



Profile of the Month

Insights into sea turtle conservation in the Republic of Korea

(Aug 2012)

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The following report was researched by Ms. Ara Jo, who served as an intern in the IOSEA Marine Turtle MoU Secretariat in 2011. Our thanks are extended to Dr. Moon Dea-yeon, Director-General of the Cetacean Research Institute (CRI), National Fisheries Research and Development Institute, who kindly shared his extensive knowledge of sea turtles in Korean waters and whose papers are referenced extensively in this review.

I. Introduction

Sea turtles live in Korean waters all year around, yet this fact is not well known among scientists, let alone the general public. Air temperatures in the Republic of Korea can range from extremes of about 38°C in summer to minus 10°C or lower in winter. As sea turtles cannot survive in water temperatures below 10°C¹, observers have for a long time disregarded Korean waters as sea turtle habitats, considering them only as passage areas for sea turtles nesting on Japanese shores. However, testimonies and other evidence demonstrate their presence along the southern and eastern coasts of the Korean peninsula. Green, loggerhead, leatherback and hawksbill turtles are found in Korean waters; with green turtles and loggerheads having been reported most frequently. In 2008, for the first time, the Government of Korea initiated research on sea turtles found in its waters. One conservation project aims to verify eyewitness accounts of intermittent sea turtle nesting on Jeju Island.

Myths or traditional fairy tales can offer historical evidence of whether or not a society is familiar with sea turtles and how people conceptualize them. In both western and eastern culture, it is common to have a birth myth of a progenitor of an ancient state, and such is also the case of ancient Korean kingdoms. The Federation of Gaya states (BC ?- AD 562) consisted of six states, including Grand Gaya and Golden Crown Gaya. Six kings of the states were conveyed to descend from heaven when their people sang a song to a turtle god asking that a king be sent for each nation. After the song/prayer was sung, six turtle eggs came down to the earth. Six ancient kings emerged from the eggs and they governed thereafter. Every Korean learns the ancient poem or song and is familiar with the myth.

Koreans seem to have a sense of intimacy with sea turtles historically, so it is not unusual to find sea turtles in traditional Korean fairy tales. It seems that Koreans also make a connection between dragon (an Asian traditional symbol of god or invincible idol) and sea turtle. In many traditional fairy tales, a sea turtle appears as a sea god, a daughter of a sea god or at least messenger of one. This notion has created beliefs in sea turtles among fishermen who typically follow strict taboos to keep them safe in the water.

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The idolisation and a sort of worship of sea turtles can still be found to this day. In 2008, the Korean Broadcasting System aired a documentary film about sea turtles in offshore Korean waters². In the film, all of the local fishermen who accidentally caught a sea turtle (which all appeared to be green turtles) immediately released them with prayer for forgiveness and a full load of fish. According one fisherman's comment, he caught at most seven sea turtles each year, a number that has been increasing for the last few years. If a sea turtle is caught alive it is released back to the sea, but other turtles have been found dead, having been killed by impact or having drowned in set nets or on hooks.

The remainder of this report outlines the institutional arrangements for biodiversity conservation in the Republic of Korea, describes conservation and research activities conducted in relation to sea turtles (especially since 2008), and highlights various initiatives undertaken to raise public awareness of sea turtles in Korea. The review also describes Korean fisheries operations which may be interacting with sea turtles, the country's membership in relevant fisheries management organisations, and various efforts made to study and help mitigate fisheries interactions. Finally, the review looks at Korean membership in various international conventions pertinent to wildlife conservation and offers insights into domestic considerations about potential membership in the Convention on Migratory Species, under whose auspices the IOSEA Marine Turtle MoU was concluded in 2001.

II. Institutional Analysis

Central Government

The three ministries responsible for fisheries and marine biological diversity are the Ministry of Land, Transport and Maritime Affairs (MLTM), the Ministry of Environment, and the Ministry for Food, Agriculture, Forestry and Fisheries (MIFAFF). The Ministry of Environment is the main implementing agency for the Act on the Conservation of Wild Fauna and Flora (2004)³ which covers terrestrial, marine and avian wildlife. In reality, the Ministry of Environment focuses on terrestrial and avian wildlife conservation rather than the marine environment. In contrast, the Ministry of Land, Transportation and Maritime Affairs has competence for marine wildlife conservation through several instruments, namely the Act on Marine Ecosystem Conservation and Management (2004)⁴, the Law on the Conservation and Management of Uninhabited Islands (2007)⁵, the Law for Marine Scientific Investigation, and the Act on the Conservation of Wetlands, and the Act on the Management of the Marine Environment (2007)⁶.

