The 2nd NOWPAP Workshop on Marine Litter

28-29 March 2007
Tower 111 Sky Hall, Toyama, Japan

Organized by
Northwest Pacific Action Plan (NOWPAP)
Special Monitoring & Coastal Environmental Assessment Regional Activity Centre (CEARAC)

Sponsored by
Ministry of the Environment, Japan
Northwest Pacific Region Environmental Cooperation Center (NPEC)

Participating Organizations

Organized by:

Northwest Pacific Action Plan
Special Monitoring and Coastal Environmental Assessment Regional Activity Centre (NOWPAP/CEARAC)

Sponsored by:

Ministry of the Environment, Japan

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Supported by:

Toyama Prefecture

Toyama City

NOWPAP RCU

Coordinating Body on the Seas of East Asia (COBSEA)

Japanese Association for Coastal Zone Studies (JACZS)

Japan Driftological Society

Japan Society of Waste Management Experts (JSWME)

The Oceanographic Society of Japan

Organizing Committee

NOWPAP MALITA Focal Points, Directors of NOWPAP RACs and representatives of NOWPAP RCU

Contents

Report on the Second NOWPAP Workshop on Marine Litter (Toyama, Japan, 28-29 March 2007)

Result of the WS

Nineteen presentations were made by NOWPAP Member States (China, Japan, Korea, and Russia), NOWPAP staff and FAO/UNEP Consultants, including a keynote speech and special lecture. Around 90 people participated in the workshop.

Through the workshop, participants shared information on: (1) countermeasures implemented in specific areas; (2) the reduction and prevention efforts implemented in each country; (3) countermeasures against fisheries-related marine litter; (4) coastal cleanup; (5) marine litter management policies and systems; and (6) regional actions against marine litter, including in the neighbouring COBSEA Region. In the discussions of each session, participants actively exchanged opinions in the pursuit of more effective ways to solve marine litter problems. The information and opinions shared at this workshop help develop a Regional Action Plan on marine litter in the NOWPAP Region.

Opening Ceremony

1. The workshop was opened in Toyama, Japan, at 1:00 pm on 28 March 2007 by the Director of CEARAC, Mr. Takeshi OGAWA.

2. Opening Addresses were made by Mr. Kentaro TOMINAGA, Deputy Director of the Global Environmental Issues Division, Ministry of the Environment, Japan, and Dr. Motoyuki SUZUKI, Chairman of the Northwest Pacific Region Environmental Cooperation Center (NPEC).

3. Guest Addresses were made by Mr. Tatsuhiro IWAMOTO, Director General of the Civic Affairs & Environmental Department, Toyama Prefecture, and Mr. Xiaodong ZHONG, Deputy Coordinator of NOWPAP.

4. The Keynote Speech was made by Mr. Steve RAAYMAKERS, of EcoStrategic Consultants. He explained the background to and impact of derelict fishing gear (DFG) as well as the current actions being taken against DFG. In his speech, he emphasized that the global response should focus on exploiting the existing regulatory regime and available tools, saying that for future actions we need to “want to use them” and “know how to use them”.

5. A special lecture was given by Dr. Tatsuro MATSUOKA, of Kagoshima University. He introduced a study explaining the impact of ghost fishing caused by DFG. He also explained various processes from fishing gear loss to the dysfunction of ghost fishing. He emphasized the utilization management of fishing grounds, improvement of fishing gear and other methods to prevent DFG and ghost fishing.

Session 1

6. Mr. Jiangning CHEN introduced some of the marine litter cleanup campaigns carried out by Dalian Environmental Protection Volunteer Association (DLEPVA), and made various suggestions on future activities for NOWPAP, such as establishing action plans.

7. Mr. Toshifumi SHIWAKU reported the results of the seabed litter investigation conducted in the Seto Inland Sea in 2006, and presented some removal and disposal approaches that have been implemented in the area by local fishermen and the local administration. He also emphasized the importance of central government involvement since the marine litter problem in Seto Inland Sea is of a trans-boundary nature.

8. Mr. Yoon-Chan CHOI introduced the litter problems found in the Nakdong estuary and the study conducted by Busan City to identify the sources of the litter. He also stated that litter problems still have low priority compared to water quality issues, and expressed the need to develop a cost-sharing mechanism for litter removal.

9. The possibility of data sharing between the Dalian Environmental Cooperation Center and NOWPAP was suggested.

10. In response to a request for information on the activities in the other Regional Seas, one participant introduced a case of recycling fishing nets that have washed ashore. He emphasized the importance of countermeasures against sources of marine litter and introduced the Stormwater Quality Improvement Device (SQID) related to this issue in Australia.

Session 2

11. Dr. Linlin HU reported on the progress of the implementation of MALITA in China, including a review of the national legal instruments and the publishing of brochures, and the introduction of various Japanese and Korean experiences to SEPA. He also reported on the upcoming national marine litter workshop and ICC activity, as well as the plans for establishing national monitoring guidelines and national strategies for integrated marine litter management.

12. Dr. Takashi KUSUI presented the results of the marine litter surveys conducted over 9 years in the NOWPAP region, and stated that plastic was one of the most abundant forms of litter in this region. He emphasized the reduction and the control of the discharge of plastic products as one of the key issues for solving the marine litter problem.

13. Mr. Seong Oh IM introduced various marine litter reduction projects conducted by the Korea Marine Pollution Response Corporation (KMPRC), and made some suggestions for multisectoral efforts towards the effective reduction of marine litter in Korea.

14. One participant asked about the containment boom implemented at estuary mouths in Korea and whether there was also a focus on prevention countermeasures against

sources of marine litter further upstream. It was explained that at present the central government, with the cooperation of various local governments, is developing a Front of Pipe approach, especially in the Busan area.

15. Some participants were impressed by the activities on marine litter implemented by KMPRC and asked what kinds of social/economic backgrounds support these activities. The chair explained that KMPRC was funded by shipping companies and that it will continue these activities as a public company with the support of the central government.

16. One participant remarked that it is important to simultaneously employ two different approaches in the fight against marine litter; one which addresses the sources of marine litter (Front of Pipe), and a separate approach that addresses the abundant marine litter already in the ocean (End of Pipe).

Session 3

17. Mr. Shigeru FUJIEDA explained that foam plastic fragments are one of the major components of beach litter in Japan, with waste EPS (Expanded Polystyrene) floats as the major source. He also explained that waste EPS floats from some fishing ports are now being recycled through the use of EPS float compressors.

18. Dr. Rho-Taek JUNG introduced the results of a marine litter survey in Korean harbors and major fishing grounds using side-scan sonar. He also introduced some marine litter prevention, survey, recovery and treatment technologies that have been developed in Korea.

19. One participant remarked that it is important to expand EPS float recycling technology to other regions and asked about the next step forward in its expansion. In response to this comment, it was explained that fishing containers have been recycled for a long time, but that the recycling of EPS floats has only recently been implemented in Japan and that further progress depends on finding new ways to recycle EPS floats.

20. The expansion of EPS float recycling technology was encouraged by a participant who also wanted to know what the next step forward in its expansion would be.

21. It was explained that because the recycling of EPS floats has only recently been introduced, there is still insufficient data to show what percentage of EPS floats are currently recycled.

22. A suggestion to share the experiences of Korea, presented by Dr. JUNG, will be reflected in the sectoral guidelines to be developed under the NOWPAP MALITA project.

Session 4

23. Ms. Yoshiko OHKURA introduced the activities of JEAN, which included the implementation of International Coastal Cleanup Campaigns, environmental education and organizing conferences, etc. She concluded her presentation by stating the importance of multisectoral and international cooperation in solving marine litter problems.

24. Mr. Artur MAYSS reported on various cleanup campaigns conducted in the Far East of Russia, and informed the meeting of an ICC event to be held in Vladivostok in September 2007.

25. Ms. Yana BLINOVSKAYA revealed that marine litter is still not perceived as a major issue in Far Eastern Russian communities, and thus stressed the importance of implementing Public relations projects.

26. Participants appreciated JEAN's efforts, especially in forming extensive networks to conduct cleanup activities, securing funds and sharing local marine litter databases with NOWPAP.

27. One participant pointed out that getting adults involved in clean up campaigns is a key factor, since they are responsible for generating more litter than the children who usually participate in the campaigns. In response to this remark, an approach by the mass media to raise public awareness in Korea was introduced.

Session 5

28. Mr. Xiangbin PEI presented a report on the status of solid waste management in China, including a review of the relevant laws and regulations, national plans, institutional arrangements, treatment facilities, enforcement and compliance measures, and outreach activities.

29. Mr. Kentaro TOMINAGA introduced the policies and measures of the Japanese government designed to address marine litter, which were formed over four inter-ministerial meetings in 2006.

30. Dr. Won-Tae SHIN introduced some of the national activities implemented in Korea, and explained that a comprehensive national action plan is now under development. He also explained some of the efforts of the fisheries sector and other public relation activities.

31. Dr. Sergei MONINETS reported on the activities implemented in Russia in relation to MALITA, and pointed out some problems, such as the insufficient budget. He also reported on the 2nd workshop on marine litter in March 2007, which was attended by representatives from relevant governments. He also informed the workshop that the International Conference "Marine Ecology 2007" and the exhibition "Clean Port", will be held in October 2007 in Russia.

32. Participants suggested that the involvement of NGO and NPO in activities against marine litter is also a key factor.

Session 6

33. Mr. Steve RAAYMAKERS reported on the status of the Regional Review and the Development of a Regional Strategy and Action Plan on marine litter in the Seas of East Asia. He emphasized that marine litter is a trans-boundary issue requiring a trans-boundary response, including close cooperation between NOWPAP and COBSEA, and efforts to identify sources of marine litter in order to address the issue at its source.

34. Dr. Jeung Sook PARK reported on the current progress of the NOWPAP implementation of MALITA and introduced some best management practices of marine litter for the shipping, fisheries and tourism sectors, which will be referred to in the development of the NOWPAP sectoral guidelines for these sectors.

35. A public morality campaign initiated by NOWPAP was suggested by a citizen of Toyama City. In addition to this suggestion, the use of a slogan in each NOWPAP language selected through public competition was suggested. In response to this suggestion, it was explained that such public awareness activities have been included in MALITA.

36. One participant suggested making the best use of existing resources.

37. One participant suggested that this workshop should be continued on a regular basis.

38. Close cooperation between NOWPAP and COBSEA, as well as Japanese involvement in COBSEA, was suggested by more than one participant in order to share their experience and expertise in the fight against marine litter.

Participants to the 2nd NOWPAP Workshop on Marine Litter


The 2nd NOWPAP Workshop on Marine Litter
Toyama Japan 28-29March 2007

Programme

1st Day : 28 March 2007 (Wednesday)

12:30-13:00	**Registration**
13:00-13:30	**Opening Ceremony** - Opening Address Mr. Kentaro TOMINAGA, Deputy Director, Global Environmental Issues Division, Ministry of the Environment Dr. Motoyuki SUZUKI, Chairman, Northwest Pacific Environmental Cooperation Center (NPEC) - Welcome Address Mr. Tatsuhiro IWAMOTO, Director General of Civic Affairs, Environment & Culture Department, Toyama Prefecture - Congratulatory Address Mr. Xiaodong ZHONG, Deputy Coordinator, Northwest Pacific Action Plan Regional Coordinating Unit (NOWPAP RCU), United Nations Environmental Programme (UNEP)
13:30-14:00	**Keynote Speech** - The Problem of Derelict Fishing Gear - Global Review and Proposals for Action (Mr. Steve RAAYMAKERS, UNEP/FAO Consultant)
14:00-14:30	**Special Lecture** - Ghost-fishing impact by derelict fishing gear (Dr. Tatsuro MATSUOKA, Kagoshima University, Japan)
14:30-15:00	***Coffee Break & Photo***
15:00-16:30	**Session 1**: Countermeasures against marine litter (Session Chair: Dr. Linlin HU) - Practice and countermeasures for public to collect and control drifting marine litter in Dalian (Mr. Jiangning CHEN, Dalian Environmental Volunteer Association) - Investigations into the actual conditions of Seabed Litter, and The problem for its removal and disposal in Seto Inland Sea (Mr. Toshifumi SHIWAKU, The Foundation for Environmental Rehabilitation and Redevelopment of Mizushima) - Treasure, Trash, To do what? In the Nakdong Estuary (Mr. Yoon Chan CHOI, Busan Development Institute)
16:30-16:50	***Coffee Break***
16:50-18:20	**Session 2**: Reduction and prevention of marine litter (Session Chair: Dr. Won-Tae SHIN) - The efforts of China during the implementation of MALITA (Dr. Linlin HU, Environmental Standard Institute, Chinese Research Academy of Environmental Science) - Suggestions to prevent marine litter in Japan based on the research on marine debris on the coasts of Northwest Pacific Region (Dr. Takashi KUSUI, Toyama Prefectural University) - Suggestions for multisectoral efforts to reduce marine litter in Korea (Mr. Seong Oh IM, Korea Marine Pollution Response Corporation)
19:00-20:30	**Reception**

2nd Day: 29 March 2007 (Thursday)

09:00-10:10	**Session 3**: Fisheries-related marine litter in the NOWPAP Region (Session Chair: Dr. Jeong-Hwan Oh) - Expanded Polystyrene Debris along the Japanese Coastline and Development of Recycling System for Waste EPS Floats (Dr. Shigeru FUJIEDA, Kagoshima University) - Deposited Marine Litter in Ports and Fishing Areas (Dr. Rho-Taek JUNG, Maritime and Ocean Engineering Research Institute / Korea Ocean Research and Development Institute)
10:10-10:30	***Coffee Break***
10:30-12:00	**Session 4**: Coastal Cleanup and marine litter monitoring (Session Chair: Dr. Anatoly KACHUR) - International Coastal Cleanup Campaign Coordinated by JEAN in Japan Present state and future prospects (Ms. Yoshiko OHKURA. Japan Environmental Action Network(JEAN)) - ICC System Introduction in the Far East of Russia (Mr. Artur MAYSS, Initiative for Social Action and Renewal (ISAR) Far East) - "Marine Litter" PR-project in Far East Russian (Ms. Yana BLINOVSKAYA, Maritime State University named after admiral G.I. Nevelskoy)
12:00-13:30	***Lunch***
13:30-15:00	**Session 5**: Marine litter management policies and systems (Session Chair: Dr. Takashi KUSUI) - The situation and management of solid waste in China (Mr. Xiangbing PEI, Marine Division, State Environmental Protection Administration) - Policies and Measures by the Government of Japan against Marine Litter (Mr. Kentaro TOMINAGA, Ministry of the Environment Japan) - National Action against Marine Litter in Korea (Dr. Won-Tae SHIN, Ministry of Maritime Affairs and Fisheries Korea (MOMAF)) - MALITA Programme Implementation: Organizational Aspects of Effort Consolidation (Dr. Sergei MONINETS, Maritime State University named after admiral G.I. Nevelskoy)
15:00-15:20	***Coffee Break***
15:20-16:30	**Session 6**: Regional actions against marine litter (Session Chair: Dr. Tatsuro MATSUOKA) - Marine Litter in the Seas of East Asia: Regional Review and Development of a Regional Strategy and Action Plan (Mr. Steve RAAYMAKERS, UNEP/FAO Consultant) - Development of Sectoral Guidelines for Management of Marine Litter (Dr. Jeung Sook Park, NOWPAP RCU)

Keynote Speech

The Problem of Derelict Fishing Gear - Global Review and Proposals for Action

Steve Raaymakers

EcoStrategic Consultants
PO Box 968, Edge Hill, Qld 4870, Australia
61-07-4053-5560
www.eco-strategic.com

The Food and Agriculture Organization of the United Nations (FAO) and the United Nations Environment Programme (UNEP) are undertaking a study entitled *The Problem of Derelict Fishing Gear: Global Review and Proposals for Action*. The review is being undertaken as a consultancy by Steve Raaymakers of EcoStrategic Consultants and the interim draft report has recently been submitted. The review currently concludes, that *inter alia*:

- Derelict Fishing Gear (DFG) is a serious global marine environmental problem, causing significant ecological, biodiversity, economic and amenity impacts;

- Scientific data and information on the problem is highly geographically patchy, with relatively good data being available from a few concentrated geographical areas where intensive studies have been conducted, such as near the Hawaiian Islands, the Seas of North East Asia and the North Pacific generally; some limited studies being available from other areas such as around Australia and in European Seas, and many other regions having very little to absolutely no data at all;

- Much more has to be done to ensure that the artisanal, small scale and industrial fisheries
  sectors are addressed as well as DFG from IUU fishing

- Sound international policy, legislative and regulatory regimes have been developed and are in place on paper (e.g. MARPOL Annex V), however there are very serious in-adequacies with the implementation and enforcement of these regimes;

- Addressing the problem is challenging as it depends to a significant degree on changing human behaviour, rather than relatively straight-forward technological fixes;

- A concerted global effort is needed to begin to address the problem, involving close cooperation between the main relevant UN agencies (FAO, IMO, UNEP, IOC), Regional Fisheries Bodies, Regional Seas Organizations, Governments, the fishing industry, ports and environmental NGOs;

- This response should initially focus on:

  - a massive and sustained global awareness and outreach programme, targeting the fishing industry and ports as primary audiences, adopting innovative communication approaches designed to effect cultural shift and behavioural change, and implemented regionally (with programmes in each region being regionally-relevant and culturally appropriate),

- the undertaking of a global review of the total economic costs of DFG, to help in assessing the overall significance of the DFG problem, and because economic arguments are often most persuasive in human society,

- a programme to develop DFG trajectory models for each main regional sea of the world,

- a programme to develop innovative technological developments and gear improvements for each main fishery of the world, to prevent/reduce loss and abandonment of fishing gear at sea,

- a programme to develop innovative economic incentives and financial instruments for each main fishery of the world, to prevent/reduce loss and abandonment of fishing gear at sea, recognizing that such are often more effective than the threat of punitive penalties and punishments,

- a programme to undertake more detailed studies and monitoring in those regions of the World where very little to no data is currently available (e.g. seas around Africa, South Asia and South America),

- the establishment of central, global databases for the reporting of annual statistics by National Governments relating to:
    - maritime safety incidents caused by DFG.
    - entanglement of species of conservation concern.
    - the sources, causes, quantities and distribution of DFG, , including data from coastal survey and monitoring programmes.

  These databases could present outputs graphically on map-based Geographic Information System (GIS) - providing visual representation of the geographical spread of the problem. This would provide a powerful monitoring tool for assessing the true global extent of the problem, including regional hot spots, as well as trends over time and the effectiveness or otherwise of management and control responses.

- Engaging more strongly with relevant industry groups to secure their involvement and material support for DFG reduction activities, including the formation of cross-sectoral DFG Task Forces under the auspices of each RFB.

- The implementation of technical cooperation programmes to assist countries to *implement the existing international regime* relating to DFG, including MARPOL Annex V and the provision of adequate waste reception facilities in ports, as well as implementation of the FAO Code of Conduct on the Responsible Management of Fisheries, rather than developing new instruments, codes and other measures.

The global response should focus on implementing the existing regulatory regime, which in itself is a strong regime (if implemented), and not on developing new regimes (which would be a repetitive waste of scarce resources).

The Problem of Derelict Fishing Gear: *Global Review and Proposals for Action*

United Nations Environment Programme (UNEP)
Food & Agriculture Organization of the United Nations (FAO)
EcoStrategic Consultants

Steve Raaymakers
EcoStrategic Consultants

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Introduction & background

The problem of Derelict Fishing Gear (DFG)

- Major component of the broader marine litter issue
- Serious global marine environmental problem, causing significant impacts
- UN GA Res. A60 L22
- Action by UNEP and FAO

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Objectives of the Review

- Review and summarise available relevant information on the DFG issue globally, including:
  - sources, quantities and distribution
  - threats and impacts
  - existing global, regional and national responses to the issue
- Make proposals for further action at the global and regional levels, including for greater cooperation between the Regional Fisheries Bodies (RFBs) and Regional Seas Organizations (RSOs)
- Assess the need and feasibility of new legal instruments and/or associated guidelines to address DFG at regional and national levels.

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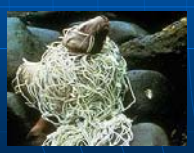
6 main impacts of DFG



1. Navigational safety – human life & property
2. Ghost fishing
3. Entanglement etc non-target species
4. Transfer invasive species
5. Beaching / coastal impacts
6. Economic impacts

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Sources, quantities and distribution

- Problem since 1960s – synthetic materials
- Two main sources are 'voluntary' and 'involuntary'
- Voluntary = intentional discard or abandonment
- Involuntary = accidental loss
- Weather and sea conditions
- Interactions between fisheries
- IUU fishing

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Sources, quantities and distribution

- Global data on quantities and distribution is very patchy
- Good data for North Pacific, Hawaiian Islands
- Some data for Europe and Australia
- Very little data from elsewhere
- ICC and similar coastal cleanups of limited value
- Distribution driven by ocean currents

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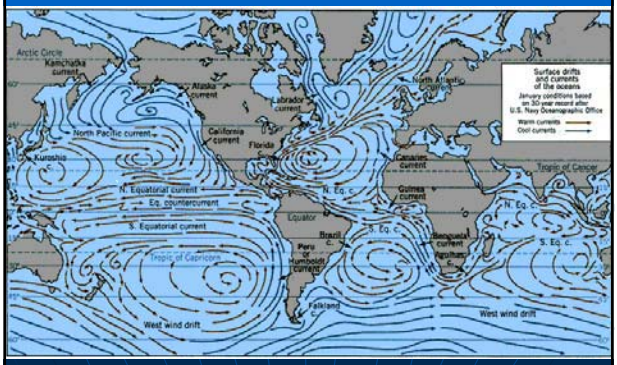
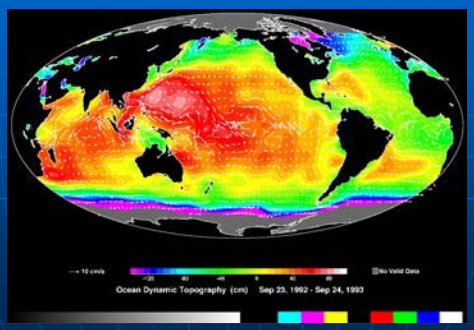
Generic global ocean currents



Ocean topography (TOPEX/Poseidon)



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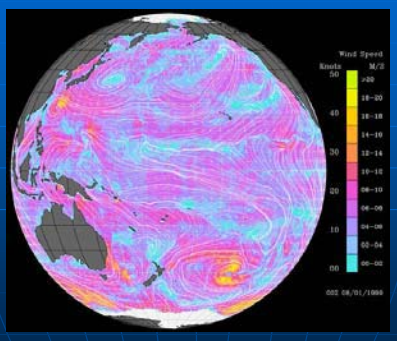
Surface Winds (QikSCAT)



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Regional current patterns

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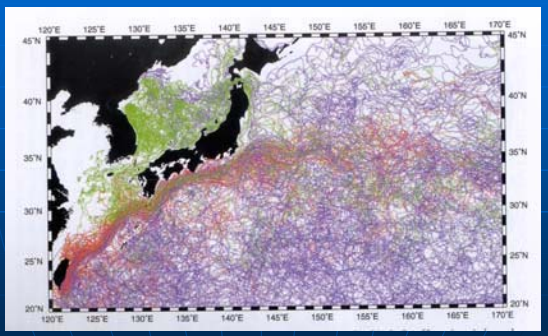
Local-scale complexities



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Existing Actions

- IMO – MARPOL Annex V

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Existing Actions

- Port Waste Reception Facilities



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Existing Actions

- FAO Code of Conduct for Responsible Fisheries
- FAO work on Ghost Fishing and Gear Marking

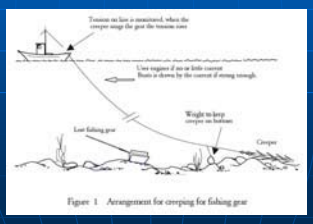

Figure 1 Arrangement for creeping for fishing gear

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Existing Actions

- UNEP Global Marine Litter Partnership
- UNEP Regional Seas Regional Marine Litter Actions
- UNEP / FAO Global Review

Plus national / local actions, e.g.

- US NOAA Marine Debris program
- WWF Australia Nets ID Kit

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Proposals for Action

- Sound international policy, legislative and regulatory regimes are in place on paper (e.g. MARPOL Annex V, FAO Code of Conduct).
- Very serious in-adequacies with the implementation and enforcement of these regimes.
- Addressing the problem is challenging as it depends to a significant degree on changing human behaviour, rather than relatively straight-forward technological fixes.
- A concerted global effort is needed to begin to address the problem, involving close cooperation between the main relevant UN agencies (FAO, UNEP, IMO etc), Regional Fisheries Bodies, Regional Seas Organizations, Governments, the fishing industry, ports and environmental NGOs.

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Proposals for Action

The global response should initially focus on:

- A massive and sustained global awareness and outreach programme, targeting the fishing industry and ports as primary audiences, adopting innovative communication approaches designed to effect cultural shift and behavioural change, and implemented regionally (with programmes in each region being regionally-relevant and culturally appropriate),
- A programme to develop innovative technical and gear improvements as well as economic incentives and financial instruments to prevent/reduce loss and abandonment of fishing gear at sea (must be fishery specific),

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Proposals for Action

- More detailed studies and monitoring in those regions of the World where very little to no data is currently available (e.g. Seas around Africa, South Asia and South America).
- The development of DFG tragectory models for each main regional sea
- The establishment of a global DFG information system
- Closer linkages between RFBs and RSOs and between efforts to address DFG and marine litter generally
- Close involvement of the fishing, fishing gear, ports, waste management and other industries

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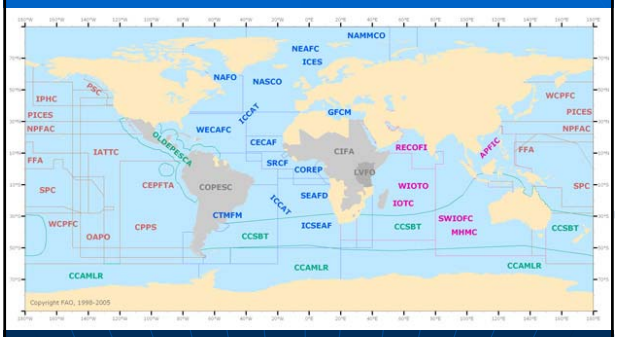
Regional Fisheries Bodies



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Proposals for Action

- The global response should focus on implementing the existing regulatory regime, which in itself is a strong regime (if implemented), and not on developing new regimes (which would be a repetitive waste of scarce resources).
- We already have the tools – we just need to use them
- To do this we need to "want to use them" (cultural change) and "know how to use them" (build capacity)

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'The problems of ocean space are closely interrelated and need to be considered as a whole . . . '
(UN General Assembly 1970)

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Ghost-fishing impact by derelict fishing gear

Tatsuro Matsuoka

Faculty of Fisheries, Kagoshima University, Shimoarata 4-50-20, Kagoshima City, Kagoshima, Japan 890-0056
Tel: 099-286-4000 or 4241, Fax: 099-286-4015, E-mail: masuoka@fish.kagoshima-u.ac.jp

1. Introduction

Derelict fishing gear is one of the major sources of marine debris, which cause unique influences due to their structures and functions. There are a variety of impacts by derelict fishing gear, among which ghost fishing is the most serious one. Ghost fishing is defined as derelict fishing gear which left fishermen's control no matter if intentionally or accidentally and maintain its capture function continue inducing mortality of fishery organisms underwater. [1)] It was first recognised among fishery scientists, managers and environmentalists in the mid 1960's and early scientific studies were conducted in the 1970's. [1, 2, 3)] It became such an influential issue as the closure of the high sea drift-net fisheries in the late 1980's was attributed to, in part, the possibility of this problem. [4, 5, 6)] A number of intellectual researches have been conducted recently and the accurate figure of ghost fishing is becoming evident. This report reviews (1) the evidences to prove ghost fishing, (2) ghost fishing by fishing gear types, (3) the effects other than ghost fishing by derelict fishing gear, (4) the methodology for estimation of ghost-fishing mortality, and (5) development of technical countermeasures in order to provide a basis for discussion among the people concerned.

2. Researches on derelict fishing gear and ghost fishing

Various influences by derelict fishing gear: The impacts by derelict fishing gear are categorised into direct mortality of organisms and indirect ones bridged by declining environmental conditions. The direct influences include ghost fishing and incidental catch of non-fishery animals such as; marine mammals, marine reptiles and sea birds. Indirect ones are; accumulation of fishing gear on seabed and coral reef, contamination on beach, deformation of seabed by deposition of sediment accelerated by derelict net fishing gear.

Origin of ghost fishing issue: Because of wide-spreading use of synthetic fibres for netting materials in the 1960's and their non-degradable character, consequences after gear loss drew attention. It is said sometimes that continuous kill of animals and impacts to aquatic environment by derelict fishing gear started because of application of non-degradable materials

Fig. 1 (Left) A dead octopus in a lost fish-pot found underwater in a coastal fishing ground in southern Kyushu, Japan (approximately 14m deep). (Right) Aged gillnet deliberately tangled around an artificial reef, on which a sea bream is entangled (approximately 25m deep).

to fishing gear those days.[1)] The fact is, however, as proved later in this report, ghost fishing is the most serious immediately after gear loss and declines very rapidly. Therefore, even fishing gear made of natural materials is not free from the problem. It is beyond a fact to say that ghost fishing is a new problem in contemporary fisheries since introduction of synthetic fibres.

Active researches on derelict fishing gear and ghost-fishing started in the 1970's.[1, 2, 3, 7, 8)] Early researches tried to find the evidences to prove the truism of ghost fishing. Possibility of ghost fishing for types of fishing gear was reviewed as early as in the mid 1980's by High,[9)] where those only in gillnet and pot fisheries were discussed. The author has carried out extensive field surveys underwater and has found almost all types of fishing gear and their fragments, however, ghost fishing were evidenced with dead bodies of animals only in pots (cage-type traps), gillnets including trammel-nets and small seine nets made of webbing similar to that of gillnets.

Pots (Cage traps): Early studies on ghost fishing by pots were conducted for mainly crustaceans by Sheldon and Dow,[2)] High,[3)] Smolowitz,[1, 10)] and Pecci *et al.*[8)] mainly in North America during the 1970's. A variety of *in situ* experiments using pots deliberately set for monitoring were carried out,[11, 12, 13, 14, 15)] where mainly mortality per unit gear and the ratios of escapement were observed for entrapped crabs and lobsters. Breen[16)] conducted a sector-wide research on ghost fishing in a pot fishery, where the ghost fishing mortality for Dungeness crab was estimated to be equivalent to 7% of the landing amount in the studied sector. On the other hand, one study reported numerous exits of the entered spiny lobster and slipper lobster and little direct mortality in pots in comparison to the total mortality in their population and, consequently, concluded as ghost fishing by those pots should be periferal.[13)]

After finding the evidences of ghost fishing mortality, researches were oriented towards those on the process to induce ghost fishing. Matsuoka *et al.*[17)] carried out underwater observation of lost pots in a coastal fishing ground in Japan. Many commercial finfishes and octopus were observed in pots remaining the original structures. Fewer organisms were observed in pots largely deformed due to breakage of frames, buried in sediment and covered by accumulated fouling organisms. These phenomena likely reflect the time elapsed since gear loss, therefore, the function of ghost fishing of pots was conjectured to decline along a time course.

The organisms confined in a pot demonstrated a variety of unusual behaviour such as bumping on net webbing inside, which they never show under the natural environment. A hypothesis is that the unusual behaviour is attributable to the high density and consequent stress in a pot for the animals which seldom meet in natural fauna.[18)] The mortality induced by unusual behaviour and subsequent injury observed in pots was clearly indicated by the correlations among them. Such behaviour was largely different from species to species. The contents of the digestion organs of entrapped fishes were analysed and few empty ones were found. This proves that entrapped fishes eat and starvation is not a reason of mortality.

Fig. 2 (Left) Fish bones scattered on the foot of an artificial reef deliberately-tangled with gillnet, recorded during an experiment (approximately 25m deep). (Right) Rabbitfish injured in a lost fish-pot due to unusual behaviour, or bumping on net webbing from inside, of which snout has disappeared and the brain is naked and which died in the next day.

Long-term observation indicated that some pots in shallow waters can maintain the ghost-fishing functions for longer than 3 years. As described, the ghost fishing function descends together with breakage and accumulation of fouling organisms. The former must be affected by the wave excitation force around the seabed and the latter, rich fauna of fouling organisms both in shallow waters. The capture function of a derelict pot is, therefore, conjectured to last for a relatively short period of time in shallower waters. Deep-water pots which are less damaged by waves and less fouled biologically may continue ghost fishing for longer than those in shallow waters.

Gillnets: Remaining of derelict gillnets in fishing grounds was first evidenced in the mid 1980's. [19, 20] Several high-quality studies which observed ghost fishing of finfishes and crustaceans by bottom gillnets and trammel-nets under both natural and experimental conditions were conducted after the mid 1990's in United Kingdom, [21] Portugal, [22, 23] Norway, [24] Spain, [25] Sweden, [26] and Japan [27, 28] mortality per gear became quantitatively assessed.

The number of enmeshing a gear a day and its ratio to the original CPUE were major research targets. The duration for which ghost fishing continues is different from species to species. [27, 29] The main ghost-fished species are replaced along the time course since gear loss, [27] as sub-demersal swimmers, *e.g.* sea bream are caught in the first several days and seabed dwellers, *e.g.* dragonet, for a longer period of time.

In principle, ghost fishing mortality by a gillnet declines since dislocation of gear [21, 22, 23, 25, 26, 27] and continues for a relatively short period of time, *e.g.* for a few weeks to several months, [30] though a marginal amount of mortality continues for much longer period of time. Consequences for derelict gillnets are strongly affected by the seabed environment. [28] The ghost-fishing function of gillnets on the flat seabed declines rapidly with decreasing heights [21, 22] and increasing visibility due to fouling. Decline in net height is mainly attributable to debris on meshes, subsequent increase of weight and hydrodynamic resistance and to gradual sticking on small projections on the seabed. A gillnet vertically expanded around an underwater structure maintains the initial magnitude of ghost fishing for a much greater extent of time even after badly fouled. Revil and Dunlin [31] reported that gillnets tangled over a wreck maintained the stretched area of webbing and ghost fishing continued for longer than 2 years. A gillnet which was experimentally tangled around an artificial reef was left for longer than 3 years and so badly fouled as the netting monofilament was no longer visible maintained the ghost fishing function at the same level as the original. [28] Since gillnets are easily tangled on three-dimensional structures such as artificial reefs, wreck ships and large rocks, the above fact may provoke such a serious problem as the ghost fishing mortality of fishes aggregated by those structures.

Ghost fishing of crabs and lobsters by so badly damaged gillnets or even their fragments of which the original structure no longer remains is frequently observed. This suggests that ghost fishing by lost gillnets continues perhaps longer in non-finfish animals such as crustaceans. [21, 22]

Other types of fishing gear: Small boat seine and beach seine nets are made of Polyamide net webbing made of thin lines which are usually used for gillnets in particular in developing countries where the available variation of net webbing is limited. The author observed ghost fishing mortality by such a small boat seine net in coastal water in Japan. It is reasonable assumption that derelict longline gear without bait cannot continue the capture function, therefore, the need to consider its ghost fishing is marginal. Divers can observe a large number of derelict bottom longlines and their fragments tangled around rocks and reefs, while the author have observed no capture of fish by a derelict bottom longline. We can conclude the possibility of ghost fishing by derelict line fishing gear is minimal.

Information availability: As overviewed above, ghost fishing has been studied mainly in the countries in North America and Europe and a small number of other countries as; Kuwait, [32] Japan, [29] Australia, [33] and Oman, [34] though beach-survey type information on fishery-origin marine debris is available in some other countries, too. Information availability is largely biased among countries and regions. The author found few derelict fishing gear with an exception of line fishing gear in an extensive underwater survey around the coastal waters in Panay and Guimarus Islands in the Philippines. Interviewed fishermen stated that they never set their net

fishing gear in such a fishing ground where the possibility of gear loss is high and retrieval of lost gear is difficult. This is because that net fishing gear is an expensive asset for local fishermen. It is a hypothesis that fishermen take a risk of gear loss in fishing operation in such countries where fish price is relatively high in comparison to gear price. It is important to recognise that the information available today particularly about fishing gear loss should not be generalised over the world.

5. Issues other than ghost fishing

Fish attraction/aggregation: It is a common question if derelict fishing gear has a function of fish aggregation as FAD and if such a function has a positive effect to resources and environment. A large number of fish is usually observed around lost and aged pots. [17] It is empirically true that derelict fishing gear likely has the micro-FAD effects to attract and aggregate fishes. Gillnets entangled on artificial reefs apparently increase their fish aggregation efficiency. [28] These are, however, not inevitably positive. Among the fishes aggregated around the artificial reef, the numbers of individuals of the species of which ghost fishing mortality was observed did not increase. [28] This may suggest mortality of ghost-fished species and support a hypothesis that the aggregated fishes are killed and accelerate ghost fishing.

Sank aquaculture cages and large fishing gear such as trawl nets made of thick twine materials form a large number of small compartments inside and likely support spawning and protect juveniles. This may increase recruit to the resource, though it has not been studied yet. The fish community newly formed around derelict fishing gear is different from the natural ones in the vicinity. There may be a new prey-predator relationship and its consequence is still unknown.

Incidental catch of non-fishery animals other than ghost fishing: In the 1980's, it became evident that even fragments of derelict fishing gear which no more remain the original capture function cause mortality of a variety of wild life. [35, 36] Researches on this issue were conducted earlier than those on the ghost fishing of finfishes and crustaceans and a variety of reports and discussions appeared in 1984; *i.e.* papers on incidental catch of marine mammals including whales, [37] pinnipeds, [38] fur seals, [39, 40] monk seal, [41] and sea lions, [42] as well as marine reptiles. [T37, T43] These research outcomes were perhaps attributable to partly that the phenomenon is observable in ambient. Researches on incidental catch or entanglement of non-fishery animals such as marine mammals [33, 44, 45, 46, 47, 48, 49, 50, 51] and marine reptiles [52] and seabirds, [53, 54] on net and line fishing gear were continued beyond the late 1980's.

Marine mammals with a fragment of net piece which are known as neck collars [33] were documented in Hawaii and Australia. Only a few researches assessed, however, the number of entanglement quantitatively. [51] It was reported that approximately 1.5-2% of Australian fur seals in Bass Strait and off southern Tasmania were found with entangled fragments of trawl nets.

