry to Chinese people and government three times and the EP-3 together with its crew was finally released[3]. On 22 December 2001, 25 Japanese military or public service vessels and 14 Japanese aircrafts chased an unidentified vessel to the EEZ of P. R. China and fired the vessel down to the seabed of the EEZ[4].

1 Qu, G.-Q. (2005) *The Law of the Sea*, the Chinese People's University Press, pp.121-124.

2 Fu, K.-C. (2006) Military Survey and Liquid Cargo Transfer in the EEZ: Some Undefined Rights of the Coastal States, *China Oceans Law Review* (2nd Issue), Xiamen University Centre for Oceans Policy and Law, p.4.

3 The People's Web: Today in History—American EP-3 Clashed with Chinese Military Aircraft over the South China Sea on 1 April 2001, http://www.people.com.cn/GB/historic/0401/6024.html, last visit on 4 May 2010.

4 Lu, R.-D. (2002) Special Focus—How can Japan Do whatever it Likes in the Chinese EEZ, *China Oceans Newspaper*, 8 February 2002.

On 8 March 2009, the Impeccable, a military survey ship owned and operated by USA navy, conducted military survey in the EEZ of P. R. China about 120 km south of Chinese Hainan Island without permission of P. R. China. The Impeccable conflicted with 5 Chinese vessels including one navy vessel and one public-service vessel, and its military survey was interrupted[5]. It has been reported that the USA has conducted over 200 times of military survey in the EEZ of P. R. China. At the same time, the USA has held many military exercises in Yellow Sea, East China Sea and South China Sea with neighbouring countries of P. R. China. During the past years, due to the dispute with P. R. China in respect of the title of Diaoyu Islands and the delimitation of EEZ and continental shelf in the East China Sea, Japanese military vessels or aircrafts often visit the EEZ of P. R. China and intervene in the normal operation of Chinese oil and natural gas exploration. In 2010, the USA together with its allies held several military exercises in marine areas surrounding coast of P. R. China.

All above events and incidents indicate that military activity of one country in the EEZ of another country is a very sensible, serious issue. In current situation, disputes and controversies in regard to this issue has posed great challenge for the international society. It is necessary and meaningful to review the EEZ legal regime and find solutions to these disputes for the benefit of regional and global peace and security.

1. Legal status of EEZ and its impact on military activity of one country in the EEZ of another country

Military activity of one country in the EEZ of another country is heavily affected by the legal status of the EEZ under international law.

According to the UN Convention on the Law of the Sea, the sovereignty of a coastal country extends beyond its land territory and internal waters and, in the case of an archipelagic country, its archipelagic waters, to an adjacent belt of sea, described as the territorial sea of the this country[6]. The sovereignty of this country also extends to the air space over the territorial sea and to its seabed and subsoil. Every coastal country has the right to establish the breadth of its territorial sea up to a limit not exceeding 12 nautical miles, measured from baselines determined in accordance with the Convention[7]. Every coastal country can exercise exclusive, absolute sovereignty over its territorial sea, which is only limited by the innocent passage right of a foreign vessel[8].

5 Yang Y.-L. (2009) Pentagon says Chinese vessels harassed U.S. ship, CNN, 10th March, 2009, available at: http://edition.cnn.com/2009/POLITICS/03/09/us.navy.china/ last visited: 01/10/09.

6 Refer to Article 2 of the UN Convention on the Law of the Sea.

7 Refer to Article 3 of the UN Convention on the Law of the Sea.

According to the above Convention, the EEZ of a coastal country is a marine zone beyond and adjacent to its territorial sea, but not extend beyond 200 nautical miles from the baselines, subject to the specific legal regime established by the Part V of the Convention, under which the rights and jurisdictions of the coastal country and the rights and freedoms of other countries are governed[9].

For the coastal country, its rights and jurisdiction includes: sovereign rights for the purpose of exploring and exploiting, conserving and managing the natural resources, whether living or non-living, of the waters over the seabed and of the seabed and its subsoil, and with regard to other activities for the economic exploitation and exploration of the zone, such as the production of energy from the water, currents and winds; jurisdiction over the establishment and use of artificial islands, installations and structures, over the marine scientific research, and over the protection and preservation of the marine environment; other rights as provided for in the Convention[10].

For other countries, their rights and freedoms in the EEZ of the coastal country include: the freedoms referred to in Article 87 on freedom of the high seas for navigation, over-flight, laying submarine cables and pipelines; rights of other internationally lawful uses of the sea related to the above mentioned freedoms, such as those associated with the operation of ships, aircrafts and submarine cables and pipelines, and compatible with the other provisions of the Convention. The Convention further stipulates that Articles 88 to 115 on the high seas and other pertinent rules of international law apply to the EEZ in so far as they are not incompatible with Part V on EEZ of the Convention[11].

Realizing the subtle balance between the interests of a coastal country and other countries and trying to avoid potential disputes, the UN Convention on the Law of the Sea continues to urge the interested countries to mutually respect the rights of each other. While the Convention requires the coastal country to pay due regard to the rights and freedoms of other countries in exercising its own rights and jurisdiction in its EEZ in a manner compatible with the provisions of the Convention, the Convention also requires that other countries should have due regard to the rights and jurisdiction of the coastal country and should comply with the laws and regulations adopted by the coastal country not incompatible with the Convention[12]. Because this requirement of mutual respect is vague and difficult to enforce, it can not resolve all the conflicts in this regard. Therefore, the Convention tries to lay down some principles in settlement of potential disputes regarding EEZ. It provides that in cases where the Convention does not attribute rights or jurisdiction to the coastal country or other countries within the EEZ, and a conflict arises between

8 Refer to Article 17 of the UN Convention on the Law of the Sea.
9 Refer to Articles 55 and 57 of the UN Convention on the Law of the Sea.
10 Refer to Article 56 of the UN Convention on the Law of the Sea.
11 Refer to Article 58 of the UN Convention on the Law of the Sea.
12 Refer to Articles 56 and 58 of the UN Convention on the Law of the Sea.

a coastal country and any other country, the conflict should be resolved on the basis of equity and in the light of all the relevant circumstances, taking into account the respective importance of the interests involved to the parties as well as to the international community as a whole. The principle of equity is also very abstract, and thus difficult to interpret, but together with considering all related elements and weighing the relative importance of involved interests, it can provide a useful route to conflict resolution.

According to the Convention, the high seas cover all parts of the sea that are not included in any EEZ, territorial sea, international waters or archipelagic waters of any country[13]. The high seas are open to each and every country, and the principle of freedom applies to the high seas as a whole[14].