Through the Act on Marine Ecosystem Conservation and Management, MLTM has been implementing conservation programmes for sea turtles and seals. In particular, the Ministry has established action plans and conducted baseline studies in collaboration with its affiliated research institutions. Because of the relatively short history of the Act, conservation efforts for marine wildlife are presently in the initial stage only, focusing on two endangered animals: sea turtles and spotted seals. MLTM has compiled a list of 46 endangered species of marine animals and plants. So far, sea turtles are not on the list, but the Ministry is reported to be making efforts to insert sea turtles in the list by 2012. With this effort, MLTM will expand its coverage of targeted species and will pursue sea turtle conservation in more depth.

The National Fisheries Research and Development Institute (NFRDI) works closely with MLTM in the area of marine migratory species conservation by implementing an Action Plan for Marine Endangered Animals. NFRDI has wide-ranging interests, including scientific research and experiments, surveys of fisheries stock, industrialization of fish and fish products, conservation of fishing environment, genetics breeding and fisheries biotechnology, sustainable stock management, seafood sanitation and aquatic animal disease control. The institute has many local research centres and specialized institutions throughout the country, including the Cetacean Research Institute, the Mudflat Wetland Research Institute, the Subtropical Fisheries Research Institute, the Seaweed Bio-research Institute, the East Sea Fisheries Research Institute, the South Sea Fisheries Institute and so on. One of NFRDI's sub-institutes has a researcher with a PhD on sea turtles who is actively working on the implementation of turtle programmes. Dr. Moon Dae-Yoen undertakes research on sea turtles in a collaborative way with researchers from the Cetacean Research Institute, Jeju Institute and other NFRDI affiliated institutes.

Other Agencies

Local governments are key implementing bodies for action plans, undertaking efforts to preserve indigenous species through the substantial management of major habitats and the control of alien species. However, a web-search and telephone interviews revealed no municipalities with plans or strategies pertaining specifically to sea turtle conservation. According to the Law of Environmental Policy, municipalities may constitute an advisory committee for environmental conservation. Most of the metropolitan cities located near the coast – such as Jeju, Pusan and Ulsan – receive advice from their respective advisory committees comprising scientists, professors and activists in the environmental sector.

The Environment Protection Association is a private association of 179 companies established in metropolitan cities of the Republic of Korea. The Association has set environmental targets for each company, for example supporting restoration of habitat of endangered species, capturing alien species that disturb indigenous ecosystems, and managing mountains in partnership with local NGOs. Since 2008, some of the companies have entered into agreements with island conservation offices to undertake conservation activities, including cleaning up marine debris.

The Korea Wild Animal and Plant Service (KoWAPS) was established through the Act on the Conservation of Wild Fauna and Flora under the Ministry of Environment. It monitors illegal hunting, trade, and rescue of wildlife to efficiently support government policies concerning wildlife conservation.

Even though there are many environmental NGOs in Korea concerned with wildlife conservation, there seems to be no organisation dedicated primarily to conserving marine biodiversity, particularly sea turtles. However, Green Korea United (GKU) is involved in conservation activities by protecting endangered bears, gorals, spotted seals and whales. GKU has held youth environmental camps on the theme of endangered sea turtles and other marine animals in cooperation with the Jeju Municipality and NFRDI since 2010 to increase public awareness of the endangered marine environment.

III. Conservation and Research

Global Warming and its Impacts on Sea Turtles in Korean Waters

The waters surrounding the Korean peninsula have not been known as a popular destination for sea turtles because of low water temperature and changes in temperature according to seasonal variations. However, it is anticipated that sea turtles may be exposed more often to Korean seas due to global warming. The Korean Ministry of Land, Transport and Maritime Affairs reported that the temperature of the surface layer of adjacent seas has already increased about 0.93°C from 1968 to 2006, including a 1.04°C increase in the South Sea⁷, where sea turtles sometimes occur and are reported to be caught by local fishermen.

The increase in temperature has accelerated over the last ten years⁸. The higher water temperature attracts less cold current species and more warm current species such as cuttlefish, chub mackerel, anchovy and tuna which are prey for carnivorous sea turtles. The catch of cuttlefish has rapidly increased by 111,000 tons, and chub mackerel by 90,000 tons over 9 years, from 1990 to 2008⁹. As a consequence of the increasing temperature, and inflow of warm currents and prey species, sea turtles are expected to appear more frequently in the waters surrounding Korea. This implies that the Government of Korea needs to establish conservation policies and actions for sea turtles and other highly migratory species.

Research and Conservation Efforts

As part of its effort to conserve endangered marine animals, the National Fisheries Research and Development Institute released a paper about sea turtles found on Korean shores for the first time in 2008. The group of researchers conducted monitoring of sea turtle strandings and by-catch, as well as nesting activity at Jung-moon Beach on Jeju Island. Four sea turtles found alive onshore had satellite transmitters affixed to their carapaces in order to monitor their movements. The results demonstrated that these particular green and loggerhead turtles frequented both Korea and Japanese waters; and it appears that the waters around Jeju Island are used as foraging grounds all year around¹⁰.