It was documented that sea turtles are peculiarly prone to tangle themselves in derelict lines and netting and are killed.[52] Mortality of seabirds by derelict salmon driftnets was surveyed in the North-west Atlantic Ocean. [35] Entanglement of seabirds by lost monofilament lines has been photographed and publicised. However, such impacts by commercial bottom longlines have not been scientifically reported yet. This possibility may be peripheral because the commercial bottom longline gear is composed of relatively thick monofilaments and lost longlines are usually extendedly hung around reefs and rocks underwater.

In the history of the studies of derelict fishing gear issue, the mortality of the non-fishery animals as above are referred to as entanglement in/on marine debris. They have not been usually dealt in the category of ghost fishing traditionally. The early start of the researches on this issue and active publications during the 1980's and 1990's are conjectured to reflect the international disputes about the trawl fishery in the Bering high-seas and the high-seas large scale drift-net fisheries in the Pacific Ocean those days.

Other phenomena provoked by derelict fishing gear: Problems of accumulation of fishing gear on seabed including entanglement on coral reefs, and contamination on beaches mainly by net fishing gear [34, 45, 49, 50, 55, 56] together with the cases of other fishing gear and its parts [57, 58] have been discussed. It is concerned if accumulation of non-degradable materials may cause

declining sea bottom environment. [33, 57, 58, 59, 60, 61] Several studies on *in situ* distribution of derelict fishing gear on seabed have been conducted by using trawl net, retrieval devices and scuba diving, [34, 45, 49, 61, 62, 63] however, there are few quantitative assessment on the impacts to the seabed environment. There is a research which concluded little apparent damages are given to reef habitat by wire-made pots. [62]

The author has observed deformation of the seabed as spaces around rocks are buried with sediment and changed to flat bottoms when rock reefs are covered by lost nets. A hypothesis is that the regional flow around a net is decelerated due to fouling organisms accumulated on meshes, and consequently, deposition occurs. This may simplify the seabed environment and reduce biodiversity and productivity, however, it has not been evidenced yet. This is, on the other hand, also the process of burial of lost fishing gear in the seabed sediment and termination of ghost fishing. It is yet unknown if this process is irreversible or not.

In addition to these biological and ecological impacts, navigation hazard is also discussed in a series of International Marine Debris Conferences (Carroll S., per. comm., 2000).

6. Quantitative assessment related to ghost fishing

Assessment of mortality per gear: The death ratios to the number of entrapped animals in a pot are the most popularly available data. The variation of the reported values are very large; *i.e.* 7.1% for king crab in a pot for the particular species, [64] 19% for Dungeness crab in a crab pot, [14] 22% for Hawaiian lobsters in a lobster pot, [13] 25% for American lobster in a pot for the species, [8] 39% for Tanner crab in a ground-fish pot, [65] 44% for octopus and less than 14% for finfishes in a fish pot, [18] 45% for blue crab in a pot for the species,[15] 55% for Dungeness crab and 94.6% for snow crab in a crab pot, [8] 95% for snow crab in a pot for the species, [66] 100% for both brown crab and lobster in a Tanner crab pot. [67]

Some researches directly obtained mortality a gear a unit period of time experimentally. [8, 12, 15] The mortality rate changes along the time after gear loss. [7, 18] Breen [11] assessed the mortality of Dungeness crab in a pot to be 9.3 individuals per pot per year. Bullimore *et al.* [12] assessed the mortality of brown crab to be a minimum of 6.1 individuals and lobster, a minimum of 0.44 per pot per year. Pecci *et al.*[8] reported that the ghost fishing mortality of lobster for an inshore-type lobster pot was 13% of the original CPUE of the studied gear.

There is no report of the death ratio to enmeshed ones for gillnets. This is attributable to the assumption of the entire kill of the enmeshed population. Revil and Dunlin and the authors found declining of the ghost fishing function of bottom gillnets depends on seabed conditions where the nets are lost. [28, 31] It was also reported that the mortality or catch changed complicatedly together with seasons, elapsed time, and associated species.[12, 67, 68]

Duration remaining capture function: There are several researches on the duration for lost fishing gear to remain the capture function. Continuous catch of crustaceans by pots for longer than one or more years even though the efficiency declined.[12, 67] Matsuoka *et al.* found finfish pots even in a shallow-water continued ghost fishing as long as for three years sometime.[17]

The duration of ghost fishing by gillnets depends on the seabed structure where they are tangled, while there are reports as continuation for longer than nine months [21] and disappearance after 15 to 20 weeks. [22] Nakashima and Matsuoka [27] found the catch efficiency declined to 5% of that of the original gear approximately in 20 weeks in the case of flat seabed while those tangled around an artificial reef maintained almost the original catch rate even after three years. Only Humborstad *et al.* [24] which reported the ghost fishing function declined after gear loss, however, levelled off at approximately 20% of the original magnitude of mortality.

The number of ghost fishing gear in a fishing ground: The number of ghost fishing gear was not dealt in the early ghost fishing studies. [19, 69] The number of lost fishing gear in a unit area of a fishing ground became to be studied in the late 1990's, as surveys of a crab-pot fishery by using side-scan sonar in Alaska [67, 70] and a finfish-trap fishery by diving in Japan.[17, 18] There are a very small number of researches which dealt the ratio of the functional lost gear and the area of ghost fishing ground, with an exception of those by Matsuoka.[18] Recently, researches to

estimate the number of fishing gear loss in a fishing sector from interview or questionnaire to fishermen are becoming popular instead of estimation of the number of lost fishing gear underwater. [11, 23, 25)]

Quantitative information on mortality in a sector: The experimental studies on the ghost fishing functions of individual fishing gear have not been developed yet to large-scale assessment of ghost fishing in a fishing sector. Case studies on quantitative assessment of ghost-fishing mortality in a sector or over a fishing ground are available in Canada, [11)] Japan, [18)] Spain [25)] and Portugal. [23)] Breen [11)] estimated that the mortality of Dungeness crab in a pot fishery in Fraser River Estury in Canada is equivalent to 7% of the landing amount in the pot fishery in the studied district. Matsuoka [18)] estimated that the mortality of octopus in a pot fishery in a coastal fishing ground in a district in Kagoshima, Japan is equivalent to or two times more than the total commercial landing amount of octopus in the studied district. Sancho *et al.* [T25)] estimated that the mortality of monkfish in a gillnet fishery in Cantabrian Sea in northern Spain is equivalent to 7% of the landing amount in the fishery. Santos *et al.* [23)] estimated that the mortality of hake in a gillnet fishery in Algarve, southern Portugal is equivalent to 0.5% of the landing amount in the fishery in the studied region.

7. Methodological development to estimate ghost fishing mortality

New approaches to estimate ghost-fishing mortality per gear were started by Kaiser *et al*., [21)] Erzini *et al*., [22)] and Nakashima and Matsuoka [27)] recently. They obtained an experimental equation to represent the chronological decline in ghost fishing mortality and integrated it over the duration for which ghost fishing mortality function remains in order to estimate the number of mortality per gear for a lost gillnet.

Model for mortality estimation: Matsuoka summarised the above researches and developed a simplified model for quantitative evaluation of ghost fishing on the basis of the above researches. [18, 71)] Ghost-fishing mortality, N_m of a species or a group of animals in a fishing sector in a fishing ground over a unit period of time, such as a year, is denoted as;

$$N_m = E_d \cdot m \qquad \ldots\ldots (1)$$

where E_d is the number of fishing gear loss in a fishing sector in a unit time period such as a year and m, the ghost-fishing mortality per gear for a species or a group of animals during a period of time until the ghost-fishing function ceases. E_d and m must be estimated individually as below. This model is equivalent to that widely used in fisheries science to assess fishing mortality from devoted fishing effort and CPUE [71)] and has an advantage where data appearing in usual fishery statistics are usable.

Micro-assessment: The author proposed a concept of Ghost Fishing per Unit Effort (GPUE), m and the estimation of m for an individual fishing gear is referred to as micro-assessment. The ghost-fishing mortality rate, $N_m(t)$ of a unit fishing gear in a given fishing sector can be assessed mathematically on the basis of a probability model with monitoring dead bodies of animals in/on fishing gear underwater. [28)]

In order to represent the declining trend with the elapsed time (*e.g.* days), t since gear loss, a variety of equations have been proposed. The most general fashion of the equation is a simple survival function as;

$$N_m(t) = a \cdot (1 - b)^{t} \quad \ldots.. (2)$$

where the a and b are constants to be determined by *in situ* data. The integral of the equation from t=0 to T_{max} gives the accumulated ghost fishing mortality, m. T_{max} is the day when the ghost-fishing ceases.

$$m = \int_{t=0}^{T_{max}} N_m(t)\, dt \qquad \ldots.. (3)$$

Macro-assessment: The number, E_d of derelict fishing gear a year in a sector is estimated as;

$$E_d = N_f \cdot r_o \cdot N_g \cdot r_l \qquad \ldots\ldots (4)$$

where N_f is the number of fishing unit, *e.g.* fishermen or fishing vessel, r_o is the ratio of units actually operating among N_f, N_g is the average number of fishing gear used by individual fishing unit, and r_l is the average ratio of the annual gear loss among N_g. It is a practical approach because these parameters are obtainable through interview or questionnaire to fishermen in ambient.

Application of the estimation method: Kaiser *et al*., [21] Erzini *et al.*, [22] Nakashima and Matsuoka, [27] Sancho *et al*. [25] and Santos *et al*. [23] formulated the descending trend in mortality since loss of bottom gillnets. Integrations of the reported formulae up to the day when the gear efficiency declines to 5% [27] of the original one gave the duration of ghost fishing for 30~328 days and mortality of 84~455 animals per net in the case of finfishes, while, 30~586 days and 4.4~1823 animals a net when including crustaceans and an extremely large-mesh gillnet (these values are different from those in the original papers due to recalculation by the authors of this report [28]). Although their net designs and fishing grounds are different from each other among the five researches, these values indicate the general trend of ghost fishing impacts by lost bottom gillnets and trammel-nets.

There are a very few researches on the equation of declining trend of ghost fishing by pots. In a case study by the author, experiments on the basis of this methodology estimated the mortality of 283 individuals including 70 octopuses for 522 to 602 days induced by a coastal fish pot with two side-entrances.

8. Development of countermeasures

Countermeasures have been discussed and tested right after the early recognition of the ghost fishing issue. The countermeasures against ghost fishing are prioritised in two aspects as; (1) countermeasures before fishing gear loss such as prevention of fishing gear loss, and (2) those taking given gear loss into account such as retrieval or dysfunction of lost gear and development of designed disabling of lost fishing gear.

Prevention of fishing gear loss: Prevention of fishing gear loss is the most essential solution against ghost fishing. The reasons of fishing gear losses are mainly; (1) entanglement of gear or its accessory parts around seabed to unable hauling, (2) cut of float line and dislocation due to interaction with other fishing activities, (3) misplacement during operations, and (4) drop of fishing gear either accidentally or intentionally. Taking these into account, management of fishing operations in order to avoid confliction among different fishing sectors and legal prohibition of discarding fishing gear at sea are practically applied. [72, 73]

Entangling of fishing gear around bottom rocks and reefs are avoidable in a certain extent by technical improvement of fishing gear and methods, *e.g.* an intermediate float on buoy line for bottom-set fishing gear can prevent the line from entanglement on the seabed. The true reason of gear loss is, however, that some fishermen choose precarious fishing grounds, taking potential gear loss into account as a risk, in particular, where fishing gear is relatively inexpensive. Increasing public awareness of the long-term impacts to the resources by ghost fishing is the solution.

Small fishing gear is destructed by larger gear, where multiple types of fishing gear are used in the same fishing ground. The breakage of float lines by larger drag-net operations and mooring ropes of aquaculture cages are typical examples.[17] These problems may be intensified where a variety of human activities are mixed up and multiple utilisation of coastal fishing grounds are encouraged. Rationalised management of multi-sector fishing in coastal fishing grounds must be taken into consideration in coastal zone development and management strategies.

Possibilities of phenomena in the categories (3) and (4) above may be marginal for fishermen equipped with high-technology position-fixing devices such as DGPS, however, set fishing gear is misplaced due to storms and strong currents from time to time. [74] Nets and pots are set with

submerged markers in order to avoid theft and naturally misplaced by fishermen themselves in some countries. Education and promotion of moral and social welfare are important particularly in deprived communities to support the promotion of proper fishing. It is an international trend to reduce fishing gear loss systematically by letting fishermen have their gear tagged to identify the users [72, 73] and developing disposal services to collect used fishing gear.[29]

Retrieval or dysfunction of lost fishing gear: Retrieval of lost fishing gear is tried in a variety of fashions. Iron clasps are widely used for this purpose, [74, 75] however, it is suspected if further damages to the seabed may be provoked by retrieval devices. The author recommends a technique to tow a heavy chain of which rings are partially cut and sharpened. It is easy to handle even around a rough bottom and less damages to the bottom environment because of no nail despite the highly efficiency in retrieval. Voluntary cleaning of seabed and dysfunctioning of derelict fishing gear are educationally effective, however, they are hardly practical and essential solutions due to high cost to efficiency and limited use in shallow waters.

Designed degradation of ghost fishing gear: Techniques for rapid degradation of lost fishing gear parts have been tested since the early stage of the ghost fishing researches, as Smolowitz [1] reviewed. Blott [76] carried out extensive and detailed practical tests as early as in the mid 1970's to determine the optimum materials for the time-releasable escape gap to a pot which opens after immersion for a certain period of time. There are many experimental data to prove effectiveness of partial use of degradable twines and plates for fishing gear for reduction of confinement of animals. Crabs entrapped in pots made of degradable materials together with a gap escaped at 99% in comparison to 0% from conventional ones and that of sub-legal size crabs, at 80~99%. [70, 77] This technique is well developed now as the time required to dysfunction since lost is controllable. It is already of practical application in fishing regulations in some countries, [65, 67, 78, 79, 80] Usage of such electro- and bio-degradable materials to net webbing and rigging of parts, *e.g.* floats of gillnets, are also tested. [70, 81]

These techniques are successful for pots. [8, 12, 14, 65, 76, 77, 79, 80] This is attributable to that the ghost fishing function of pots declines slowly and a technically allowable time is long enough for control of the time period needed for degradation of parts. Usage of degradable materials must be carefully evaluated, taking the fact into account that ghost fishing is most serious immediately after gear loss for example only within a couple of days for some species in gillnet. [27] In such cases, it is not realistic to satisfy both intended degradation and required durability for fishing gear materials under a variety of environmental conditions.

Mobility of derelict fishing gear: One of the most serious concerns against solutions today is derelict fishing gear drifts and moves to vulnerable places other than the original fishing ground. Derelict fishing gear entangled on, in particular, coral reefs are hardly recoverable due to possible destruction of corals. [55] These may cause irreversible destruction of marine environment and magnify the problems of derelict fishing gear. [45, 49] Derelict gear drifted and piled up in Hawaii and the other Pacific islands are, for example, mainly trawl nets [49] which are not locally used and assumed to be of a foreign origin. Identification of their origin is a global concern, because when derelict gear is swept away from the original fishing grounds as the above, the people of the damaged areas are not responsible to the problem and it may provoke external conflicts either internationally or domestically.

Lost fishing gear does not necessarily stay in the original fishing ground. According to the author's survey, derelict fishing gear drifts and approaches toward shallow waters and beaches. A variety of bottom conditions (including beaches) have different power of holding the arrived fishing gear. Derelict fishing gear repeats being stuck and released around shallow waters and end up to the places where the holding power is the strongest. This is the mechanisms that lost fishing gear is distributed around thorny bottom environment and on the beaches.

8. Prevention of derelict fishing gear and ghost fishing

The most important but less studied area in this field is the reason of fishing gear loss and its technical and legislative countermeasures. Fishing gear loss is an economic loss to business

viability for fishermen and a negative impact to sustainability of the capture fishery sector. Therefore, countermeasures after gear loss is an alternative way. Prevention of fishing gear loss is the most fundamental countermeasure. Researches towards the following countermeasures are essential as;

(1) Management of duplicated utilisation of fishing grounds by multiple fishing sub-sectors including aquaculture; and
(2) Improvement of fishing gear and methods, considering those before and after loss, when they are used in fishing grounds where gear loss easily occurs.

Although the overall impacts by derelict fishing gear and ghost fishing have not been assessed yet, it is convincing that the issue is no more at a peripheral level. The challenge to assess and to reduce the problem must secure the future of the fishery industry because the resources currently wasted by ghost fishing could be converted to new resources additional to human consumption.

References

1) Smolowitz R.J. Trap design and ghost fishing: an overview. *Mar. Fish. Rev.* 1978; **40**: 2-8.
2) Sheldon W.W., Dow R.L. Trap contribution of losses in the American lobster fishery. *Fish. Bull.* 1975; **73**: 449-451.
3) High W.L. Escape of Dungeness crabs from pots. *Mar. Fish. Rev.* 1976; **38**: 19-23.
4) Anon. Report of the Expert Consultation on Large-Scale Pelagic Driftnet Fishing, *FAO Fish. Rep.* **434**, Rome. 1990.
5) Wright A., Doulman D.J. Drift-net fishing in the South Pacific: from controversy to management, *Mar. Policy* 1991; **15**: 303-337.
6) Richards A.H. Problems of drift-net fisheries in the South Pacific. *Mar. Pollut. Bull.* 1994; **29**: 106-111.
7) Miller M.J. Resource underutilization in a spider crab industry. *Fisheries* 1977; **2:** 9-13.
8) Pecci K.J., Cooper R.A., Newell C.D., Clifford R.A., Smolowitz R.J. Ghost fishing of vented and unvented lobster, *Homarus americanus*, traps. *Mar. Fish. Rev.* 1978; **40**: 9-43.
9) High W.L. Some consequences of lost fishing gear. *NOAA Tech. Memo.* 1985; **54**: 430-436.
10) Smolowitz R.J. Trap design and ghost fishing: discussion. *Mar. Fish. Rev.* 1978; **40**: 59-67.
11) Breen P.A. Mortality of Dungeness crabs caused by lost traps in the Fraser River Estuary, British Columbia. *N. Am. J. Fish. Manage*. 1987; **7**: 429-435.
12) Bullimore B.A., Newman P.B., Kaiser M.J., Gilbert S.E., Lock K.M. A study of catches in a fleet of "ghost fishing" pots. *Fish. Bull.* 2001; **99**: 247-253.
13) Parrish F.A., Kazama T.K. Evaluation of ghost fishing in the Hawaiian lobster fishery. *Fish. Bull.* 1992; **90**: 720-725.
14) Muir W.D., Durkin J.T., Coley T.C., McCabe G.T. Escape of captured Dungeness crabs from commercial crab pots in the Columbia River estuary. *N. Am. J. Fish. Manage.* 1984; **4:** 552-555.
15) Guillory V. Ghost fishing by blue crab traps. *N. Am. J. Fish. Manage.* 1993; **13**: 459-466.
16) Breen P.A. Ghost fishing by Dungeness crab traps: A preliminary report. *Can. Manuscr. Rep. Fish. Aquat. Sci.* 1985; **1848**: 51-55.
17) Matsuoka T., Osako T., Miyagi M. Underwater observation and assessment on ghost fishing by lost fish-traps. In: Zhou Y. *et al.* (eds). *Fourth Asian Fish. Forum,* Beijing. 1995; 179-183.
18) Matsuoka T. Ghost-fishing by lost fish-traps in Azuma-cho water, *Mini Rev. and Data File of Fish. Res.* 1999; **8:** 64-69.
19) Carr H.A., Amaral E.H., Hulbert A.W., Cooper R. Underwater survey of simulated lost demersal and lost commercial gill nets off New England. In: Shomura R.S. and Yoshida H.O. (eds.) *Proc. Workshop on the Fate and Impact of Marine Debris*, 26-29 November 1984, Honolulu Hawaii. 1985; 438-447.
20) Barney W. Lost gillnet retrieval project. 1983-1984. Department of Fisheries and Oceans, St.

John's, 1985.
21) Kaiser M.J., Bullimore B., Newman P., Lock K., Gilbert S. Catches in 'ghost fishing' set nets. *Mar. Ecol. Prog. Ser.* 1996; **145**: 11-16.
22) Erzini K., Monteiro C.C., Ribeiro J., Santos M.N., Gaspar M., Monteiro P., Borges T.C. An experimental study of gill net and trammel net 'ghost fishing' off the Algarve (southern Portugal). *Mar. Ecol. Prog. Ser.* 1997; **147**: 257-265.
23) Santos M.N., Saldanha H.J., Gasper M.B., Monteiro C.C. Hake (*Merluccius merluccius* L., 1758) ghost fishing by gill nets off the Algarve (southern Portugal). *Fish. Res.* 2003; **64**: 119-128.
24) Humborstad O., Løkkeborg S., Hareide N.R., Furevik D., Gasper M. Catches of Greenland halibut (*Reinhardtius hippoglossoides*) in deepwater ghost-fishing gillnets on the Norwegian continental slope. *Fish. Res.* 2003; **64**: 163-170.
25) Sancho G., Puente E., Bilbao A., Gomez E., Arregi L. Catch rates of monkfish (*Lophius* spp.) by lost tangle nets in the Cantabrian Sea (northern Spain). *Fish. Res.* 2003; **64**: 129-139.
26) Tschernij V., Larsson P.O. Ghost fishing by lost cod gill nets in the Baltic Sea. *Fishery Research* 2003; **64**: 151-162.
27) Nakashima T., Matsuoka T. Ghost-fishing ability decreasing over time for lost bottom-gillnet and estimation of total number of mortality. *Nippon Suisan Gakkaishi* 2004; **70**: 728-737
28) Nakashima T., Matsuoka T. Ghost-fishing mortality and fish aggregation by lost bottom-gillnet tangled around fish aggregation device. *Nippon Suisan Gakkaishi* 2005; 71: 178-187.
29) Laist D.W. Marine debris entanglement and ghost fishing: A cryptic and significant type of bycatch?. In: Wray T. (ed.) *Proc. Solving Bycatch Workshop*, Seattle. 1996: 33-40.
30) Anon. The catching capacity of lost static fishing gears: introduction. *Fish. Res.* 2003; **64**: 101-105.
31) Revill A.S., Dunlin G. The fishing capacity of gillnets lost on wrecks and on open ground in UK coastal waters. *Fish. Res.* 2003; **64**: 107-113.
32) Mathews C.P., Gouda V.R., Riad W.T. and Dashti J. Pilot study for the design of a long life fish trap (gargoor) for Kuwait's fisheries, *Kuwait Bul. Of Mar. Sci.* 1987: 221-234.
33) Jones M.M. Fishing debris in the Australian marine environment. *Mar. Pollut. Bull.* 1995; **30**: 25-33.
34) Al-Jufaili S., Al-Jabri M., Al-Baluchi A., Baldwin R.M., Wilson S.C., West F., Matthews A.D. Human impacts on caral reefs in the Sultanate of Oman. Estuarine, *Coastal and Shelf Sci.* 1999; **49**: 65-74.
35) Degange A.R., Newby T.C. Mortality of seabirds and fish in a lost salmon driftnet. *Mar. Pollut. Bull.* 1980; **11**: 322-323.
36) Henderson J.R. Encounters of Hawaiian monk seals with fishing gear at Lisianski Island, 1982. *Mar. Fish. Rev.* 1984; **46**: 59-61.
37) Cawthorn N.W. Entanglement in, and ingestion of, plastic litter by marine mammals, sharks, and turtles in New Zealand waters. In: Shomura R.S. and Yoshida H.O. (eds.) *Proc. Workshop on the Fate and Impact of Marine Debris*, 26-29 November 1984, Honolulu Hawaii. 1985; 336-343.
38) Stewart B.S., Yochem P.K. Entanglement of pinnipeds in net and line fragments and other debris in the southern California bight. In: Shomura R.S. and Yoshida H.O. (eds.) *Proc. Workshop on the Fate and Impact of Marine Debris*, 26-29 November 1984, Honolulu Hawaii. 1985; 315-325.
39) Jones L.L., Ferrero R.C. Observations of net debris and associated entanglements in th e north Pacific Ocean and Bering Sea, 1978-84. In: Shomura R.S. and Yoshida H.O. (eds.) *Proc. Workshop on the Fate and Impact of Marine Debris*, 26-29 November 1984, Honolulu Hawaii. 1985; 183-196.
40) Scordino J. Studies on fur seal entanglement, 1981-84, St. Paul Island, Alaska. In: Shomura R.S. and Yoshida H.O. (eds.) *Proc. Workshop on the Fate and Impact of Marine Debris*,

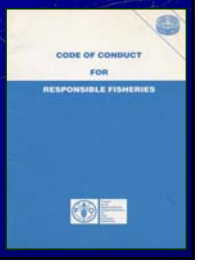
26-29 November 1984, Honolulu Hawaii. 1985; 278-290.
41) Henderson J.K. A review of Hawaiian monk seal entanglements in marine debris. In: Shomura R.S. and Yoshida H.O. (eds.) *Proc. Workshop on the Fate and Impact of Marine Debris*, 26-29 November 1984, Honolulu Hawaii. 1985; 326-334.
42) Galkins D.G. Steller sea lion entanglement in marine debris. In: Shomura R.S. and Yoshida H.O. (eds.) *Proc. Workshop on the Fate and Impact of Marine Debris*, 26-29 November 1984, Honolulu Hawaii. 1985; 308-314.
43) Balazs G.H. Impact of ocean debris on marine turtles: entanglement and ingestion. In: Shomura R.S. and Yoshida H.O. (eds.) *Proc. Workshop on the Fate and Impact of Marine Debris*, 26-29 November 1984, Honolulu Hawaii. 1985; 387-429.
44) Stewart B.S., Yochem P.K. Entanglement of pinnipeds in synthetic debris and fishing net and line fragments at San Nicolas and San Miguel Island, California, 1978-1986. *Mar. Pollut. Bull.* 1987; **18**: 336-339.
45) Donohue M.J., Brainard R., Parke M., Foley D. Mitigation of environmental impacts of derelict fishing gear through debris removal and environmental monitoring, *International Marine Debris Conference*, Honolulu. 2000; 58-78.
46) Henderson J.R. A Pre- and Post-MARPOL Annex V Summary of Hawaiian Monk Seal Entanglements and Marine Debris Accumulation in the Northwestern Hawaiian Islands, 1982-1998. *Mar. Pollut. Bull.* 2001; **42**: 584-589.
47) Arnould J.P.Y., Croxall J.P. Trends in Entanglement of Antarctic fur seals (*Arctocephalus gazelle*) in man-made debris at south Georgia. *Mar. Pollut. Bull.* 1995; **30**: 707-712
48) Hanni K.D., Pyle P. Entanglement of pinnipeds in synthetic materials at south-east Farallon Island, California, 1976-1998. *Mar. Pollut. Bull.* 2000; **40**: 1076-1081.
49) Donohue M.J. How multiagency partnerships can successfully address large-scale pollution problems: a Hawaii case study. *Mar. Pollut. Bull.* 2003; **46**: 700-702.
50) Boland R.C., Donohue M.J. Marine debris accumulation in the nearest marine habitat of the endangerd Hawaiian monk seal, *Monachus schauinslandi* 1999-2001. *Mar. Pollut. Bull.* 2003; **46**: 1385-1394.
51) Page B., McKenzie J., McIntosh R., Baylis A., Morrissey A., Calvert N., Haase T., Berris M., Dowie D., Shaughnessy P.D., Goldsworthy S.D. Entanglement of Australian sea lions and New Zealand fur seals in lost fishing gear and other marine debris before and after government and industry attempts to reduce the problem. *Mar. Pollut. Bull.* 2004; **49**: 33-42.
52) Carr A. Impact of non-degradable marine debris on the ecology and survival outlook of sea turtles. *Mar. Pollut. Bull.* 1987; **18** (6B): 352-356.
53) Robards M.D., Gould P.J., Piatt J.F. The highest global concentrations and increased abundance of oceanic plastic debris in the North Pacific: evidence from seabirds. In: Coe J.M., Rogers D.B. (eds) *Marine Debris Sources, Impacts, and Solutions*, Springer-Verlag, New York. 1997; 71-80
54) Franson J.C., Hansen S.P., Duerr A.E., Destefano S. Size and Mass of Grit in Gizzards of Sandhill Cranes, Tundra Swans, and Mute Swans. *Waterbirds* 2001; **2**: 242-244.
55) Donohue M.J., Boland R.C., Sramek C.M., Antonelis G.A. Derelict fishing gear in the Northwestern Hawaiian Islands: Diving Surveys and Debris Removal in 1999 Confirm Threat to Coral Reef Ecosystem. *Mar. Pollut. Bull.* 2001; **42**: 1301-1312.
56) Chiappone M., Dienes H., Swanson D.W., Miller S.L. Impacts of lost fishing gear on coral reef sessile invertebrate in the Florida Keys National Marine Sanctuary. *Biological conser.* 2005; **121**: 221-230.
57) Wallace N. Debris entanglement in the marine environment: A review. In: Shomura R.S. and Yoshida H.O. (eds.) *Proc. Workshop on the Fate and Impact of Marine Debris*, 26-29 November 1984, Honolulu Hawaii. 1985; 259-277.
58) Slip D.J., Burton H.R. Accumulation of fishing debris, plastic litter, and other artifacts, on Heard and Macquarie Islands in the southern ocean. *Environ. Conservation* 1991; **18**: 249-254.
59) Whiting S.D. Types and sources of marine debris in Fog bay, northern Australia. *Mar. Pollut.*

Bull. 1998; **36**: 904-910.
60) Hess N.A., Ribic C.A., Vining I. Benthic marine debris, with an emphasis on fishery-related items, surrounding Kodiak Island, Alaska, 1994-1996. *Mar. Pollut. Bull.* 1999; **38**: 885-890.
61) Galgani F., Leaute J.P., Moguedet P., Souplet A., Verin Y., Carpenter A., Goraguer H., Latrouite D., Andral B., Cadiou Y., Mahe J.C., Polard J.C., Nerisson P. Litter on the sea floor along Eouropean coasts. *Mar. Pollut. Bull.* 2000; **40**: 516-527.
62) Sutherland D.L., Beardsley G.L., Jones R.S. Results of a survey of the south-Florida fish-trap fishing grounds using a manned submersible. *Northeast Gulf Sci.* 1983; **6**: 179-183.
63) Brothers G. Gear technology and management tools used in Atlantic Canada to reduce derelict fishing gears and other gear losses. *International Marine Debris Conference on Derelict Fishing Gear and the Ocean Environment*, Honolulu, 2000. Countermeasure
64) High W.L, Worlund D.D. Escape of king crab, *Paralithodes camtschatica,* from derelict pots. *NOAA Tech. Rep.* **734**. 1979; 1-11.
65) Kimker A. Tanner crab survival in closed pots. *Alaska Fish. Res. Bull.* 1994; **1**: 179-183.
66) Hébert M., Miron G., Moriyasu M., Vienneau R., DeGâce P. Efficiency and ghost fishing of snow crab (*Chionoecetes opilio*) traps in the Gulf of St. Lawrence. *Fish. Res.* 2001; **52**: 143-153.
67) Stevens B.G., Vining I., Byersdorfer S., Donaldson W.T. Ghost fishing by Tanner crab (*Chionoecetes bairdi*) pots off Kodiak, Alaska: pot density and catch per trap as determined from sidescan sonar and pot recovery data. *Fish. Bull.* 2000; **98**: 389-399.
68) Vienneau R., Moriyasu M. Study of the impact of ghost fishing on snow crab, *Chionoecetes opilio*, by conventional conical traps. *Can. Tech. Rep. Fish. Aqua. Sci.* 1994; **1984**: 1-9.
69) Carr H.A., Cooper R.A. Manned submersible and ROV assessment of ghost gillnets in the Gulf of Maine. *Proc. Oceans'87. Ocean An International Workplace* **l** (2). 1987; 622-624.
70) Stevens B.G. Crab bycatch in pot fisheries: causes and solution. In: Wray T. (ed.). *Proc. Solving Bycatch Workshop.* Seattle. 1996; 151-158.
71) Matsuoka T. Estimation of ghost-fishing mortality and its evaluation. In: Arimoto T. and Haluan J. (eds.). *Proc. 3rd JSPS International Seminar on Fisheries Science in Tropical Area Sustainable Fishing Technology in Asia towards the 21st Century*. Tokyo. 2000; 373.
72) Anon. Code of Conduct for Responsible Fisheries, FAO, Rome. 1995.
73) Anon. FAO Technical Guidelines for Responsible Fisheries 1 – Fishing Operations, FAO, Rome. 1996.
74) Ilan Y. Retrieval project for the lost bottom gillnet in Korea. *Proceedings of International Commemorative Symposium70th anniversary of the Japanese Society of Fishing Science 68 supplement I 2002*, the Japanese of Society of Fisheries, Tokyo, 2002; 380-383.
75) Bech G. Retrieval of lost gillnets at Ilulissat Kangia. *NAFO Sci. Counc. Res. Doc.* 95/6. 1995.
76) Blott A.J. A preliminary study of timed release mechanisms for lobster trap. *Mar. Fish. Rev.* 1978; **40**: 44-49.
77) Scarsbrook J.R., McFarlane G.A., Shaw W. Effectiveness of experimental escape mechanisms in sabkefish traps. *N. Am. J. Fish. Manage.* 1988 (**8):** 158-161.
78) Arcement E., Guillory V. Ghost fishing in vented and unvented blue crab traps. *Proc. LA. Acad. Sci.* 1993; **56**: 1-7.
79) Blois S. The implementation of the galvanic time release mechanism on queen crab pots in the Gulf of St. Lawrence. A case of more responsible fishing. *Proc. MTS ' 92: Global Ocean Partnership.* Marine Technology Soc., Washington DC, 1992: 415.
80) Selliah N., Oxenford H., Parker C. Selecting Biodegradable Fasteners and Testing the Effects of Escape Panels on Catch Rates of Fish Traps. In: Creswell R.L. (ed.), *Proc. Gulf Caribb. Fish. Inst.* 2001; **52**: 634-653.
81) Carr H.A., Blott A.J., Caruso P.G. A study of ghost gillnets in the inshore waters of southern New England. *Proc. Global Ocean Partnership*, Marine Technology Society Conference, Washington DC. 1992; 361-366.

Ghost-fishing impact by derelict fishing gear

Tatsuro Matsuoka
Faculty of Fisheries, Kagoshima University, Japan

- **Global concern to negative impacts in capture fisheries**
  - **Bycatch and discards**
  - **Derelict fishing gear and ghost fishing**
  - **Destruction of habitat**
  - **Less selective fishing activities**



Impacts by derelict fishing gear

- Ghost fishing (Sheldon WW. 1975; High WL. 1976 *etc.*)
- Incidental mortality of non-fishery animals as;
  - Marine mammals
  - Marine reptiles
  - Sea birds
- Accumulation on seabed and coral reefs
- Contamination on beaches
- Deformation of seabed by deposition
- Increasing fish aggregation efficiency of FAD
- Micro-FAD effects to aggregate fishes
- Navigation hazard

What is ghost fishing?

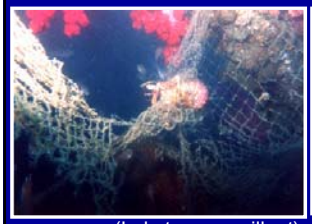
Derelict fishing gear no matter if abandoned intentionally or not and removed from fisherman's control remain its capture function in aquatic environment and continue inducing mortality to fishery organisms.

(Octopus in cage pot)

(Sea bream on gillnet)

Evidences of ghost fishing (1980's)

Quantitative assessment of mortality (since late 1990's)



(Lobster on a gillnet)

(Flatfish in a pot)

Proposed model for estimation of GF mortality

$N_m = E_d \cdot m$ ..... (1)

N_m : Number of GF mortality
E_d : Number of fishing gear lost/abandoned in a unit time period
m : Number of GF mortality per gear

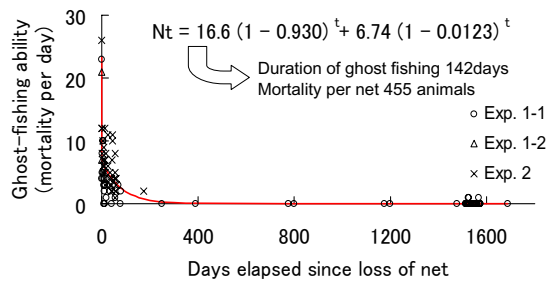
(1) Micro-estimation (estimation of m)
- Equation to represent change in GF mortality along time
- Integral to find total GF mortality toward T_{max} (cease of GF)

(2) Macro-estimation (Number of derelict gear E_d then N_m)
- Field survey to find the total number of fishing gear loss

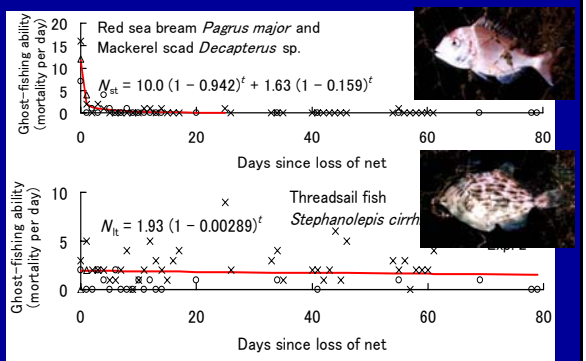
Ghost fishing by gillnets left on flat seabed

- Experimental methods: Finding the number of enmeshed fish a day
  (1) Setting a 72m-long gillnet on flat seabed,
  (2) Observations on consecutive two days,
  (3) Monitoring for 1,689 days.