From above analysis, it can be concluded that EEZ is a special marine zone, standing between the territorial sea and high seas. The EEZ legal regime makes about 30% of the sea under sovereign rights or jurisdiction of coastal countries[15]. In EEZ, a coastal country can not enjoy all the rights and jurisdiction it can enjoy in territorial sea and other countries can not enjoy all the rights and freedoms they can enjoy in high seas. There exists a subtle balance between the coastal countries and other countries in EEZ. Many resources such as 90% of global commercial fishing, 87% of global marine crude oil and natural gas, and large quantity of mineral exist in EEZ. The main part of marine scientific research is held in EEZ. Most of world marine passages are also located in EEZ[16]. Consequently the chance of conflict among countries in EEZ increases sharply.

The analysis of the legal issues concerning the military activity of one country in the EEZ of another country can only rest on the legal regimes of EEZ. In other words, the legal status of EEZ under the international law can exert a great influence on the discussing and resolving of the issues concerning the military activity of one country in the EEZ of another country.

2. Relation between military activity in EEZ and peace principle

Peace principle is one of fundamental principles of the UN Charter[17]. Peace principle has also been adopted by the UN Convention on the Law of the Sea. Peace principle is concretely embodied by Articles of 88, 141, 246 and 301 of the UN Convention on the Law of the Sea as leading principle of marine activities. Through the provision of Article 58 of this Convention, peace principle also applies to activities in EEZ.

13 Refer to Article 86 of the UN Convention on the Law of the Sea.
14 Refer to Article 87 of the UN Convention on the Law of the Sea.
15 Song, Y.-X. (2009) *Theories and Practice of State Marine Jurisdiction*, the Oceans Publishing House, p.61.
16 Qu, G.-Q. (2005) *Law of the Sea*, the Chinese People's University Press, p.120.
17 Refer to Article 2 of the Charter of the UN.

However, as the Convention is the outcome of compromises between coastal states and big maritime powers, the issue of military activities of one state in the EEZ of another state is in some degree a grey area[18]. As a result, there arise questions such as how to determine an activity of one state in the EEZ of another state is in conformity with the peace principle, whether all military activities of one state in the EEZ of another state are against the peace principle or only some of them are against the peace principle, and who shall have the final judgment of the nature of such activity.

There are three viewpoints in regard to above questions. One viewpoint holds that peace principle prohibits any military activities of one state in the EEZ of another state. The second viewpoint holds that military activities can be divided into two categories---those for peaceful purpose and those not for peaceful purpose, and that the peace principle only prohibits those activities not for peaceful purpose. The third viewpoint holds that the coastal state that is heavily affected by such military activities should be given the right to judge the nature of the military activities and prohibit those that might threaten its security.

The UN Convention on the Law of the Sea has not generally prohibit all military activities of one state in the EEZ of another state, and in practice it is difficult for a coastal state to prohibit all military activities of other states in its EEZ. The general practice of coastal states is to tolerate those military activities of other states in their EEZ if they do not pose a threat to the coastal states. So the first viewpoint can not stand either from international law perspective or from practice perspective. The second viewpoint reflects the attitude and practice of the majority of states, but problem lies in that they have inconsistent practice in regard to the judgment of the nature and consequences of such activities. As to the third viewpoint, because it considers more the feelings and interests of developing states and submits the military activities to the decision of coastal states,, it is welcomed by them, but strongly opposed by the big marine powers.

In view of above different viewpoints and inconsistent practice of states, it is necessary for the international society to reconsider the relationship between the peace principle and the military activity of one state in the EEZ of another state, to codify the practice of states and to make universally acceptable norms in this regard. The author suggests that the legislating pattern of the innocent passage of ships of one state through the territorial sea of another state can be used to draft the military activities of one state in the EEZ of another state[19]. On the one hand, it is necessary to lay down a general principle for the military activities of one state in the EEZ of another state, and on the

18 Ji, G.-X. (2009) The Legality of US Conduct in the South China Sea, *China Security* (14th Issue), at http://www.chinasecurity.us/index.php?option=com_content&view=article&id=266 last visit on 20/04/2011.

19 Refer to Articles of 18 and 19 of the UN Convention on the Law of the Sea. The Article 18 gives a definition to innocent passage of ships of one state through the territorial sea of another state, and the Article 19 first describes the detailed contents of such innocent passage and then gives a list of 12 activities which do not belong to the exercise of right of innocent passage.

other hand, it is helpful to make a list of permitted military activities and/or prohibited military activities. The list can be further adjusted according to the development of international law and state practice.

3. Whether the USA should be bound by the UN Convention on the Law of the Sea?

The UN Convention on the Law of the Sea was enacted in 1982 at the third UN Conference on the Law of the Sea, and became effective in 1994 and as at 14 April 2011 among the 192 UN member states 155 states have ratified this Convention[20].

This Convention has been called the ocean charter and it stands in the centre for the rule of law in the field of the sea. But the USA as a super power has not ratified the Convention. As a result of this, there arises the question whether the USA should be bound by this Convention. If the answer to this question is yes, the other states can base on the Convention to restrict the USA military activities in their EEZ, otherwise they can not.

From the perspective of the law of treaties, the UN Convention on the Law of the Sea, as an international treaty, has no abiding ability on a non-contracting country. The USA has not ratified the Convention, so the USA as a non-contracting party to the Convention is not bound by the Convention. However, if this Convention has codified the international customary rules, then the USA shall be bound by these international customary rules which have been codified by the Convention. Then whether the UN Convention on the Law of the Sea has codified the related international customary rules becomes a key question.

Article 38 of the Statute of the International Court of Justice is deemed universally to have authoritatively explained what international rules are composed of. It says that international customary rule is a general practice which has been accepted as law. General practice and acceptance as law are two requirements for establishing the existence of an international customary rule[21]. As far as the UN Convention on the Law of the Sea is concerned, almost all of the states then had taken part in the negotiations, nowadays 155 states of the 192 UN member states have accepted the Convention, a small number of states have not yet ratified the Convention but have signed the Convention, and the USA has participated the negotiation from the beginning to the end and played a leading role in the process and agreed to almost all parts of the Convention except the Part Ⅺ concerning

20 http://www.un.org/zh/law/sea/statesparties.shtml, last visit on 14 April 2011.