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Distribution and Strandings of Endangered Sea Turtles¹¹

Climate change plays a role in the redistribution of some turtle species, which migrate further into temperate regions beyond their original habitats in tropical and sub-tropical zones. As noted above, the waters surrounding Korea have been affected by increasing temperature, with the southern seas of the Korean peninsula changing from the temperate climate to sub-tropic. This may help to explain why sea turtle strandings on Korean shores have been increasing in the recent years. In this context, the Ministry of Land, Transport and Maritime Affairs established plans for conservation of endangered marine species including whales, sea seals and sea turtles in 2007.

Activities conducted by the Korea National Fisheries Research and Development Institute have included receiving calls and dispatching researchers to the spot where a sea turtle is reported to be found. Researchers receive calls from the marine police and from fishermen who initially find stranded or by-caught turtles. In the case of sea turtles found dead, researchers note the species, sex, length, weight and cause of death when it is possible to determine this through visual inspection. After finishing the basic research on the spot, turtles are moved to the lab to confirm their cause of death by necropsy. If a sea turtle is found alive, following basic research on the spot, it is immediately released unless the animal suffers impairment from fishing gear or barnacles. In the latter case, the animal is transported to a rescue centre/clinic for treatment until its release.

In 2008, a total of 19 sea turtles were caught, mostly by set-nets, or found dead onshore (10 = 53%), while another 7 turtles were reported to be have been released by local fishermen (Table 1). Four species of sea turtle – green, loggerhead, leatherback and hawksbill – are known to occur in Korean waters, with green and loggerhead turtles appearing most frequently. Of the animals that were observed in 2008, 12 were identified as green turtles and 7 as loggerhead turtles. Another seven animals were not identified.

The green turtles had sea-weed such as green algae, fusiforme, and agar in their digestive tracts; while loggerhead turtles were found to have consumed mackerel, hairtail, cuttlefish and crabs. Additionally, vinyl and nylon were also found in one green turtle's intestine. Another green turtle was badly wounded by a barnacle *Balanus crenatus* attached to its carapace, which had burrowed deeply into internal organs causing haemorrhage. The turtle was taken to a clinic for treatment lasting eight months.

Another dead green turtle was found with a flipper tag originating from Japan. The Japanese Sea Turtle Committee confirmed that the animal had been released in Kagoshima, Japan, on 1 October 2007 before turning up in Pohang, Korea, some 11 months later. It is known that some of the turtles nesting on Japanese shores migrate to the East China Sea or Korean waters through Tsunshima sea current. Another case was reported in 2004, when a green turtle discovered with a Japanese flipper tag was caught on Jeju Island and offshore of Pohang, coinciding with the direction of Tsunshima warm current.

Table 1. Observed composition of sea turtles in Korea waters – 2008

Species	Number	Curved Carapace Length (cm)	
		Min	Max
<i>Chelonia mydas</i>	12	39.2	90
<i>Caretta caretta</i>	7	65	84.2
Unidentified Species	7	-	-
Total	26 (dead = 10)		

Sea turtles have been found in the southern and eastern waters of the Korean peninsula, including 9 on the shores of Jeju Island and 6 in the South Sea. The map below illustrates the locations and numbers of turtles found stranded on Korean shores.