Representation of observed GF-mortality by a gillnet with experimental equation



Different durations of GF-efficiency for fishes

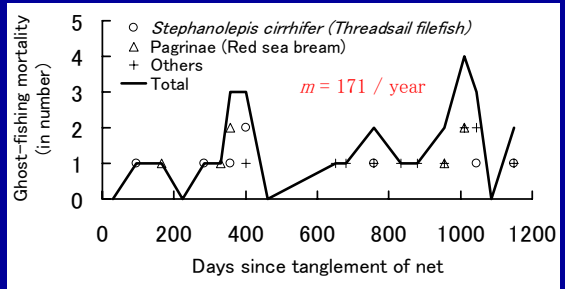


Accumulation of data by researches on GF by gillnets on flat seabed

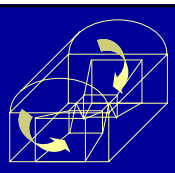
	Kaiser *et al*.	Erzini *et al*.	Nakashima & Matsuoka
Net length (m)	90	100	72
Net height (m)	3.0	2.1	2.3
Mesh size (mm)	100	60	60 to 99
Maijor GF species	Cat-shark	Scorpionfish	Threadsail filefish
	Nursehound	Seabream	Dragonet
GF duration (days)	141	56	142
GF mortality (mumber)	334	318	455

Ghost fishing by gillnets 3-dimmensionally tangled on FAD

Observed Ghost-fishing mortality by a gillnet tangled on FAD



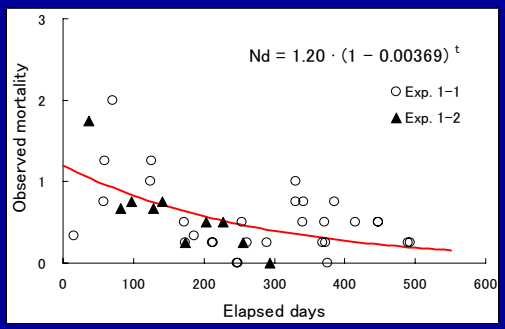
Ghost fishing by pots



Setting 4 pots in 10-24 m depth
Underwater observation for 492 days;
(a) Number of observed live organisms
(b) Number of observed dead bodies
(c) Number of injury

Ghost-fishing process in pots: unusual behaviour, injury and subsequent mortality

Observed numbers of dead bodies of entered organisms in a pot



Estimated numbers of entry and mortality in a pot

		All species	Finfishes	Octopus
Live organisms	Declining rate	0.00203	0.00222	
	$T_{0.05}$	1,480	1,350	2,110
	Integral to $T_{0.05}$	6,759	5,472	1,287
	Observable days	2.80	3.18	1.64
	Number of entry	2,414	1,721	785
Deadbodies	Declining rate	0.00369	0.00434	
	$T_{0.05}$	810	690	1,030
	Integral to $T_{0.05}$	313	189	148
	Observable days	0.99	0.81	1.52
	Number of mortality	315	233	98

Macro-estimation of ghost fishing mortality

Estimation of *Ed* (number of derelict fishing gear during a unit period of time) based on interview surveys

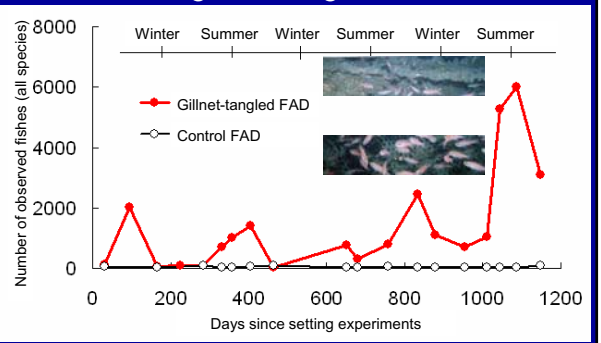
$$E_d = N_f \cdot r_o \cdot N_g \cdot r_l$$

N_f ; Number of registered fishermen
r_o ; Ratio of presently operational fishermen
N_g ; Number of fishing gear used per fisherman
r_l ; Ratio of annual gear loss

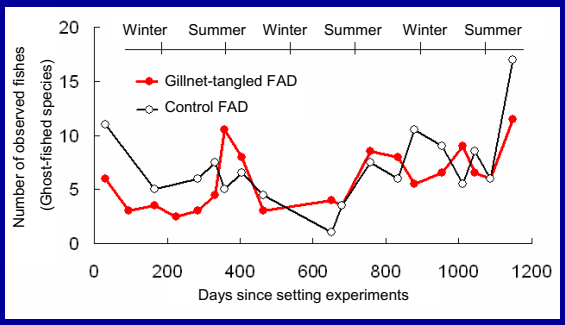
GF by other types of fishing gear: small Danish seine and bones of entangled fish

Micro-FAD effects by derelict fishing gear and aquaculture cages (large fishing gear)

Increasing fish-aggregation efficiency of gillnet-tangled FAD



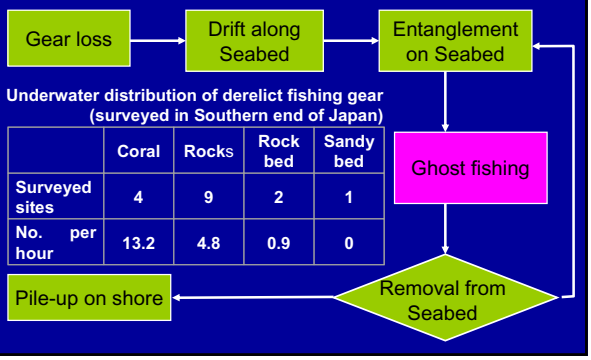
Un-increasing fish-aggregation in gillnet-tangled FAD for ghost-fished species



Distribution of fishing gear and parts underwater and on-shore

	Coral	Rocks	Rock bed	On shore
Webbing	0.32	0.30	0.00	0.19
Line	0.68	0.68	1.00	0.02
Sinker line	0.00	0.02	0.00	0.01
Float	0.00	0.00	0.00	0.64
Float line	0.00	0.00	0.00	0.02
Plastic trap	0.00	0.00	0.00	0.12

Process from gear loss to dysfunction of ghost fishing



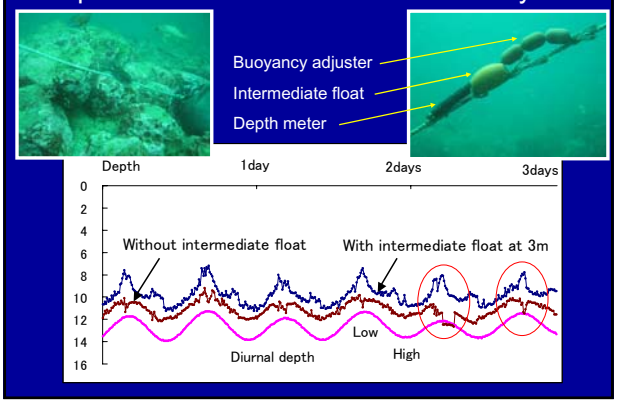
Underwater distribution of derelict fishing gear (surveyed in Southern end of Japan)

	Coral	Rocks	Rock bed	Sandy bed
Surveyed sites	4	9	2	1
No. per hour	13.2	4.8	0.9	0

Countermeasures against ghost fishing

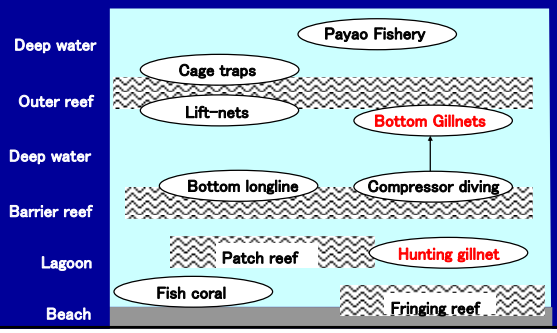
- Reduction of fishing gear loss by preventing;
  (1) cut of float line due to interaction with other sectors,
  (2) entanglement of gear around seabed to unable hauling,
  (3) misallocation during operations,
  (4) improper setting of fishing gear *e.g.* to avoid theft,
  (5) drop of fishing gear either accidentally or intentionally,
  (6) cut of float lines by boats.
- Retrieval or dysfunction of derelict fishing gear.
- Designed degradation of derelict fishing gear.
- Responsible behaviour and systematic cycle of purchase-use-replacement-treatment of fishing gear (and materials)

Experiment of intermediate float on buoy line



Retrieval of derelict fishing gear by iron clasp device

Avoidance of fishing gear loss in traditional coastal fishery in the Philippines



Prevention of derelict fishing gear and ghost fishing

The most important but least studied areas are the technical and legislative countermeasures. Fishing gear loss is an economic loss to business viability for fishermen and the worst impact to sustainability of the capture fishery sector. Therefore, countermeasures after gear loss is an alternative way. Prevention of fishing gear loss is the most fundamental countermeasure. Researches towards the following countermeasures are essential as;

(1) Management of duplicated utilisation of fishing grounds by multiple fishing sub-sectors including aquaculture; and

(2) Improvement of fishing gear and methods before loss, when they are used in fishing grounds where gear loss may occur.

Session 1

Countermeasures against marine litter

Practice and countermeasure for public to collect and control drifting marine litter in Dalian

Chen Jiangning, Zhao Xiaoxue

Dalian Environmental protection Volunteer Association
No.1 Huale St. Zhongshan District, Dalian 116001, China
Tel: 86411-82704122 , Fax: 86411-82704102
E-mail: dlchenjn@126.com & dlchenjn@sina.com

Introduction

The marine litter pollution is an important regional and global environmental problem. For the sustainable developing and protecting sea, these drifting marine litter must clear away just like sweeping the family floor daily. Therefore, Dalian Environmental Protection Volunteer Association starts to research and explore this problem. We unite enterprises and other social strength to carry on the elimination and investigation of drifting marine litter.

Dalian is a beautiful and clean city. It is China's first environmental protection city of "500 world good", and is one of the first batch of Chinese best tour cities. Dalian's geographical position and climatic conditions are extremely superior; the length of Dalian's coastline amounts to 1906 kilometers and the jurisdiction sea area is 23,000 square kilometers.

Dalian still face the problem of marine litter pollution just like the other coastal cities. Drifting marine litter nearby sea area change the drifting direction according to factors such as wind and current, which affects the navigation when floating to the sea-route, serious accidents such as propeller winded by the drifting matter maybe occur.

For the sustainable developing and protecting sea, these drifting marine litter must clear away just like sweeping the family floor daily. For many years, coastal units cleared sea trash year by year, but there are still not the effective countermeasure and persistent mechanism about the high seas float trash that out of the management at present. Therefore, Dalian Environmental protection Volunteer Association has started to research and explore this problem since 2006, and launches public welfare campaign about the elimination and investigation of drifting marine litter 2006·China Dalian.

In June and August 2006, the launch ceremony and the relay ceremony were held at Port wharf 6th berth of Dalian Port group and Dalian dock of Dalian Zhongyuan shipping limited company respectively. We had organized more than 500 volunteers, ten ships from maritime affair bureau and Dalian Port group and so on in these two large-scale campaign, and eliminate the drifting marine litter more than 2000 kilograms. Fishing litter were moved away with garbage trucks before classifying, weighting and recording.

From the table, we can see conspicuously that the main pollutant is plastic product such as domestic plastic bottle and the plastic bag, plastic ball, foaming plastic and plastic nets for fishery and the fish breeding; log, branch, paper case and greasy dirt and so on.

This campaign obtained the support from the municipal party committee, the municipal government and all walks of life; and environmental protection bureau, municipal party committee propaganda department, maritime affair bureau, harbor bureau and sea bureau send representatives to participate in the campaign.

Reporters of the Dalian Daily, China view and other mediums had come to carry in-the-spot coverage a issued the massive news.

Dalian Environmental protection Volunteer Association organizes to eliminate the marine drifting matter campaign as well as seabed trash and the seacoast trash campaign such as fishing seabed trash at Xinghai bay disposal trash at Fujiazhuang garden. There is still a large of reports and coverage about this campaign on the net of Baidu and Google.

Dalian Environmental protection Volunteer Association not only organizing the eliminating of the marine floating matter campaign as well as seabed trash and the seacoast trash campaign such as fishing seabed trash at Xinghai bay disposal trash at Fujiazhuang garden. Just in 2006 participator of sea protection the volunteer has rose to several thousands.

As follows, I will discuss countermeasure to control drifting marine litter:

The first respect, it is principal that NOWPAP-RCU is propeller of sea environmental protection in Northwest Pacific region.

Firstly, NOWPAP-RCU may formulate the region's sea protecting objective and action plan of the future 5 and 10 years.

Secondly, RCU may drive to revise international conventions and multilateral protocols about the sea protection.

Thirdly, RCU coordinates relation and the cooperation with each member countries.

Fourthly, we had better choose a few suitable experimental cities to implement the above protecting objective and action plan, and make great effort to support them in the fund and guideline as experimental cities.

Fifthly, we promote the valuable experience of the demonstration cities to a broad region.

The second respect, it is key point that is the main manager and should be responsible for the sea protection.

Firstly, each member country works out special goal according to the protecting objective and action plan of RCU;

Secondly, each member country revises and promotes the law of sea protection;

Thirdly, each member country supports and assures in terms of manpower and fund ;

Fourthly, each member country gives priority to the construction of the experimental cities, then promote their experience to other cities and areas gradually.

The third respect, it is essential that the experimental cities and other cities are important force of achieving the aims and plans.

Firstly, the experimental cities should make (such as Dalian) the planning for action in details according to RCU and our country;

Secondly, it is necessary to amend and improve the legal level, human capital investment and give assurance for that.

Thirdly, It's important to support in the respect of manpower and fund;

Fourthly, the long-term mechanism—"protect, manage and develop" must be built, and detailed method must be studied and implemented.

The fourth respect, it is important bridge that the NGO links with enterprise, government and the public.

Firstly, unite enterprise and all walks of life to organize public activities, and appeal the government to pay attentions to marine litter and solve it;

Secondly, coordinate relations between government and all walks of life, supervise activities of protecting sea environment.

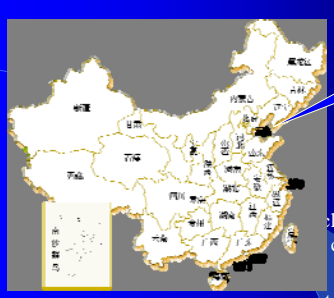
If Dalian is fortunate enough to be the experimental city, Dalian Environmental Protection Volunteer Association is pleasure to be a participant in this project. Of course, Dalian is qualified to be a experimental city. For environmental protection, especially marine protection, Dalian not only has complete hardware facilities, but good software environment because of government's highly emphasized attentions, enterprises' actively supporting and enthusiastic public.

For more information:
Dalian Environmental Protection Volunteers Association
Adds： No.1 Huale St. Zhongshan District, Dalian, China
P.C.： 116001
Tel： 86411-82704122
Fax： 86411-82704102
E-mail: dlchenjn@126.com & dlchenjn@sina.com

Practice and Countermeasure for Public to Collect and Control Marine Litter in Dalian

Jiangning Chen

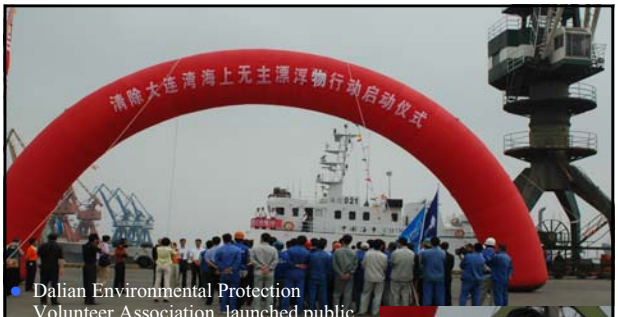
Dalian Environmental protection Volunteer Association (DLEPVA)



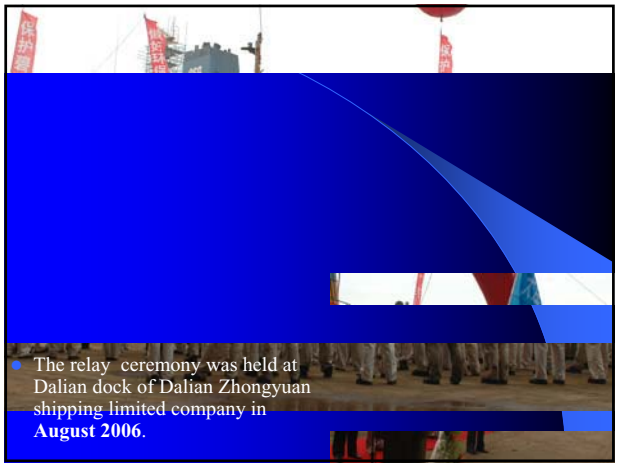
Dalian is a beautiful and clean city. It is China's first city of "the Global 500" , and is one of the best tourism cities in the world.

- The length of Dalian's coastline amounts to 1,906 kilometers and the jurisdiction sea area is 23,000 square kilometers.

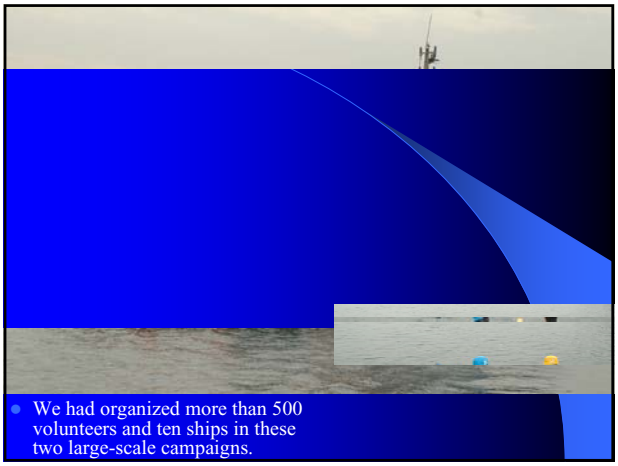
- Dalian still faces the problem of sea trash pollution just like the other coastal cities. Drifting marine litter nearby sea area changes the drifting direction according to factors such as wind and current .



- Dalian Environmental Protection Volunteer Association launched public welfare campaign "the elimination and investigation of drifting marine litter 2006·China Dalian". The launchment ceremony was held at 6th berth of the wharf of Dalian Port group in **June 2006**.



- The relay ceremony was held at Dalian dock of Dalian Zhongyuan shipping limited company in **August 2006**.



- We had organized more than 500 volunteers and ten ships in these two large-scale campaigns.

- Environmental protection volunteers were collecting the drifting marine litter.

- This campaign obtained the support of the municipal government, and environmental protection bureau, harbor bureau and sea bureau and all walks of life. The ship is from maritime affair bureau.

The weight of drifting marine litter was more than 2,000 kilograms.

Table of classification about marine litter in Dalian

No.	Category	Weight (Kg)	Percent (%)	Possible Source	Remark
1	wood	260	25.1	Seacoast enterprise	
2	plastic bag	250	24.1	Shipping&Seacoast &Breeding&Tourism	
3	wastepaper	200	19.3	Shipping&Seacoast enterprise&Tourism	disheveled
4	foam plastic	120	11.6	Shipping&Seacoast &Breeding&Tourism	bulky
5	fishing net	100	9.7	Fisher&Breeding	
6	glass bottle	58	5.6	Shipping&Seacoast enterprise&Tour	
7	pericarp and others	48	4.6	Shipping&Seacoast enterprise&Tour	
8	Total	1,036	100		

- Massive news was issued by newspaper, reporters of China view, Liaoning TV and the Dalian Daily and other mediums.

The history of DLEPVA

- DLEPVA was founded on June 23, 2003. We have about 300 registered individual members, and 40+ group members.

- A diver was interviewed after clearing seabed trash (more than 20 divers participated), **June 2003**

- We organized campaigns to eliminate the coast trash at Heishijiao, **March 2004**.

- We also have organized campaigns to eliminate the seacoast trash at Fujiazhuang garden, **August 2004**.

- 'Marine branch' of DLEPVA was founded in **2005**, followed by a seabed trash clearing activity.

We have organized campaign clearing seabed trash at Xinghai bay (last for more than a month), **Aug.-Sep. 2005**.

Countermeasure to control marine litter

- Member countries of NOWPAP should work out an action plan to control marine litter
- Experimental cities can be selected to start the action plan (such as Dalian)
- In the selected experimental cities, a long-term mechanism for "marine litter protection, management and development" must be built
- We would like to suggest NOWPAP to draw a new marine litter plan for next 5 years or more

It is important for NGO to build a regular relationship with enterprise, government and the public

- NGO could unite enterprises and all walks of life to organize public activities, and suggest the government to pay attention to environmental problem and to solve it;
- NGO may coordinate relations between government and the public, supervise activities of protecting sea environment.

- Picture 2: the son of Sun Deliang is reluctant to part with this little spot seal and gaze at it; so it does.
- Picture 3: Return quickly to the sea to look for mother and bye-bye to our lovable spot seal; may she have a best wishes!

To contact me:

- Name:Mr. Jiangning Chen
- Dalian Environmental Protection Volunteers Association
- Adds: No.1 Huale St. Zhongshan District, Dalian, China
- P.C.: 116001
- Tel: +86411—82704122
- Fax: +86411—82704102
- E-mail: dlchenjn@126.com

Welcome to Dalian


Thanks everyone !
Ir. Jiangning Chen
alian Environmental Protection Volunteers Association
dds No.1 Huale St. Zhongshan District, Dalian, China P.C. :116001
el: +86411—82704122 Fax: +86411—82704102
-mail: dlchenjn@126.com

Investigations into the actual conditions of Seabed Litter, and The problem for its removal and disposal in Seto Inland Sea.

Shiwaku Toshifumi

The Foundation for Environmental Rehabilitation and Redevelopment of Mizushima

Nishisakae-cho 13-23,Mizushima Kurashiki-city,Okayama 712-8034,JAPAN

Tel: 81-86-440-0121, Fax: 81-86-446-4620

E-mail: shiwaku@mizushima-f.or.jp

1. Introduction

A lot of scattered litter is seen in the beach part etc, being caused by the lifestyle characterized by heavy consumption and a large amount of abandonment which have been promoted since the period of the high economic growth. However, we must notice that not only these litter which is easily visible but also much more litter is scattered and piles up in the Seabed that causes the waste problem with the sea area. Therefore, it is important to clarify the realities first of all to do the approach of Seabed Litter that causes "invisible environmental concern ".

Our research activities on this problem have been supported by the Japan Fund for the Global Environment of Japan Environment Corporation（Present : Environmental Restoration and Conservation Agency）since 2000. This report describes the investigation result attained in fiscal year 2006, and the approach about removal and disposal of Seto Inland Sea by the cooperation of the administration and the fishermen.

2. The realities grasp investigation by small trawling boat

1) Examination method

The litter that is obtained with, the cooperation of two fishermen who owns respectively one small trawling boat widely used in the Bisan-seto sea area, was received by us so that Seabed Litter may be understood on its realities, the collection area being recorded and the contents being analyzed. We have been investigating into the litter using specimen ships – two small trawling boats – offered by the Yorishima-cho Fishermen's Cooperative Association. Postgraduate students at Okayama University have classified and measured the total litter.

2) Investigation result

①number and weight

Days of the operation of the total of two fishermen in the investigation in fiscal year 2006 are 124 days. (April, 2006 ~ January, 2007; by small trawling boat). In weight of the litter is about 1,525kg, and the number is about 53,000(The bulky pieces are excluded).

In the ratios of the numbers of each classification of Seabed Litter, the plastic bag (Including the tray) occupies the largest proportion of about 43% and the plastics products about 33%(Fig.1). The plastic bag occupies still larger proportion of about 32% according to weight.

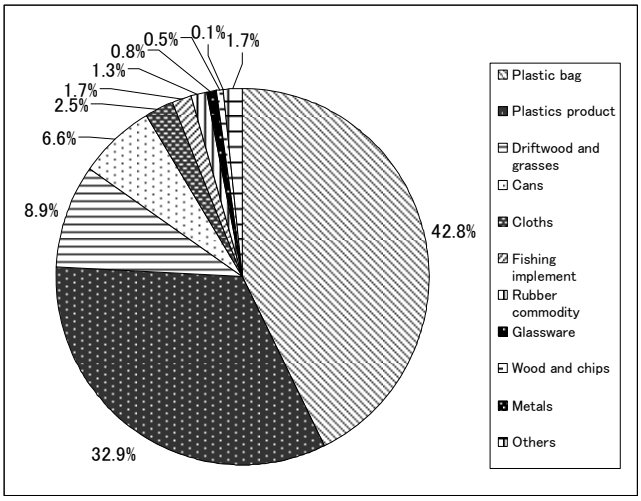


Figure1.Percentage of Seabed litter of each article by quantity(April,2006~January,2007)

②Can-waste ratio according to A best-before date

It accounts for the cans for about 12% in the number and it accounts for about 7% in weight. Usually the beverage cans are marked with the best-before date. The best-before date is decided generally roughly from eight months to one year after production. So we can estimate the time when each can was wasted into Seabed Litter by investigating the best-before date. In the investigation in fiscal year 2006, about 49% of the wasted cans had been wasted before the date in 2007 and about 27% in 2006 and it is estimated that most of the cans should be wasted within these several years before(Fig.2).

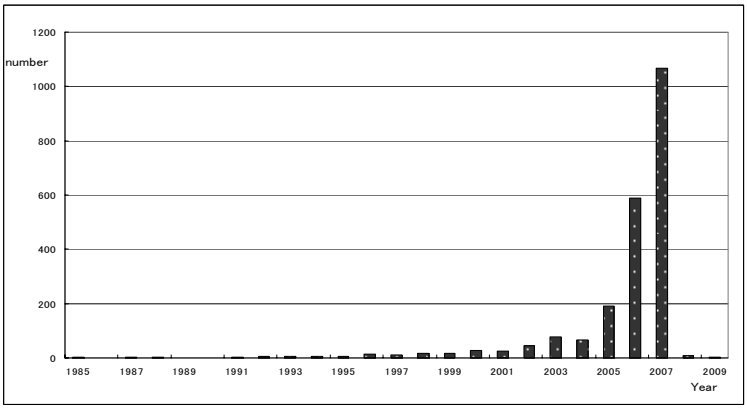


Figure2.Number of cans according to “best-before”date(April,2006~January,2007)

It is estimated that most of Seabed Litter should have been exhausted from daily life, and the results of our investigation shows us we should work on Seabed Litter as entire citizens' themselves problems.

3. The realities of Seabed Litter in Seto Inland Sea and Approach of its removal and disposal.

Seabed Litter has increased in the entire Seto Inland Sea especially in the sea area near the metropolis and the industrial zone in the Osaka bay and the Hiroshima bay, etc. Especially speaking, there are proper features by each sea area in the kind of Seabed Litter. Seto Inland Sea is divided into a lot of open seas and straits and the conditions of each parts are individual.

There is an example of a daily removal of Seabed Litter in the Hinase-cho fishery cooperative in Okayama Prefecture. The Etajima fishery cooperative in Hiroshima Prefecture with the initiative of young members, is collecting and buying Seabed Litter drawn by small trawling boat. The fishermen are daily drawing back Seabed Litter by small trawling boat in Suo-Oshima Yamaguchi Prefecture. But the administration is impossible to comply to the request of assistance to the fishermen.

However, some administrations also have started the approach to Seabed Litter in recent years. The Okayama prefectural assembly took up the problem of Seabed Litter, and the problem of Seabed Litter entered into an agenda at the governors' conference of both prefectures in Okayama and Kagawa of fiscal year 2004. The Ministry of Chugoku-Shikoku Regional Environment Office started up "Investigative commission on measures for marine waste of the Seto Inland Sea" that aimed at the approach by the cooperation of six prefectures of Chugoku and Shikoku districts, coast municipalities, the fishery people, and civic groups in March, 2006. The Mizushima foundation also is participating in the study committee as a commissioner. The task force for investigating into actual conditions of problem is set up in May, 2006, and the task force of the removal and disposal and the generation control will start up in March, 2007, too.

4. To the end

For the adequate approach to Seabed Litter, it is necessary for fishermen to draw them back and for the administration to dispose it. The drawing cost should be born by the ones who are clearly recognized as the exhausters. As for the other parts, the administration should bear responsibility. Moreover, because Seabed Litter flows in from the river, it is necessary to bear cost of removal and disposal for the inhabitants and enterprises of the entire river valley. It is important for the central government to have the responsibility because there is a lot of litter that pass over the prefecture boundary in Seto Inland Sea. In addition, the prefecture and the central government should have the responsibility for the cleaning of the bottom of the sea area where a small trawling is not allowed to enter owing to sea routes such as Maritime Traffic Safety Laws.

At the same time, it is necessary to work for the spread of the product made of the biodegradability material and the enlightening activity to the citizens is in order not to generate.

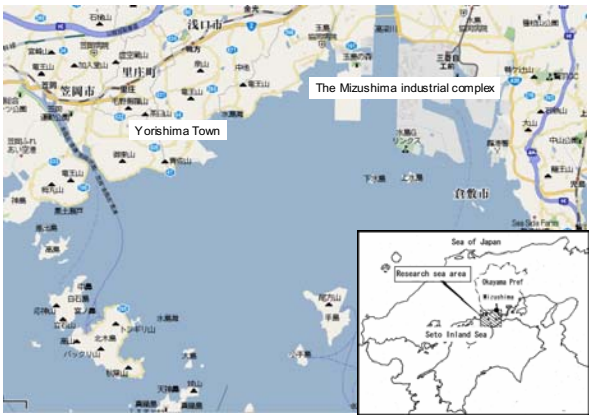
Investigations into the actual conditions of Seabed Litter, and The problem for its removal and disposal in Seto Inland Sea.

The Foundation for Environmental Rehabilitation and Redevelopment of Mizushima

Researcher : Shiwaku Toshifumi

Activities of the Mizushima Foundation

- Reviving the environment of Mizushima
  →Research of seabed litter
- Succession of experiences of pollution damages and Support of pollution patients
- Pollution and environmental study
- Announcing to the public and exchange

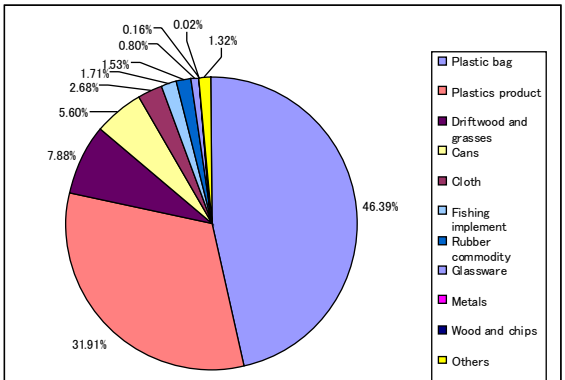


Researched Area

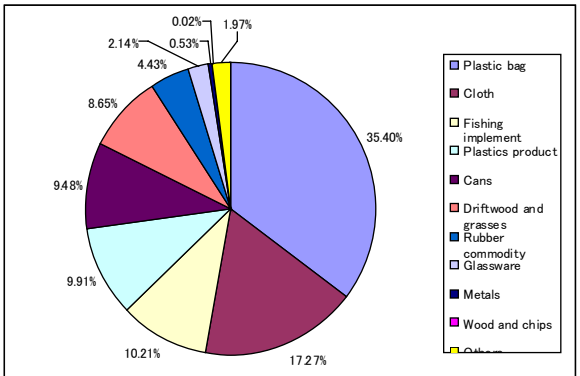
Small trawlling boat

A fisherman is separating litter from fish on the boat

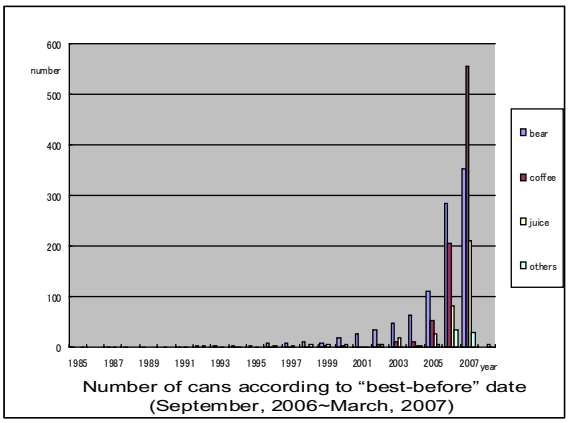
Separating and Measuring of collected seabed litter



Percentage of seabed litter of each article by quantity (September, 2006~March, 2007)



Percentage of seabed litter of each article by weight (September, 2006~March, 2007)



Number of cans according to "best-before" date (September, 2006~March, 2007)

Collecting the mass of metallic wires.

Characteristics of the seabed litter

- 1) It is understood that the seabed litter is composed of garbage which, for the most part, spewed out of daily life, leisure activities, etc.
- 2) Plastic and aluminum products are not easily corroded and keep piling up at the bottom of the sea for a long time.
- 3) It damages fisheries, causes water pollution and get in the way of fishermen.
- 4) The seabed litter is accumulated constantly by new garbage.

Removal and disposal of Seabed Litter in the Hinase-cho fishery cooperative in Okayama Prefecture

- The Seabed Litter is removed with small trawlling boat since the beginning of 1980's.
- The fishery cooperative bore the cost of 2yen/kg and the Hinase-cho disposed of the collected Seabed Litter.
- Seabed Litter rose by as much as 12t/day at first, decreased to about 5kg/day now.
- Seabed litter is disposed by 10yen/kg in the disposal place in Bizen City now.

The Boxes to collect the seabed litter
（Hinase-cho）

Approaches to Seabed Litter by the administration

- The Okayama prefectural assembly took up the problem of Seabed Litter, and the problem entered into an agenda at the governors' conference of Okayama and Kagawa prefectures in the fiscal year 2004.
- The Ministry of Chugoku-Shikoku Regional Environment Office started up "Investigative commission on measures for marine waste of the Seto Inland Sea" in March 2006.

A station of the collected seabed litter
(Yorishima-cho)

"Investigative commission on measures for marine waste of the Seto Inland Sea"（February 7, 2007）

The problem for Seabed Litter removal and disposal

- Especially, small islands (Because, Securing the place is difficult!)
- Maintain, disposal, removal system & organization of Seabed Litter.
- Load of removal & disposal cost of Seabed Litter.
- Amends such as fishing nets damaged by Litter collection etc.

Necessity of exhaust source measures of Seabed Litter

- The drawing cost should be born by the ones who are clearly recognized as the exhausters.
- The spread of the product made of the biodegradability material (at the same time, clarifing the responsibilities of Manufacturer & Distributors)
- Prohibition of illegal dumping of litter to the sea area and river.

View in the future

- Who have the responsibility for Seabed Litter?

⇒ The central government (Because a lot of litter passes over the prefecture boundaries in Seto Inland Sea).

- What measures are necessary?

⇒ Spread of the biodegradability material.
The enlightening activity to the citizens.

Treasure, Trash, To do What? In the Nakdong Estuary

Yoon Chan, Choi*, Yang Ho, Song**, Su Jin, Oh***

*Busan Development institute. Environment Research Department.

Water Authority Bldg. 9 F, 273-20, Yangjung-2Dong, Busanjin-Gu, Busan, 614-052, Korea

Tel : 82-51-860-8763, Fax : 82-51-860-8787

cyc2001@bdi.re.kr

** Fisheries Promotion Division Manager, Busan Metropolitan city

1000, Yeonsan 5-Dong, Yeonje-Gu, Busan, Korea 611-735

yhsong@busan.go.kr

*** Maritime Affair & Port Division, Busan Metropolitan city

1000, Yeonsan 5-Dong, Yeonje-Gu, Busan, Korea 611-735

sujin@busan.go.kr

1. Nakdong Estuary is one of Busan's treasure

Busan, a bustling city of approximately 3.7 million residents, is located on the Southeastern tip of the Korean peninsula, is the second largest city in Korea. The size of Busan is 763.3km2 which is 0.8% of the whole land of Korea. The natural environment of Busan is a perfect example of harmony among mountains, rivers and sea. Its geography includes a coastline with superb beaches and scenic cliffs, mountains which provide excellent hiking and extraordinary views, and hot springs scattered throughout the city.

The Nakdong river flows 520 kilometers across south Korea, leads to northwest pacific ocean via city of Busan. The Nakdong estuary, the mouth of river, has the big wide open spaces of wetland and sand island giving a spectacular sight. Also it has been providing an ideal place for migratory birds, reed, water plants, shellfishes, it is a paradise of millions of birds for a long time. Thus the Nakdong estuary is one of great treasure to the ecosystem as well as to the city of Busan. And furthermore, there are so many water sources to drink along the Nakdong river basin.

Fig. 1 Beautiful scene at the Nakdong river (around middle stream)

Fig. 2 A fine view of sand islands at the Nakdong estuary

Fig. 3 The wetland provide a good shelters to a lot of birds at the Nakdong estuary

2. The massive trash threatening Busan's treasure

For a long time, the Nakdong estuary suffered from the trash flowed into the river especially in the heavy rainy seasons. Once litter gets into the estuarine environment, it seriously affects wildlife, the environment, humans, and our economy. City of Busan make an appropriation of funds for clean-up the riverside, estuary, and marine debris every year.

Fig. 4 An accumulated trash at some of the place of the Nakdong estuary in summer season, 2006.

3. Project on the track of river trash through the Nakdong river

At the end of a strong storms scratched across the Nakdong river basin, we could easily found the massive trash all around Eulsuk Island which belong to Nakdong estuary at last summer.

Then we had done a hard project that certification on the extent of trash flowed into river. Through the aviation photographing before and after the rain, we got significant pictures to explain the washing out of the trash along the Nakdong river basin of 130km distance.

Fig. 5 An image of aviation photographing (http://images.google.com)

Fig. 6 An example photo on the track of river trash (river bank was completely washed out after heavy rain))

4. It is necessary to develop more detailed countermeasures to protect Nakdong estuary from the threatens of the trash

Despite some of the transboundary water pollution issues were not approached to the settlement among the relevant authorities of the Nakdong river region, Busan city has conducted a study by itself on the river trash and marine litter problems in the year of 2001.

According to the study results, it was estimated that some parts of the trash accumulated at one of Busan's treasure caused from the upstream area of the riverside hills, an agriculture fields, a construction fields, and the down-town streets along the river basin.

So, Busan city authority suggested the cost-sharing system to the upstream local governments for removing the river trash, but there has being heard any good news about the cooperation between up & down authorities until now.