21 Lee, M. L. (2006) The Interrelation between the Law of the Sea Convention and Customary International Law, *San Diego International Law Journal*, p.405 and pp.408-409.

the deep seabed. In addition, the USA has taken part in the negotiation for the amendment to the Convention in regard to the enforcement of the Part Ⅺ in 1994, and the federal government of the USA has repeatedly declared that it is considering ratifying the Convention. Furthermore, the USA courts have cited related provisions of the Convention with a view that they have reflected the international customary rules. Therefore it can be inferred from above evidence that this Convention has been accepted as a codification of existing international customary rules. Following the same reasoning, the EEZ legal regime established by the Convention can also be seen as reflecting the international customary rules. What deserves special attention is that it is the USA that first introduced through Truman Proclamation the regime of controlling marine resources beyond the territorial sea[22]. In 1983 President Reagan of the USA established an EEZ for the USA by proclamation, asserting rights over living and nonliving resources in accordance with the Convention[23]. Thus it is obvious that the USA has recognized the EEZ legal regime established by the Convention. It naturally and logically follows that the USA should be bound by the Convention as a treaty codifying related international customary rules.

Now the problem is not whether the USA should be bound by the Convention, the problem is how to interpret the provisions of the Convention when applying to the USA activities in the EEZ of other states. In practice, the USA emphasizes the aspects of EEZ which are similar to those of high seas. It singles out the provisions of the Convention which confer freedoms to other countries in the EEZ of a coastal country[24], and it especially points out that all rules of high seas shall apply to EEZ if only the application does not violate the sovereign rights to natural resources and related jurisdiction of the coastal country. In interpreting the Convention, the USA uses a special term *international waters* to refer to the EEZ and a special term *international airspace* to refer to the airspace over the EEZ. Through use of these terms, the USA aims to indicate that it enjoys freedom of navigation and over-flight in EEZ of other countries including the related freedom of military activity. In December 1988, the USA issued the USA Free Navigation Program, declaring that the USA shall oppose the excessive claims on the sea and shall insist the global marine navigation freedom and over-flight freedom through diplomatic and military activities[25]. Italy as an ally of USA also declared when signing the UN Convention on the Law of Sea in July 1994 that the jurisdiction of a coastal state should not extend to military exercises of other states, and a foreign state need not inform in advance or get permission of the coastal state for military activities in the EEZ of latter state[26]. In recent years, the USA has been conducting various military activities in the

22 Liang, S.-Y. (2011) *International Law*, China University of Political Science and Law Press, p.219.

23 Damrosch, L. F. *et al* (2001) *International Law—Cases and Materials (fourth edition)*, West Group, p.1438.

24 Xiao, F.-C. and Xia Wang (2007) Three Issues of the Law of the Sea Concerning the Maritime Military Activities, *Research on Trends of International Law of the Sea*, Oceans Publishing House, p.99.

25 Sohn, L. B. and John E. Noyes (2004) *Cases and Materials on Law of the Sea*, Trans-national Publishers Inc., pp.579-580.

EEZ of the P. R. China particularly in the East China Sea and the South China Sea. When the P. R. China protested against such activities, the USA answered by saying that its activities were in conformity with international law and that it had conducted similar activities in EEZ of over 85 countries including India, Republic of Korea, Australia without any prior notice or permission.

The use of the terms *international waters* and *international airspace* by the USA and its following activities is to make legal basis for its activities and to confuse the legal status of the EEZ and high seas[27]. This attempt is certainly opposed by most of the countries. They insist that the USA should be bound by the UN Convention on the Law of the Sea and that there is no legal basis to see the EEZ as international waters and that the USA should pay due respect on the sovereign rights and jurisdiction enjoyed by a coastal country under the Convention. P. R. China repeatedly declares without its consent any USA military survey in its EEZ is unlawful. Brazil also declared in December 1982 when signing the UN Convention on the Law of the Sea that the Convention never authorized other states to have military exercises or use of force in the EEZ of a coastal state without the consent of this coastal state, and it further declared in December 1988 when ratifying the Convention that without its consent no other states could have military exercises in its EEZ[28].

4. Legal analysis of some military activities of one state in the EEZ of another state

The military activities a state conducts in the EEZ of another state can be of various kinds. Though it is useful to study these military activities as a whole, it is more useful and meaningful to classify these activities and analyze some typical activities of them in details.

4.1 Navigation of warships in EEZ

According to the UN Convention of the Law of the Sea[29], ships of any state are entitled to freedom of navigation in the EEZ of another state subject to the provisions

26 Tian, S.-C. (2007) Military Activities in EEZ—A Commentary on Guidelines on Navigation and Over-flight in EEZ Drafted by EEZ Team of 21st Century, *Research on the Trends of International Law of the Sea*, Oceans Publishing House, p.152.

27 Mandsager, D. (1998) U.S. Free Navigation Program: Policy, Procedure and Future, The Law of Military Operations, International Law Studies, Vol. 72, Naval War College Press, p.114 and p.117.

28 Tian, S.-C. (2007) Military Activities in EEZ—A Commentary on Guidelines on Navigation and Over-flight in EEZ Drafted by EEZ Team of 21st Century, Research on the Trends of International Law of the Sea, Oceans Publishing House, p.151.

29 Refer to Article 58 of the UN Convention on the Law of the Sea.

and conditions of the Convention. Here the Convention does not exclude the warships from the ships. State practice shows that no state requires the prior notice or consent for a foreign warship to navigate in its EEZ though most states denies the right of navigation of warships in their territorial sea. This means that warships of a state enjoy the freedom of navigation in the EEZ of another state subject to the provisions of the Convention.

But problem is that some marine superpowers insist the absolute freedom of their warships in EEZ of other states to guarantee the global movement of their warships. For example, in order to justify the conduct of the USA naval vessel Impeccable in the EEZ of P. R. China, Admiral Michael Mullen, the Chairman of the Joint Chiefs of Staff of the USA, once said that though the Impeccable was in the EEZ of P. R. China, the USA has the right to enter this area because this area is not territorial water. The USA insists that EEZ is international water and its warships can enjoy the same freedom as they enjoy in high seas. This saying is obviously due to a misunderstanding of the provisions of the Convention. The marine area of EEZ used to be high seas until the UN Convention on the Law of the Sea entered into force in 1994. Since then the EEZ area is no longer high seas, and the freedom of navigation once enjoyed by other states in this area has been greatly derogated[30]. The term international waters can not find its place in the provisions of EEZ under the UN Convention on the Law of the Sea. In other words, the EEZ is not international water, and the exercise of such freedom must meet the requirements and conditions of the Convention. For example, the exercise of such freedom of navigation should pay due regard to the sovereign rights, safety and security of the coastal state and must abide by the laws and regulations made by the coastal state according to the Convention and other international law.