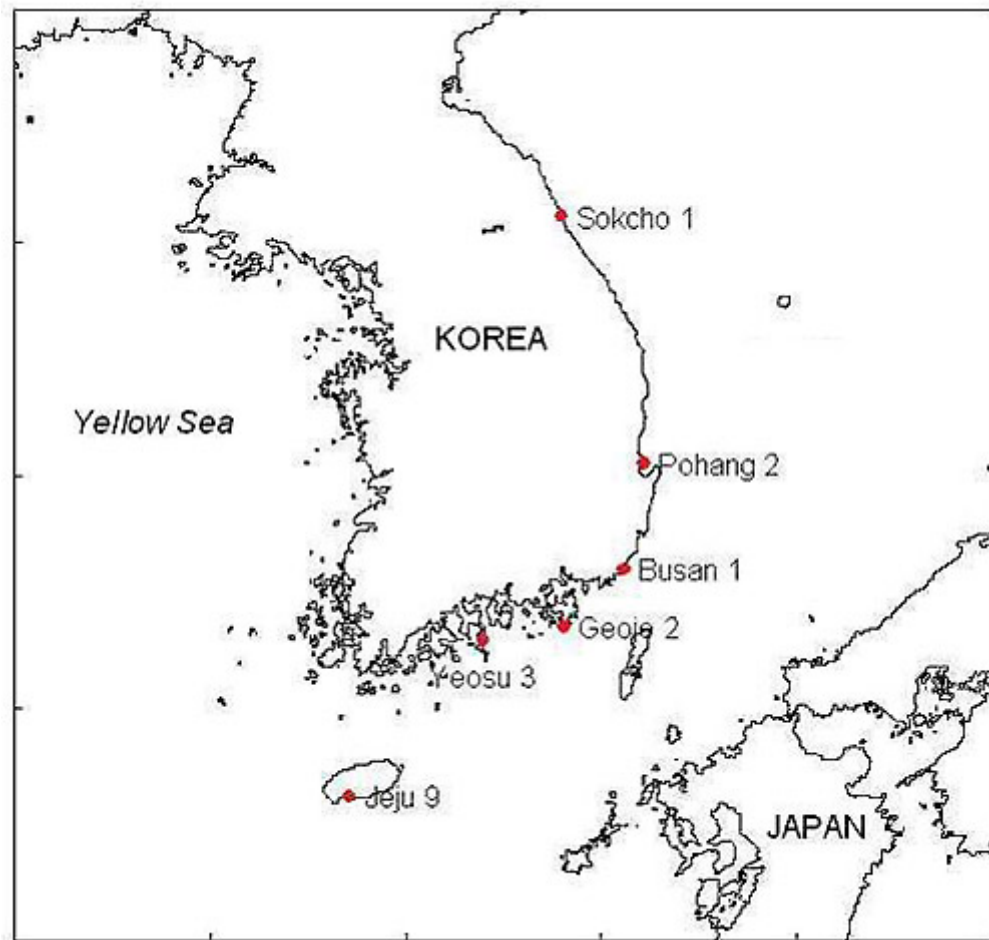


Fig.1 Strandings of sea turtles on Korean shores (Source: NFRDI)

Of the four seasons, summer (June-August) ranked highest for strandings (accounting for 68%), but strandings also occurred in November, January and March, which fall in the winter season in Korea.

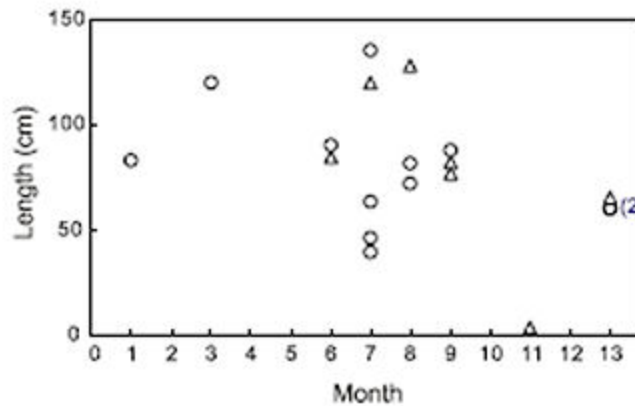


Fig.2. Number and size of stranded sea turtles by month Legend: o = Green turtle, Δ Loggerhead turtle (Source: NFRDI)

This research reveals that Korean waters, especially around Jeju island, have been underestimated as sea turtle habitats and foraging areas. It had been thought that sea turtles show up only occasionally during summer, but that notion has been proved wrong since sea turtles appear all year around near Jeju Island. According to local interviews, sea turtles are frequently observed in all four seasons in areas with rich sea algae.

In 2009, a total of 10 turtles (7 greens, 2 loggerheads and 1 hawksbill) were examined and another 16 unidentified cases were reported by fishermen, especially on the northeast shores of Jeju Island. Among the inspected turtles, 9 out of 10 were female, while one loggerhead was male. Green turtles were caught from June to November and loggerheads between August and December. The single hawksbill turtle was found dead in February. Turtles were caught mostly by set nets (16 turtles, 61.5%) and drift nets (4 turtles). Live animals were released on the spot. A further 7 strandings were recorded onshore¹².

Table 2. Observed composition of sea turtles in the Jeju waters – 2009

Species	Number	Curved Carapace Length (cm)	
		Min	Max
<i>Chelonia mydas</i>	7	41.2	87
<i>Caretta caretta</i>	2	81	91.1
<i>Eretmochelys imbricata</i>	1	41.9	41.9
Unidentified Species	16		
Total	26 (dead = 8)		

Monitoring of nesting

Nesting of loggerhead turtles on Jeju Island's Jungmun Beach has been suggested and local people have confirmed intermittent nesting. Therefore, the Jeju Fisheries Research Institute started a monitoring project at two places on the beach using two CCTV cameras operating 24 hours a day.

During the nesting season, a local person hired for monitoring made twice-daily patrols at 6 A.M. and 10 P.M. so as to not miss any nesting. However, as of April 2011, no nesting had been reported on Jungmun Beach since the beginning of the project.

Satellite Transmitter Tracking

A group of scientists has conducted tracking research by attaching satellite transmitters on the carapaces of sea turtles caught accidentally in Korean waters. From 2008 to 2010 a total of four turtles were involved in this project. A green turtle caught by a set net in Sinchang on 15 July 2008 was released with satellite transmitter on 21 October 2008 near Jungmun Beach, selected because the absence of set-nets and fishing activities offshore. For six months, the green turtle stayed offshore of Jeju Island as the map shows below. The turtle was estimated to travel from 5 to 67 km per day, until the battery died on 18 April 2009.