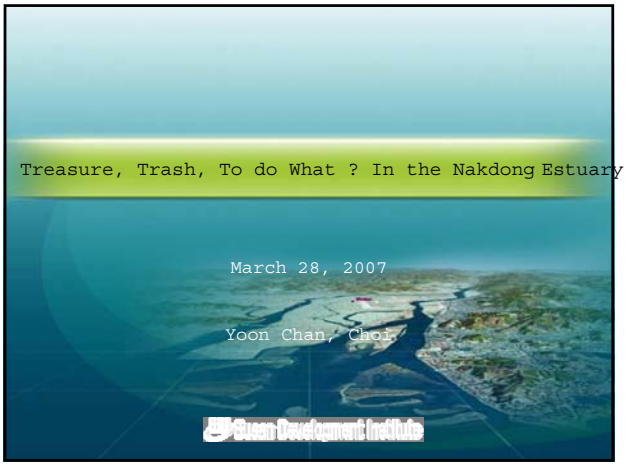
So, it is necessary to develop more detailed countermeasures and to make efforts for preserving the Nakdong estuary from the threaten of the river trash ;

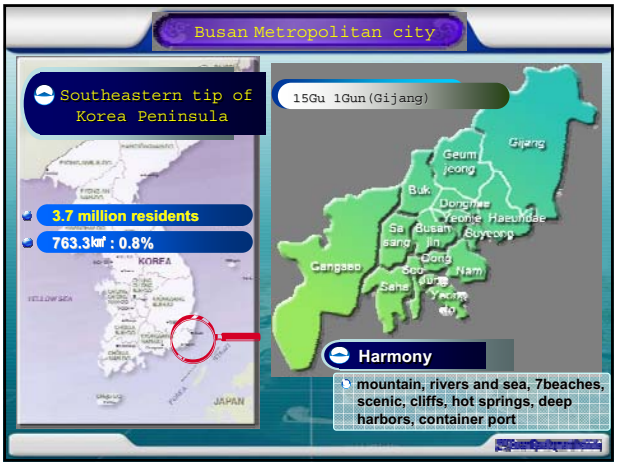
1) Prepare the damage assessment for the Nakdong estuary ecosystem, because there has been

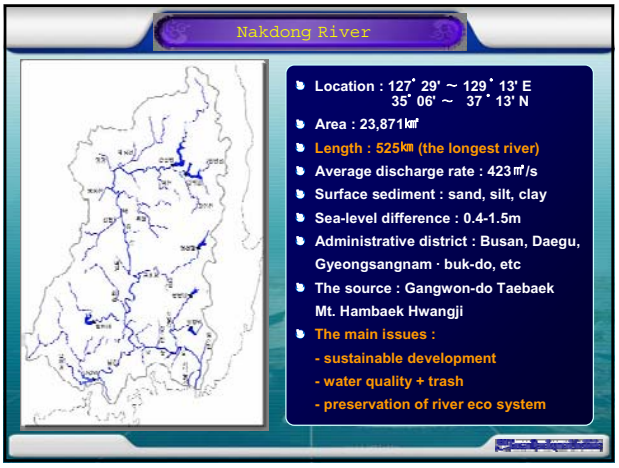
no trial to clear up the relationship between the public nuisance toward the downstream area citizens, eco-systems and the accumulated trash at present.

2) Continue the study on organization of the compact commission about the cost-sharing system to remove flowed into trash between up & downstream in the Nakdong river basin

3) Despite the principled negotiation models are not still exist which settle down the issues including water quality and river trash, we will continue to study in order to get a inner-province compacts processes, mediation, facilitation, convening, consensus process, negotiation method on the whole Nakdong river basin.


Treasure, Trash, To do What ? In the Nakdong Estuary
March 28, 2007
Yoon Chan, Choi
Busan Development Institute


Busan Metropolitan city
Southeastern tip of Korea Peninsula
3.7 million residents
763.3㎢ : 0.8%
KOREA
JAPAN
15Gu 1Gun(Gijang)
Gijang
Geum jeong
Buk
Dongnae
Yeonje
Haeundae
Suyeong
Sa sang
Busan jin
Dong
Nam
Seo
Gangseo
Saha
Harmony
mountain, rivers and sea, 7beaches, scenic, cliffs, hot springs, deep harbors, container port

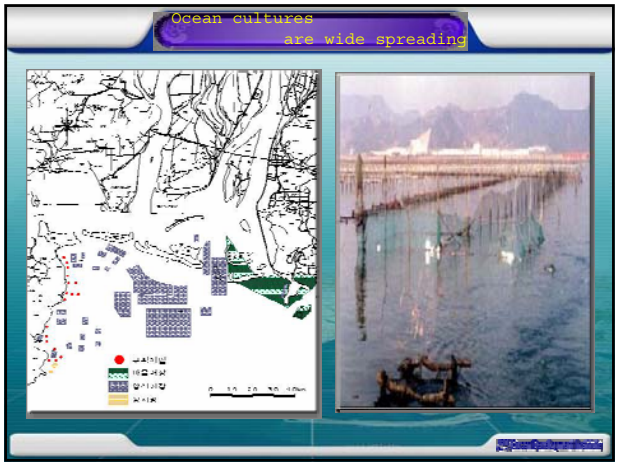

Nakdong River
Location : 127˚ 29' ~ 129˚ 13' E
35˚ 06' ~ 37˚ 13' N
Area : 23,871㎢
Length : 525㎞ (the longest river)
Average discharge rate : 423㎥/s
Surface sediment : sand, silt, clay
Sea-level difference : 0.4-1.5m
Administrative district : Busan, Daegu, Gyeongsangnam · buk-do, etc
The source : Gangwon-do Taebaek Mt. Hambaek Hwangji
The main issues :
- sustainable development
- water quality + trash
- preservation of river eco system

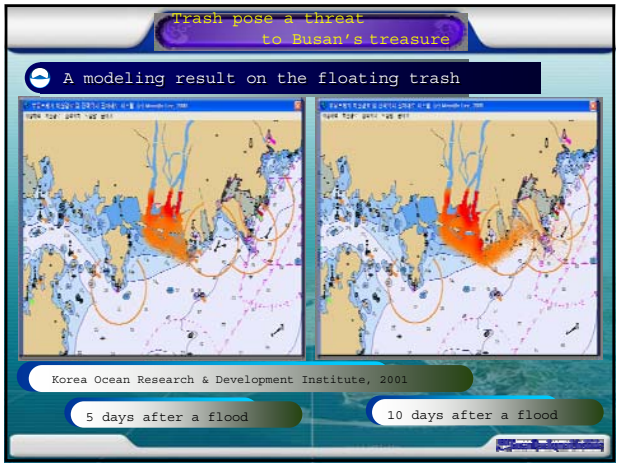

3-D Map : Busan city

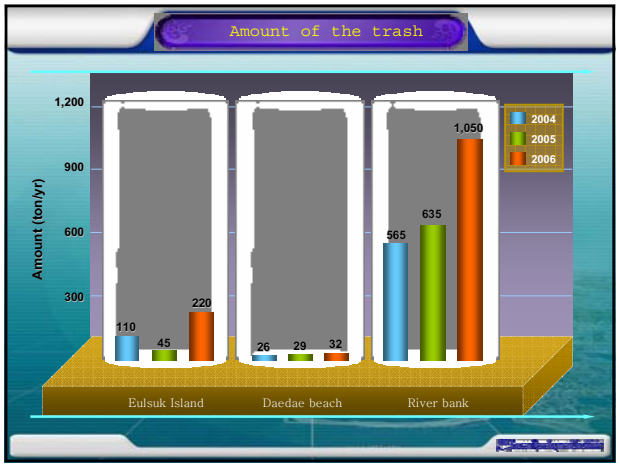

Nakdong Estuary
= One of Busan's treasure
Nakdong delta
Shelter to migratory birds
Widespread waterweeds
Habitats for crab, shellfish
Drinking water source for the citizens
Paradise for millions of birds

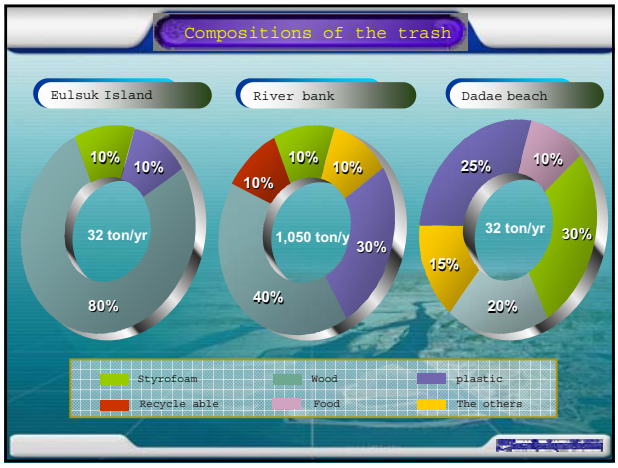

Nakdong estuary : Eulsuk Island


Protection Acts
on Nakdong Estuary
Preservation of Natural Environment Act 52.74㎢
Marine Pollution Act 741.5㎢
Protection of Cultural Properties Act 231.9㎢
Conservation of Wetlands & Ecology Act 34.2㎢

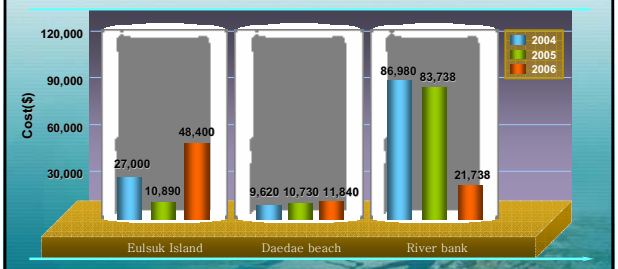

Ocean cultures
are wide spreading


Trash pose a threat
to Busan's treasure
A modeling result on the floating trash
Korea Ocean Research & Development Institute, 2001
5 days after a flood
10 days after a flood


Amount of the trash
Amount (ton/yr)
1,200
900
600
300
2004
2005
2006
110
45
220
26
29
32
565
635
1,050
Eulsuk Island
Daedae beach
River bank


Compositions of the trash
Eulsuk Island
River bank
Dadae beach
10%
10%
32 ton/yr
80%
10%
10%
10%
1,050 ton/y
30%
40%
25%
10%
32 ton/yr
30%
15%
20%
Styrofoam
Wood
plastic
Recycle able
Food
The others

Removal Cost



- Street waste management fund
- Emergency national territory protection fund
- Marine pollution protection fund

Trash Tracking Project

- Before & After a rain
- Aug. 9 ~ Sep. 18. 2006
- Wondering,
  - What happens ?
  - Is it possible to monitor the moving trash ?
- I think, get a half success

< Point 2 >

- If heavy rain comes again, the construction wastes will be drawn into river
- Litter was piled up at a oil- defense net

< Point 7 >

- After rain, the river bank was submerged, where they are ?

Activities for Marine Litter

- Monitoring : estuary, river, ocean (floating, immersed litter)
- Support NGO's activities
  - clean-up marine pollutants, river & beach wastes
  - periodical inspection around an inland sea (dumping, etc…)
  - carry out tour programs for students around the Nakdong estuary
- Buyback marine litter pulled-up during fishing
- Clean-up activities in ocean cultivation region
- Elimination of immersed fishing nets

First of all, we want the cost-sharing system

Countermeasures on River Trash

- Development of effective management system to
  - preventing wash out of trash through the streams at downtown area
  - methods of tie-up the cut-down trees around riverside mountains
  - construction fields through the river flows
  - agriculture wastes in rural areas
- Establish an effective treatment system
  - prepare to emergency situation of the trash flowed into
  - needs to set-up cost sharing system
  - development of new technology for surveys, collection, disposal…
- Sustained approach to litter abatement education
  - inform the value of Nakdong estuary
  - the trash's threaten to the river & oceans eco-system


Thank you

Session 2

Reduction and prevention of marine litter

The efforts of China during the implementation of MALITA

Linlin HU and Yuhua ZHOU

Environmental Standard Institute, Chinese Research Academy of Environmental Science
No.8 Dayangfang, Anwai, Beijing, 100012, P.R. China
Tel: +8610-84931980, Fax: +8610-84919396
E-mail: hull@craes.org.cn

1. Background

The NOWPAP Marine Litter Activity (MALITA) has been approved by the Tenth Intergovernmental Meeting (Toyama, Japan, 2006) and is now being implemented. China, as one of the member countries of the NOWPAP, accepted the Marine Litter Activity (MALITA) in the NOWPAP region, too.

This article is to discuss the current progress of the MALITA implementation in China and to find the necessary steps to be taken.

2. Efforts

2.1 Collection of related information on Marine Litter in China

Despite limited quantitative data on marine litter was found in China, we have made efforts to collect available information on legal instruments on marine litter, to give a summary of the coastal cleanup activities in NOWPAP areas of China, The collected information was submitted to the NOWPAP RCU and also was presented during the NOWPAP workshop in Incheon.

2.2 Review of national legal instruments and programmes related to marine litter in China

Through collecting and summarizing the data and information on constitutional provisions, framework laws, institutional legislation/cross-cutting legislation related to marine litter in China, a national summary on marine litter related national legal instruments and institutional arrangements is introduced. From the view of marine litter and the analysis of gaps and needs in the coverage of the marine litter issue by national instruments are subsequently made.

2.3 Promotion of awareness on the reduction of marine litter

Officials and experts from related departments of government and provinces covering NOWPAP areas of China participated the NOWPAP ML workshops and activities. Such as officials and experts from department of Marine, Communication, Fishery and Shandong, Liaoning, Tianjin,

Hebei provinces,
With the help of NOWPAP RCU, DINRAC has developed marine litter education brochure and the brochure has been used in some activities.

2.4 Introduction of Korea and Japan's successful experiences on ML
We have submitted a report to SEPA, introducing the successful experiences on ML have carried out in Korea and Japan. The report covers the monitoring methods for the floating ML, ML on beach and ML in the seabed, the policy measures, such as inter-deparment conference in Japan and fishery facilities purchase in Korea, and also the cleanup activities and technical means including cleanup ship and solid waste treatment technologies.

2.5 Preparation for NOWPAP marine litter workshop and ICC activity in Rizhao
Both SEPA and Rizhao EPB have formally approved the workshop&activity proposal and will give financial support to hold this event. The event will be arranged in the end of June,2007, following the instruction from NOWPAP RCU.The 2-day workshop&activity will cover ML workshop, ICC activity and site visit. During the coming ICC activity, a large scare of participants is being expected, including national and local NGOs, students, officials and people from companies. From this point of view, this event could be one part of implementing awareness and education campaigns.

2.6 Plan to publish national technical guideline for monitoring marine litter
Guideline on the existing monitoring programmes at regional level is being developed by NOWPAP RCU and RACs, and China also has given some comments for it. After the publish of the final monitoring guideline, we will suggest SEPA to transfer it to the national level, probably by the mean of "Environmental Standard".

2.7 Review of waste management policies and systems
(To be introduced by Mr. PEI Xiangbin)

2.8 Communication with Chines NGOs
We have built a regular communication with several NGOs in Dalian, Beijing and Rizhao. And with the help of Koreda from Japan international environmental research association, we also have got a list of tens of NGOs.

2.9 To develop national strategies on integrated management of marine litter

This activity should be implemented using an integrated approach, i.e. it will cover issues from marine litter prevention to monitoring, public awareness, and civil society involvement. Different sectors of the economy will be included. This activity could be started from the marine litter strategies in several experimental cities, such as Dalian, Rizhao in China.

Refences

1. NOWPAP. Establishment of the Marine Litter Activity (MALITA) in the NOWPAP Region.Tenth Intergovernmental Meeting of the Northwest Pacific Action Plan, Toyama, Japan, 24-26 November 2005.

2. The situation and management of solid waste in China. Pei Xiangbin. 2rd NOWPAP workshop on ML, Toyama, Japan, 28-29 March 2007.

2nd Marine Litter Workshop in Toyama 2007

Efforts of China during the implementation of MALITA

Hu Linlin
Chinese Research Acadamy of Environmental Sciences

March 28, 2007
Toyama, Japan

Contents

- Background
- Efforts

Background

- The NOWPAP Marine Litter Activity (MALITA) has been approved by the Tenth Intergovernmental Meeting (Toyama, Japan, 2005) and is now being implemented.
- China, as one of the member countries of the NOWPAP, accepted and implemented MALITA in the NOWPAP region, too.

Collection of related information

- Limited quantitative data on marine litter was found
- Collection of available information on legal instruments on marine litter
- A summary of the coastal cleanup activities in NOWPAP areas of China.
- The collected information was submitted to the NOWPAP RCU and also was presented during the NOWPAP workshop in Incheon.

Information related to marine litter in China

Hu Linlin, ML Focal Point of China

1. Cleanup activity

The available beach and coastal cleanup activities were summarized in the table-1, including the information from the year 2004 to 2006 in Dalian of Liaoning province, Qingdao, Weihai, Yantai, all in Shandong province and Qinhuangdao of Hebei province. Most of the information was collected from the internet pages (in Chinese) and some was provided by friends in Dalian and Yantai.

From the derived information, we can see that there are many cleanup activities conducted in north China and participant source includes government, companies, colleges, schools and NGOs. And Dalian contributes the most in the amount and scale of the cleanup activity according to the available information.

Some photos are also shown in the paper.

2.Monitoring

There is little monitoring information on Marine Litter in China, an one found from the internet was the washed-up driftage survey in Qingdao, which was already introduced by Mr. Fujitani from NPEC in the Toyama workshop in 2005. More than 60 participants were from

Legal instruments and institutional arrangements related to Marine Litter in China — Summary and Analysis

1. List of national laws, regulations, and institutional legislation related to the marine litter

The laws, regulations, and institutional legislation obviously related to the marine litter in China include:

Constitution of the people's republic of Chi the fourth time on March 14, 2004,

Environmental Protection Law of the people's republic of China, December 26,1989

Marine Environmental Protection Law, Revised on De 5,1999

Regulations on the Prevention of Pollution Damage to the Marine Environment by Land-based Pollutants, Effective on August 1, 1990

Promotion of awareness on the reduction of marine litter

- With the help of NOWPAP RCU, DINRAC has developed marine litter education leaflet and the leaflet has been used in some activities
- An exhibition board was prepared by CRAES

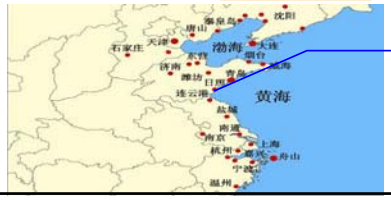
- More than ten officials and experts from ML related departments of central government and NOWPAP related provinces participated the NOWPAP ML workshops and activities.

Introduction of Korea and Japan's experiences

- We have submitted a report to SEPA, introducing the successful experiences on ML that have been carried out in Korea and Japan
- The report covers the monitoring methods, the management measures, the cleanup activities and technical means

Preparation for NOWPAP marine litter workshop and ICC activity in Rizhao

Proposal by ML FP → Official of marine division, SEPA agreed → Visit of Rizhao → Director of RIzhao EPB visited Beijing → Both SEPA and Rizhao municipal government formally approved → Modification of the proposal by Rizhao EPB



Rizhao city (in Shandong Province)

"2007 年日照市国际海滩清扫活动及西北太平洋海洋垃圾论坛"活动方案（建议稿）

1．有关背景

随着海洋垃圾在世界范围及西北太区域内成为影响海洋环境的一个重要问题，2005 年 11 月西北太行动计划（NOWPAP，Northwest Pacific Action Plan of UNEP）的四个成员国中国、韩国、日本和俄罗斯在其第十届政府间会议批准通过了海洋垃圾行动计划（MALITA）。在此前后，分别在日本富山和韩国仁川召开了海洋垃圾的研讨会，并于 2006 年 9 月在日本山形举行了国际海滩清扫活动，各成员国均积极参与了这些活动。

在国内，尽管环保部门近年来对此一直较为注重，但海洋垃圾问题还没有六

Marine litter workshop and ICC activity in Rizhao (cont'd)

- Both SEPA and Rizhao EPB have formally approved the proposal and will give financial support to hold this event.
- The event will be arranged in the end of June,2007
- The 2-day event will cover ML workshop, ICC activity and site visit
- About 25 foreign participants will be invited
- During the coming ICC activity, a large scale of participants is being expected, including national and local NGOs, students, officials and people from companies.

To publish national technical guideline for monitoring ML

- Guideline on the monitoring at regional level is being developed by NOWPAP RCU and RACs
- China also has given some comments on it
- After the publication of the final monitoring guideline, we will suggest SEPA to transfer it to the national level, probably by the mean of "Environmental Standard"

国家环境保护行业标准

Review of waste management policies

Imported waste from developed countries
(electronic wastes, clothes…)

- Domestic solid wastes
- Imported electronic wastes
- Medical wastes
- …

Communication with NGOs

- We have built a regular communication with several NGOs in Dalian, Beijing and Rizhao.
- And with the help of Koreda from Japan International Environmental Research Association, we also have got a list of tens of NGOs.

大连市环保志愿者协会参与海洋垃圾清理
与调查的情况简介

To develop national strategies on integrated management of marine litter

- This activity should be implemented using an integrated approach
- It will cover issues from marine litter prevention to monitoring, public awareness, and civil society involvement
- Different sectors of the economy will be included
- This activity could be started from the marine litter strategies in several experimental cities, such as Dalian, Rizhao in China

Suggestions to prevent marine litter in Japan based on the research on marine debris on the coasts of Northwest Pacific Region.

Takashi Kusui

College of Technology, Toyama Prefectural University
5180 Kurokawa, Imizu City, Toyama 930-0398, Japan
Tel： 81-766-56-7500, Fax： 81-766-56-0398
E-mail：kusui@pu-toyama.ac.jp

1. Introduction

Marine litter, or debris, is not only the aesthetically problem but also threaten marine wildlife by entanglement, ghost fishing and ingestions (Gregory, 1999). To clarify the present situations and monitor the trend, many monitoring programs, especially beach surveys, have been undertaken throughout the world.

Concern over these marine litter led Toyama Prefecture local government and Northwest Pacific Region Environmental Cooperation Center (NPEC) to initiate international survey on marine litter from 1996. The purpose of this survey is to monitor the distribution and abundance of marine litter in this area for further action and raise public awareness toward this issue through the public involvement. The unique characteristics of this international survey are as follows; (1) the unified survey method has been employed to ensure the compatibility of the results of each beaches; (2) the survey have been conducted at more than 20 beaches at the same period of the year with the help of local government and volunteers; (3) buried litter in the sand (Ogi & Fukumoto, 2000) were measured as well as stranded litter on the beach considering the characteristic of plastics. In this paper, the results of 9 years' research are presented and the suggestions to prevent marine litter in Japan are discussed.

2. Method

In 1996, 10 local governments in Japan participated in the initial research. Then, in the 2001 other 3 Japanese local governments in Kyushu area and 1 Korean civilian organization, and in the 2002, 1 Korean and 1 Chinese local government got involved in the research. In 2004, with the cooperation of 25 local governments including 16 in Japan, 2 in Russia, 3 in Korea, 4 in China, the research was conducted as an international collaboration in 51 beaches (Fig.1). Two types of litter were measured. To evaluate the amount of stranded litter on the beach quantitatively, a survey unit of 10m width and 10 m length ($100m^2$) was set from the water edge to backshore zone of beaches continuously. In each unit, the collected litter were categorized into 8 items, counted and weighed. As for the buried litter, the

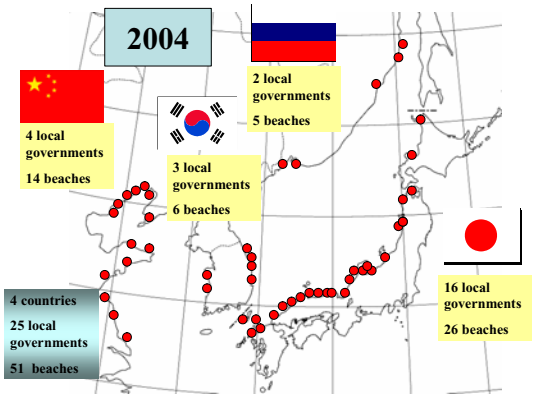


Figure 1. Location of the beaches surveyed

sand of 8L was collected, then, mixed with seawater and the supernatant was filtered with a net (0.3mm mesh) to collect floating plastic particles.

3. Result

As a results of 9 years' research, following tendency have been found. Firstly plastic is a major item in weight for stranded debris (Fig.2). As a general characteristic, there is a tendency that the quantity and weight of stranded debris decrease northwardly along the coasts in Japan（Fig.3 ）. As for the buried litter, Styrofoam was the predominant item. At the same time, the results reveal that the amount of buried litter is not negligible in evaluating the amount of litter on beaches. The mean concentrations of buried litter on Japanese beaches were higher those of other countries.

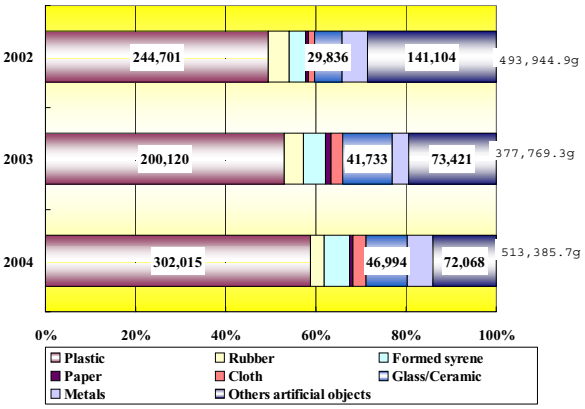


Figure 2. Weight of stranded debris

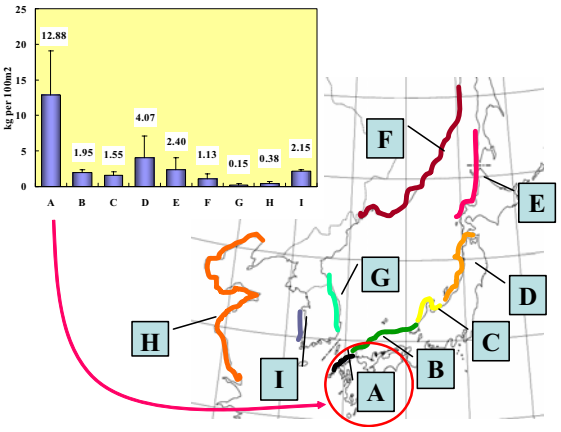


Figure 3. Geographical distribution of stranded debris

4. Discussion

These results clearly showed that the total amount of stranded debris in the northwest of Kyushu was the biggest among the surveyed coasts in NOWPAP region. This area is located downstream of Tsushima Current and the high ratio of foreign litter have been found. It is also reported that the marine litter in the islands facing to the open sea along Japan showed the same tendency. To solve the marine debris problem in these specific areas, both national and international efforts are necessary.

Plastics are the major marine debris and accounted for more than half of marine debris. Considering the large production of plastics in Japan that amounted as high as 14 million tons per year, the reduction and control of discharge of plastic products from various sources is a key issue. As for the land-based discharge, diverse technological approaches including reduction of unnecessary use of plastics, thorough solid waste management, recycling, and control of floating debris discharge from rivers and drainage systems should be adapted. As for fishery gears which are tended to be the potential marine debris, the control of discharge including recovery of deteriorated and discharged gears, and replacement by alternative materials such as biodegradable materials should be taken. Lastly, the development of recycling and disposal technologies of marine debris should be established.

These technological approaches would be successful only if other approaches including education of public and industries, litter-control policy and continuous marine debris monitoring networks would work together.

Reference

Ogi, H. & Fukumoto, Y.(2000). A Sorting Method for Small Plastic Debris Floating on the Sea Surface and Stranded on Sandy Beaches. *Bulletin of the Faculty of Fisheries, Hokkaido University*, Vol.51, No.2, 71-93

2nd Workshop on Marine litter DEMECS7, Toyama, Japan, March 27, 2007

Suggestions to prevent marine litter in Japan based on the research on marine debris on the coasts of Northwest Pacific Region.

Takashi KUSUI
College of Technology, Toyama Prefectural University,
Toyama, 5180 Kurokawa, Imizu City, Toyama, 939-0398, Japan

Outline

- BACKGROUND
  - –Northwest Pacific region & Marine litter
- SURVEY METHODS
- RESULTS OF 9 YEARS' SURVEY
- MEASURES TO PRFEVENT MARINE LITTER
- SUMMARY

Impacts of marine debris

Aesthetic problem

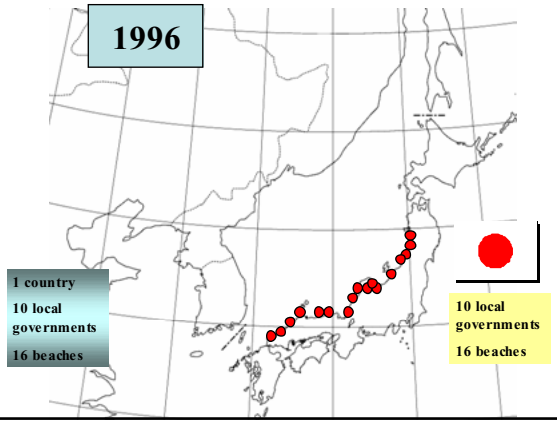
Threats to marine wild life

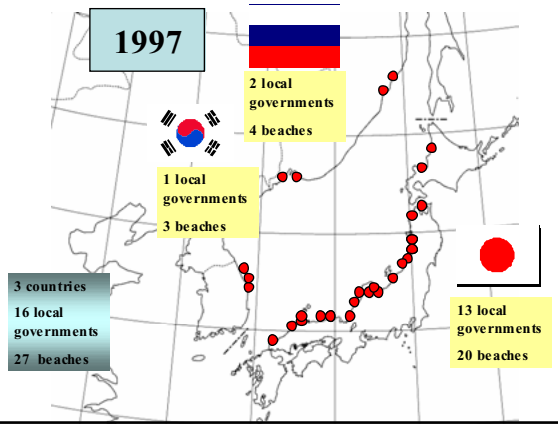
Financial burden on municipalities for removal and disposal

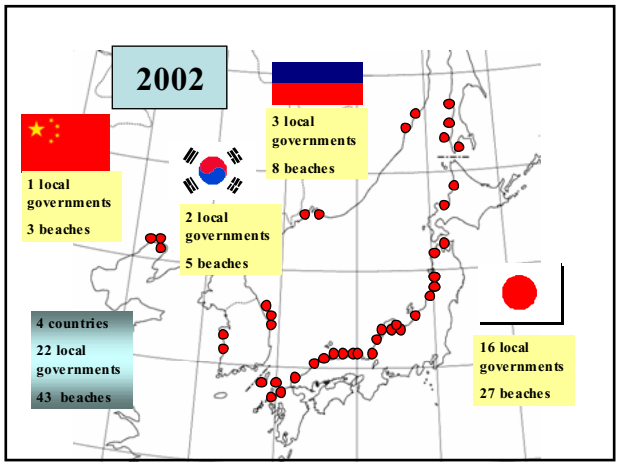
Small plastic particles found in the gut of seabirds

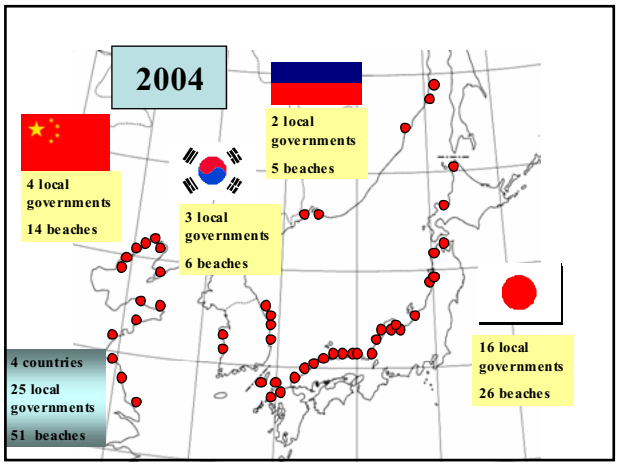
Marine litter issue in Northwest Pacific region

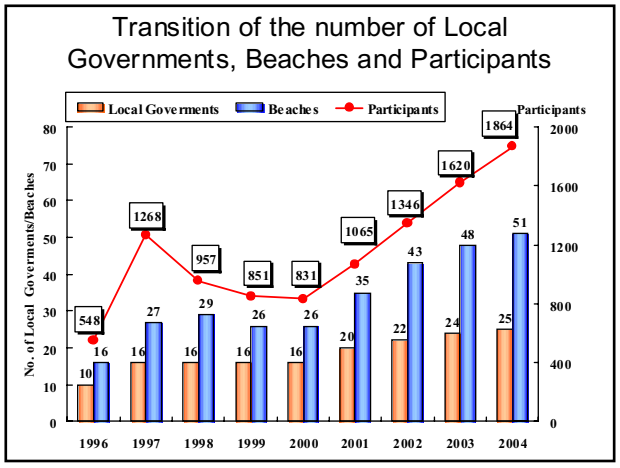
- Initiation of an international survey of marine litter by Toyama Prefecture in Japan and the Northwest Pacific Region Environmental Cooperation Center (NPEC) from 1996
  - Two-fold purpose
    - to monitor the marine litter as a basis for remedial action
    - to raise public awareness through public involvement
  - The unique characteristics of this international survey
    - i. a unified survey method
    - ii. the same period of the year with the help of local governments and volunteers
    - iii. the amounts of litter buried in the sand and stranded litter

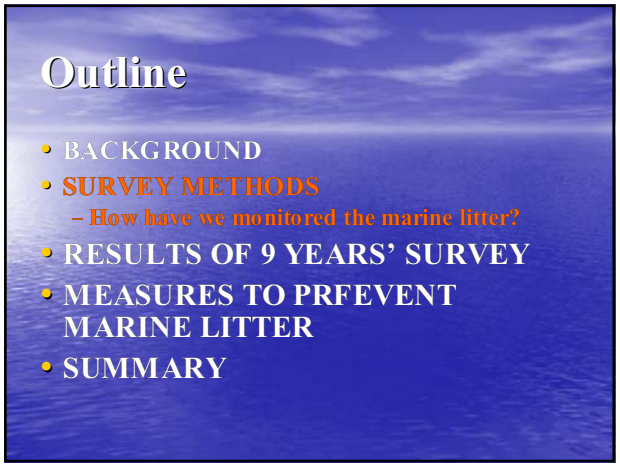


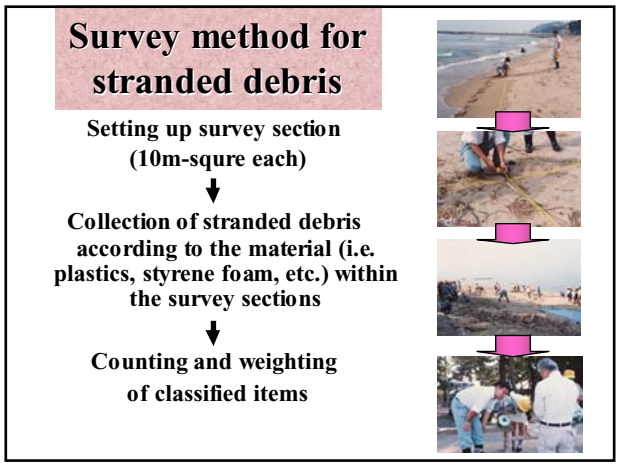


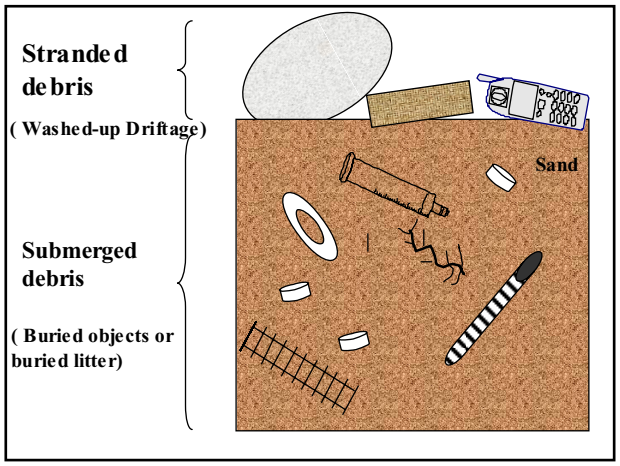

2002
1 local governments
3 beaches
3 local governments
8 beaches
2 local governments
5 beaches
4 countries
22 local governments
43 beaches
16 local governments
27 beaches

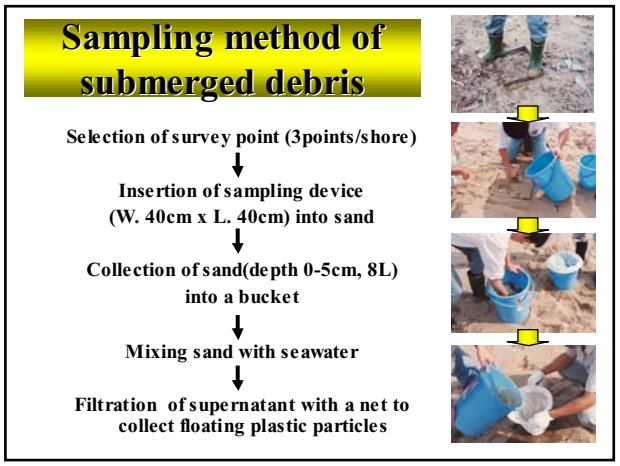

2004
4 local governments
14 beaches
2 local governments
5 beaches
3 local governments
6 beaches
4 countries
25 local governments
51 beaches
16 local governments
26 beaches

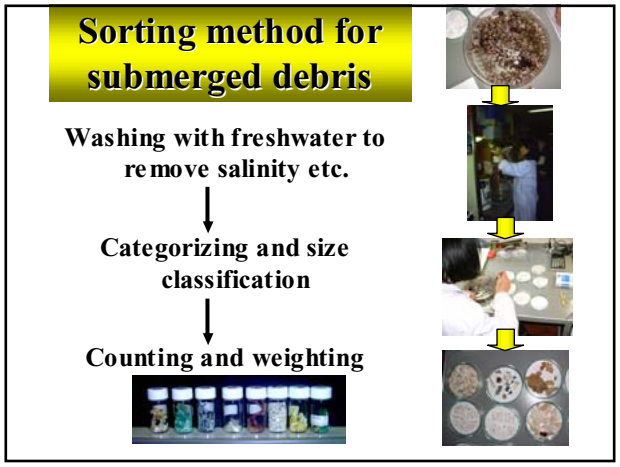

Transition of the number of Local Governments, Beaches and Participants
Local Goverments
Beaches
Participants
No. of Local Goverments/Beaches
Participants
1996 1997 1998 1999 2000 2001 2002 2003 2004
548 1268 957 851 831 1065 1346 1620 1864
10 16 16 16 16 16 20 22 24 25
16 27 29 26 26 35 43 48 51

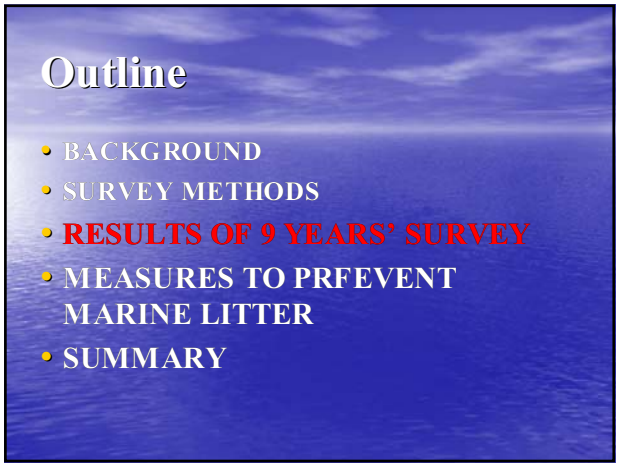

Outline
BACKGROUND
SURVEY METHODS
– How have we monitored the marine litter?
RESULTS OF 9 YEARS' SURVEY
MEASURES TO PRFEVENT MARINE LITTER
SUMMARY


Survey method for stranded debris
Setting up survey section (10m-squre each)
Collection of stranded debris according to the material (i.e. plastics, styrene foam, etc.) within the survey sections
Counting and weighting of classified items


Stranded debris
(Washed-up Driftage)
Submerged debris
(Buried objects or buried litter)
Sand


Sampling method of submerged debris
Selection of survey point (3points/shore)
Insertion of sampling device (W. 40cm x L. 40cm) into sand
Collection of sand(depth 0-5cm, 8L) into a bucket
Mixing sand with seawater
Filtration of supernatant with a net to collect floating plastic particles


Sorting method for submerged debris
Washing with freshwater to remove salinity etc.
Categorizing and size classification
Counting and weighting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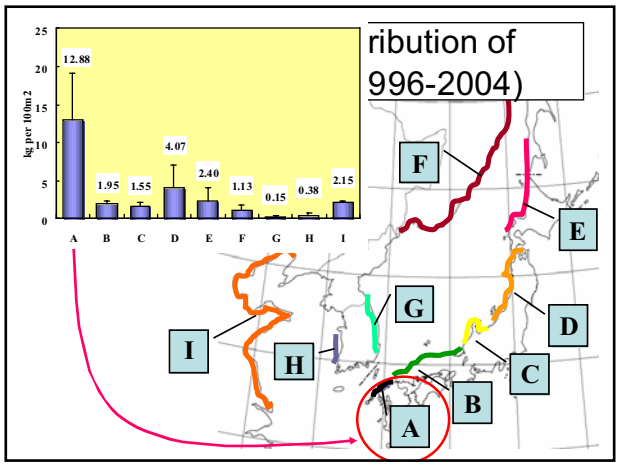
ribution of
996-2004)
kg per 100m2
12.88
1.95
1.55
4.07
2.40
1.13
0.15
0.38
2.15
A B C D E F G H I
A
B
C
D
E
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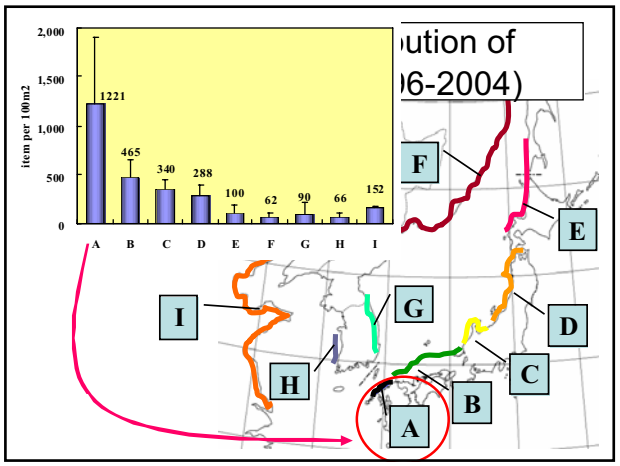
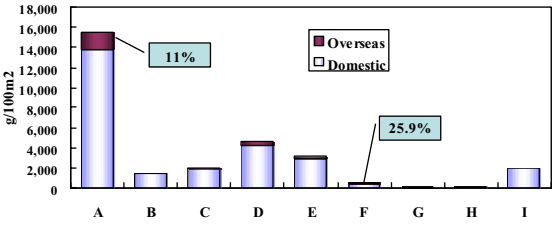
H
I

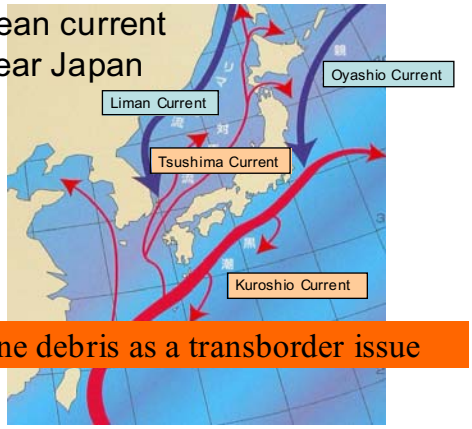

ution of
6-2004)
item per 100m2
1221
465
340
288
100
62
90
66
152
A B C D E F G H I
A
B
C
D
E
F
G
H
I

Origin of stranded debris



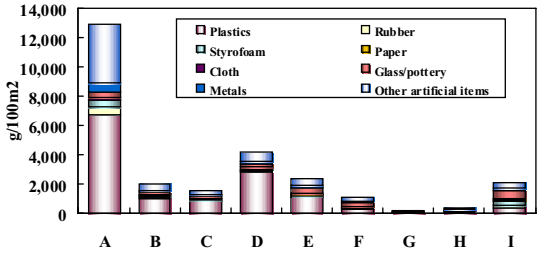
The marine debris from overseas accounts for 0 to 26% in terms of weight. These figures suggest that international cooperation is necessary to solve marine debris issue as well as domestic efforts.