Accordingly, the freedom of navigation enjoyed by warships of a state in EEZ of another state has been submitted to significant restrictions nowadays. On the one hand, in exercising such freedom, the warships should abide by the restrictions imposed by the Convention and other international law. On the other hand, they have to abide by the laws and regulations of the coastal state made in accordance with the Convention and other international law, such as laws and regulations of protection and management of living or non-living resources, of preservation of environment and measures against marine pollution, of management of artificial island and manmade structures etc.

In practice, most states are greatly concerned with the navigation of warships of other states in their EEZ. This is determined by the military nature of the navigation. They usually take different measures in this regard. They either trace or watch or intervene in such navigation, or pay no special attention to it, taking into consideration all the concrete situation and circumstances.

30 Fu, K.-C. (2006) Military Survey and Liquid Cargo Transfer in the EEZ: Some Undefined Rights of the Coastal States, *China Oceans Law Review* (2nd Issue), Xiamen University Centre for Oceans Policy and Law, pp.8-9.

4.2 Flight of military aircrafts over the EEZ

According to international law, the airspace over land and territorial sea of a state is the territorial airspace over which the coastal state exercises exclusive and absolute sovereignty and the coastal state can prohibit any entry to or flight over its territorial airspace by foreign aircrafts. The airspace over the high seas is open to aircrafts of all states regardless of their military or civil nature. But according to the UN Convention on the Law of the Sea[31], the airspace over the EEZ is a special airspace standing between the territorial airspace over the territorial sea and the international airspace over the high seas. Therefore, the airspace over the EEZ is not an international airspace as called by the USA[32].

According to the UN Convention on the Law of the Sea, when exercising the rights and freedoms conferred by the Convention, a contracting state should not threat the sovereignty, territorial integrity and political independence of another contracting state and should not use force or threat the use of force against another contracting state not in conformity with the Charter of the UN[33]. This means that when military aircrafts of one state fly over the EEZ of another state, they should not abuse the freedom of over-flight to threat or damage the sovereignty, territorial integrity, security and safety of the coastal state. For example, the military aircrafts of the USA usually fly over the EEZ of the P. R. China to collect national security information about the P. R. China, this activity of the USA poses potential threat to the security and safety of P. R. China, the information so collected may be used against P. R. China in any war or armed conflict with P. R. China, therefore this activity is not for peaceful purpose and constitutes a threat to sovereignty and security of P. R. China, and this activity is in deed an abuse of the freedom of flight over the EEZ.

In practice, due to the fast speed of aircrafts and the potential threat they might pose to the coastal states, in order to strengthen the national defence against any such threat, some costal states declare and establish air defence identification zone[34]. The air defence identification zone usually extends to the airspace over the EEZ and the coastal state declaring and establishing this zone requires that any aircraft entering into this zone

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31 Refer to Article 58 of the UN Convention on the Law of the Sea. The flight of foreign aircraft over the EEZ of a coastal state should be in conformity with the provisions of the Convention and must show due respect to the related laws and regulations made by the coastal state in accordance with the Convention and other international law.

32 According to some marine experts of the USA, the airspace over the EEZ should not be deemed as international airspace. Some authors deliberately use the “EEZ airspace” to replace the “international airspace” when referring to the airspace over the EEZ. Please refer to: Morris, M. A. (1982) Military Aspects of the Exclusive Economic Zone, *Ocean Yearbook 3*, University of Chicago Press.

33 Refer to the Article 301 of the Charter of the UN.

34 Nowadays tens of coastal states have declared and established the air defence identification zone. With the threat of international terrorism spreading widely, in order to protect national security, more and more coastal states shall follow this practice to declare and establish their air defence identification zone.

should notice in advance the coastal state its nationality, category, route, purpose of the flight etc. When necessary, the costal state shall intervene in the flight and may warn, intercept, or forcefully land the aircraft. The USA has declared and established such an air defence identification zone extending to the airspace over its EEZ, and take strong measures to intervene in the flight over its EEZ after the event of 9/11. The very practice of the USA itself shows that the airspace over the EEZ is not an international airspace in which a foreign aircraft can enjoy absolute freedom of over-flight.

Taking into consideration of the nature of military aircrafts and the more serious threat they can pose to the coastal states, it is natural that the flight of military aircrafts of one state over the airspace of the EEZ of another state shall draw special attention of the coastal state and may attract more intervention by the coastal state whenever the flight is conducted not in conformity with the Convention and other international law.

4.3 Military scientific research and military survey in EEZ

According to the UN Convention on the Law of the Sea, a coastal state has the jurisdiction over any marine scientific research conducted in its EEZ. The Convention requires that marine scientific research to be conducted by a state in the EEZ of another state should get the permission or consent of the latter state. In order to protect the marine interests of the coastal states and at the same time to facilitate marine scientific research, the Convention divides the marine scientific research into two categories—theoretical scientific research and applied scientific research—and treat them differently. The former mainly refers to purely scientific research which is done for peaceful purpose and for the benefits of all mankind. The latter mainly refers to the scientific research for the exploration and exploitation of the resources of the EEZ. For the former, the Convention stipulates that without particular reason the coastal state should not refuse to give permission or wilfully delay the permission; for the latter, the Convention lays down stricter conditions and stipulates that the coastal state can exercise absolute discretion in regard to the permission[35]. Accordingly, military scientific research conducted by a state in the EEZ of another state also needs the permission or consent of the coastal state. If an application for marine scientific research is refused by the coastal state, the refused party can resort to the proceedings of the Convention for the settlement of dispute.