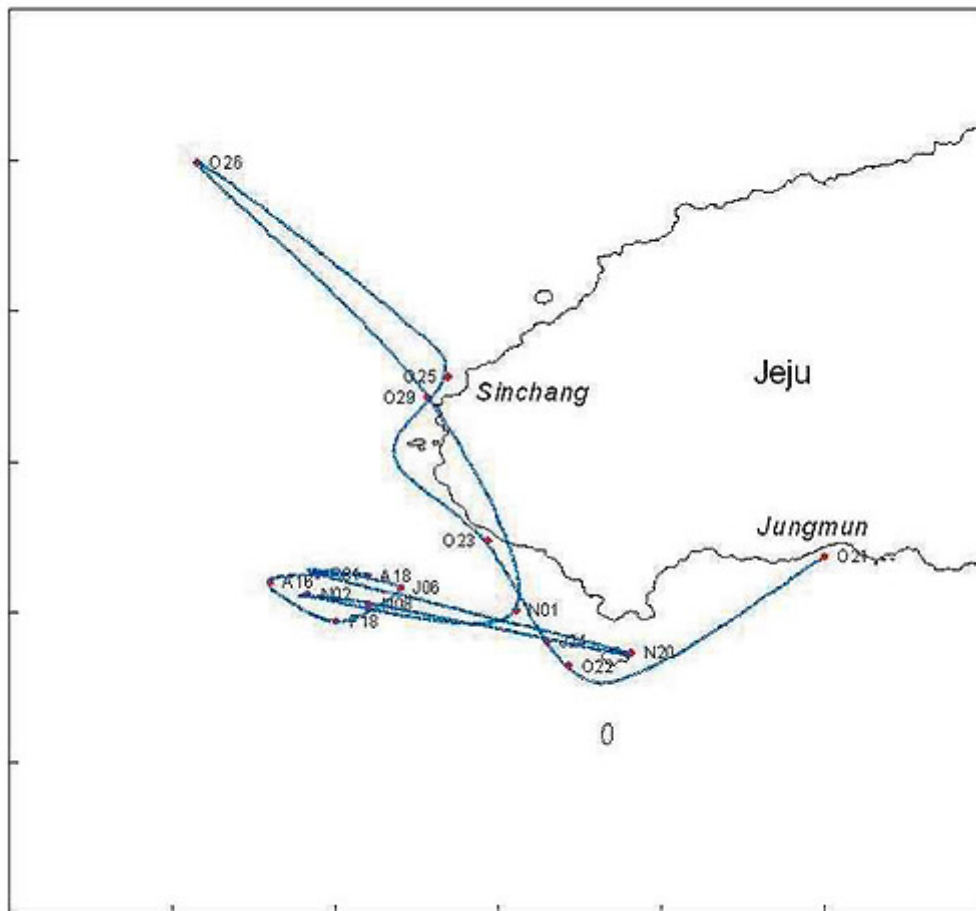


Fig. 3. Seasonal movement of a green turtle tagged with a satellite tag (Source: NFRDI)

Future prospects

In accordance with the Act on Marine Ecosystem Conservation and Management, the Ministry of Land, Transport, and Maritime Affairs (MTTM) develops conservation plans for endangered marine animals such as seals, sharks, seabirds and sea turtles. Research activities mentioned above are based on these plans, implemented mainly by offices of the National Fisheries Research and Development Institution scattered across the country. People associated with turtle conservation activities seem to recognize the importance and value of turtle conservation and have a clear vision of future efforts -- not only for maintaining sea turtle populations, but also for developing associated eco-tourism activities. However, marine biodiversity is a relatively less exploited area in Korea; and ecosystem-

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oriented development, tourism and even conservation activities for endangered marine ecology are still at the initial stage. Thanks to the country's economic development and high awareness for environment, the future of sea turtle conservation research is expected to be bright, with international cooperative activities and domestic regulations.

In addition, the Ministry of Environment has declared 46 endangered wildlife species in Korea requiring special conservation efforts because of population decline and habitat destruction. Those species have benefitted from strict monitoring and genetic research. While sea turtles are not among them, the government is reported to be positively considering including them in the list in 2012, which should accelerate more comprehensive conservation efforts.

IV. Public Awareness-raising

Release Events

In October 2009, the Cetacean Research Institute of Korea released a female green sea turtle bearing a small "SPOT 5" satellite transmitter in order to investigate the migratory route of sea turtles. Many civilians and reporters celebrated the release, which took place in Pusan. The event included a briefing about the situation of sea turtles, farewell kite-flying, and a memorial ceremony wishing for the turtle's health and safe life.

This particular green turtle had been caught and wounded by a set-net near Geoje Island in the southern part of the Korean peninsula. On 26 June 2008, the animal was moved to Pusan Aquarium's Marine Animal Conservation Center (MACC), which has been designated as the official center for treatment and rehabilitation of marine wildlife.