Ocean current near Japan



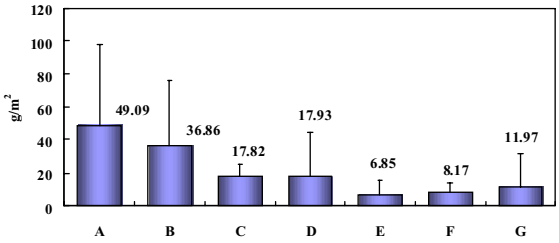
Marine debris as a transborder issue

Composition of stranded debris



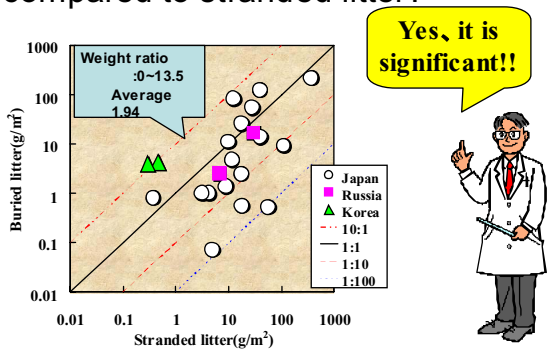
Plastics are major items from Area A to Area E; 46 -70% of stranded debris. In other areas, glass/pottery and other artificial items are predominant as well as plastics, which suggest lifestyle of each areas.

Buried litter in beaches



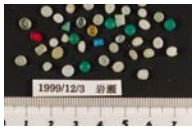
The level of buried litter raged from 7 to 50 g/m² and showed the almost same geographical distribution as that of stranded debris.

Is buried litter significant compared to stranded litter?



Minor item #1 -resin pellets

- Industrial origin, released incautiously during transportation, storage and handling
- Results of 2004 survey on stranded debris
  - Japan:
    - 9532 particles found in 25 beaches out of 26.
    - average 23 particles /100 m²(max. 177)
  - Russia:
    - 7 particles found
  - Korea
  - China
    - 54 particles found in 3 beaches out of 14.



Resin pellets found in Iwasehama, Japan

Resin pellets found in Russian beaches

Minor item #2 –Outer coat of fertilizer

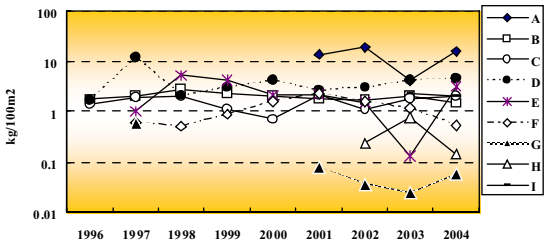
- Found in buried litter from Japanese beaches
- Polyethylene-coated fertilizer
  - ca.50,000t/yr
  - ca.10% of total weight

Found in 3 beached in 2004. Of 9 Japanese beaches, found in 8 beaches in 2002-2004.

Highest concentration : 50 items/8L of sand

The weight is less than 1% of those of buried litter

Marine debris are increasing or decreasing in Northwest Pacific region?

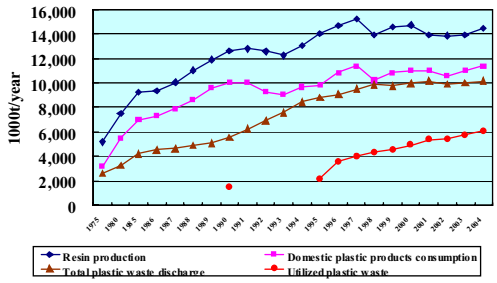


The level of marine debris in NOWPAP region seems to be relatively stable for the last decade, indicating there is no sign of reduction.

Outline

- BACKGROUND
- SURVEY METHODS
- RESULTS OF 9 YEARS' SURVEY
- MEASURES TO PRFEVENT MARINE LITTER
- SUMMARY

Plastic production and wastes in Japan



Plastic production in 2004 amounts to about 14 million tons and have been constant for the last decade. The total plastic waste discharge amounts to about 10 million tons and about 60 % of wastes are utilized.

Marine debris and their source

- Daily life litter: plastic products (shopping bags, bottles, food containers,), other products (drink cans etc.)
  - Large quantities, some are recycled, street litter
- Fisheries related wastes (net, ropes, floats etc.)
  - Large volume and weight, potential source of marine debris
- Industrial wastes inadequate management
  - Chemical container, medical wastes etc.,
  - Resin pellets : small quantity but chronically found around Japan, mall

transported by current from remote area and some are fragmented in the environment

Suggestions to reduce marine debris (1) Reduction of plastic waste discharge

- Solid waste management
  - promote recycling of plastics
- Control of discharge
  - Street litter : prevention of runoff through rivers or channels
  - Illegal dumping : legal regulation and penalty
  - Industrial sector : measures to prevent the spill of resin pellets
  - Outdoor use : avoid the unnecessary use of plastic or replacement , LCA
- International cooperation
  - Exchange the information of marine litter and prevention measures

Estimation of amount of stranded debris on Japanese coasts and its disposal cost

- Stranded debris on Japanese coast (monthly)
  3.0 kg/100m^2 × (10 m × 34,812 km × 10^3)
  ÷ 10^3 ≒ 10,444 t / month
- Annual stranded debris
  10,4441 t/month × 12month/yr = 123,328 t/yr
- Annual disposal costs
  123,328 t/yr × 10^3 × 50 yen/kg = 6.2 billion yen
  (ca. 43 million €)

ca.1% of plastic discharge in Japan

Suggestions to reduce marine debris (2) Removal and disposal of marine debris

- Recovery of marine debris from various places
  - Sea bed, beaches etc,
  - Need for the instrument for recovery
- Recycle of plastic debris
  - Development for recycling technology
- National support to municipalities
  - Responsibility and cost

Suggestions to reduce marine debris (3) Development of eco-friendly materials and products

Biodegradable plastic

Fishing line


Electric compliance

Fishing worm

Weatherized products


Aluminum float


Developed by Sankyo Tateyama Aluminum Inc. & Toyama Fishery Union

Cost and durability

Suggestions to reduce marine debris (4) Monitoring and education

- Continuous monitoring
  - regional and national
  - Networking among NOWPAP
- Sharing information with;
  - Citizens, NGO, industrial sectors
  - NOWPAP countries
- Public education
  - Participation in clean-up activity

Summary

The international survey of marine litter in Northwest Pacific region from 1996 to 2004 shows that

- Plastic is the major stranded debris in terms of weight (ca.50%) as well as number (ca.70%)
- The highest average concentration of stranded debris, 12,880 g/100m^2 was recorded in the northern part of Kyushu, Japan.
- There has been no signs of reduction of marine debris in this region.

To reduce marine debris in NOWPAP region, multiple efforts including technological, legal, educational approaches are necessary regionally, national and internationally.

Suggestions for multisectoral efforts to reduce marine litter in Korea

Im Seong Oh

Korea Marine Pollution Response Corp. Environment Business Team

HaeGong Building, 71, Samseong-dong, Gangnam-gu, Seoul, Korea

san94@hanmail.net

1. Introduction

The sea is becoming a gathering place of litter due to the increasing litter from inland and sea. These litter cause severe destruction of spawning grounds and habitats of marine creatures, as well as threatening the safety of vessel operation. According to the survey of Korea Ocean Research & Development Institute(KORDI) in 2003, about 400 thousand tons of marine litter are deposited in the coastal sea of Korea

Korea Marine Pollution Response Corporation(KMPRC) has led improving marine environment by carrying out various projects of collecting marine litter from Ministry Of Maritime Affairs & Fisheries(MOMAF) and local government. And to remove deposited marine litter in the coast of Korea, it needs cooperation and efforts of multisectors (Central government, local government, general public, private corporation and research institute).

In this presentation, I'll show various projects to reduce marine litter carried out by KMPRC and the results of each projects. Also I'll suggest multisectoral efforts to reduce marine litter in Korea.

2. Who is KMPRC ?

In 1997, KMPRC was established to preserve marine environment by carrying out marine pollution control and response, training on oil pollution response, technical development. Main activities of KMPRC are marine pollution control and response, operation of waste oil storage facilities, training on oil pollution response, salvage and rescue operation on marine disaster, harbour tug service and so on.

3. Status of KMPRC

MOMAF has framed various policies concerned about marine environment to conserve and manage them effectively. Because of insufficient manpower it's hard for MOMAF to accomplish all projects directly. So, MOMAF's consigned these projects to private corporation specialized in marine environment by a law. KMPRC as a specialized organization in the area of marine environment protection has been left in charge of the project of collecting marine litter from MOMAF.

4. KMPRC's Accomplishment of Projects to improve marine environment

KMPRC has been left in charge of the project of collecting marine litter from MOMAF and carried out various projects for improvement of marine environment every year on a basis of marine pollution prevention law. It's also carried out the project of collecting fishing implements deposited in the sea bed, cleaning the fishing ground and managing the artificial reef as projects of local governments, and as a result it's collected total about 55 thousand tons of marine litter.

The projects to reduce marine litter carried by KMPRC are as follows

A. The project of collecting marine litter(MOMAF)
- The marine litter deposited in the sea bed in the national harbors and fishing ports
- The marine litter deposited in the sea bed in the fishing ground of the coastal sea
- The litter left in the island
- The litter left in the protection area for wet land
- Recovering damage of a typhoon
- Collecting floating lumbers
- Removing discarded vessels left in harbor or port
- Buy-back marine litter pulled up during fishing

B. The project of collecting litter off the coast of Incheon
(Incheon metropolitan city)

C. The project of managing the artificial reef
(National Fisheries Research and Development Institute)

D. The project of collecting fishing nets deposited in the sea bed(Local government)

E. The project of cleaning the fishing ground(Local government)

F. The project of removing discarded vessels
(Regional Maritime Affairs ＆ Fisheries Office)

5. Suggestions for multisectoral efforts to reduce marine litter in Korea

MOMAF has pushed forward various projects, funded research and development, made environment-friendly policies and induced participation of local government and fishermen to solve the problem of marine litter. In result we've met with considerably good results to reduce marine litter.

I'll suggest multisectoral efforts to reduce marine litter in Korea based on experiences of KMPRC's projects from 2000~2006 as a private corporation.

A. Efforts of KMPRC as a private organization

1) Successful accomplishment of the projects for reducing marine litter

We should make an effort to accomplish the projects for reducing marine litter successfully matching the marine litter policy of the government and accumulate know-how about carrying out projects, through exchanging information with marine environment-related organization we should carry out the projects more efficiently. Also we should contribute to change the recognition of general public by making public relations about the importance of marine environment.

2) Roles of Marine Environmental Management Corporation(MEMC)

KMPRC is reorganized to MEMC next year by abolishing present law of marine pollution prevention and revising the law of marine environment management. Present essential projects of KMPRC are restricted to the response of oil pollution from vessels but after reorganizing to MEMC the projects for improving marine environment will be contained.

MEMC are expected to accomplish collecting marine litter at the estuaries of 4 major rivers and operating integrated management system of marine litter and so on as well as present projects.

Collecting marine litter at the estuary of major rivers is presently accomplished only at the coast of Incheon, Han-river. If this project is expanded at other 3 major rivers(Nakdong-river, Kumkang-river and Youngsan-river), by taking this projects MEME is expected to play a leading role for prior prevention of marine litter originated from inland compared to present post-collecting activities.

The project under investigation for implement of KMPRC among "Integrated management system of marine litter" of KORDI is "Complex process system on the ship". After constructing a ship equipped with system for making resources from marine litter, we'll collect marine litter from islands of west and south coast in Korea and dispose them economically and effectively by operating this system. The system will be contained a pre-treatment system and RDF(Refuse Plastic Fuel) production system and Polystyrene buoy thermal volume reduction system(Production of ingot). This system will contribute to improvement of marine environment by collecting marine litter left in islands frequently, recycling them. Also, this will be able to reduce the problem of marine litter's migration to other nations.

Like above all, establishment of MEMC will be able to reduce heavy work load of the central and local government and induce the high quality of policy from them and also maximize synergy effects for the projects to reduce marine litter which are dispersed and carried out presently by the central government, local government and so on. Various present projects of KMPRC will be good experiences for activities as MEMC later.

B. Efforts of Central & Local government, research institution and fishermen.

The central government and MOMAF have secured budget and promoted various projects of collecting marine litter continuously for successful policies to reduce marine litter. As a result, they've got good results considerably. But from now, it needs to make a synergy effects for reducing marine litter by inducing participation of multisectoral parts not only projects of central government.

For examples, research institution, KORDI, under budget support of MOMAF developed "Floating debris containment boom" as part of development of integrated management system of marine litter. With this boom, KMPRC accomplished collecting floating marine litter from an estuary of Han-river successfully from 2002 to 2004 off the coast of Incheon and contributed to reduce marine litter greatly. This boom will be used again in other 3 major rivers.

Also, we are expecting that when we use the other nice products of KORDI, for examples, deep-sea bottom surveying equipment, incineration system for marine litter, complex process system on the ship and so on, they are able to make a great contribution to reduce marine litter.

"The project of buy-back marine litter pulled up during fishing" is the typical example in which the central and local government, KMPRC and fishermen have participated. With this project, we were going to make fishermen raise the recognition of the marine environmental importance and elevate the effect of improvement efficiently with low cost as well as reducing marine litter.

Also, fishermen should make an effort to restrain dumping marine litter like worthless fishing nets by themselves by conducting real-name system of fishing implement and to induce this system the government should support them with budget for various kind of projects and expand this system to whole nation. Like that, more and more projects in which fishermen are the main body to reduce marine litter should be developed.

To raise recognition of general public about marine environmental importance, continuous public relation is also important. Almost all the people recognize that marine litter is primary originated from vessels and aquatic farms. Therefore it's necessary for them to recognize they are the interested parties and the source about marine litter. Through public relation of government and continuous support for private marine environment groups, it's need to form sympathy of general public for reducing marine litter.

Lastly, most projects for marine litter of local government have carried out with a government subsidy according to policy of the government but because of their insufficient budget, their promotion of its own projects is deficient. Through securing their own budget, promoting the projects apposite to their case must be efficient for reducing marine litter. Like the project of

collecting litter off the coast of Incheon, I think the projects promoted by local government actively can secure budget from the government.

6. Conclusion

KMPRC has carried out various projects of MOMAF and local governments from 2000 to 2006 and as a result collected total about 55 thousand tons of marine litter.

KMPRC is reorganized to MEMC next year by revising the law of marine environment management. Establishment of MEMC will be able to reduce heavy work load of the central and local government and induce the high quality of policy from them and also maximize synergy effects for the projects to reduce marine litter which are dispersed and carried out presently by the central government, local government and so on.

The central government and MOMAF have secured budget and promoted various projects of collecting marine litter continuously for successful policies to reducing marine litter. But from now, it needs to make a synergy effects for reducing marine litter by inducing participation of multisectoral parts not only projects of central government.

Under budget support of central government research institution like KORDI should make technical developments for reducing marine litter and make the best use of them effectively at the field of various projects by corporations carrying out projects like KMPRC.

More and more projects in which fishermen are the main body to reduce marine litter like "Buy-back project" should be developed.

To raise recognition of general public about marine environmental importance, continuous public relation is also important.

Through securing budget of local government by themselves, it's needed to promote the projects to reduce marine litter apposite to their case effectively.

Suggestions for multisectoral efforts to reduce marine litter in Korea

Seong-Oh Im
Korea Marine Pollution Response Corporation
K M P R C

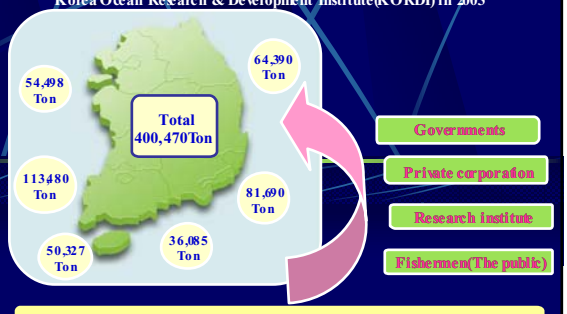
Introduction

- Importance of the sea
  - Cheerful surroundings
  - Food & industrial resources
  - Main route for import & export

- Increasing marine litter
  - Gathering place of litter
    - Threatening spawning grounds & fish habitats and ship's safety

Marine litter submerged in the coast of Korea

Fig. The amount of submerged marine litter in the coast of Korea by survey of Korea Ocean Research & Development Institute(KORDI) in 2003



Mutisectoral efforts to reduce marine litter

Purpose of this presentation

- Various projects to reduce marine litter by KMPRC
  - Purpose of each projects
  - Results of performance
- Suggestions for multisectoral efforts
  - Private organization(KMPRC)
  - Central & Local government
  - Research institution
  - Fishermen(The public)

Outline

I. About KMPRC

II. Accomplishment of projects to improve marine environment by KMPRC

III. Suggestions for multisectoral efforts in Korea

Who is KMPRC ?

- Established to preserve environment in 1997

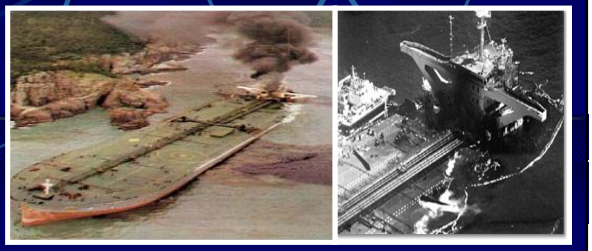


Fig. The incident of "Sea Prince" in 1995

Activities of KMPRC

- Marine pollution control and response
- Training on oil pollution response
- Operation of waste oil storage facilities
- Harbor tug service & Marine floating crane operation
- Special project on marine environment preservation

Status of KMPRC

Governments — MOMAF

Framing various policies
Making a project guide
Securing budget

Conclusion of consignment contract

Private corp. — KMPRC

Implementation of projects
entrusted by the central or local government

※ MOMAF : Ministry Of Maritime Affairs & Fisheries

The projects of collecting marine litter carried out by KMPRC

- Collecting marine litter(MOMAF)
- Collecting marine litter off the coast of Incheon(Incheon city)
- Managing the artificial reef(NFRDI)
- Collecting fishing nets deposited in the sea bed
- Cleaning the fishing ground
- Removing the discarded vessels

※ NFRDI : National Fisheries Research & Development Institute

The result of each projects

The project of collecting marine litter(MOMAF)

Purpose

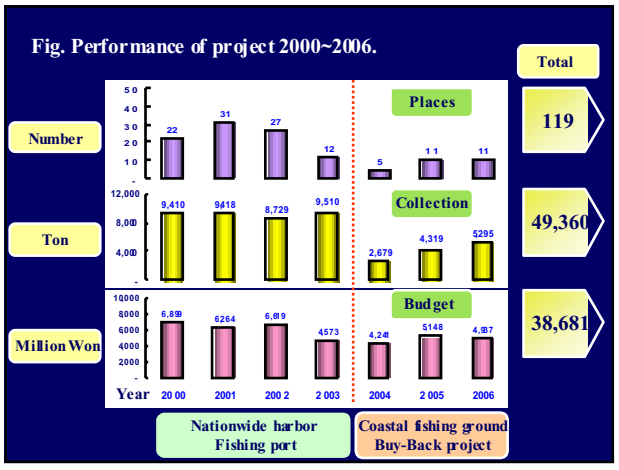
Preservation of marine environment by collecting & disposing all sort of litter
- Recovering spawning ground & habitats
- Securing the safety of vessel operation

The objects of this project
- Marine litter from national harbors & ports, coastal sea, Island, Wetland
- Buyback marine litter pulled up during fishing
- Recovery of typhoon damages
- Floating lumbers
- Discarded vessels

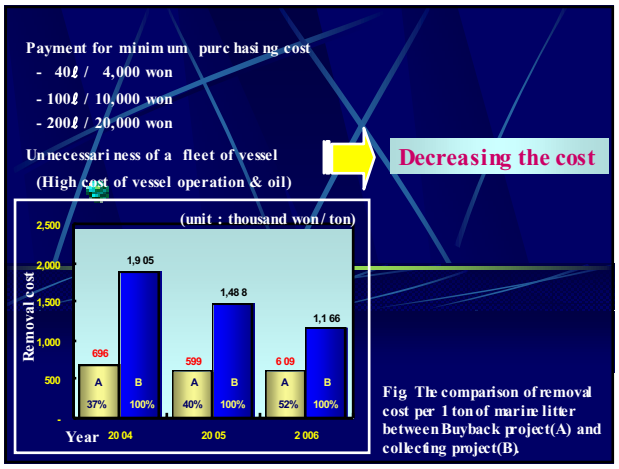
Fig. Collecting fishing implements, discarded vessels and cars from a waste collecting boat and a crane barge at the coastal fishing grounds and ports.

Fig. Washing and separating fishing nets, irons and tires from collected marine litter on barge for disposal wastes(Incineration, recycling and sale)

Fig. Collected bones of whale and a cannon ball at west coast of Korea during projects.




Successful result of "Buy-back project" from 2004
Purpose
Making fishermen bring back marine litter pulled up during fishing
- Raising the recognition
- Elevating effectiveness with low cost
Fig. Procedure of "The project of buy-back marine litter pulled up during fishing"


Payment for minimum purchasing cost
- 40ℓ / 4,000 won
- 100ℓ / 10,000 won
- 200ℓ / 20,000 won
Unnecessariness of a fleet of vessel
(High cost of vessel operation & oil)
Decreasing the cost
(unit : thousand won / ton)
Removal cost
2,500
2,000
1,500
1,000
500
-
1,905
1,488
1,166
696
599
609
A
B
37%
40%
52%
100%
Year 2004 2005 2006
Fig. The comparison of removal cost per 1 ton of marine litter between Buyback project(A) and collecting project(B).

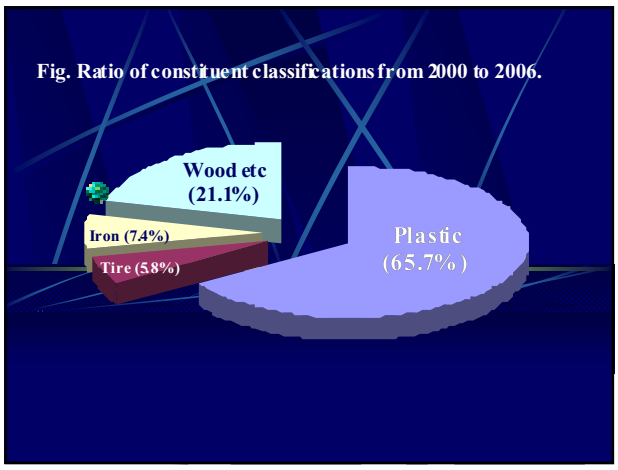


Fig. Ratio of constituent classifications from 2000 to 2006.
Wood etc (21.1%)
Iron (7.4%)
Tire (5.8%)
Plastic (65.7%)

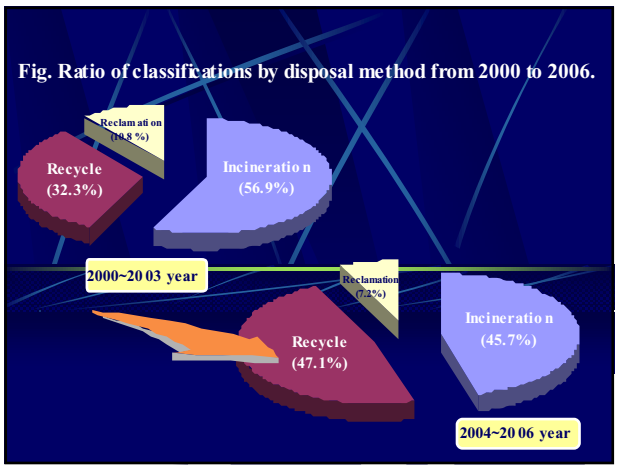


Fig. Ratio of classifications by disposal method from 2000 to 2006.
Reclamation (10.8%)
Recycle (32.3%)
Incineration (56.9%)
2000~2003 year
Reclamation (7.2%)
Recycle (47.1%)
Incineration (45.7%)
2004~2006 year

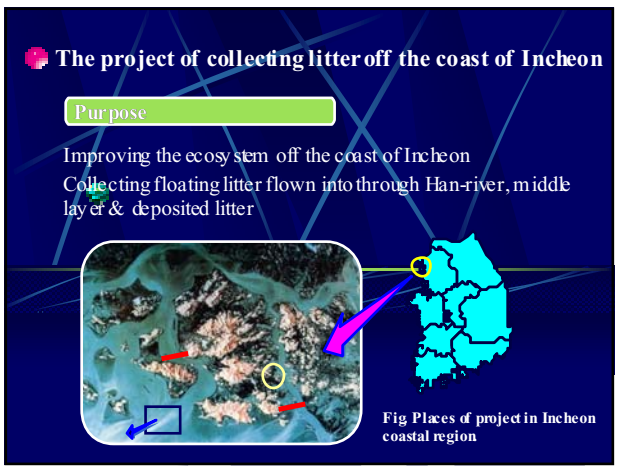

The project of collecting litter off the coast of Incheon
Purpose
Improving the ecosystem off the coast of Incheon
Collecting floating litter flown into through Han-river, middle layer & deposited litter
Fig. Places of project in Incheon coastal region


Fig. Floating debris containment booms at 2 sites of Incheon for collecting floating litter from Han-river.


Fig. Collecting floating litter gathered in
'Floating debris containment boom'.


Fig. Buy back marine litter of middle layer from fishermen.
Fig. Collecting submerged marine litter by a cleaning vessel.

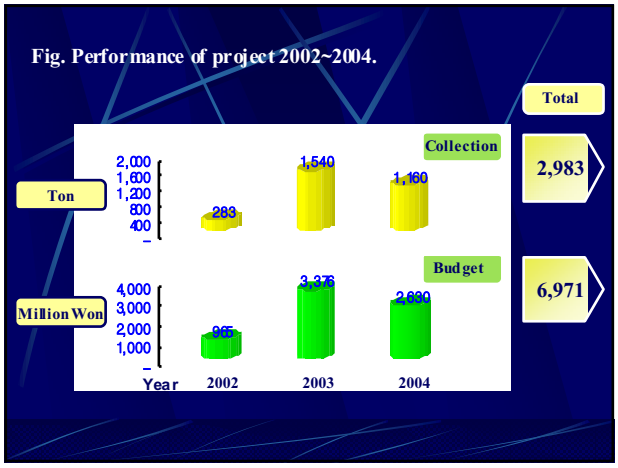


Fig. Performance of project 2002~2004.
Total
Collection
2,983
Budget
6,971
Ton
Million Won
2,000
1,600
1,200
800
400
4,000
3,000
2,000
1,000
283
1,540
1,160
965
3,376
2,639
Year
2002
2003
2004

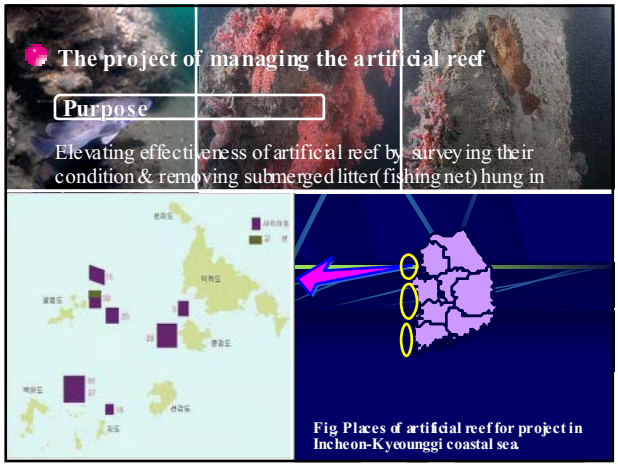

The project of managing the artificial reef
Purpose
Elevating effectiveness of artificial reef by surveying their condition & removing submerged litter(fishing net) hung in
Fig Places of artificial reef for project in Incheon-Kyeounggi coastal sea


Fig. Surveying condition of artificial reefs by divers.
Fig. Fishing implements hung in artificial reefs.


Fig. Collecting fishing implements by divers.
Fig. Collected fishing implements at each artificial reefs.


Fig. Comparison condition of artificial reef between before and after collection.
Before
After


Fig. Comparison condition of artificial reef between before and after collection.
Before
After


Fig. Comparison condition of artificial reef between before and after collection.
Before
After


Fig. Comparison condition of artificial reef between before and after collection.
Before
After

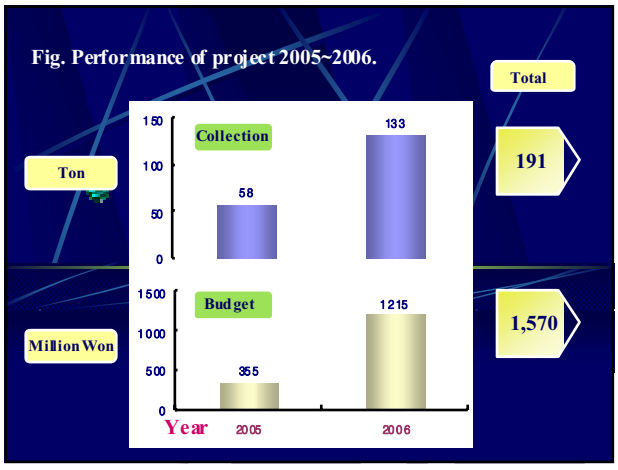
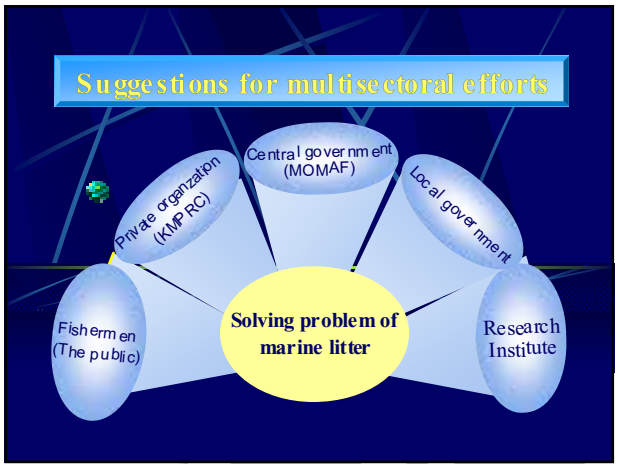


Fig. Performance of project 2005~2006.
Total
Ton
Collection
150
100
50
0
58
133
191
Million Won
Budget
1500
1000
500
0
355
1215
1,570
Year
2005
2006


Suggestions for multisectoral efforts
Central government (MOMAF)
Private organization (KIMPRC)
Local government
Fishermen (The public)
Solving problem of marine litter
Research Institute

The efforts of KMPRC as a private organization

Successful accomplishment of the projects

- Effort to accomplish the projects successfully
- Accumulation Know-how, exchanging information for carrying out more efficiently
- Contributing to change the recognition of the public by PR

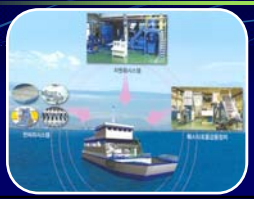
Establishment of Marine Environmental Management Corp. (MEMC)

Reorganization to MEMC in 2008

Revising the law of marine environment management

Playing a leading role for prior prevention of marine litter

- Collecting marine litter at the estuaries of 4 major rivers in Korea
- Operating "Complex process system on the ship" of KORDI



Reducing heavy work load of Central & Local government

Inducing high quality of policy and maximizing synergy effect

Fig. 'Complex process system on the ship' of KORDI.

The efforts of central · local government, research institution & Fishermen(The public)

Presnt	Future
Promoting projects by MOMAF	Making synergy effect for reducing marine litter by inducing participation of multisectoral parts

Use of research & development

Use of research & development(KORDI)

- Floating debris containment boom(Incheon)
- Deep-sea bottom surveying equipment
- Incineration system for marine litter
- Complex process system on the ship

Participation of fishermen(The public)

Development of projects for participation of fishermen

- ex) Buy-back project

Conducting real-name system of fishing implement

Forming sympathy for reducing marine litter by PR

- "You're the interested parties and the source performers about marine litter"

Promoting the projects apposite to locality's case

Promotion projects of local government itself

Present

Most projects are carried out with central government subsidy

Future

Securing their own budget, promoting the projects apposite to their case must be efficient for reducing marine litter


Thank you…

Session 3

Fisheries-related marine litter

in the NOWPAP Region

Expanded Polystyrene Debris along the Japanese Coastline and Development of Recycling System for Waste EPS Floats

Shigeru Fujieda

Faculty of Fisheries, Kagoshima University

4-50-20 Shimoarata Kagoshima City, Kagoshima 890-0056, Japan

Tel: +81-99-286-4252, Fax: +81-99-286-4255

E-mail: fujieda@fish.kagoshima-u.ac.jp

1. Issue of EPS debris

International Coastal Cleanup (ICC) has identified fragments of foamed-plastic as being a major component of beach litter around the world (Fig. 1). The extents to which these small fragments have been washed up on beaches or become buried have been investigated along the Japanese coast from 1998 to the present.