In practice, there appears a new situation where military vessels of a state conduct marine survey in the EEZ of another state without applying for consent or permission of the latter state. For example, military vessels of the USA, such as the Bowditch and the Impeccable, frequently enter into the EEZ of the P. R. China and conduct marine survey without the permission or consent of the P. R. China. When protested by the P. R. China,

35 Zhou, Z.-H. (2008) *International Law*, China University of Political Science and Law Press, p.349.

the USA claims that it is not conducting marine scientific research but is surveying the marine passage and that the survey of marine passage is to guarantee the exercise of freedom of navigation stipulated by the Convention and therefore is a lawful use of the EEZ. Then whether marine survey is one kind of marine scientific research and is subject to the permission of the coastal state? Are there any differences between them? If marine survey is not subject to the permission of the coastal state, what will happen to the marine scientific research regime of the Convention? It is true that the Convention deals with the marine survey and marine scientific research in different sectors of the Convention[36], but is this sufficient to say that they are different and should be treated differently in regard to the permission of the coastal state? In practice, due to the development of science and technology and application of advanced equipment, it is very difficult to distinguish marine survey from marine scientific research[37], and marine survey also concerns the search and investigation of marine currents, marine environment, marine geology etc. In addition, practice shows that marine survey in EEZ can affect the sovereign rights and jurisdiction of the coastal state in regard to the EEZ natural resources and the exploration, exploitation, preservation and management of these resources[38]. Furthermore, "marine survey" conducted by the USA military vessels in the EEZ of the P. R. China actually aims to collect national security information of P. R. China, therefore it is for military purpose and constitutes security problem for the P. R. China. For this reason, such survey often leads to confrontation with the P. R. China. Taking above into consideration as a whole, it can be inferred that it is not proper to exclude from the jurisdiction of a coastal state the military marine survey of another state in the EEZ of the former state. If such exclusion is permitted, what will happen? It will happen that this exclusion can be abused by a state whenever it wants to circumvent the permission of the coastal state regarding its marine scientific research in the EEZ of the coastal state. For example, it might happen that even though the USA military vessels are actually conducting marine scientific research in the EEZ of the P. R. China, they can inform the P. R. China that they are conducting marine survey so that it is not the Chinese business to step in. When the P. R. China intervened in the military survey conducted in its EEZ by the USA navy vessel Impeccable, what the Impeccable said was just that it was conducting military survey and the Chinese vessels should stop harnessing its activity[39]. If this is the case, the jurisdiction of a coastal state

36 Refer to the Article 19 (2) (j) and the Article 54 of the UN Convention on the Law of the Sea. The arrangement of marine scientific research and marine survey in different sectors of the Convention seems to indicate there is slight difference between them.

37 Zhang, H.-W. (2006) Conflict between Jurisdiction of Coastal States over Marine Scientific Research and Military Survey, *China Oceans Law Review* (2nd Issue), Xiamen University Centre for Oceans Policy and Law, p.31.

38 At least sufficient evidence has shown that the sonar system used in military marine survey can bring fatal damage to dolphins and whales and other marine living resources.

39 Actually, the Impeccable, as a marine surveillance ship, was detecting through the sonar system the information about the movement of the Chinese submarines deployed at the Sanya Submarine Base then. In an interview

over marine scientific research in its EEZ shall end up with nothing, and this will heavily damage the rights and national interests of coastal states which are conferred and protected by the Convention. According to the above analysis, it can be concluded that the marine survey especially the military survey of a state in the EEZ of another state should be subject to the permission of the latter state.

In order to guarantee its EEZ rights and jurisdiction under the UN Convention on the Law of the Sea, P. R. China has enacted the Regulations on the Management of Foreign-related Marine Scientific Research 1996 and the Law on EEZ and Continental Shelf 1998. According to these national laws and regulations of the P. R. China, any foreign related marine scientific research conducted in the EEZ of the P. R. China must be based on the consent or permission of relevant authority of the P. R. China. So it can be said that the above USA military survey in the EEZ of P. R. China not only violates the UN Convention on the Law of the Sea but also violates the national law of P. R. China.

4.4 Military exercises and arms trials

There is no direct provision in the UN Convention on the Law of the Sea in respect to the military exercises and arms trials of a state in the EEZ of another state. So in order to judge the legitimacy of these activities, general principles of the Convention and other sources of the international law should be considered.

According to the peace principle of marine activity as described in part 2 of this article, activity held by one state in the EEZ of another state should be for peaceful purpose. Military exercises or arms trials held by one state in the EEZ of another state are difficult to be classified as for peaceful purpose. Especially in the eyes of the coastal state in whose EEZ such activity is being held, this kind of activity is unfriendly or even hostile, and in some situations, it can be seen as a form of threat of use of force. It is easily understandable that when the USA held military exercises in the EEZ of the P. R. China, the P. R. China strongly protested such activity as a threat to the regional stability and security. So according to the peace principle of the UN Convention on the Law of the Sea and the UN Charter principle of no use of force in international relations, it is difficult to say it is lawful for a state to hold military exercises or arms trials in the EEZ of another state.

In practice, if a state is planning to hold military exercises or arms trials in the EEZ of another state, some area of the EEZ shall be covered and enclosed, and this shall impose adverse effects on the sovereign rights of the coastal state such as exploration,

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with the Russian ITAR-TASS News Agency, an anonymous Pentagon official admitted that the ship was indeed engaged in collecting intelligence in the South China Sea. The activities of the Impeccable are obviously not for peaceful purposes and consequently violate the peace principle. Please refer to *the Global Times* of 11 March 2009 and http://news.sohu.com/20090312/n262749905.shtml

exploitation, preservation and management of these resources. In addition, the military exercises or arms trials shall inevitably have some adverse influence on the marine environment and marine living organisms. Just as what has been mentioned in the part 1 of this article, the Convention requires that other states should have due regard to the rights and jurisdiction of the coastal state and should comply with the laws and regulations adopted by the coastal state. Therefore, the military exercises and arms trials held by one state in the EEZ of another state can not be said to be proper and lawful.

It should be noticed that more and more states declare that other states are prohibited to hold military exercises or arms trials in their EEZ. For example, coastal states such as Brazil, India, Pakistan, Malaysia, Uruguay and Peru have expressly declared or enacted national law that military exercises or arms trials of other states are prohibited in their EEZ[40]. More coastal states are following their examples.

In view of the above analysis, for the benefits of world peace and security and for the respect of the sovereign rights of the coastal states, if a state plans to hold military exercises or arms trial in EEZ of another state, it should inform in advance the latter state any such activity and get permission or understanding from the latter state.

4.5 Use of force by warships or military aircraft in the EEZ of another state

According to the provisions of the UN Convention on the Law of the Sea, warships or military aircrafts on behalf of the their states can exercise right of hot pursuit over vessels which have violated the laws or regulations of their internal waters, territorial sea, contiguous zone or EEZ, and can continue the pursuit in high seas or EEZ of other states[41]. The warships or military aircrafts of one state can also exercise universal jurisdiction over crimes committed at high seas such as piracy, terrorism, illegal broadcasting, slave trade etc., and they can exercise exclusive jurisdiction over vessels flying the flag of their own state[42]. If the vessels or their personnel flee into the EEZ of another state, the warships or military aircrafts can pursue them in the EEZ of another state.