According to the data generated by this green turtle during the research period, it travelled between the waters of Korea and Japan. The turtle made its way towards the southwest to Geoje Island and Jeju Island and then moved in an easterly direction towards Fukuoka, Japan. For the first four months it stayed in the South Sea before reaching and staying near Fukuoka for five months, then returning to Korean waters in July 2009.



Satellite tracking path of Eunbuk (released green sea turtle). Source: Yonhap News website

In a related media interview, the Institute mentioned the necessity for cooperative research and conservation activities with Japan so as to better conserve these endangered species. Other news reports about the release and its subsequent satellite tracking mostly reported about the research with a brief introduction to sea turtle conservation needs and international conservation efforts.

Youth Camp

In collaboration with Green Korea United, and Jeju Municipality, the Jeju Fisheries Research and Development Institute hosted a camp for youth in line with a program of "island environment camps" for the future generation, which have been organized every year since 2002. The institute has conducted research on artificial breeding and wildlife nesting specifically for endangered marine species such as seahorses and sea turtles. Forty invited secondary students were introduced to marine ecology and the process of artificial spawning with the aim of raising their awareness of the environment and biodiversity at risk.

Pusan Aquarium

Pusan Aquarium exhibits sea turtles and sharks and hosts the Marine Animal Conservation Center (MACC), which rescues and treats injured wild animals. To raise public awareness of endangered sea turtles, the Aquarium held a series of events and seminars about sea turtles. This public awareness activity included a puppet play about Eunbuk, the green sea turtle which had been treated and released by Pusan Aquarium, a performance on the beach, a web cartoon open exhibition, a sea turtle drawing contest, fund raising, and a forum about turtle conservation and Eunbuk's release ceremony. The Pusan Aquarium is known to retain three sea turtles and over 30 sharks in its aquarium.



V. Overseas Tuna Fisheries

Status of Korean Deep-Sea Fisheries

Korea's deep-sea fisheries started in 1957 with one tuna long line fishing fleet in the Indian Ocean. Since then the number of vessels has dramatically increased, peaking in 1977 with 850 vessels (539 tuna longliners, and 311 trawlers) catching 332,410 G/T of fish¹³. Since the 1970s, various factors have compelled Korea to decrease the number of fishing vessels to the current total number of 362 (182 tuna long liners, 106 trawlers, 31 cuttlefish operators, and 43 others) producing 184,850 G/T of fish as of 2009¹⁴. These factors included the declaration of EEZ (exclusive economic zone) or EFZ (exclusive fisheries zone) according to the UN Law of the Sea, two oil price shocks, plunging fish prices and expansion of regulations on the open seas.

Around 1990, the total production of deep-sea fish reached a second peak, at 422,144 G/T, before declining on account of various international limitations on overseas fishing operations¹⁵. Korean overseas tuna longline fisheries ranked the second largest in total production, after Japan, and third largest in total production of deep-sea fisheries next to China and Taiwan in 2009¹⁶. Korea has 22 fishing grounds in 20 countries throughout the three oceans. By way of example, Oman and Somalia currently provide the fishing rights to 24 Korean tuna longliners and 10 trawlers¹⁷.

Korea presently grasps for solutions to maintain its leading position in the deep-sea fishing industry without breaching ever more sophisticated international regulations encouraging sustainable use of marine biological resources and responsible fishing.

International and Regional Fisheries Organizations

One-fifth of fish products in Korea are currently produced by its deep-sea fishing operations¹⁸. Ninety percent of the tuna catch of Korean distant-water fishing is produced in the area of competence of the WCPFC (Western Central Pacific Fishery Commission), as well as the areas covered by ICCAT and CCSBT. Korea has actively participated as a member country since the foundation of each of these organizations¹⁹.

Korea has continually tried to promote its pelagic fishing industry in the open sea, while actively responding to internationally agreed concepts such as responsible fishing or sustainable development by joining most of the international and regional fisheries entities. Fisheries commissions require their member countries to implement regulations aiming to prevent bycatch of endangered marine animals and depletion of targeted fish stocks by some technically advanced countries. The most common obligations include VMS (vessel monitoring system), onboard monitors, international observers, maintenance of logbooks, harbour State inspections with a view to preventing overfishing, illegal killing and trade of endangered wild animals, as well as gathering necessary scientific data²⁰. Through

Table 3. International Fisheries Organisations of which Korea is a member (as at 2007)