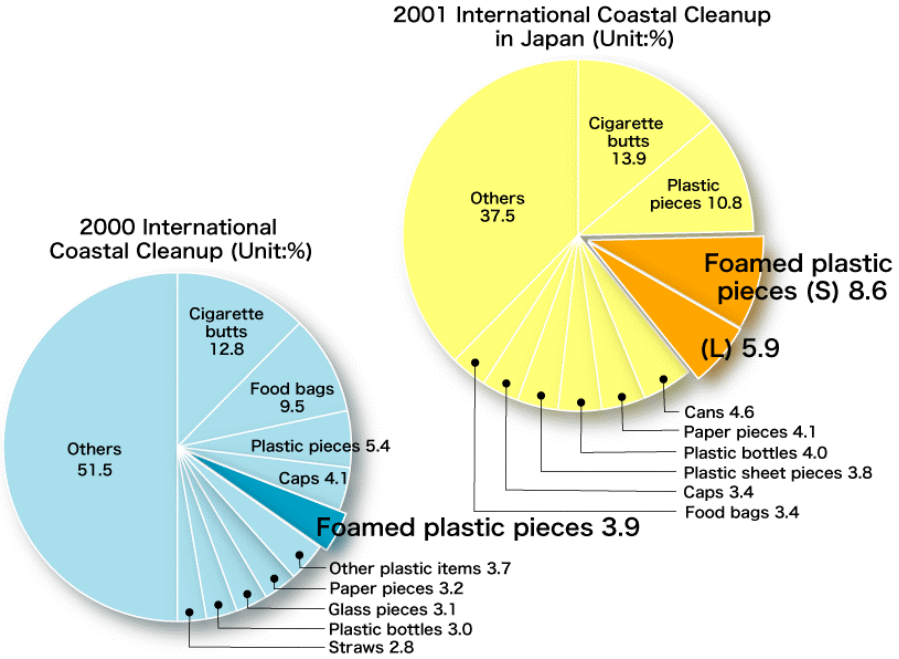


Fig. 1 Results of International Coastal Cleanup

From 1998 to 2000, 80,655 items of beach litter were collected from sand samples on 65 beaches of Kagoshima Prefecture in south Kyushu. Foamed-plastic fragments accounted for 92.6% of the total, with the size range of 0.3 to 4.0 mm representing 91.0% of the fragments collected. The highest density of fragments was collected along the east coast of Kagoshima Bay, which had an average density of 14,519 pieces per m^2 and a maximum density of 69,169 pieces per m^2. In this region, abundant use is made of expanded polystyrene (EPS) floats for the production of net-cage rafts for marine culture, as well as for the fenders of boats in coastal areas generally. If the floats are not well maintained and are left exposed to the elements on the

seashore, they disintegrate and become widely scattered on beaches after drifting at sea.

We therefore visually assessed the use of EPS floats in Kagoshima Bay (1997 to 1998) and found that a total of 3,043 EPS floats without covers were washed up as drift along the entire coastline of Kagoshima Bay. The average density was 10.3 pieces per km, with the highest densities found in the fishing district of Ushine (38.9 pieces per km) along the east coast of Kagoshima Bay, the major mariculture area in the bay. Floats without covers were also used as mooring buoys and as fenders for pleasure boats in harbors, the total amounted to 3,885 floats.

The EPS floats are also commonly used for the floats of oyster farming rafts in Hiroshima Bay on the Seto Inland Sea. Beached floats and foamed-plastic fragments on the beach, as well as floats that were being used without covers for as mooring buoys and fenders in the bay were investigated visually at 58 sites along 48.6 km of coastline in 2001. Small items of beach litter amounting to 245,656 pieces were collected from sand samples, and of these, foamed-plastic fragments accounted for 99.5% of the total. The average density of fragments was 44,521 pieces per m^2, while unsuitably used floats that were being used without covers totaled 6,760 at a density of 140.7 pieces per harbor. The density of beached floats was 1.1 pieces per km.

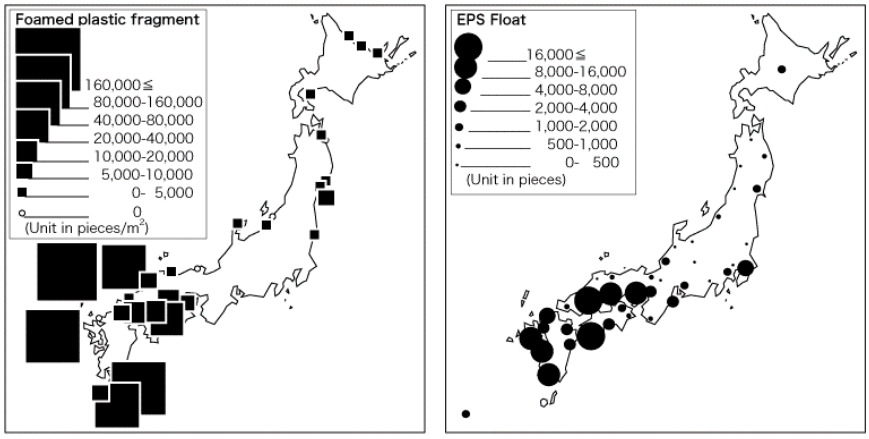


Fig. 2 Distribution of foamed-plastic fragment (left) and EPS float production in 2005 (light).

In 2004 to 2006, we surveyed the number of small plastic fragments that had either washed-up or become buried along 30 beaches in Japan (Fig. 2). In addition, the Japan Foam Styrene Industry Association surveyed EPS float production in 2005. Compared to eastern Japan, both surveys showed that the occurrence of EPS pieces was greater in western Japan. The density of fragments was particularly high on the island coastlines of northern Kyushu, with the highest numbering in excess of two million pieces per m^2 on the Koshidaka Coast of Tsushima Island in Nagasaki Prefecture. Thus, since the distribution of foamed-plastic fragments along coast of North Kyushu and the Sanin region almost corresponded to the production in the northwest Pacific, it suggested that the fragments are not Japanese in origin.

Recently, concerns have arisen regarding the impact of small plastic marine debris on

fisheries. Foamed-plastic fragments and fibers were found within the harvested laver off Izumi City in Kagoshima, Japan. More than 700 EPS floats were found to have washed up on the coastline of the islands off Izumi City, and more than 400 floats were used as fenders for fishing boats in 24 ports. Consequently, it is suggested that one of the major sources of foamed-plastic fragments found in the laver are these floats.

These small fragments must be removed by hand in fish processing plants as failure to do so would result the contamination of marine food products with these fragments. While this not only decreases the commercial value of marine food products, it also increases production costs. Left unchecked, food contamination by marine debris is likely to have an indirect sustained and progressively negative impact on coastal fisheries. Such a situation is also likely to result in eroding the trust of consumers in marine products and coastal fishing.

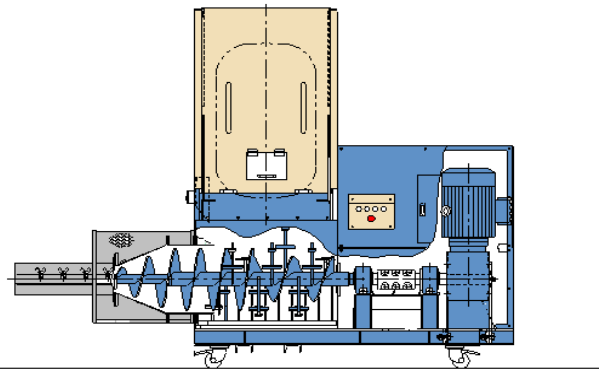


Fig. 3 EPS float Compressor for recycling.

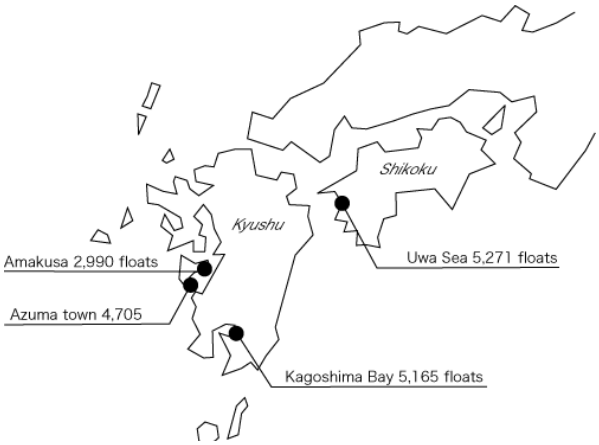


Fig. 4 Total amount of recycled EPS float in four years.

2. Recycling EPS floats

Improved recycling of EPS floats was started in 2003. Using this new system, once waste EPS floats are compressed by a portable compressor (Fig. 3) at the fishing port near the marine culture area, it is transported to Refuse Paper and Plastic Fuel (RPF) manufactures. The system has the advantage of being able to reduce transport costs considerably by reducing the volume of the waste floats to less than one-tenth of their original volume. In four years of testing, 18,131 floats have been recycled in southern Kyusyu and western Shikoku (Fig. 4), and it is planned that the new system will be deployed as part of a government program at four locations every year from 2007 onward.

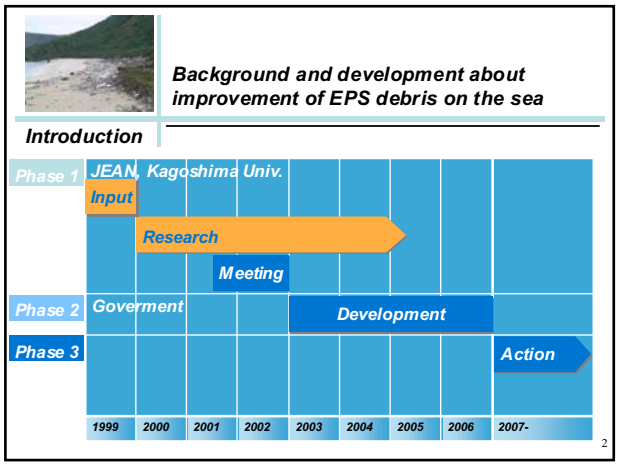
Fujieda, S., H. Tou, and Y. Hamada. Field study of foamed fishing debris on the coast of Kagoshima Bay, Nippon Suisan Gakkaishi 66(2), 236-242 (2000).

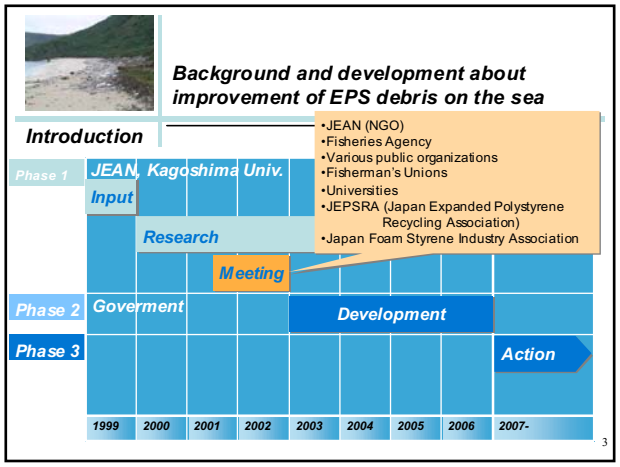
Fujieda, S., J. Ikeda, and F. Makino. Grounded and buried fragments of foamed plastic on the coast of Kagoshima Prefecture, Nippon Suisan Gakkaishi 68(5), 652-658 (2002).

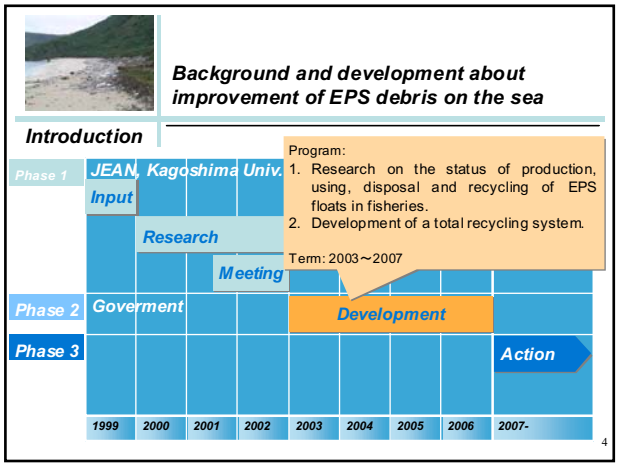
Fujieda, S. and K. Sasaki. Stranded debris of foamed plastic on the coast of Eta Island and

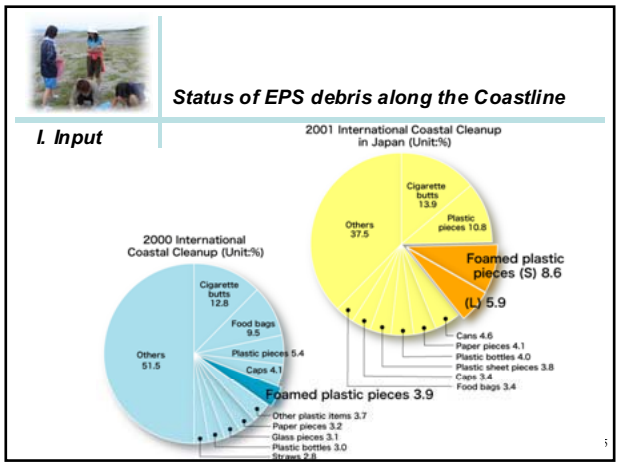
Kurahashi Island in Hiroshima Bay, Nippon Suisan Gakkaishi 71(5), 755-761 (2005).
Fujieda, S., T. Shibata, M. Hidaka, and A. Kojina. Small plastic marine debris on 30 beaches in Japan, including singing beaches, J. Jap. Driftological Soc. 4, 9-14 (2005).

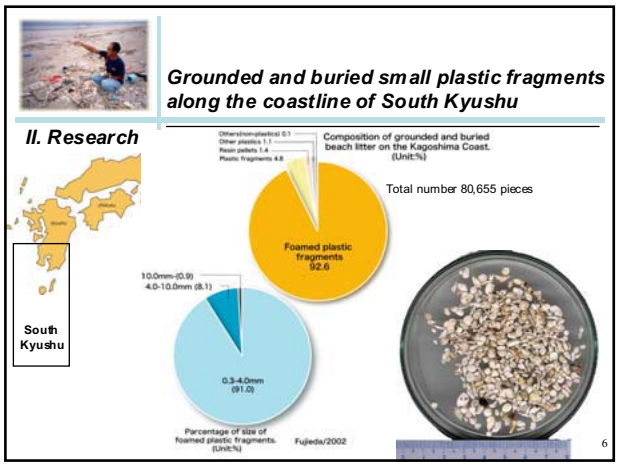

Expanded Polystyrene Debris along the Japanese Coastline and Development of Recycling System for Waste EPS Floats
Yonaguni Is., Okinawa
Faculty of Fisheries, Kagoshima University
Shigeru FUJIEDA

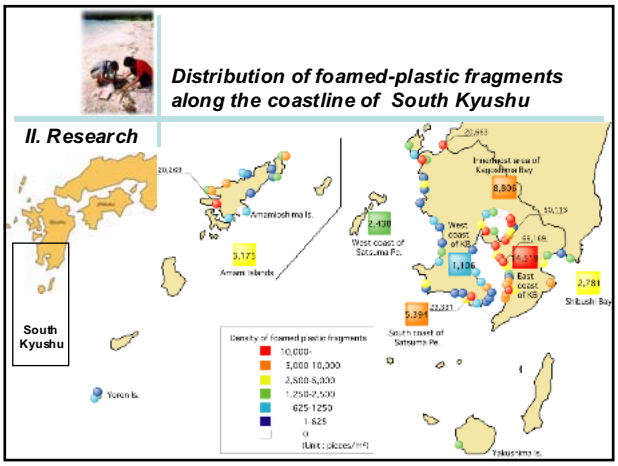

Background and development about improvement of EPS debris on the sea
Introduction
Phase 1
JEAN, Kagoshima Univ.
Input
Research
Meeting
Phase 2
Goverment
Development
Phase 3
Action
1999
2000
2001
2002
2003
2004
2005
2006
2007-
2


Background and development about improvement of EPS debris on the sea
Introduction
•JEAN (NGO)
•Fisheries Agency
•Various public organizations
•Fisherman's Unions
•Universities
•JEPSRA (Japan Expanded Polystyrene Recycling Association)
•Japan Foam Styrene Industry Association
Phase 1
JEAN, Kagoshima Univ.
Input
Research
Meeting
Phase 2
Goverment
Development
Phase 3
Action
1999
2000
2001
2002
2003
2004
2005
2006
2007-
3

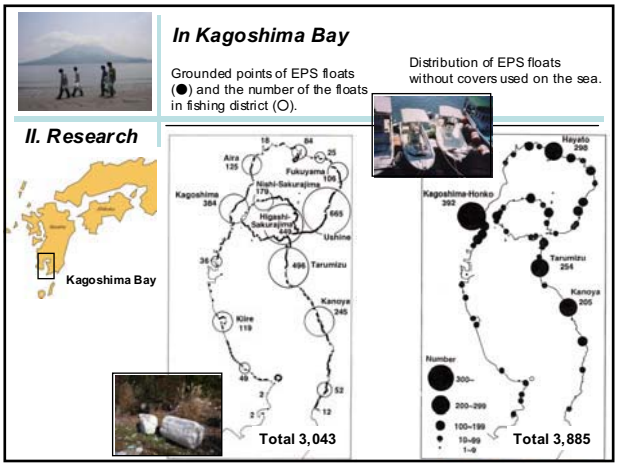

Background and development about improvement of EPS debris on the sea
Introduction
Program:
1. Research on the status of production, using, disposal and recycling of EPS floats in fisheries.
2. Development of a total recycling system.
Term: 2003～2007
Phase 1
JEAN, Kagoshima Univ.
Input
Research
Meeting
Phase 2
Goverment
Development
Phase 3
Action
1999
2000
2001
2002
2003
2004
2005
2006
2007-
4

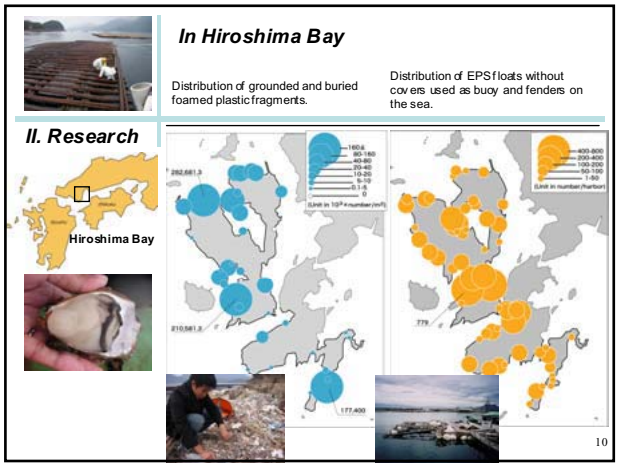

Status of EPS debris along the Coastline
I. Input
2001 International Coastal Cleanup in Japan (Unit:%)
Cigarette butts 13.9
Plastic pieces 10.8
Others 37.5
Foamed plastic pieces (S) 8.6
(L) 5.9
Cans 4.6
Paper pieces 4.1
Plastic bottles 4.0
Plastic sheet pieces 3.8
Caps 3.4
Food bags 3.4
2000 International Coastal Cleanup (Unit:%)
Cigarette butts 12.8
Food bags 9.5
Others 51.5
Plastic pieces 5.4
Caps 4.1
Foamed plastic pieces 3.9
Other plastic items 3.7
Paper pieces 3.2
Glass pieces 3.1
Plastic bottles 3.0
Straws 2.8
5

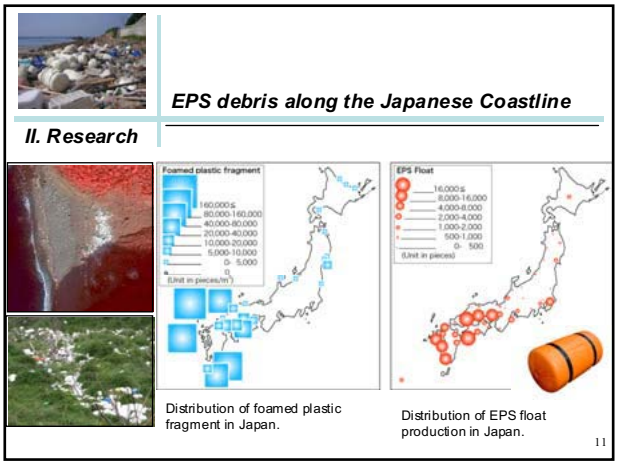

Grounded and buried small plastic fragments along the coastline of South Kyushu
II. Research
South Kyushu
Composition of grounded and buried beach litter on the Kagoshima Coast. (Unit:%)
Total number 80,655 pieces
Foamed plastic fragments 92.6
10.0mm-(0.9)
4.0-10.0mm (8.1)
0.3-4.0mm (91.0)
Parcentage of size of foamed plastic fragments. (Unit:%)
Fujieda/2002
6

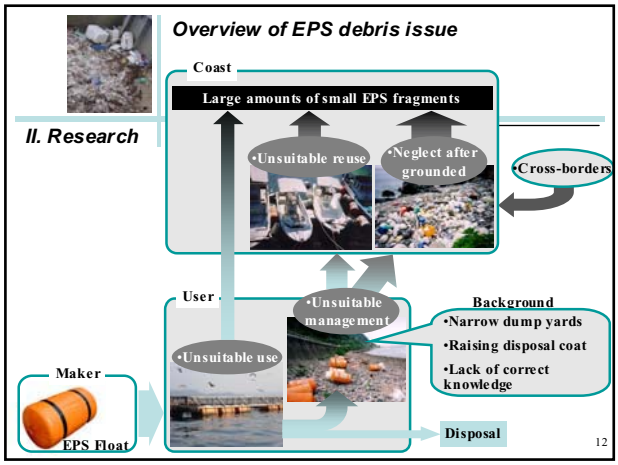

Distribution of foamed-plastic fragments along the coastline of South Kyushu
II. Research
South Kyushu
Amamioshima Is.
Amami Islands
West coast of Satsuma Pe.
East coast of KB
Shibushi Bay
South coast of Satsuma Pe.
Yoron Is.
Yakushima Is.
Density of foamed plastic fragments
10,000-
5,000-10,000
2,500-5,000
1,250-2,500
625-1250
1-625
0
(Unit : pieces/m²)

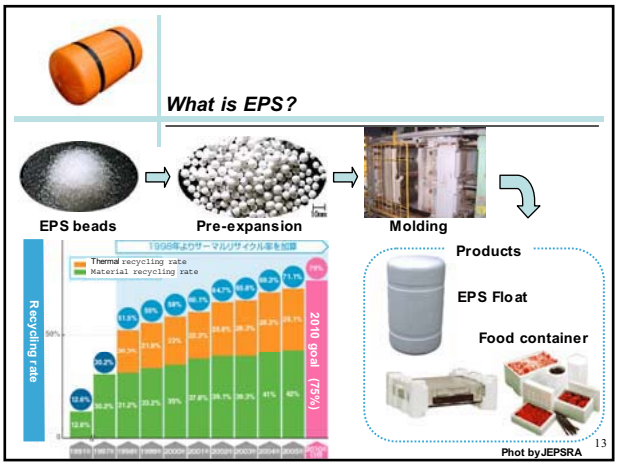

Source

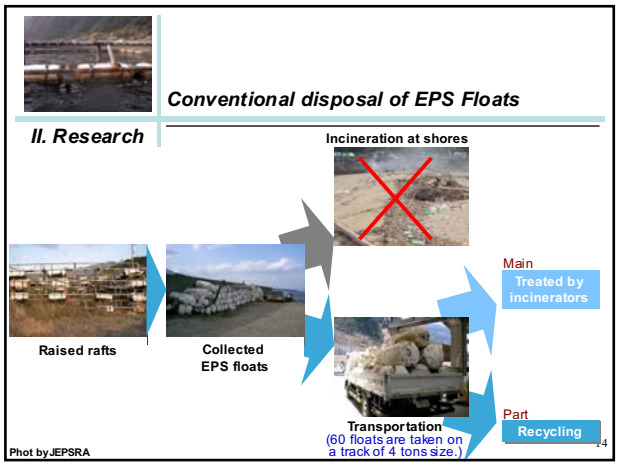

In Kagoshima Bay
Grounded points of EPS floats (●) and the number of the floats in fishing district (○).
Distribution of EPS floats without covers used on the sea.
II. Research
Kagoshima Bay
Total 3,043
Total 3,885

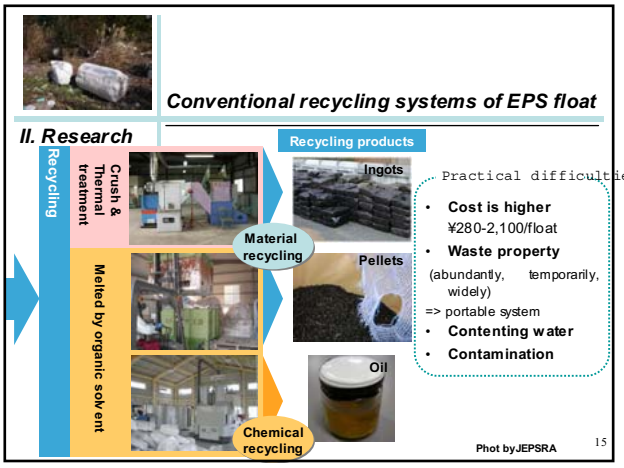

In Hiroshima Bay
Distribution of grounded and buried foamed plastic fragments.
Distribution of EPS floats without covers used as buoy and fenders on the sea.
II. Research
Hiroshima Bay
10

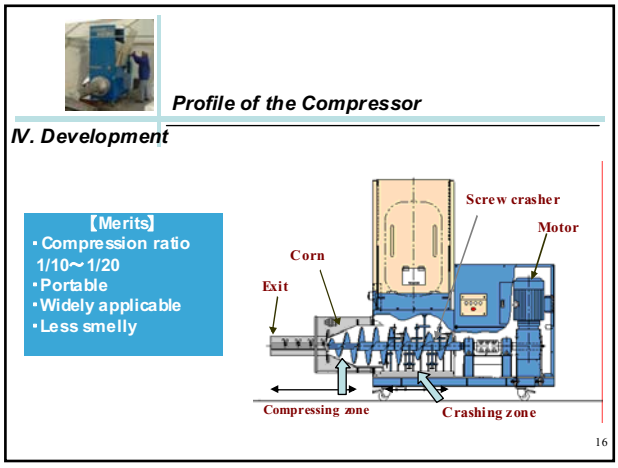

EPS debris along the Japanese Coastline
II. Research
Distribution of foamed plastic fragment in Japan.
Distribution of EPS float production in Japan.
11

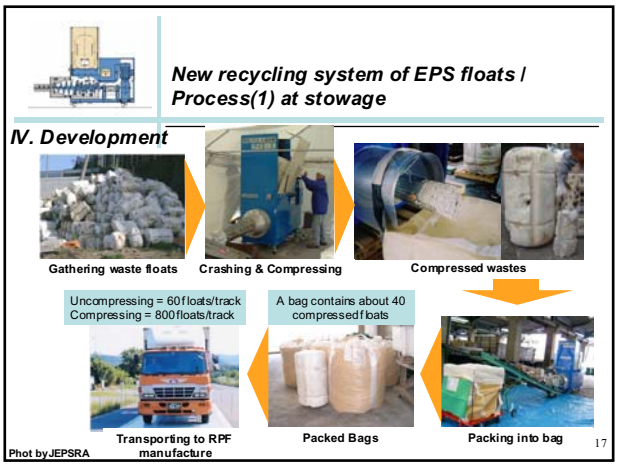

Overview of EPS debris issue
II. Research
Coast
Large amounts of small EPS fragments
•Unsuitable reuse
•Neglect after grounded
•Cross-borders
User
•Unsuitable management
•Unsuitable use
Background
•Narrow dump yards
•Raising disposal coat
•Lack of correct knowledge
Maker
EPS Float
Disposal
12


What is EPS?
EPS beads
Pre-expansion
Molding
Products
EPS Float
Food container
Recycling rate
Thermal recycling rate
Material recycling rate
2010 goal (75%)
Phot by JEPSRA
13


Conventional disposal of EPS Floats
II. Research
Incineration at shores
Raised rafts
Collected EPS floats
Transportation
(60 floats are taken on a track of 4 tons size.)
Main
Treated by incinerators
Part
Recycling
Phot by JEPSRA
14


Conventional recycling systems of EPS float
II. Research
Recycling products
Recycling
Crush & Thermal treatment
Melted by organic solvent
Material recycling
Chemical recycling
Ingots
Pellets
Oil
Practical difficulties
Cost is higher ¥280-2,100/float
Waste property (abundantly, temporarily, widely)
=> portable system
Contenting water
Contamination
Phot by JEPSRA
15


Profile of the Compressor
IV. Development
【Merits】
• Compression ratio 1/10~1/20
• Portable
• Widely applicable
• Less smelly
Screw crasher
Motor
Corn
Exit
Compressing zone
Crashing zone
16


New recycling system of EPS floats / Process(1) at stowage
IV. Development
Gathering waste floats
Crashing & Compressing
Compressed wastes
Uncompressing = 60 floats/track
Compressing = 800 floats/track
A bag contains about 40 compressed floats
Transporting to RPF manufacture
Packed Bags
Packing into bag
Phot by JEPSRA
17

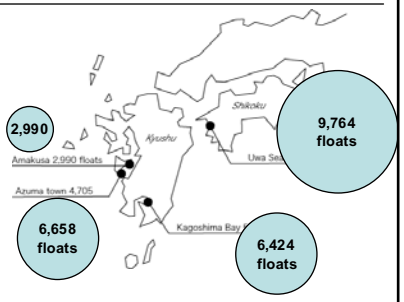

RPF facilities
New recycling system of EPS floats / Process(2) at the RPF manufacture
IV. Development
Receiving the bags
Feeding by mixing with waste paper and other plastics
Crashing
Heating, molding, cutting
Boiler
Delivery
Stowage
RPF
Phot by JEPSRA
18

Results of new recycling system

IV. Development

Result
Term :
From 2003 to 2006
Total : 25,836 floats

EPS float Production
(floats/year)
Ehime : 191,00
Kumamoto : 10,400
Kagoshima : 11,900



19

Advantage and disadvantage of New Recycling System for Waste Floats

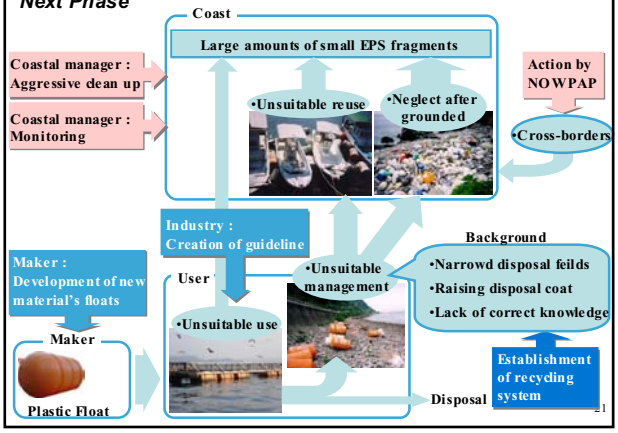
IV. Development

Advantage	Disadvantage
1. Low transport cost	1. Store of bags (prevention of fire and flying)
2. Low treatment cost	2. Need legal approval to receive commission from fishermen
3. Portable compressor system	3. Need over 2,000 float/year on an economic basis
4. Higher compression speed	
5. Safety	
6. Prevention of flying fragment	
7. No qualified handling officer of hazardous materials	
8. Compressed EPS debris can economically treat at local dealers of industrial wastes.	
9. Formation of consciousness	

Total cost = ¥150-200/float
(Other system = ¥280-2,100/float)

20

Next Phase



21

Thank you for your attentions.

Special thanks for JEPSRA

Deposited Marine Litter in Ports and Fishing Areas

Rho-Taek Jung, Seon-Dong Kim, Won-Soo Kang, Chang-Gu Kang, Seong-Gil Kang,

Maritime & Ocean Engineering Research Institute, Korea Ocean Research & Development Institute
P.O.Box 23, Yuseong, Daejeon, 305-600, Republic of Korea
Tel: +82-42-868-7215, Fax: +82-42-868-7738
E-mail : rtjung@moeri.re.kr

1. Introduction

Persistent solid marine wastes from ocean and land sources give rise to impede the safe surface passage and foul our coastal scenery. The contamination of the costal area is accelerated by the over-fishing activity, rapid economic development, and marine leisure boom. To ultimately mitigate the solid waste problems, the Korea government MOMAF(the Ministry of Maritime Affairs and Fisheries) has started in the marine debris issue since 1999 by supporting several R&D projects in MOERI/KORDI. In this context, we introduce our survey studies on deposited marine litters and show the results of the national efforts on the harbors and fishing area, and explain the R&D project called with Integrated Management system for marine debris which has four categories: prevention, in-situ survey, recovery, and treatment technologies. Throughout the context, we lay high emphasis on the significance of practical approaches to the problem of marine debris.

2. Removal of Deposited Marine Debris

The survey of marine litter was carried out at the all the harbors which have been under management of the central government of Korea during two years of 1999-2000, and then, major fishing grounds in the coastal waters and EEZ has been surveyed since 2003. The survey region extends from near sites, such as harbors to offshore sites, such as fishing grounds.

We introduce the some field survey results, methods, and evaluations. You can refer the detail data in the reference [1]. The field survey is covered the 129 harbors which are comprised of 29 sites from the west coast, 64 sites from the south coast, and 42 sites from the east coast. The field surveys at each harbor were carried out using the Side Scan Sonar method which might be regarded as cheap and simple technique for the survey of marine litter in the shallow water such as harbors. The Side Scan Sonar has been used in the survey of marine seabed, which has been coupled with the differential global positioning system to record the exact locations. The total area surveyed was 91.0 km^2 (23.1 km^2 for the west harbors, 31.2 km^2 for south harbors, and 36.7 km^2 for east harbors).

Through reading the scanning images obtained by the side scan sonar survey, it clearly shows kinds of automobile tires, metals, ropes, woods, and wire ropes, but it is so difficult to identify glass bottles, small plastics, papers and other small miscellaneous litter. So, it is assumed that the results from the side scan sonar may be underestimated compared to other direct sampling methods such as SCUVA diving, trawling and grab sampler.

For the amount assumptions, the scanned marine litters were roughly converted to the weight basis using simple conversion factors, which were gotten from pre-sampling survey and the conversion factor may be different with their shapes even if the kinds of the litters are similar.

The typical items and the total number of the marine litters are shown in Table 1 and the total weight is estimated as 34,636 ton (12,344ton for west harbors, 11,416ton for south harbors, and 10,876ton for east harbors).

Table 1. Total number of marine litters surveyed at the 129 harbors scanned 91Km^2

Items	Tires	Ropes	Wires	Metals	Woods	Others	Total
Number	6,623	5,406	2,108	1,935	552	4,388	21,012
%	31%	26%	10%	9%	3%	21%	100%

Based on the estimated weight-data, MOMAF removed deposited marine debris at the harbors, major fishing ports, and major fishing grounds, such as blue crab fishing grounds in the Yellow Sea and king crab fishing grounds in the East Sea. Two government-controlled organizations remove and dispose deposited marine debris: in fishing grounds by the Korea Fisheries Infrastructure Promotion Association(KFIPA) and in the coastal waters by the Korea Marine Pollution Response Corporation(KMPRC). MOMAF executed several recovery projects, especially a kind of marine litter buyback program which government purchases the deposited marine litters pulled in during fishery activities.

A total of 71,815 tons of deposited marine debris has been removed from 1999 to 2006, most of which were derelict fishing gear, wire, and tires and the total budget is 62,697 million won as shown in Table 2.

Table 2. Performance of collection/processing of deposited marine debris (MOMAF)

Recovery amount : ton, (Expenses) : million won

Years	'99~'02	'03	'04	'05	'06	Total
Recovery Project	34,892 (25,085)	11,338 (7,668)	3,619 (6,893)	5,354 (7,965)	5,368 (8,308)	55,203 (47,611)
Buyback Program	-	578 (731)	2,453 (1,706)	3,076 (1,841)	5,137 (2,500)	6,107 (4,278)
Total	34,892 (25,085)	11,916 (8,399)	6,072 (8,599)	8,430 (9,906)	10,505 (10,808)	71,815 (62,697)

※ Buyback program consists of national expenditure only.

3. On-going National R&D projects on Marine Debris

In 1999, MOMAF initiated national project to develop an integrated management strategies and practice guidelines on marine litter problems at the national level. The project had been mainly carried out by the Maritime and Ocean Engineering Research Institute(MOERI, former KRISO) / Korea Ocean Research & Development Institute(KORDI) and Korea Maritime Institute(KMI). The project calls by "Practical Integrated Treatment System for Marine Litter"[2]. MOERI develops environmental practical facility categorized with prevention technology, field survey technology, recovery technology and recycling technology. KMI supports those implications with some valuable achievement of the administrative organization.

MOMAF acquired a budget for marine debris management in 1999 and thereafter the amount has increased. The total budget for removal of deposited marine debris from 1999 to 2003 was U.S. $7.9 million, and U.S. $5.1 million from 2004 to 2006. The budget for "Integrated

Management System for Marine Debris" from 1999 to 2006 is U.S. $13.0 million. In addition to the above, considerable amounts of the budget for various marine debris management have been acquired by MOMAF.

The integrated treatment system for marine litter has been constructed helping with marine science and engineering technology categorized with prevention, field survey, recovery and recycling on the debris.

In order to prevent the floating debris from entering the coastal region through rivers or channels, we have developed a floating debris containment boom. It is extended the oil boom by modifying the skirt to mesh structure and putting collection mechanism at the center of the boom. Since the design procedure of the oil boom in waves and currents was firmly set up, we had to carry out site experiments in coastal areas with the developed model.

In the second, the deep towed-camera system for searching the derelict fishing nets on the sea-bed in the East Sea has been assembled and the reliability of the equipment has been guaranteed by in-situ test on the seabed of 1,000m water depth while 7m effective width is kept. Recently, the method for obtaining the seabed picture has been extended from recording-type to acoustic sonar in order to carry on the survey experiences effectively.