When exercising the right of hot pursuit in the EEZ of another state, the warships or military aircrafts may frequently find it necessary to use force against the fleeing vessels or personnel. In this situation, whether to use force and how to use force is not only an issue between the pursuing and pursued parties but also an issue between the pursuing party and the coastal state. According to development of relevant international customs, there is a trend to put more restrictions on the use of force against civil vessels. As an exception, the use of force may be permitted in extreme circumstances and in accordance

40 Kim, H.-S. (2003) Military Activities in the EEZ under the Law of the Sea, *Maritime Law Review* (Volume 15), the Korea Institute of Maritime Law, p.228.

41 Refer to the Article 111 of the UN Convention on the Law of the Sea.

42 Refer to the Articles of 92 and 110 of the UN Convention on the Law of the Sea.

with strict conditions and procedures. At least the following elements should be considered when warships or military aircrafts of one state decide to use force in the EEZ of another state: (1) whether the acts committed by the pursued vessel is a serious crime or not, as a general rule it is not proper to use force against minor misconduct; (2) Whether there are other choices except use of force, if there are other choices, then the use of force should be the last choice; (3) whether the warships or military aircrafts are encountered with armed attack, if the answer is yes, then they are entitled to use force; (4) Generally the use of force should follow an escalating procedure of warning, warning shooting, and shooting; (5) The use of force should be due to good reason and be proportional; (6) Impact on the coastal state should be considered, and when considering the impact on the coastal state, the distance from the coast, the function of the marine area, the situation of marine structures etc are relevant elements; (7) If the situation permits, warships or military aircrafts should contact the coastal state and inform in advance the use of force, if in emergency it is impossible to contact the coastal state, the use of force should be informed in due time thereafter. Existing cases of use of force by warships or military aircrafts of one state in the EEZ of another state show that such use of force often causes diplomatic dispute between the two states, therefore such use of force must be restrained, otherwise it may lead to serious conflicts between the two states.

5. Conclusions

Summarizing the main points of this article, the following conclusions can be drawn:

(1) The EEZ legal regime under the UN Convention on the Law of the Sea is a result of compromise between the developing coastal states and the big marine powers. EEZ is a marine zone between the territorial sea and high seas. In EEZ, the rights and interests of the coastal state and the rights and freedoms of other states coexist and interact with each other, and this fact makes the activities in EEZ sensitive and complicated.

(2) Military activity of one state in the EEZ of another state often leads to dispute and even armed conflicts between the two states, therefore it is extraordinary meaningful to study the related issues and search for acceptable norms.

(3) Peace principle does not prohibit all military activities of one state in the EEZ of another state, but imposes limitations on some kinds of military activities. Peace principle requires that such military activities should be conducted according to the conditions and limitations imposed by the UN Convention on the Law of the Sea and other international law, should not threat the sovereignty, the territory integrity and security of the coastal state, should not hinder the rights and jurisdiction enjoyed by the coastal state, and should

be in conformity with the laws and regulations made by the coastal state according to the UN Convention on the Law of the Sea.

(4) The UN Convention on the Law of the Sea has been the ocean charter and it stands in the centre for the rule of law in the field of the sea. State practice shows that the Convention has codified the international customary rules. The USA shall be bound by the Convention. There is no legal basis for the USA to call the waters of EEZ and airspace over EEZ as *international waters* and *international airspace*.

(5) Warships and military aircrafts of one state can enjoy freedom of navigation and freedom of over-flight in the EEZ of another state subject to the conditions and limitations contained in (3) above. Warships and military aircrafts should not abuse these freedoms.

(6) Military scientific research conducted by one state in the EEZ of another state should get permission of the latter state and should abide by the conditions thereof. There is no direct provision in the Convention as to whether military survey of one state in the EEZ of another state should get the permission of the latter state. Because nowadays marine survey can not be distinguished from the marine scientific research, because marine survey can also affect the sovereign rights and jurisdiction of the coastal state, it is proper to bring the military survey under the permission of the coastal state, otherwise the jurisdiction of the coastal state over marine scientific research in its EEZ might be circumvented.

(7) It is difficult to say military exercises or arms trials of one state in the EEZ of another state are lawful under the Convention. More and more states prohibit other states to hold military exercises or arms trials in their EEZ. For the benefits of world peace and for the respect of the sovereign rights of the coastal states, a state planning military exercises or arms trial in EEZ of another state should inform in advance the latter state and get permission or understanding from the latter state.

(8) The use of force by warships or military aircrafts in the EEZ of another state during the hot pursuit should be prohibited unless in extreme circumstances and in accordance with strict procedures. In any situation the coastal state should be informed the use of force. Existing cases show that such use of force often causes dispute between the two states, therefore such use of force should be restrained.

Received: May 2, 2011
Reviewed: May 30, 2011
Accepted: June 24, 2011

References

Morris, M. A. 1982. Military Aspects of the Exclusive Economic Zone, *Ocean Yearbook 3*, University of Chicago Press.

Mandsager, D. 1998. U.S. Free Navigation Program: Policy, Procedure and Future, The Law of Military Operations, *International Law Studies*, Vol. 72, Naval War College Press.

Damrosch, L. F. 2001. *International Law—Cases and Materials* (fourth edition), West Group.

Kim, H.-S. 2003. Military Activities in the EEZ under the Law of the Sea, *Maritime Law Review* (Volume 15), the Korea Institute of Maritime Law.

Sohn, L. B. and John E. Noyes. 2004. *Cases and Materials on Law of the Sea*, Trans-national Publishers Inc.

Qu, G.-Q. 2005. *The Law of the Sea*, the University of the Chinese People Press.

Fu, K.-C. 2006. Military Survey and Liquid Cargo Transfer in the EEZ: Some Undefined Rights of the Coastal States, *China Oceans Law Review* (Second Issue), Xiamen University Centre for Oceans Policy and Law.

Zhang, H.-W. 2006. Conflict between Jurisdiction of Coastal States over Marine Scientific Research and Military Survey, *China Oceans Law Review* (Second Issue), Xiamen University Centre for Oceans Policy and Law.

Lee, M.-L. 2006. The Interrelation between the Law of the Sea Convention and Customary International Law, *San Diego International Law Journal*.

Xiao, F.-C. and X. Wang 2007. Three Issues of the Law of the Sea Concerning the Maritime Military Activities, *Research on Trends of International Law of the Sea*, Oceans Publishing House.