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Organization		Member countries	Concerned area
IWC	1948 International Convention for the Regulation of Whaling	59	Areas of whale distribution
IPFC	1948 Indo Pacific Fish Conference	20	Indian Ocean, Pacific Ocean
IATTC	1950 Inter American tropical tuna commission	16	Eastern Pacific Ocean
COFI	1965 FAO Committee on Fisheries	100	All seas
IOFC	1967 Indian Ocean Fishery Commission	45	Indian Ocean
CECAF	1967 Committee for the Eastern Central Atlantic Fisheries	32	Eastern and Central Atlantic ocean
ICCAT	1969 International Commission for the Conservation of Atlantic Tunas	41	Atlantic Ocean
WECAFC	1973 Western Central Atlantic Fishery Commission	32	Western and Central Atlantic Ocean
NAFO	1979 Northwest Atlantic Fisheries Organization	17	Northeaster Atlantic Ocean
CCAMLR	1981 Commission for the Conservation of Antarctic Marine Living Resources	24	Antarctic seas
NPAFC	1993 North Pacific Anadromous Fish Commission	5	Northern Pacific Ocean
CCSBT	1993 Commission for the Conservation of Southern Bluefin Tuna	5	High Seas
CBSPC	1995 Central Bering Sea Pollock Convention	6	Open areas of Bering Sea
IOTC	1996 Indian Ocean Tuna Commission	23	Indian Ocean
WCPFC	2004 Western and Central Pacific Fisheries Commission	25	Western and Central Pacific Ocean

(Source; 50 years development history of deep-sea fisheries. 2008)

Indian Ocean Tuna Commission (IOTC)

The IOTC is one of the affiliated fisheries organisations of FAO, promoting responsible fishing and sustainable development in the Indian Ocean. The Republic of Korea has been a member country since 1996, fulfilling duties such as submitting an annual national report to the commission, operating vessel monitoring systems and dispatching onboard observers²¹.

According to Korea's national report for 2009, the total catch of tuna and tuna-like species (four target species) by Korean longliners was 2,978 mt, accounting for 81% of the total catch by 21 vessels, a decrease of 7 vessels compared to 2007. With regard to conservation efforts for ecologically important species such as sharks, seabirds and sea turtles, fishermen have to submit the logbooks filled in during their operations and handed in immediately after the end of the fishing operation. The National

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Fisheries Research and Development Institute issued a species identification guidebook to help fishermen fill out the data sheets, so that the information would be available from 2011²².

According to the regulation of IOTC, three scientific observers were dispatched for monitoring compliance and scientific data collection, covering 14.5 % of the total fishing efforts²³. NFRDI files the observer reports with comments on sea turtle bycatch, however, the data are not categorised or digitalized systematically. Therefore, if one needs data on turtle bycatch, one has to look through all reports to see whether they happen to report incidental bycatch of sea turtles. Not all of the reports have data on sea turtles.

Guidelines for Identification of Species Bycatch

As mentioned above, in order to participate in efforts to reduce mortality of endangered species bycatch, the Government of Korea has issued a guidebook to tuna fishing fleets. The “Guide to species by-catch in tuna fisheries” was published with the aim of helping Korean fishermen identify endangered species. The guidebook describes four groups of migratory marine animals – sharks, seabirds, sea turtles and whales – giving their picture, distribution map, description with simplified illustrations, and brief ecological characteristics of the species. All sea turtle species – loggerhead, green, hawksbill, leatherback, olive ridley, Kemp’s ridley, and flatback – are illustrated with their names indicated in English, Japanese and Korean.

Research on Comparison of Hooks²⁴

From August 2005, NFRDI conducted three-year circle hook experiments in the Eastern/Western Pacific Ocean to measure the impacts of hook types on turtle bycatch. Three types of circle hooks of different size and a traditional J-hook for tuna fishing were used in the study. Two scientists were deployed on a Korean longliner fishing for tuna in the Eastern Pacific. The study revealed no difference in the catch rate of target species by hook type, and showed inconsistency in bycatch rate by hook type. In the 2005 experiment only J-hooks caught sea turtles, but in 2006 both J-hooks and circle hooks caught sea turtles. The 2007 experiment (in the Western Pacific) recorded no sea turtle bycatch even though scientists employed same method used in the previous two studies.

Based on the results from the 2006 experiment it appears that the use of circle hooks did not prevent turtles from being incidentally caught during fishing operations. While the circle hook may not prevent sea turtle bycatch, it could increase the survival rate of sea turtles after capture (on account of less harmful hooking location). The following table depicts the number of by-caught sea turtles and their status when they were hauled aboard vessels. Interestingly, all of the turtles caught were olive ridleys.