In the third, a multi-functional marine debris recovery system, which is defined as a floating vessel and needed equipments working in the shallow water to remove marine litters has been developed to apply for the recovery technology. The development of the whole system including the vessel and auxiliary recovery devices has been built in 2002 to 2003.

In the forth, we introduce development of various treatment systems for marine debris. Even though the marine debris contains a lot of seawater, it has higher caloric value (4,000 kcal/kg) than that (1,500 kcal/kg) of land-based debris. By analyzing physical properties of RDF(Refuse Derived Fuel), we have revealed that it is mainly due to the higher percentage of carbon and hydrogen in the ocean-based debris. Due to this property and palletizing process of burning materials, the caloric value of RDF becomes more 6,000 kcal/kg of the ocean-based debris.

Fishery waste polystyrene buoys are one of most cumbersome marine debris in the state of salty and sludgy, and their volume fraction is very high among marine debris and we had no suitable treatment methodology environmental friendly. Thus, we have developed thermal extrusion system for volume reduction of waste buoys which the reduction rate is about 1/70. The system deals with the waste polystyrene buoys of 100kg per hour, and composes of cutting, crushing, salt and sludgy cleaning, several containers for drying, and finally, thermal extrusion device. The system has been already popularized to 17 areas of the local governments where locate at coastal areas of high abundance of waste buoys since 2003. The budget of the popularized system consists of 80% of central ministry and 20% of local government. We are planning to develop a truck-type reduction equipment for the small mount treatment of 30kg/hr because the cost of the land foundation facility is high.

For some parts of marine debris that cannot be transformed to RDF, reusable or recyclable forms, we try to incinerate them. For this purpose, we have developed a stabilized incinerator for usage of marine debris. Recently, we have started to develop a direct melting system for the wasted FRP(Fiber Reinforced Plastics) vessel in the recycling way because the marine litter is not just waste any more.

This project is to concentrate the focus on the marine environment conservation technology development which is systematic with problem analysis and complementary research in putting the emphasis for practical application business.

4. Results and Discussion

Like other regions, the Korean coasts have also been seriously polluted by the marine litter. In response to growing concern over marine debris, the total amount of marine litter in the Korean ports has been surveyed by the Side Scan Sonar (SSS) method. The amount of marine litters in the Korean fishery ports (129 sites) was at least estimated as the 34,636 ton. The total tonnage value is to be a basic data for estimating the national recovery budget. In fact, investment of 25,085 million won has gotten the mount of 34,892 ton until the year of 2002. Main source of the litters in the harbors are more related to ship-based activities than land-based activities.

We briefly introduced the concepts and accomplishment of the main project for marine debris in Korea: Integrated management system for marine debris. As elemental technologies, it has four categories: 1. prevention, 2. in-situ survey, 3. recovery, and 4. treatment. For each category, we explained primary development of a related equipment or facility during past five years (1999~2003) and then the practical developments in the II-phase now.

5. References

[1] W.-S. Kang et al, 2005, “Marine litter in the ports of the republic of Korea”, ISOPE conference paper No. 2005-CGK-01

[2] R.-T. Jung et al, 2005, “The Outline of the Integrate Treatment System to Marine Debris for Offshore Korea”, ISOPE conference paper No. 2005-CGK-04

The 2nd NOWPAP MALITA Workshop /`07. 3.28~29/Toyama

Deposited Marine Litter in Ports and Fishing Areas

R.-T. Jung, S.-D. Kim, W.-S. Kang, C.-G. Kang, S.-G. Kang

Presenting:

Dr. Rho-Taek Jung
Maritime & Ocean Engineering Research Institute/ Korea Ocean Research and Development Institute (MOERI/KORDI)

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Marine Litter (ML)

- Definition by EPA
  - any man-made, solid material that enters our waterways directly (for example dumpling) or indirectly (for example washed out to sea via rivers, streams, storm drains, etc)
- US Academy of Science
  - Estimates the total input of ML into oceans worldwide is 6.4 Million tones per year – most of it does not degrade!

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Marine Litter (ML)

- Damage by the marine litter
  - Ghost-fishing, destruction of spawning ground
  - Damage of coastal view caused by derelict marine litter
  - Cause of marine industry and vessel accidents
  - Damage of tidal power generation(10% down working efficiency)

Purpose of the Study

- To elucidate amount, type and spatial distribution of ML on sea floor of all ports in Korea and fishing place, in order to provide basic data available for the activities of the Govern't to clean-up ML in the area of Korea.
- To execute a national integrated management project for ML, in order to distribute equipments results from R&D continuously and support the recycling enterprises
- This study was carried out from 1999 as one of MOERI/KORDI's studies

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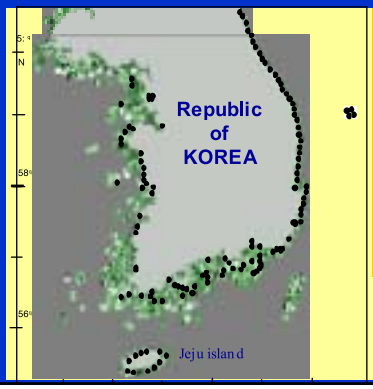
Distribution of Ports surveyed



Total 129 fishery ports

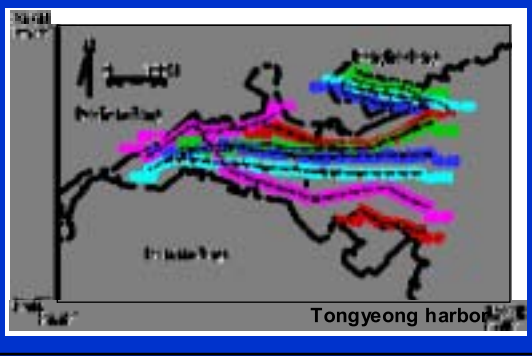
27 ports on western,
57 ports on southern,
45 ports on eastern coast

Field Survey Method

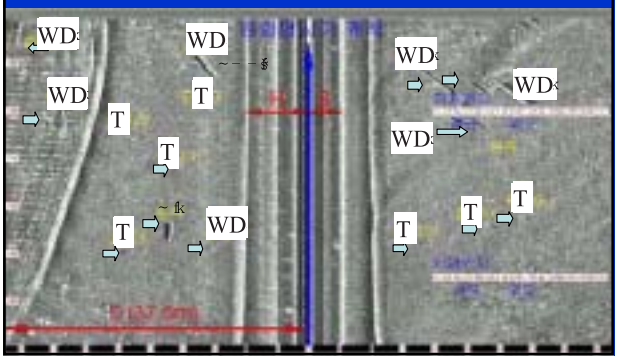
- Single Beam Side Scan Sonar(SSS)
  - Ultra Electronics 3050E Widescan
- Advantage
  - To enable economic and simple field survey over the large areas
  - To be regarded as cost-effective and time-shaving method compared to other methods (trawling, scuba, submarine, etc)
- Demerit
  - To have a limit unavailable to the survey for deep area and/or for small litter

Example of scanning trajectory of the side scan sonar

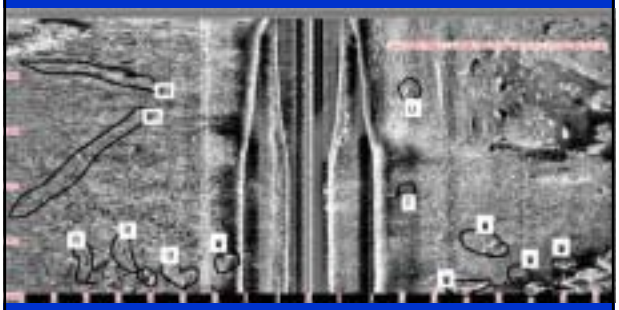
□covered about 30% of total surface area



Sample image of the side scan sonar - woods (WD) & tires (T)

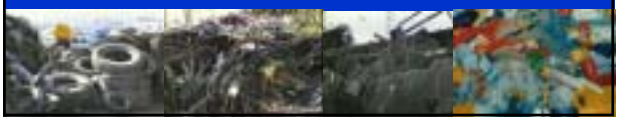


- rope (R), wire rope (WR), metals (M), others (U)



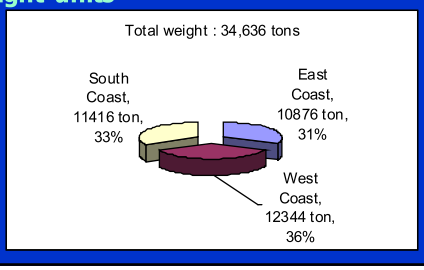
The number of marine litters surveyed at the 129 harbors scanned 91Km²

Items	Tires	Ropes	Wires	Metals	Woods	others	Total
Number	6,623	5,406	2,108	1,935	552	4,388	21,012
%	31%	26%	10%	9%	3%	21%	100%



Total weight of marine litter at all harbors is estimated about 34,636ton

□Applied conversion factor for changing weight-units



Execution of ML collection

□Done by two government-controlled organizations (KFIPA & KMPRC)

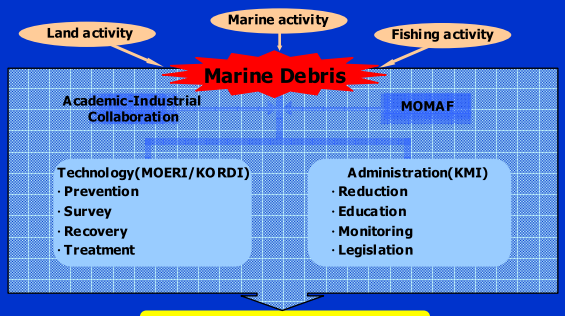
□Executed at harbor site until 2003, extended to fishing area continuously

Recovery amount : ton, (Expenses) : million won

Years	'99~'02	'03	'04	'05	'06	Total
Recovery Project	34,892 (25,085)	11,338 (7,668)	3,619 (6,893)	5,354 (7,965)	5,368 (8,308)	55,203 (47,611)
Buy-Back program	-	578 (731)	2,453 (1,706)	3,076 (1,841)	5,137 (2,500)	6,107 (4,278)
Total	34,892 (25,085)	11,916 (8,399)	6,072 (8,599)	8,430 (9,906)	10,505 (10,808)	71,815 (62,697)

On-going R&D project on ML

"Integrated Management System for ML"



The project stage & budget

Phase I (1999~2003) :
- Fundamental R&D Technologies

Phase II (2004~2011) :
- Practical Technologies and Popularization

Years	'99~'02	'03	'04	'05	'06
Budget (million won)	5,900	2,000	1,820	1,989	1,228

Technology for prevention

- Concept & Goal
  - Preventing the intrusion of wastes into the ocean through rivers or channels, blocking spreading and collecting
- Main Achievement
  - Floating debris collection boom for usage in coastal area
  - Floating debris containment boom (for usage in rivers and channels)
  - Real-time prediction model for floating debris spreading

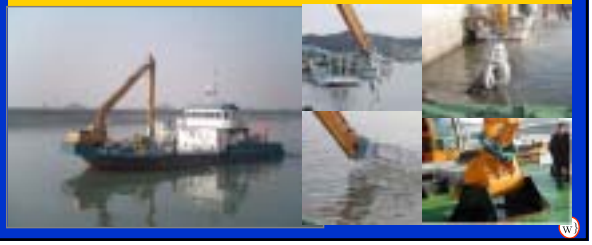
Technology for deep sea-bed survey

- Concept & Goal
  - Developing efficient methods and proper equipments for surveying spatial distribution of marine debris
- Main Achievement
  - Tow-Sled: Deep-sea bottom surveying equipment
    - For derelict fishing gears distributed over the deep-sea bottom up to the depth of 1,000m in the eastern sea of Korea
    - Quasi-real time survey equipment

Deep tow-sled camera system to 1,000m depth

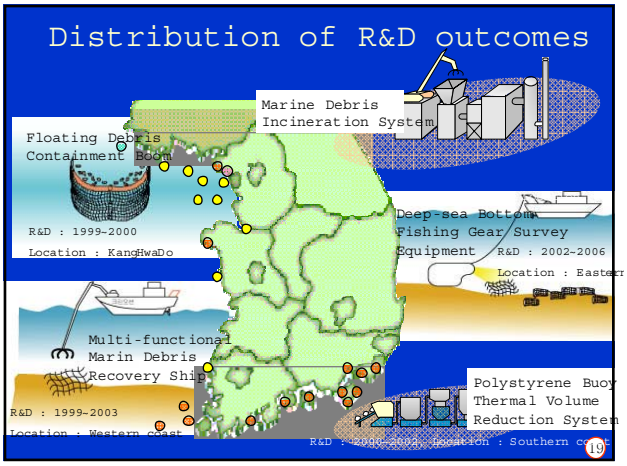
Technology for recovery

- Concept & Goal
  - Developing effective mechanical devices and systems for recovery of marine debris
- Main Achievement
  - Multi-functional marine debris recovery ship with auxiliary recovery devices
  - Speed : 7 knots, LOA : 27.5m, Displacement : 225.5ton, Max. reach of crane : 15m



Technology for Treatments

- Concept & Goal
  - Environmental-friendly and stable treatment methods and equipments
- Main Achievement
  - Pre-treatment and RDF production system
  - Polystyrene buoy thermal volume reduction system
  - Marine debris incineration system
  - Direct melting system for waste FRP vessel



Conclusions(1)

- The Korean coasts is confronted with the serious pollution with marine litters.
- The Side Scan Sonar (SSS) method might be regarded as cheap and simple technique for the survey of marine litter in the shallow water such as port
- The field survey is covered 129 harbors, total area was 91Km^2. The most component of the marine litter was tires and ropes which indicates that main source of the litters in the ports are more related to ship-based activities than land-based activities.

Conclusions(2)

- The national project of the integrate treatment system to marine litter was embarked for distributing ocean environmental equipments resulted from R&D continuously, and supporting recycling enterprises.
- The integrated project consists with four classified elementary techniques
  - Prevention - Deep sea survey
  - Recovery - Treatment
- Environment-friendly technology and equipment transferred to the related government agency for the public good and/or related associations.

Session 4

Coastal Cleanup and marine litter monitoring

International Coastal Cleanup Campaign Coordinated by JEAN in Japan

Present state and future prospects

Yoshiko Ohkura and Azusa Kojima

Japan Environmental Action Network (JEAN)
Komatsu Building 3rd Floor 3-23-2 Minami-cho Kokubunji City Tokyo 185-0021 Japan
Tel: 81-42-322-0712, Fax: 81-42-324-8252
E-mail: cleanup@jean.jp

1. The Beginning of JEAN—ICC in Japan Started in 1990

1.1 Japan Environmental Action Network (JEAN) and The Cleanup Office-Japan

Japan Environmental Action Network (JEAN) was founded in 1990 by the coordinating volunteers who participated in the first International Coastal Cleanup (ICC) held at Kugenuma Beach in Kanagawa and other 79 sites in Japan. ICC was first conducted by an American marine conservation organization, The Ocean Conservancy, in 1986 in USA.

JEAN founded “The Cleanup Office – Japan” in 1991 espousing the principle, "Start with what one can do," since action is needed instead of just thinking. The Office organizes a country-wide cleanup campaign and serves as an intermediary for networking local coordinators and volunteers participating in the campaign throughout Japan. The office appeals to the Japanese public to support ongoing cleanup activities within Japan, as well as gathering and sending out information focused on the issues of the marine environment and marine litter.

1.2 People supporting the ICC in Japan

Fellow local coordinators help JEAN to gather data of marine debris from Japan’s water shores. There are four major groups that are responsible for coordinating cleanup sites which are open to the public. Two of these groups have participated since the first ICC in Japan at Gamo Tidal Flat in Sendai City in Miyagi Prefecture and Suma Beach in Kobe City, Hyogo Prefecture. The Kagoshima office, in addition to having their own sites, involves the prefecture government which conducts cleanups around the Kinko Bay, calling for citizens’ participation. Okinawa O.C.E.A.N. started in 1993 and now coordinates cleanups throughout the year, including about 20 sites for ICC every year. Okinawa O.C.E.A.N. organizes cleanups in Okinawa and reports to TOC independently.

Whether the cleanup scale is large or small, individual local captains (volunteer coordinators) throughout Japan are equally important to this first-hand experience and educational activity. From there, the message can be passed on.

2. How JEAN Operates at Present

2.1. Enlighten the Public on the Marine Debris Issue through Cleanup Activities

The Ocean is a symbol of the global environment for JEAN. The Cleanup Campaign is one of the means to promote our conservation activities.

Marine debris in the natural environment is not only unsightly but also poses threats to wildlife, such as fish, birds, sea turtles, seals and dolphins. These animals may become entangled in

debris or ingest garbage along with real food. Plastic debris degrading, or fragmenting, into small pieces has become a serious problem.

JEAN conducts two cleanup campaigns each year. Through investigative surveys in these campaigns, we learn the actual situation and the effect of marine debris on the global environment. By disclosing the findings of our research widely, we facilitate planning of effective measures to reduce the root causes of debris production.

Through the ICC, we want to appeal the hazardous effects of marine debris; not only that the trash on beaches is dirty and unsightly to the scenery, but that it is now clearly understood that it has become a main cause of environmental pollution. Trash can cause harm to life that entangles or ingests it. Trash imposes a financial burden on local bodies when they try to transport and dispose of it. Damages to tourism are also serious.

In addition, and not the least in importance, especially with regard to plastics, trash decomposing into minute pieces and non-degradability are both considered highly problematic.

We also emphasize the fact that the trash has been produced by people, and we are the ones who must deal with it and prevent it, as it has been proven to be non-biodegradable in the natural environment.

The cleanup campaign is held twice a year - once in spring and again in autumn. The spring campaign gives participants first hand experience of cleanup at beaches and riversides, and fosters consideration of what kind of debris is abundant and why it is there.

At the International Coastal Cleanup Campaign in autumn, litter on beaches and river banks is surveyed. By surveying the composition of debris, the participants become aware of the types, quantity and sources of debris and this inspires them to think about ways of reducing the litter.

2.2 The Trash Survey in the same way at the same time world-wide

ICC is a cleanup involving a trash survey by volunteers. The trash survey is conducted using the same method during the same period worldwide. This in fact gives Japanese volunteers who participate in the campaign, a feeling of oneness with the international effort, enthusiasm and challenges them to reduce the marine debris problem.

2.2.1 The Survey

Once the captains finish their cleanups, they send the results to JEAN. JEAN then puts together all the information to report to The Ocean Conservancy (TOC) who then collects international data and compiles an annual report, “International Coastal Cleanup Report.” The report is shared globally and therefore people can see the common problem of marine debris and that leads to making the next step for solving the problem.

JEAN also compiles Japanese survey results and comments from cleanup participants in our annual "Cleanup Campaign Report". It is delivered to those who coordinated local cleanup sites, as well as relevant industries, businesses and government agencies and offices. This report is used as a base for carrying out further examinations toward developing concrete measures and suggestions to reduce the trash.

Apart from the report, JEAN provides survey results to mass media, concerned organizations and groups or individuals, so that the information can reach the general public widely.

2.2.2 The Flow of ICC in Japan

The flow of an ICC campaign is as follows:

First, JEAN sends out notice of a planned ICC and recruits local cleanup captains in Japan. Information is sent out to those captains who participated in previous ICC, usually selected from within the past three years. The notice is sent together with necessary materials, such as an entry/registration form, a manual which explains how to conduct the ICC, "data cards" to record the survey results and other necessary information, map which shows sea areas around the coast of Japan, blank map to mark their site, return envelope, etc. Captains, who are willing to participate and coordinate the year's ICC, send the entry/registration form back to JEAN, enclosing 1000 yen in postal stamps as their correspondence fee for a year. With this fee, they receive JEAN's newsletter and the annual report of the year, as well as additional information as needed. Having interest in coordinating cleanups in their local area, there are also new captains who join the ICC campaign as they learn about the activities through our web page or by word of mouth. These people contact JEAN and JEAN in return send them the necessary materials.

When JEAN receives the entry/registration forms from the captains, a list of cleanup sites is printed and sent out to members with the JEAN newsletter. The information is presented on JEAN's Web site by the end of August, so that the general public can participate in cleanups held in their local area.

Local captains carry out their cleanups and survey on their planned dates, following the instructions in the manual. Once the cleanups are finished, the captains compile all of the survey results onto a data card and send the data card back to JEAN, along with photos, a site indicated map and other information. JEAN started online reporting of cleanup results since the 2006 ICC, but still the paper form of data card is necessary to confirm and check the data sent online.

The Ocean Conservancy set the closing date for result reporting on 15 November. JEAN totals the data and formats it into sheets which TOC requires, and makes a report by then.

Then, JEAN compiles its own annual report, which illustrates the cleanup activity in Japan and survey results of the year, along with articles contributed.

2.3 Environmental Education, Enlightenment and Public Relation Activities

Another area in which we direct our efforts is the area of education and PR for marine environment conservation and marine debris control. We have produced the following materials:

- "Umibe no Karute" – a set of Educational booklets (each consisting of a leader's guidebook and a children's workbook) with marine debris as its subject matter.
- Photo panels and a series of "Trunk Museum of Flotsam" – materials for loan that shows samples of sea trash.
- "Gomibako ni natta Umi (The Ocean that Became a Trash Can)" – an enlightenment video on the problems of marine debris, especially a problems of plastic becoming minute pieces. This material was made to let the public know about the severity of accumulation of trash on Japanese coast lines.
- Talks on problems of marine debris at schools/groups on request, and leader training sessions that tie-up with other organizations.

2.4 Countermeasure Projects for the Problems Identified Through ICC

2.4.1 Our Recent Project

JEAN has worked together with Korean non-government organizations (NGO) and researchers on the issue of marine debris. We have suggested that Asian countries need to cooperate and tackle this serious environmental problem – the fact that trash travels in our oceans.

Our liaison started since 2002, as we had an opportunity to visit and meet people in Korea in the spring of the year. In December 2002, JEAN invited three people to Tsushima, Nagasaki, to observe the trash washed ashore and to exchange information on the state of marine debris in each country. In return, JEAN was invited to marine debris workshops held in Korea and gave presentations on the matter. The exchange of visits has continued since then, and in September last year, we worked together in a cooperative effort with Korean Marine Rescue Center (KMRC) in the "International Coastal Cleanup and Workshop in Yamagata 2006" of NOWPAP, providing the how to of ICC and taking the role of leading the activity.

We are making an effort to continue this cooperation and spread steps toward resolving the problem to other countries of the NOWPAP region and further to other Asian countries. We plan to have a study session in China this year.

2.5 Holding Conferences and Forums

JEAN has held several conferences on marine debris issues, such as "Conference on Issues of Marine Debris on Beaches" (held in Tobishima, Yamagata in August 2003, in Tsushima, Nagasaki in October 2004, in Oki, Shimane in November 2005 and in Shiretoko, Hokkaido in July 2006) and "Action Forum for Clean Seashores" (February 2004, March 2005 and February 2006). These conferences are held with the participation and cooperation of many researchers, organizations and groups concerned, as well as government offices.

2.6 Toward Building a Platform

2.6.1 Level of Social Understanding on the Issues of Marine Debris in Japan

Regretfully, the level of social understanding on marine debris issues is low in Japan. Many Japanese people still seem to believe that the problem can be solved by voluntary cleanup activities by community people and volunteers. People and groups who are willing to participate in clean-up events are plentiful. If we can harness their enthusiasm and support, making them aware of the real problems behind the generation of trash on beaches, then perhaps a greater step will have been taken to solving the problems of marine debris.

On the other hand, a large number of people who belong to non-profit or non-government organizations and researchers have applied their skills to this issue.

However, the problem is that some of those specialist practices are conducted within individual organizations and the results are kept internally without having any compatibility with those of other bodies. It is necessary to disclose the information possessed by individual organizations and present the data in a compatible manner.

2.6.2 Tardiness in Starting Up an Academic Study

In addition to the problems of incompatible data, there seems to have been a delay in commencing academic researches into several areas of marine debris problems. A lack of collection techniques of trash is one issue. It is difficult to collect debris en route down the rivers. Underwater trash and minute pieces of synthetic materials are also difficult to collect.

Marine debris is often of bad quality and troublesome to recycle or put to effective use because of adhesion of salt and grime or shellfish. This area also needs to be studied to seek the best

technique for recycling marine trash, as has been done for recyclable trash on land.

Fragmentation of plastic is also becoming a serious issue. The effect of minute plastic pieces on the natural world should be examined. Possible problems for consideration are the effect of ingestion of such minute pieces along the line of the food chain, toxicity or pollution of water and food resources because of the characteristic of chemical absorption by plastics, and effects on future generations.

2.6.3 What Needs to be done?

There are different issues concerning trash being intermixed – the source of occurrence is one issue and content or type of trash is another. Most of the time, it is difficult to identify who produced trash. The "Polluter Pay Principle" has been discussed, but has not actually been established. The involvement of various organizations and systems in collection and processing gives further difficulty.

To solve these problems, it is necessary to have a system that can address individual problems by promptly sharing information. At present, related organizations cope with the problems separately. Integration and cooperation is urgently needed.

Considering the conference on islands' marine debris, held annually since 2003, JEAN has made a proposition of a "platform for the problem of marine debris" as a social system, in order for the betterment of the problem. We have appealed to people and organizations concerned, having a number of informal discussion gatherings, and are preparing for the official establishment of such a system. This platform will be a nation-wide system that also fits with local circumstances. It will be more applicable and realizable when there are collaborating research investigations that incorporate information provided by the general public.

3. Prospects and Development of JEAN's Actions on the Marine Debris Problem

3.1 Maintain and Extend Our Actions to Raise Awareness on the Marine Debris Problem

JEAN will continue to take the role as a coordinator of ICC. ICC will still be an effective tool to address the issue of marine debris because it can raise public awareness through the first-hand experience of picking up and survey the trash on beaches. The survey educates participants about the following matters and challenges them to think of solutions.

- The primary source of the marine debris is trash produced from everyday life, reaching the sea through rivers and waterways
- Everyone generates garbage, thus it is a visible and easily understandable subject
- The best solution = cultivation of a community to have good eyes and skillful hands, thus preventing generation of garbage, and building a recycling-oriented society
- Role of community = through the marine debris survey during ICC, people can understand the actual situation of the garbage and that the amount generated by human society is substantial; remove as much trash as possible; and act for betterment.

3.2 Strengthen the Liaison amongst the Countries around the Northwest Pacific Ocean; Appeal Cooperation to Other Asian Countries and World-wide

The issue of marine debris cannot be solved in one country alone, as marine debris travels over the earth's great water body – the oceans. Information sharing and action taking in a cooperative manner are vital. JEAN, with the cooperation and support of Korean NGOs, will

expand the use of ICC to not yet fully enforced areas and countries, starting within Asia. We would like to appeal for more active and collaborative information sharing and operation of ICC activities.

Although, through The Ocean Conservancy's "International Coastal Cleanup Report," we recognize so many countries and areas in the world participated actively and enthusiasm has been maintained for over 20 years of ICC, communications among international coordinators are at a stage that still needs to be improved and become more active.

JEAN hopes to gain more interaction with the Northwest Pacific countries and also beyond that boundary, extend to Southeast Asia, and then to the world.

3.3 Anticipated Cooperation and Interactive Work among Various Sectors of Society

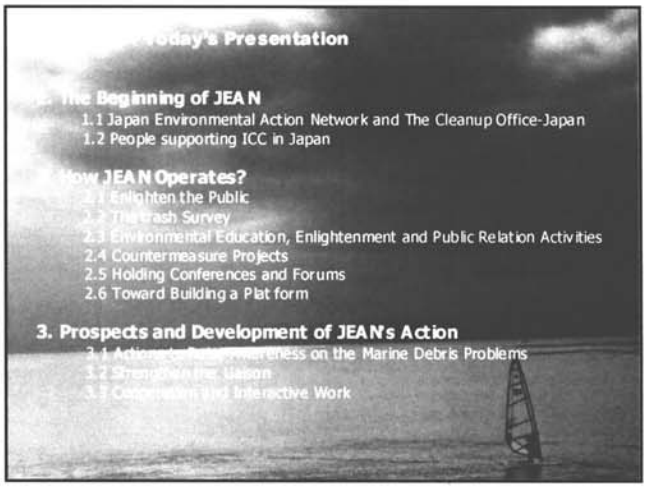
Considering the source and generation of marine debris, it is obvious that the various sectors of society need to work together toward resolution of this problem. Within Japan, JEAN will make efforts for linking diverse organizations and individuals concerned.

Businesses and industries, which produce commodities and put them on the market, need to consider preventing trash generation on the product lines or after consumers' purchase and use. The development of effective collection systems of used products is also anticipated. In addition, we expect business and industry sectors to reinforce the environmental viewpoint in their social contribution activities and programs.

For educating the general public on the issue of marine debris, it will be effective to work with groups or organizations/associations that deal with the field of environmental education through experiencing nature or marine sports. We consider still the need for a wider flow of environmental information and education. For that, JEAN should be a provider of knowledge and available for those who want information on the marine debris issue and ICC.

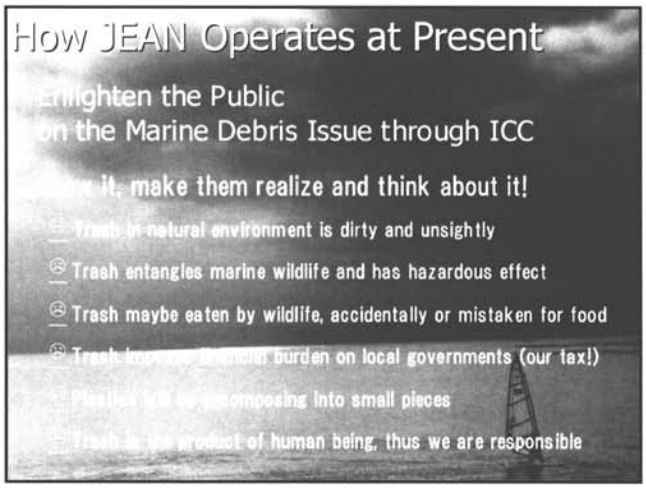
The marine debris issue cannot be solved while we blame each other -- we humans are responsible for littering our beaches. We now all understand that it is a serious and imminent issue, and therefore cooperation, research and action are needed.

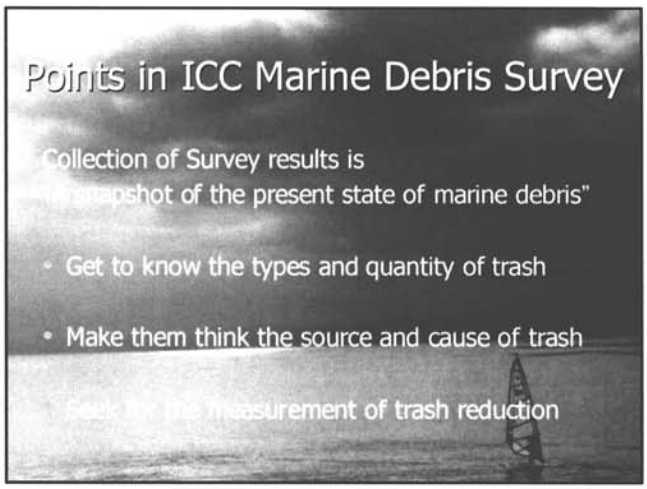

ICC Campaign Coordinated
by JEAN in Japan
Present State & Future prospects
Yoshiko Ohkura and Azusa Kojima
Japan Environmental Action Network (JEAN)
Komatsu Building 3rd Floor 3-23-2 Minami-cho Kokubunji City Tokyo
185-0021 Japan
Tel: 81-42-322-0712 Fax: 81-42-324-8252
cleanup@jean.jp
www.jean.jp


Today's Presentation
1. The Beginning of JEAN
1.1 Japan Environmental Action Network and The Cleanup Office-Japan
1.2 People supporting ICC in Japan
2. How JEAN Operates?
2.1 Enlighten the Public
2.2 The trash Survey
2.3 Environmental Education, Enlightenment and Public Relation Activities
2.4 Countermeasure Projects
2.5 Holding Conferences and Forums
2.6 Toward Building a Plat form
3. Prospects and Development of JEAN's Action
3.1 Actions to Raise Awareness on the Marine Debris Problems
3.2 Strengthening the Liaison
3.3 Cooperation and Interactive Work


1. ICC, JEAN and
The Cleanup Office-Japan
Brief History of ICC relative to JEAN
1988 The Ocean Conservancy (TOC)
conducted a study of plastic marine garbage for EPA
1986 Texas, USA
The first beach cleanup by TOC staff members
1989 Canada and Mexico joined – starting of ICC
1990 JEAN joined ICC: 80 sites with 800 participants
1991 The Cleanup Office Japan
to organize the country-wide cleanup campaign
2005 The growth: 218 sites with 16,726 survey participants
The Ocean Conservancy
International Coastal Cleanup
JEAN


People supporting ICC in Japan
Cleanup Gamo (Sendai, Miyagi)
participating ICC since 1990
Cleanup Kansai Office (Kobe, Hyogo)
established in 1991, participation since 1990
Cleanup Kagoshima Office
established in 1995, participation since 1993
Okinawa O.C.E.A.N
established in 1995, participation since 1993
*report results to TOC, independently
Local Captains (coordinators) throughout Japan
about 170 captains

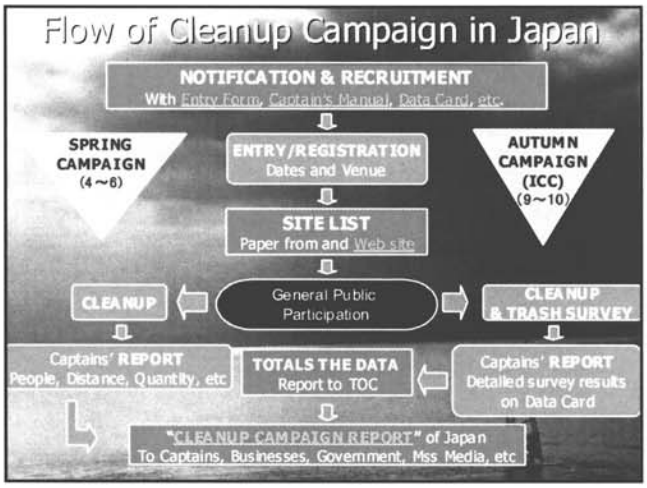

How JEAN Operates at Present
Enlighten the Public
on the Marine Debris Issue through ICC
Show it, make them realize and think about it!
Trash in natural environment is dirty and unsightly
Trash entangles marine wildlife and has hazardous effect
Trash maybe eaten by wildlife, accidentally or mistaken for food
Trash imposes financial burden on local governments (our tax!)
Plastics will be decomposing into small pieces
Trash is the product of human being, thus we are responsible


Points in ICC Marine Debris Survey
Collection of Survey results is
"Snapshot of the present state of marine debris"
Get to know the types and quantity of trash
Make them think the source and cause of trash
Seek for the measurement of trash reduction

Disclosure of the Survey Results

- TOC's "International Coastal Cleanup Report"
  - * Useful tools for making national policies and solution measurements
  - * Sharing information world-wide
- "Cleanup Campaign Report" of Japan by JEAN
  - *Attainment of work done
  - *Information sharing
    by site captains, industries and business bodies, government offices, general public through mass media, etc.
  - *Use it as the bases for examination and suggestions for concrete policy making and prevention measures

Flow of Cleanup Campaign in Japan



Environmental Education, Enlightenment and Public Relation Activities

- "Umibe no Karute (carte)"
- Photo panels and a series of "Trunk Museum of Flotsam"
- "Gomibako ni natta Umi (The Ocean that Became a Trash Can)"
- Talks on problems of marine debris

Our Projects and Activities

Cooperation with Korean NGOs and researchers

Exchange information on marine debris and its problem

Exchange of visits to observe the state of marine debris in each country since 2002

Holding and attending conferences in Korea and Japan

- * Marine debris workshops held in Korea
- * Conferences on the issues of marine debris "Marine Debris Summit" (2004 in Tsushima, 2005 in Oki)
- * "Action Forum for Clean Seashores" in Tokyo (2006)
- * "International Coastal Cleanup and Workshop in Yamagata 2006"

Holding Conferences and Forums

- "Conference on Issues of Marine Debris on Island Beaches"
  - Tobishima, Yamagata in August 2003
  - Tsushima, Nagasaki in October 2004
  - Oki, Shimane in November 2005
  - Cape Shiretoko, Hokkaido in July 2006
  - (2007 Conference will be held in Sado Island, Niigata)
- "Action Forum for Clean Seashores"
  - February 2004, March 2005 and February 2006 (also planned on April 2007)

These are held with the participation and cooperation of many researchers, organizations and centers concerned, as well as government offices.

Lectures and study sessions are also held in some

...ward Building a Platform

people who belong to non-profit or non-government organizations and researchers have applied their skills to marine debris issue

...he problem

...ractices are conducted within individual organizations

...the results are kept internally without having any compatibility with those of other bodies.

Needs of the information disclosure

"platform for problem of marine debris"

a social system, in order for the betterment of the problem
a nation-wide system that also fits with local circumstances


Prospect and Development
Maintain and Extend Our Action to Propagate the Issue
– Make people known
The primary source of the marine debris
Every one litters
The best solution
Role of community and individuals
Strengthen the Liaison
– Promotion of ICC in NOWPAP area
– Promoting cooperation and information Exchange with Southeast Asia
– Make it to a world-wide action
Anticipated Cooperation and Interactive Work
– Prevention of trash generation
– Activities of Environmental learning through experiencing Nature
– Information sharing

ICC System Introduction in the Far East of Russia

Mayss A.A.

ISSAR-FE
197 Svetlanskaya St., Vladivostok, Russia 690000
tel: +7 4232 269 606
e-mail: koryak@yandex.ru

In September, 2006 there was held an international working meeting on sea coast cleanup issue where representatives of Japan, Republic of Korea, and the USA reported on the experience in finding solution to the sea coast pollution problem through International Coastal Cleanup (ICC) procedure. The said procedure implies that representatives of different countries go out to the sea coast at the last weekend of September to clean it from litter, the latter being then classified and counted in accordance with a uniform method designed by "The Ocean Conservancy" non-governmental organization. The data obtained are forwarded to the joint analytical centre for processing and on the basis of the data analysis results the information on the sources of pollution is produced to be further used for the sake of the sea coast pollution prevention. The event was also attended by delegations from China and Russia and these were approached with a proposal to join this international action and to make use of ICC procedure in their countries.