Tian, S.-C. 2007. Military Activities in EEZ—A Commentary on Guidelines on Navigation and Over-flight in EEZ Drafted by EEZ Team of 21st Century, *Research on the Trends of International Law of the Sea*, Oceans Publishing House.

Anthony, A. 2007. *Modern Treaty Law and Practice*, Second Edition, Cambridge University Press.

Paulsen, M. B. 2007. *The Law of the Sea*, Nova Science Publishing.

Zhou, Z.-H. 2008. *The International Law*, China University of Political Science and Law Press.

Song, Y.-X. 2009. *Theories and Practice of State Marine Jurisdiction*, Oceans Publishing House.

Ji, G.-X. 2009. The Legality of US Conduct in the South China Sea, *China Security* (14th Issue).

Henderson, C. W. 2011. *Understanding International Law*, Wiley-Blackwell.

Liang, S.-Y. 2011. International Law, China University of Political Science and Law Press.

China Oceans Newspaper, 8 February 2002.

The Global Times, 11 March 2009.

The UN Convention on the Law of the Sea 1982.

Regulations of P. R. China on Management of the Foreign-related Marine Scientific Research 1996
Law on the EEZ and the Continental Shelf of P. R. China 1998.

<Website>
http://www.people.com.cn/GB/historic/0401/6024.html
http://news.sohu.com/20090312/n262749905.shtml
http://edition.cnn.com/2009/POLITICS/03/09/us.navy.china/
http://www.chinasecurity.us/index.php?option=com_content&view=article&id=266
http://www.un.org/zh/law/sea/statesparties.shtml,
http://www.un.org/en/
http://www.treaties.un.org/
http://www.un.org/law/ilc/

KMI International Journal of Maritime Affairs and Fisheries • Volume 3 Issue 2 December 2011 pp.183-188 •

Different Voices on Military Activities in the EEZ

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The purpose of this short paper is to address different voices on military activities in the EEZ responding to an article by Yao-Dong Yu and Wen-Jin Piao.[1] It seems that the article completely reflects China's position on the hot issue of military activities in the EEZ which is opposed to that of the United States and many other states. Therefore, it will be fair to introduce different or opposing viewpoints on military activities in the EEZ.

1. A sui generis legal regime of EEZ

The EEZ regime has not appeared until the 1982 UN Convention on the Law of the Sea(the Convention). Before the Convention the maritime space was mainly divided into the territorial sea and the high seas.[2] Coastal States had sovereignty over its territorial sea and all states enjoyed widespread freedom of the high seas including freedom of navigation and freedom of flight over the high seas.[3]

EEZ is "an area beyond and adjacent to the territorial sea", thus situated on between the territorial sea and the high seas.[4] Article 55 of the Convention provides that EEZ is "subject to the specific legal regime established in this Part[EEZ], under which the rights and jurisdiction of the coastal State ... are governed by the relevant provisions of this Convention." And the Convention provides specifically the rights and jurisdiction of the coastal states in the EEZ. In the EEZ the coastal state has (a) "sovereign rights" for the economic purpose, (b) jurisdiction with regard to (i) the establishment and use of artificial islands, installations and structures, (ii) marine scientific research and (iii) the protection

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1 Yao-Dong Yu and Wen-Jin Piao, "Legal Study on Military Activities in the EEZ – with a focus on foreign Military Activities in the EEZ of P.R. China", *KMI International Journal* (to be published in December 2011).

2 Of course, there were contiguous zone for particular purpose such as customs, fiscal, immigration or sanitary and the continental shelf for the seabed and subsoil of submarine areas.

3 1958 Geneva Convention on the High Seas, Article 2.

4 1982 Convention, Article 55.

and preservation of the marine environment, and (c) other rights provided for in the UNCLOS.[5]

High Seas is defined in Article 86 of the Convention as "all parts of the sea that are not included in the EEZ, in the territorial sea or in the internal waters of a State, or in the archipelagic waters of an archipelagic State."[6] In the high seas every state enjoys freedom of the high seas and Article 87 gives examples of the freedom such as freedom of navigation, freedom of overflight, freedom of lay submarine cables, freedom of fishing and freedom of scientific research. It is no doubt that warships and military planes enjoy these freedom of high seas. Even the Convention provides that "warships on the high seas have complete immunity from the jurisdiction of any State other than the flag State."[7]

It is important to note that Article 58(1) of the Convention provides that in the EEZ all States enjoy the freedom of high seas provided in Article 87 subject to the relevant provisions of the Convention. As mentioned above, in the EEZ coastal states has sovereign rights on marine resources and jurisdiction with regard to some specified things such as establishment of artificial islands, marine scientific research and the protection and preservation of the marine environment. Therefore EEZ contains the nature of the territorial sea and the high seas. In this sense, EEZ is a *sui generis* zone newly appeared in the Convention.[8]

2. Military activities in the EEZ

Military activities in the EEZ include routine navigation, exercises and manoeuvres to weapons firing and testing, survey, reconnaissance and surveillance. These activities have been largely admitted in state practices as freedom of the high seas before the appearance of 1982 Convention. Pursuant to the Lotus principle,[9] military activities in the EEZ will be permitted if there are no rules to prohibit them.

China argues that military activities such as surveillance and intelligence collection amount to "any threat or use of force against the territorial integrity or political independence" of China in violation of Article 301 of the Convention and Article 2(4) of the Charter of the UN. The same language of these articles

5 1982 Convention, Article 56.

6 1982 Convention, Article 86.

7 1982 Convention, Article 95.

8 Satya N. Nandan and Shabtai Rosenne, *United Convention on the Law of the Sea 1982. A Commentary Volume II* (Martinus Nijhoff Publishers, 1993), p.520.

9 SS Lotus (France v. Turkey), 1927 PCIJ(Ser. A), No. 10, p.18. "Now the first and foremost restriction imposed by international law upon a State is that - failing the existence of a permissive rule to the contrary - it may not exercise its power in any form in the territory of another State."

can be found in Article 19(2)(a) which specifies some military activities violating the innocent passage in the territorial sea.[10] However no such provisons are appeared in Part V of EEZ regime except on MSR. Also during the Third UN Conference on the Law of the Sea, China, Peru and Group of 77 made efforts but failed to include a security interest in the EEZ regime. When the convention was opened for signature on 10 December 1982, Brazil, Cape Verde and Uruguay made a declaration purporting to require coastal State consent to do military exercises in the EEZ. However, most of the delegations who participated in the Conference supported the view of the United States:[11]

> *All States continue to enjoy in the [EEZ] traditional high seas freedoms of navigation and overflight and the laying of submarine cables and pipelines, and other internationally lawful uses of the sea related to those freedoms, which remain qualitatively and quantitatively the same as those freedoms when exercised seaward of the zone. Military operations, exercises and activities have always been regarded as internationally lawful uses of the sea. The right to conduct such activities will continue to be enjoyed by all States in the exclusive economic zone. This is the import of Article 58 of the Convention.(emphasis added)*

Therefore it can be concluded that military activities in general except MSR are permitted in the EEZ. Security concern of coastal State is not enough reason to prohibit the activities.