Table 4. Bycatch of sea turtles (Source: NFRDI)²⁵

Year	Species	Carapace length	Hook type	Position hooked	Status at capture
2005	Olive ridley	63 cm	J4.0(#2)	Front flipper- left	Dead
		64 cm	J4.0(#1)	Front flipper- left	Alive
		33 cm	J4.0(#1)	Front flipper- left	Alive
2006	Olive ridley	52cm	C15(#2)	Lower jaw	Alive
		66cm	J4.0(#13)	Mouth	Dead
		57cm	J4.0(#16)	Mouth	Dead
		83cm	C15(#6)	Front flipper-right	Alive
		82cm	J4.0(#5)	Mouth	Dead
2007	None				

VI. International Laws and Regulations on Wildlife Conservation

Korean Membership in International Conventions Pertinent to Wildlife Conservation

According to a survey undertaken by the Korea Maritime Institute, officers and experts in charge of environmental matters expressed their priority to develop adaptation programmes for marine ecosystems as fourth highest out of ten possible choices²⁶. They also mentioned the international conventions which they considered to play a key role in policy making in maritime and fisheries matters, namely: the United Nations Framework Convention on Climate Change (UNFCCC) and its related Kyoto Protocol, the Convention on Biological Diversity (CBD), the International Maritime Organization Convention (IMO convention) and the 1996 Protocol to the London Convention (on marine pollution), in that order²⁷. It may be interpreted that environmental professionals give top priority to the need for carbon mitigation, but they may also have relatively high awareness of conservation of biological diversity.

In addition to the conventions mentioned above, Korea has joined a number of other international instruments such as the Ramsar Convention on Wetlands, the United Nations Convention to Combat Desertification, the International Convention for the Regulation of Whaling (ICRW), the International Convention for the Conservation of Atlantic Tunas (ICCAT), the Convention on the Conservation of the Living Resources of the Southeast Atlantic, the Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Seas relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, a series of IMO conventions relating to oil spills, wastes and ocean safety, the International Plant Protection Convention, International Tropical Timber Agreement and so on. Regarding the conservation of migratory species, in particular, the Government of Korea engages in CBD, CITES, Ramsar, ICRW, and other conventions governing straddling and/or highly migratory fish stocks.

Feasibility Study on Korea's Accession to CMS

Amid the ever increasing importance of securing biological diversity at the global level, Korea has also recognized the pressure of depletion of natural fauna and flora and bio- resources. As a response to this pressure, the Government of Korea considered signing the Convention on the Conservation of Migratory Species of Wild Animals (CMS) in the early 1990s and in 2008, but both of the reviews failed to produce agreement among relevant ministries about convention membership. The first review was reported to have concluded unfavourably mainly for two reasons: the Ministry of Marine Affairs and Fisheries at the time opposed to break the regional solidarity among Korea, China and Japan which have not ratified CMS until now. The second reason is the potential for negative ramifications in relation to whaling and shark catches. These issues seem to be the main logic preventing Korea from acceding to CMS since then.

However, according to a feasibility study on CMS membership undertaken in 2008, it was argued that joining the international agreement has more positive impacts for Korea's national interest than adverse effects for four reasons: (1) Korea could extend its conservation activities for migratory species to the global stage; (2) Korea could take new initiatives for conserving migratory species in Far East Asia; (3) Korea would have a better system for forecasting and problem-solving against the epidemic of Avian Influenza through systematic cooperation with other CMS Parties and other related international regimes; and (4) Korea would be in a better position to generate statistical data and to develop techniques to reduce the bycatch of the sharks and whales²⁸. The researchers concluded that the possible negative effects on fisheries were very limited, since Korea is already a member country of CITES, CBD, Ramsar Convention, and other international fisheries organisations.

As for sea turtle bycatch, the 2008 review concluded that joining the CMS would not result any change in the obligations concerning conservation of sea turtles. It posited that offshore fisheries and coastal fisheries do not intentionally catch sea turtles because of the strong traditional idolization of sea turtles and that deep-sea fisheries fleets strictly follow international regulations on the conservation of sea turtles. Similarly the review noted that killing of whales has been prohibited by the International Convention for the Regulation of Whaling since 1991 and that shark bycatch represented only 2% of

the total overseas fishing – as such, neither could be interpreted as significant impediments preventing accession to CMS. Despite providing an alternative viewpoint on the issues of regional solidity and the impacts of CMS membership on fisheries, the analysis was not sufficient to persuade ministries to resolve their different positions at that time.

Perhaps as a consequence of the decision of the Government of Korea not to join the Convention on Migratory Species, the IOSEA Marine Turtle Memorandum of Understanding – which was concluded under CMS auspices – has not yet had the opportunity to recruit Korea as a member country. Nevertheless, there is hope that sea turtles will receive enhanced protection in Korea through domestic laws and national plans.

VII. Conclusion

The Republic of Korea has strived to enhance marine wildlife conservation through domestic regulations and programmes, including conservation efforts for sea turtles developed since 2008. By ratifying many international agreements, these efforts are able to keep in step with international collaboration and set a path to globally shared goals. Korea has already joined CITES, CBD, and Ramsar, through which a major portion of its wildlife can be protected and conserved. If Korea were to join CMS and its daughter Agreements, its conservation efforts for migratory species could be implemented more effectively in cooperation with many other countries sharing the same species.

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Original URL: http://www.ioseaturtles.org/pom_detail.php?id=119

Printed: 29 September 2012, 12:27 AM, ICT



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