3. Military Flights above EEZ

China takes an aggressive position against US surveillance and reconnaissance flights above the EEZ. A good example is the EP-3 incident between US and China. On 1 April 2001 two Chinese F-8 fighters intercepted a US EP-3 conducting a routine reconnaissance flight about 70 miles away from Hainan Island. As a result of close approaching to EP-3, one of the F-8 fighters lost control and collided with the EP-3.[12] China criticized that the US violated the Convention. However china's

10 1982 Convention, Article 19 (2) (b) "any exercise or practice with weapons of any kind"; (c) "any act aimed at collecting information to the prejudice of the defence or security of the coastal State"; (d) "any act of propaganda aimed at affecting the defence or security of the coastal State"; (e) "the launching, landing or taking on board of any aircraft"; (f) "the launching, landing or taking on board of any military device"; (j) "the carrying out of research or survey activities".

11 Official Records of the Third UN Conference on the Law of the Sea, Vol. 17, Plenary Meetings, Doc. A/CONF.62/WS/37 and ADD.1 and 2 (New York: United Nations, n.d.), 243(Recited at Raul Pedrozo, "Preserving Navigational Rights and Freedoms: The Right to Conduct Military Activities in China's Exclusive Economic Zone", in 9 *Chinese Journal of International Law* 9 (2010), p.10).

argument to require coastal State consent on military activities above the EEZ is misplaced. There is no article in the Convention which prohibits those activities above the EEZ. Articles 2 and 49 of the Convention provides that the airspace above the territorial sea and archipelagic waters is subject to coastal State or archipelagic State sovereignty. On the other hand, Article 56 of the Convention limits sovereign rights of coastal States in the EEZ to the seabed, subsoil and the waters superjacent to the seabed for the economic purpose only. In accordance with Article 58 of the Convention all States enjoy the freedoms of navigation and overflight which includes routine military activities over the EEZ. Thus coastal States do not have sovereign rights over airspace above the EEZ. They can not control military flight of other State if it does not affect on the EEZ use of coastal States.

In fact, military flights for surveillance and intelligence collection were common place during the Cold War and continue today without the consent of the coastal States concerned. From May 2007 to May 2008, for instance, in many times, Russian TU-95 Bear bombers conducted military flights just outside the territorial sea limit off Alaska and Canada. Each time US and Canadian fighters took off to monitor the Russian bombers but allowed the bombers to continue on their way.[13] To sum up, to regulate military activities in the airspace above the EEZ has no legal basis in the Convention.[14]

4. MSR and military survey

The convention distinguishes between marine scientific research(MSR) activities and data collecting activities such as hydrographic survey. For instance, Article 19(2)(j) of the Convention provides that "carrying out of research or survey activities" is not innocent passage in the territorial sea of coastal States. And Article 40 of the Convention provides that foreign ships "including marine scientific research and hydrographic survey ships may not carry out any research or survey activities without the prior authorization of the States bordering straits." Article 40 also applies to archipelagic waters pursuant to Article 54 of the Convention. On the other hand, Article 56 grants specifically coastal States jurisdiction only over MSR in the EEZ and Part 12 of the Convention regulates only on MSR.

Although MSR and survey are legally different from each other, however, problems

12 Raul Pedrozo, "Military Activities In and Over the Exclusive Economic Zone", in Myron H. Nordquist, Tommy T.B. Koh and John Nroton Moore (eds.), *Freedom of Seas, Passage Rights and the 1982 Law of the Sea Convention* (Martinus Nijhoff Publishers, 2009), p.239.

13 For more instance, see Raul Pedrozo(2010), p.15;

14 Raul Pedrozo(2010), p.12.

arise from the fact that it is very difficult to draw a sharp distinction between them in practice.[15] As an author clearly points out this, "many of the technologies now used for hydrographic surveying and MSR are relatively recent innovations. Both MSR vessels and dedicated hydrographic surveying vessels use precise navigation systems, multibeam sonars, current meters, seabed sampling devices, etc."[16] Indeed, some states including Australia and Canada seek to permission of the coastal States before conducting hydrographic surveys in the EEZ of other States. According to a survey carried out in the 1980s by UN, legislations of most States do not distinguish between MSR and hydrographic surveys.[17] With regard to military survey in the EEZ, the gap between law and practice is a source of conflicts. However, it is also clear that other routine military activities such as reconnaissance and surveillance in the EEZ are not required to authorization of coastal State.

5. Conclusions

Since 1945 in which US President Truman proclaimed US authority over the resources of the continental shelf contiguous to the lands of US, many coastal States tried to extend their sovereignty beyond the territorial sea. EEZ is the result of compromise to keep a balance between the interest of coastal States and the freedom of high seas. Coastal States enjoy exclusive economic rights in the EEZ specifically provided in the Convention. It is clear that the power to control military activities in the EEZ does not belong to coastal States. Therefore all States maintain the rights of military activities in the EEZ of coastal States as a traditional freedom of high seas right. However, with regard to military survey, question is that it is difficult to distinguish between MSR and military survey in practice.

Received: Nov. 23, 2011
Reviewed: Nov. 29, 2011
Accepted: Dec. 23, 2011

15 Zhang Haiwen, "Is IT Safeguarding the Freedom of Navigation or Maritime Hegemony of the United States? - Comments on Raul (Pete) Pedroz's Article on Military Activities in the EEZ", 9 *Chinese Journal of International Law* 31 (2010), p.42.

16 Sam Bateman, "Scholars' Community Response to Agora: Military Activities in the EEZ - A Response to Pedrozo: The Wider Utility of Hydrographic Surveys", 10 *Chinese Journal of International Law* 177 (2011), p.181.

17 UN, Office for Ocean Affairs and the Law of the Sea, The Law of the Sea: National Legislation, Regulations and Supplementary Documents on Marine Scientific Research in Areas under National Jurisdiction (UN, 1989), pp.143-154 (Recited at Sam Bateman(2011), p.182).