In Far East Russia there exists a procedure of beach trash gathering and calculation. For instance, during the previous five years the representatives of nature protection organizations and initiative groups of residents, having united in "Alive Sea" Coalition have been implementing the "Summer of Live Sea" programme. The programme's objectives and aims are as follows: by joint efforts and using a uniform method to collect information about sea coast condition, to reveal violations of nature management and foci of pollution, to single out particularly sensitive and valuable zones of the sea coast, to make this information known to the interested public and responsible governmental agencies for taking immediate measures. Another task of great importance is engaging and training local groups of school students and activists from among the seaside residents. In future they may become a kind of "coast wardens", maintaining constant watch of its condition and promptly responding to any circumstance that might arise. Many members of the Coalition, as well as school students, extended education institution students, initiative groups, members of non-governmental organizations, others concerned participate in the project.

Groups compile reports on the results of the work done to reflect the following:

1. GENERAL INFORMATION (Number of members in a group (participants and leaders), organization in charge - full name, contact information. Route (routes) of the group (or dislocation, for camp) - Starting point, main waypoints (points of reference - capes, rivers, settlements), terminal point. Total kilometres covered (together with radial routes). Objectives and aims (requirement specification).
2. MAIN BODY OF THE REPORT (fundament - geology, tectonics, minerals, relief, hydrology, hydrography, climate, soil, flora, fauna, nature conservation. Description of the route - complexity, difficulty, passability, details of the locality, extra hazardous sections, features of passing, special equipment required, route and length in kilometres day by day. Area study part - history of settling the territory, archaeology, ethnography. Outline of the state of ecology - pollution and pollutants, their types, reserves, main environmental problems of the territory.
3. DESCRIPTION OF THE WORK DONE (Methodical support – procedures applied, Peculiarities of the work done, Basic difficulties in work, Brief outlines of the work done, Informational support, Specific results of the work done, nature protection result.
4. APPENDICES (Diagrams, plots, charts, photographs, diary of travel, research works, research blank forms, as raw research material, statements of facts, etc.).

The work in question allows the participants to gain indispensable skills of handling reference books and encyclopaedic literature, cartographical materials, to learn how to elicit regularities and to integrate the material. Material obtained through the expeditions can be used in writing abstracts, and making presentations for school, University, district, and regional conferences on area study, environment protection, etc.

Apart from coastal ecosystem study and observation the work done during merely previous two years throughout the Far East Russia resulted in cleaning-up more than 50km of littoral, and gathering and disposing of more than 1,000kg of domestic litter and trash polluting the Far Eastern seas. As an illustration, there was a competition held on Kamchatka for the best sculpture made from assembled litter in “trash art” style. In Khabarovsk Krai a week-long action titled “Clean Mile” was held and 8km of beaches of recreational value in settlements of Khabarovsk Krai were cleaned-up from domestic litter and trash. In Primorsky Krai they held “Sea without Plastics” action and “Alive Sea – Clean Shore” campaign aimed at removal of plastic bottles from near-shore zones. Plastic bottles that had been collected in the number of approximately 10,000 were forwarded for recycling.

Thus, there is every precondition available to join the international ICC procedure. Nevertheless, it should be noted that transition to a new procedure will take some time and expenditures. To introduce the said procedure it will be necessary to provide for teaching a new method, for equipping local groups with necessary implements, means of transport and communication to enable exchange of experience with other groups, as well as for informational and educational support. To achieve these goals combining efforts of the state, municipalities, higher educational institutions, schools, tourism companies, non-governmental organizations, and all concerned is mandatory.

The above and some other issues of ICC procedure implementation were discussed at the second regional workshop on marine litter held on March 1, 2007 in Vladivostok. Principal decisions of that workshop as far as ICC procedure implementation in the Far East of Russia is concerned are as follows:

- to create a workgroup for ICC programme implementation combining representatives of ISSAR-FE, of Sea Protection Institute, as well as officials of Environment Protection Department of Primorsky Krai Administration.
- to approach Nakhodka municipality Administration with an offer to agree upon a model section for conducting ICC (beaches of Livadiya microdistrict).
- to request from organizations in Japan and Republic of Korea for methodical support in arranging ICC programmes' implementation.
- to distribute information on ICC programme to all concerned organizations, members of "Alive Sea" Coalition, schools, and higher educational institutions with an invitation to join.

Only through joint efforts we will succeed in saving our sea while it is still alive!

ICC System Introduction in the Far East of Russia

Mayss A.
ISAR-RFE,
Vladivostok,
RUSSIA

TOYAMA, JAPAN
2007

1

Precondition

- Participation of the Russian delegation in ICC in Sakata (Japan) in 2006 year.

2

Forecast

- The first Russian ICC experience will be take place in September, 2007 in Vostok bay of Primorye region .

3

Object and course

- We'll suppose organization ICC in Vostok bay which is modeling area for the further application on Russian Far East coast

Basis

Vostok bay has 4 beaches. Their length is 30 km. It's very popular recreation and reservation area.

5

Current situation

- During the last five years the NGO's in RFE have been implementing programs on marine litter the "Summer of Living Sea" and International Sea Day (IMO).

6

Current achievement:

- more than 100 NGO and initiative groups participated in actions;



7

Current achievement:

- more than 50 km of coasts are clean up;


- more than 1 000 kg of marine litter are collected;

8

Current achievement:

- more than 10 000 plastic bottles are recycled.


9

Current problem

- Absence of the uniform analytical center on gathering and the data analysis about quantity and quality of marine litter.
- Insufficient financing on carrying out of this works.

10

Possible decisions:

1. To create a workgroup for ICC programme implementation combining representatives of ISAR-RFE, of Sea Protection Institute, as well as officials of Environment Protection Department of Primorsky Krai Administration;

11

Possible decisions:

2. To approach Nakhodka city Administration with an offer to agree upon a model section for conducting ICC (beaches of Livadiya microdistrict);

12

Possible decisions:

3. To request from RCU support in arranging ICC programmes' implementation in Russian Far East;

13

Possible decisions:

4. To distribute information on ICC programme to all concerned organizations, members of "Living Sea" Coalition, schools, and higher educational institutions with an invitation to join.

14

Conclusion

- Russia will be integrate into the international process of pollution prevention ICC as a result.

15

16

"Marine Litter" PR-project in Far East Russia

Blinovskaya, Ya.Yu.

Sea Protection Institute
Maritime State University named after Admiral G.I. Nevelskoy
50A Verkhneportovaya St., Vladivostok, Russia
tel./fax +7-4232-51-52-70
e-mail: blinovskaya@msun.ru

Far East of the Russian Federation is the only NOWPAP region where marine litter issue tackling is in the making. The results of research have shown that the sources of introducing polluting matter into the sea coastal environment in Japan, Korea, China and Russia are quite different. Thus in the south-western part of Primorsky Krai litter of the "shore" origin is predominating. The major sources of its introduction into the marine environment are enterprises and entities, carrying out their activities on the coast, as well as tourism, represented mainly by spontaneously created tourist camps. Litter of the "sea" origin is dominating in the southern part of the Khasan offshore zone. Broad sandy beaches of this area are polluted mainly in the maximum and middle wave setup zones, while the litter is composed mainly of the articles of foreign origin (e.g., consumer plastics). The fact that marine litter is no longer an aesthetic problem alone but has acquired the significance of an economic and environmental problem, bringing harm to a man's health and safety of life is well-known. But communities in the Russian sector of NOWPAP most often do not perceive that marine litter has grown into a problem of international significance. Not a single environment protection organization has ever been engaged in a wide coverage of marine litter issue in the Far East region. The region peculiarities including not only insufficient awareness of the essence of international problems, non-availability of volunteer corps, location of authorized municipal urban ore dumping grounds on the coast, but also non-availability of waste treatment system, incomprehension of its attractiveness for small businesses put obstacles in the road of introducing vast positive experience gained by neighbouring countries. Taking this into account Sea Protection Institute in collaboration with the initiative group of the "Voice of Taiga" wildlife protection centre are developing "Marine Litter in the Far East of Russia" PR-project.

The main objective of this project is that of raising awareness and its implementation demands achieving the following goals:

- to attract attention of the wide public and to analyze public opinion;
- to identify the allies and to select the partners for the large-scale multipurpose program on identifying a comprehensive solution to marine litter issue;

- to create a data bank of target audience and volunteers;
- to define specific sections of the coast to work with population there and to identify problem zones affecting concerns of the majority;
- to appraise various methods of PR influence upon different target audiences on separate sections of the coast

Among the basic stages of the project implementation one should note:

- developing common strategy and tactics of the campaign;
- interviewing in specified tests-groups;
- manufacturing a small circulation package for each target audience

Thus, one of the top priorities in identifying solutions to marine litter issues in the region is the PR-project implementation, focused not on drawing attention to the issue alone, but on substantiating the ways of solving it as well.

"Marine Litter" PR-project in Russian Far East

Blinovskaya, Ya.Yu., PhdD,
Sea Protection Institute Maritime State University named after Admiral G.I. Nevelskoy, Vladivostok, RF

1

Marine Litter in the Far East of the Russian Federation





2


Marine Litter in Japan
(Mr. TANAKA presentation)


Marine Litter in Korea
(Mr. Jung presentation)


Marine Litter in China
(Dr. HU presentation)


Marine Litter in Russia

3

In the south-western part of Primorsky Krai the "land originated" litter is prevailing




4

The major sources of marine litter introduction




5

«Sea» origin litter




6

Marine litter is a problem

aesthetic *environmental* *economic*



international

7


Not a single environment protection organization has ever been engaged in a wide coverage of marine litter issue in the Far East region.


8

Features of region put obstacles in the road of introducing vast positive experience gained by neighbouring countries



9

«Marine Litter in the Far East of Russia» Public relations project

=

Sea Protection Institute Maritime State University named after admiral G.I. Nevelskoy

+

wildlife protection centre **«Zov Taigi»**

+

ISAR - Russian Far East

+

. . .

10


The **main objective** of this project is that of raising awareness


11

Project goals

➢ to attract attention of the wide public and to analyze public opinion

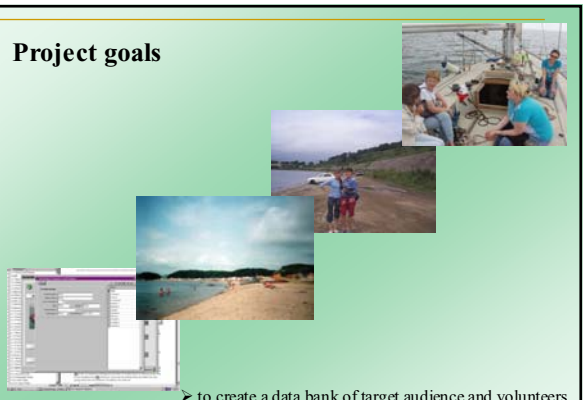
12

Project goals

➢ to identify the allies and to select the partners for the large-scale multipurpose program on identifying a comprehensive solution to marine litter issue

13

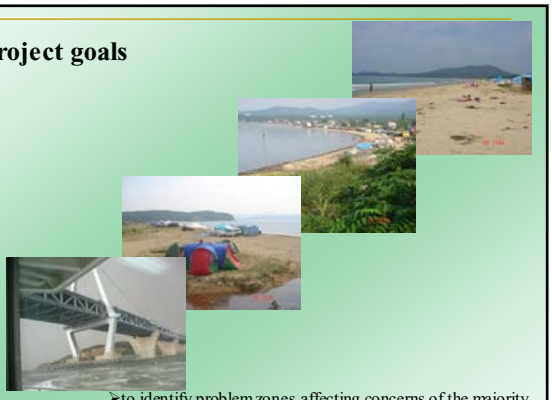
Project goals



➢ to create a data bank of target audience and volunteers

14

Project goals



➢to identify problem zones affecting concerns of the majority

15

Project goals

➢ to appraise various methods of PR influence

16

The basic stages of the project

✓ developing common strategy and tactics of the campaign

17

The basic stages of the project

✓ interviewing in specified tests-groups

18

The basic stages of the project

✓ manufacturing a small circulation package

19

One of the top priorities in identifying solutions to marine litter issues in the region is the PR-project implementation

20

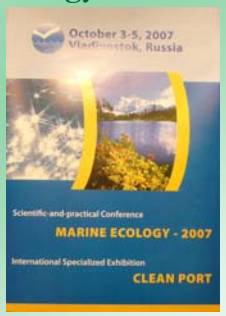
Welcome to the International Conference "Marine Ecology-2007"

October 3-5, 2007, Vladivostok

Contact information:

e-mail: morec@msun.ru

web: exconf2007.msun.ru
will be available from April



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thank you for attention!

☺ ☺ ☺

22

Session 5

Marine litter management policies and systems

The situation and management of solid waste in China

PEI Xiangbing, HU Linlin

Marine Division, State Environmental Protection Administration & Environmental Standard Institute, Chinese Research Academy of Environmental Science
No.115 Xizhimennei, Nanxiaojie, Beijing, 100035, P.R. China
Tel: +8610-66556276, Fax: +8610-66556272
E-mail: pei.xiangbin@sepa.gov.cn

1.General Situation

In 2005, 1.34 billion tons of industrial solid wastes were generated across the country, up by 12.0% against the previous year while the discharge of industrial solid wastes was 16.547 million tons, down by 6.1% compared with that of 2004. The amount of industrial solid wastes under integrated reuse totaled 770 million tons, resulting in an integrated utilization rate of 56.1%, same level as that of the previous year. And in 2004, 1.20 billion tons of industrial solid wastes were generated across the country, up by 20.0% against the previous year while the discharge of industrial solid wastes was 17.920 million tons, down by 7.7% compared with that of 2003. The amount of industrial solid wastes under integrated reuse totaled 680 million tons, resulting in an integrated utilization rate of 55.7%, same as that of the previous year.

And from 1981 to 2003, the collected urban domestic solid waste increased from 31.32 million tons to 148.57 million tons, with a up rate about 8.64%. The disposal amount was relatively low, for example, in 2002, the disposal amount of urban domestic solid waste was 74.044 million tons. Till the year of 2003, there were 575 urban domestic solid waste disposal plant in China in total amount.

2.Countermeasures and Actions

2.1 Development of Relevant Laws, Regulations and Standards.

On April 1st of 2005, the Law of the People's Republic of China on the Prevention and control of Environmental Pollution by Solid Wastes was put into effect. The SEPA also issued the Measures on the Prevention and Control of Environmental Pollution Caused by Abandoned Hazardous Chemicals, released the environmental protection control standards for 12 types of imported solid wastes as raw materials after necessary revision and formulated and released the environmental protection control standards for imported solid wastes as raw materials—compressed piece of scrap automobile.

In 2005, the General Administration of Quality Supervision，Inspection and Quarantine worked out and issued the notice on the prohibition of the regeneration of kinescope from waste glass under the joint efforts with SEPA and other relevant departments. Besides, the Ministry of Commerce, General Administration of Customs and the SEPA jointly released No. 105 Notice on the prohibition of the processing and trading of certain commodities, banning the processing and trading of 16 types of imported wastes including waste and scrap copper.

2.2 Environmental Management on domestic wastes

Strengthening the environmental management for domestic wastes is a systematic work and needs efforts in many aspects. Paritcularly the people's above county level are legally responsible for the unified arrangement and promotion of domestic waste reduction, beneficial and harmless treatment. This work should be raised to the important agenda to push the establishment and completion of the social service system for controlling pollution due to domestic waste from multi-aspects and multi-angles. Urban domestic waste treatment needs the unified planning, investment increase, policy perfection, technical demonstration, reform deepening, supervision strengthening, acceleration of construction for treatment facilities and continuous improvement of the level of urban waste reduction, beneficial and harmless treatment under the guidance of scientific development outlook and for the purpose of safeguarding the people's health and environmental safety.

A total of 3.11 billion m2 road area were under regular cleanup during 2005, 660 million m2 of which was cleaned by mechanic means, taking up 21.11% of the total area, up by 3.1 percentage points than 2004. The amount of domestic refuse and excrement cleared and transported away in 2005 totaled 195 million tons. In medium and large sized cities, daily refuse and excrements could be basically cleared away on the same day as they are produced. Till 2005, each province of China has its waste solid management center, providing a professional management strength to the local government.

Due to the requirement of the National Eleventh Five-Year Plan, the rate for harmless treatment of urban domestic wastes should be no less than 60%.

2.3 Environmental Management on Medical Wastes

The National Plan for Hazardous Wastes and Medical Wastes Disposal and Treatment is one of the key projects for China, and till now 19 Newsletters have been published for public knowledge. In the National Eleventh Five-Year Plan, Hazardous Wastes and Medical Wastes Disposal and Treatment is still be one of the key projects.

In 2005, teamed up with the Ministry of Public Health, SEPA conducted another round of special investigation on the management and disposal of medical wastes based on the similar checkup initiated in 2004. The two ministries jointly released the Circular on Some Issues Concerning the Classification of Medical Wastes in a bid to further step up and standardize the management of medical wastes. SEPA issued some related standards including the Technical Specification on the Project Construction of Centralized Incineration Disposal of Medical Wastes.

2.4 Prevention and Control of Pollution from Electronic and imported Wastes

Under the concerted instruction of the SEPA, NDRC and Ministry of Information Industry, Guangdong Provincial Environmental Protection Bureau asked Shantou Municipal Government to compile the Planning of the Industrial Demonstration Park on the Integrated Utilization of Waste Electric Appliances, thus stimulating the work on the prevention and control of environmental pollution from electronic wastes in Guiyu Town of Shantou City, Guangdong Province.

In 2005, SEPA distributed the Circular on Furthering the Administration Regarding the Examination and Approval of Imported Waste Steel amid its efforts to better the examination

and approval as well as management work of imported waste steel. On October 10, SEPA began to get access to the electronic port network of various customs in its 57 examination and approval of wastes import. Such a move have increased its work efficiency and strengthened the macro regulation of government department.

In an effort to reinforce the check and approval of designated enterprises to process and utilize waste hardware electric appliances, waste wires and cables and waste electric motors, SEPA had altogether designated 502 such enterprises (in 3 groups) for 2005 in 28 provinces and municipalities in 2005. Besides, SEPA also intensified the check and approval of mported wastes and the supervision and administration of enterprises engaged in the processing and utilization of such wastes. In 2005, the Administration had dispatched over 40 person/times for site inspection on over 70 enterprises in 20 provinces and found out more than 300 fake certifications accordingly.

The work on “zoned management” on imported wastes was further promoted. In August of 2005, SEPA published the Technical Specification on the Environmental Protection Regarding the Centralized Dismantlement and Utilization of Waste Electric Motor. Correspondingly, various provinces and autonomous regions like Shandong, Hebei and Guangxi all initiated the construction of processing parks of imported wastes, and Jiangsu Province unfolded its construction of the pilot zone on the dismantlement of compressed piece of scrap automobile.

References

1.The National Eleventh Five-Year Plan of China. The State Council, 2006.
2.2005 Report on the State of the Environment in China. SEPA.
3.Environmental management for urban domestic wastes in China. Fan Yuansheng, Environmental Economy(in Chinese). Vol. 22, 2005.
4.Present situation of and problems existing in the urban domestic waste treatment in China. Wang Qi, Environmental Economy(in Chinese). Vol. 22, 2005.

Protection coastal and marine Environment from land-source Solid Waste In China

Pei Xiangbin

Marine Environmental Protection Division,
Department of pollution control
State Environmental Protection Administration (SEPA)

Main Authorities concerning Marine Environmental protection

- SEPA, Maritime Safety Administration (MSA), State Oceanic Administration (SOA), Ministry of Agriculture (MA) etc.
- The SEPA, as a department to make unified supervision and administration over nationwide environmental protection directly under the State Council, is in charge of guidance, coordination and supervision of nationwide marine environmental protection, and is responsible for prevention and control of land-based pollution and administration of coast environment protection.
- Local governments have main responsibility for the environmental quality of coastal zones.

Main Law and Regulations related to marine litters

- The Marine Environmental Protection Law of the People's Republic of China;
- The Law of the People's Republic of China on prevention and control of Environmental Pollution by Solid Waste;
- Regulations of the People's Republic of China Concerning Management of Medical Wastes;
- Regulations of the People's Republic of China Concerning urban sanitation and environment;
- The Measures on prevention and control of Environmental pollution caused by abandoned hazardous chemicals.

National Plan

- National Plan for Disposal and Treatment of Hazardous wastes and Medical Wastes;
- National Plan for Harmless Treatment of city domestic solid wastes.
  - According to the National Eleventh five-year plan, the rate of harmless treatment of city domestic solid wastes will reach to 60%.
- Key Basin plans for Prevention and control of pollution.
- Action plan for coastal and marine environmental Protection.

Institutional Arrangement

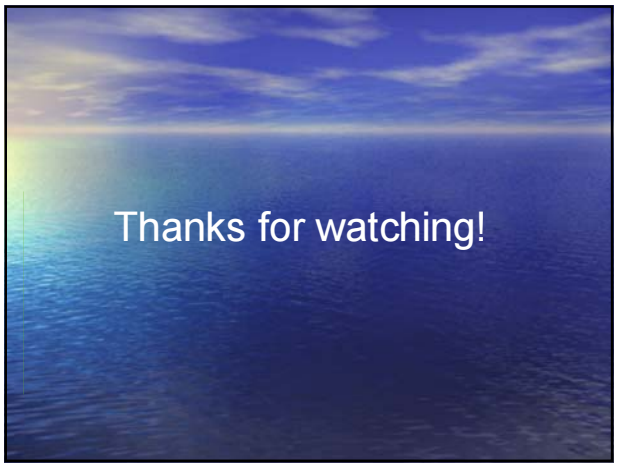
- National-level center of solid waste management has been set in order to promote recycling, reusing, and reducing solid waste.
- Similarly, Provincial-level centers have been established. Up to 2005, each province of China has its solid waste management center;
- A lot of cities have set up the centers of solid waste management.

Capability Building at city-level

- Domestic solid waste treatment Facility;
- Hazardous Chemical disposal and treatment facilities;
- Medical waste disposal and treatment Facilities.


Enforcement and Compliance
SEPA in collaboration with relevant Authorities, such as Maritime Safety Administration (MSA), State Oceanic Administration (SOA), Ministry of Agriculture (MA) etc. conducted legal Compliance Inspection.
Ministry of Public Health and SEPA conducted special inspection of medical waste disposal.


Outreach
Promoting multi-sectoral participatory actions in marine litter cleanup;
Raising awareness to protect coastal and marine environment from solid waste pollution;
Publishing information on prevention and control of Environmental pollution caused by solid wastes;
Training in solid waste management.


Thanks for watching!

Policies and Measures by the Government of Japan against Marine Litter

Kentaro TOMINAGA

Global Environmental Issues Division, Global Environment Bureau, Ministry of the Environment
1-2-2, Kasumigaseki, Chiyoda-ku, Tokyo, 100-8975 Japan
Tel: +81-3-5521-8245, Fax: +81-3-3581-3348
E-mail: kentaro_tominaga@env.go.jp

1. Introduction

In these years, concerns about marine litter have been growing in Japan. Degradation of coastal functions, aggravation of the marine environment including ecosystems and landscapes, and bad influence to safe navigation of ships and to fisheries, are often pointed out.

Coast management is basically one of the duties of local governments, but, in the case of areas where much marine litter is drifted on shore, it causes a big burden for the local governments to cope with. In such cases, local governments express their desire to take appropriate measures taken by central government for reducing their technical and financial difficulties.

Within the government, relevant ministries and agencies established a Director-General level meeting in order to discuss possible immediate measures. The meeting published the results of discussion in March 1, 2007.

2. Overview of Marine Litter and the Countermeasures

Owing to strong tides around Japan and a strong west wind in winter, marine litter is washed away and ashore on the coasts of Japan, especially northwestern coasts in Mainland, western coasts in Kyushu and the Southwest Islands. Marine litter causes bad influence to marine landscapes, cleanliness of coastal areas, sightseeing and inshore fishery.

Since mid 2005, medical wastes have been washed up on the northwestern coasts in Mainland and western coasts in Kyushu, which was widely reported in Japanese media. Such waste would cause a puncture wound or an infection as well. To early solve this problem, it is necessary to grasp the situation, exchange of information with neighboring countries through diplomatic channels and analyzing a source and its routes.

Concerning the coastal management, as local governments take basic responsibility for the coastal management, they take countermeasures such as:

- Activities of municipalities for transportation, temporary storage and disposal of marine litter.
- Collection of marine litter with a partnership of private sectors, NGOs and volunteers.

Some local governments or municipalities answer that measures against marine litter are much beyond their capacities for normal coastal management.

In the Government, several ministries and agencies have responsibility for measures against marine litter. It was strongly requested to have a framework for considering the governmental policy, which was established in April 2006. And in this stream, the government held a unified conference with relevant ministries and local governments for information sharing about their countermeasures. Through such opportunities, the problems came to light, such as, importance of pollutant control at national and international level, needs for financial support, demands of care in case of disasters, and requests for support to volunteer activities

3. Policies and Measures of the Government

As mentioned above, the Government established a Director-General level meeting in April 2006 in order to discuss more effective measures against marine litter. Relevant ministries and agencies - the Cabinet Office, Ministry of the Environment, Ministry of Land, Infrastructure and

Transport, Japan Coast Guard, Meteorological Agency, the Fisheries Agency, Ministry of Foreign Affairs, Ministry of Internal Affairs and Communications - participate in the meeting. It has held four times. Through this meeting, they exercised information sharing of their policies and measures, preparation of the budget of FY 2007, etc. And in March 2007, the government policies and measures against marine litter took shape.

(1) Grasp of the state of marine litter:

Observation of drifting marine litter by Meteorological Agency; classification of marine litter at opportunities of coastal cleanup by Japan Coast Guard; prediction technique of the route of marine litter by Ministry of the Environment

(2) Control of the sources:

- Domestic actions

cleaning activities and prevention of illegal dumping in riverbeds, collection of marine litter and oil within harbors by Ministry of Land, Infrastructure and Transport; reduction and support for disposal of fishery materials and the removal of sediment by Fisheries Agency; reduction of packing waste by Ministry of Economy, Trade and Industry;.

- International actions

TEMM, NOWPAP, cleaning campaign by Ministry of the Environment and Ministry of Foreign Affairs.

(3) Support to the local governments which faces remarkable damage caused by marine litter:

- Financial support:

Each ministry or agency has some options to support the areas, such as, ports and harbors by Ministry of Land, Infrastructure and Transport and the Fisheries Agency; Ministry of the Environment has a viewpoint of the disaster waste and material cycle;

- Research:

Research for more efficient and effective measures of waste disposal by Ministry of the Environment including cooperation development among relevant ministries and agencies; Settlement of coastal management policy for safe utilization of coasts by Ministry of Land, Infrastructure and Transport; Research for specifying sources and causes of marine litter by Japan Coast Guard;

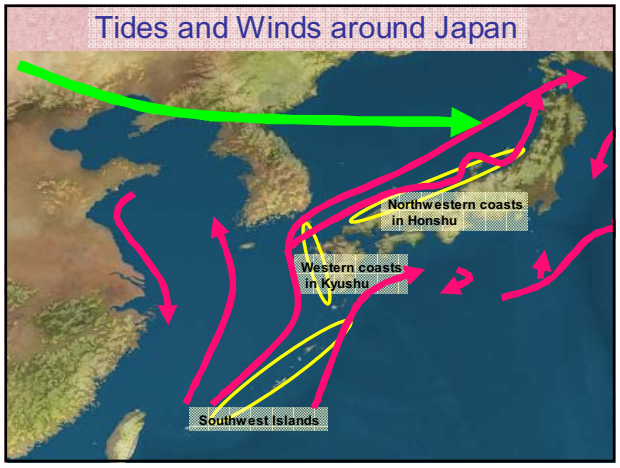
- Technology development:

Subsidies for technology development for disposal of marine litter, like wastes containing salt, by Ministry of the Environment.

4. Forward Look

Marine litter is the problem which confronts us and which we should continuously deal with. Forward look for related matters would be needed, such as:

- a follow-up of the implementation of policies and measures;
- reinforced cooperation among public sector and private sector, with exchange of information;
- need of a national framework for marine litter management with proper role and responsibility of actors;
- further investigation of sources, accumulation of data, analysis of the pollutant;
- increase of public awareness through various activities
- continued relationship of cooperation among neighboring countries, with framework of NOWPAP



Coastal Management

- Local Governments take basic responsibility for the coastal management.
  - Transportation, temporary storage and disposal of ML
  - Collection of ML

Such measures are much beyond the capacities of some municipalities

For the areas much marine litter is drifted on shore...

- Central Government established in April 2006 a Director-General level meeting to discuss possible immediate measures.

And a unified conference with local governments in last Oct.

Policies and Measures of the Government

Director-General level meetings

The Cabinet Office
Ministry of Internal Affairs and Communications
Ministry of Foreign Affairs
Fisheries Agency
Meteorological Agency
Ministry of Land, Infrastructure and Transport
Japan Coast Guard
Ministry of Economy, Trade and Industry
Ministry of the Environment

They exercised Information Sharing, Preparation of the Budget, etc

The meeting published the results of discussions in 1st March 2007

Policies and Measures of the Government

(1) Grasp of the state of ML

- Observation of drifting marine litter by Meteorological Agency
- Classification of marine litter at opportunities of coastal cleanup by Japan Coast Guard
- Prediction technique of the route of marine litter by Ministry of the Environment

Policies and Measures of the Government

(2) Control of the Sources

- Domestic actions
  - Cleaning activities and prevention of illegal dumping in riverbeds, collection of marine litter and oil within harbors by Ministry of Land, Infrastructure and Transport
  - Reduction and support for disposal of fishery materials and the removal of sediment by Fisheries Agency
  - Reduction of packing waste by Ministry of Economy, Trade and Industry
- International actions
  - TEMM, NOWPAP, cleaning campaign by Ministry of the Environment and Ministry of Foreign Affairs.

Policies and Measures of the Government

(3) Support to the local governments which face remarkable damage caused by marine litter

- Financial support:
  - Each ministry or agency has some options.
    - Ports and harbors by Ministry of Land, Infrastructure and Transport and the Fisheries Agency; Ministry of the Environment has options with a viewpoint of disaster waste and a material cycle;
- Research :
  - Ministry of the Environment : Research for more efficient and effective measures of waste disposal including cooperation development among relevant ministries and agencies;
  - Ministry of Land, Infrastructure and Transport : Settlement of coastal management policy for safe utilization of coasts;
  - Japan Coast Guard : Research for specifying sources and causes of marine litter;
- Technology development:
  - Ministry of the Environment : Subsidies for technology development for disposal of marine litter, like wastes containing salt.

Forward Look

- a follow-up of the implementation of policies and measures;
- reinforced cooperation among public sector and private sector, with exchange of information;
- need of a national framework for marine litter management with proper role and responsibility of actors;
- further investigation of sources, accumulation of data, analysis of the pollutant;
- increase of public awareness through various activities
- continued relationship of cooperation among neighboring countries, with framework of NOWPAP

Thank you for your attention

National Action against Marine Litter in Korea

Won-Tae Shin

Marine Environment Division, Marine Policy Bureau

Ministry of Maritime Affairs and Fisheries, RO Korea

Tel: +82-2-3674-6545

140-2 Gye-dong, Jongno-gu, Seoul 110-793, Republic of Korea

wtshin@momaf.go.kr

1. Introduction

With the help of the active public relations activities of international organizations, the marine litter issue is commonly understood as a worldwide problem and needs joint efforts of global society. International organizations such as IMO, UNEP, and GPA among others, stressed the negative impact of the marine litter to marine ecosystem. According to the publication of UNEP[1] in 2005, approximately 6.4 million tones per year of marine litter is thrown into ocean globally and over 13,000 pieces of plastic litter are floating on every square kilometer of ocean surface. This is an overwhelming phenomenon that requires immediate action against it.

Korean government has been well aware of the marine litter problem since the inception of the Ministry of Maritime Affairs and Fisheries (MOMAF) in 1996. The inception of MOMAF acted as a firm foundation and the starting point for the action against the marine litter due to its integrated functions and responsibility for ocean. With the strong institutional framework internally, Korea became a world's leading country in marine litter policy. Although brief, UNEP (2005) introduced and highlighted the Korean government's national actions against marine litter in its publication[1].

In this presentation, it is the intention of author to introduce the profound and broad National Action against marine litter of Korea.

2. National Action

Korean government led by MOMAF took a holistic approach to tackle marine litter issue since 2000. The holistic approach of National Action includes Source Management, Sectoral Management, Monitoring, Public Awareness, Recovery and Disposal, International Cooperation, and Legal Framework Renovation.

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[1] Marine Litter, An analytical overview, UNEP 2005

The major stakeholders involved in these actions are central government, local government, residents, NGOs, and international entities such as NOWPAP, COBSEA, among others.

Government support for these actions comes from mainly MOMAF. MOMAF allocated a sum of 15.65 Billion Won (equivalent to USD 16.6 Million) in 2007 fiscal year. Other ministries such as Ministry of Environment (MOE), Ministry of Construction and Transport (MOCT), local governments, private sectors also secured financial resources to tackle the marine litter. Although the total sum of these funding is not available at the current stage, author believe that the amount of funding for National Action will be much larger than MOMAF's funding alone.

The following is the brief contents of activities of National Action.

- **Source management**
  - Fisheries sources: aquaculture buoy, fishing gears, chemical application can
  - Maritime vessels: shipboard garbage etc.
  - Land-based sources: municipal garbage, agricultural waste, etc.

- **Legal Framework Renovation**
  - Fisheries Ground Management law: waste fishing gear disposal is illegal, entry into force in December 2008.
  - Marine Environment Protection law: incorporating MARPOL Annex 5

- **Sectoral Management**
  - Local community committee: joint efforts by local governments, NGOs, private sectors, residents, etc.
  - Inter-ministry negotiation: MOMAF, MOE, National Emergency Management agency (NEMA), etc.

- **Recovery and Disposal**
  - Recovery Technology: Styrofoam volume reduction, floating fence, etc.
  - Recovery Ship building: State-of-the-art all-in-one multifunction marine litter recovery and disposal vessel (newly funded project starting in 2007)
  - Fishing gear recovery and purchase: implementing purchasing project by two MOMAF associated institutions: Korea Marine Pollution Response Corporation (KMPRC) and Korea Fisheries Infrastructure Promotion Association (KFPA)

- **Monitoring**

- Government funded monitoring: Korea Marine Rescue Center (KMRC) for coastal area and foreign-born litter survey, Korea Ocean Research and Development Institute (KORDI) for litter in harbors.
- ICC monitoring: KMRC hosts the event and collects ICC data card

- **Public Awareness**
  - ICC event, Collection manuals, etc
  - Workshops and Publications
  - Media advertisement broadcasting regarding marine litter
  - NGO supports

- **International Cooperation**
  - With neighboring countries: NOWPAP, COBSEA, PEMSEA, Joint Committee for Environmental Cooperation with PR China and Japan
  - Global Efforts: GPA, Basel, London, UNEP, IOC, FAO

3. Conclusion and Recommendation

As described above, Korean government is very active and aggressive in combating marine litter. MOMAF believes that the tangible results and the effects of "Nation Action against marine litter" are producing and spreading throughout country after 6 years of marine litter campaign. These results are sensational not only to Korea, but also to the global community, who has keen eye on the marine litter issue.

As a world's leading country in marine litter policy, MOMAF is sure that more dramatic success story will be producing in near future.

Although Korea has many success stories in preventing marine litter, there are cases that remain unsolved and untouched. These are marine litter caused by natural disasters such as flooding, Typhoon, Tsunami, etc. As data indicated, most of the land-based litter in Korea is produced in the time of Typhoon and heavy rain season. Korea's major rivers have dikes in the estuary and the litters are collected at the river mouths.

In this light, the following recommendation can be drawn in this presentation.

1. International efforts should be addressed more intensively since the marine litter issue is not one country's matter. It is a global agenda.
2. Marine litter preparedness and response system in time of disaster should be developed.

3. Grass root movement by private sectors such as local communities, NGOs, etc should be more active. Governmental control over marine litter has certain limit. It is more citizens' responsibility than government's.
4. Powerful policy measures and legal instruments should be developed to support the prevention of marine litter.

Korea will keep enhancing national capacity toward the prevention of marine litter by effectively implementing the National Action of Korea. Think Globally, Act Nationally. End.

2nd NOWOPAP Marine Litter Workshop

National Action against Marine Litter:

- a holistic approach by the Republic of Korea -

Ministry of Maritime Affairs and Fisheries

Ministry of Maritime Affairs and Fisheries

2nd NOWOPAP Marine Litter Workshop

Issue Raising

- ✓ Fairly successful due to MALITA activities in NOWPAP region
  - Influence to China, Russia
  - East Asian Seas (COBSEA, PEMSEA)
- ✓ Sustained efforts necessary
  - NOWPAP MALI
  - other activities more to come

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2nd NOWOPAP Marine Litter Workshop

Contents

Ministry of Maritime Affairs and Fisheries

2nd NOWOPAP Marine Litter Workshop

Bilateral Discussions between Korea and Japan

- ✓ Presidential meeting ('03)
- ✓ TEMM ('05)
- ✓ 1st MOMAF-MLIT Marine Environment meeting ('05.11)
- ✓ 9th Korea-Japan Environment Joint Committee meeting ('06.2)
- ✓ Director level meeting ('06.9)
- ✓ Presidential meeting ('06)
- ✓ 2nd MOMAF-MLIT Marine Environment meeting ('06.11)

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2nd NOWOPAP Marine Litter Workshop

I. Myth about Marine Litter

- ✓ We know lots about it now, at least within NOWPAP region
  - 3 workshops ('05, '06, '07)
  - 2 ICC events ('06 Yamagata, '07 Busan)
- ✓ World is getting familiar with it
  - UNEP RSP
  - GPA, MARPOL, FAO, TOC, etc.

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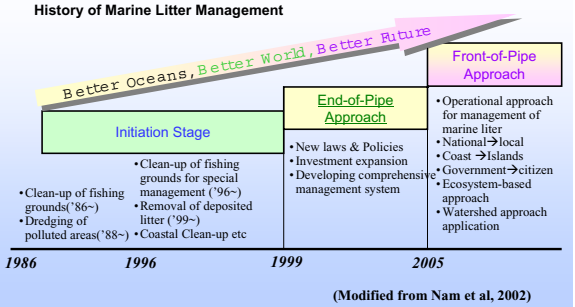
II. National Action against Marine Litter

History of Marine Litter Management



(Modified from Nam et al, 2002)

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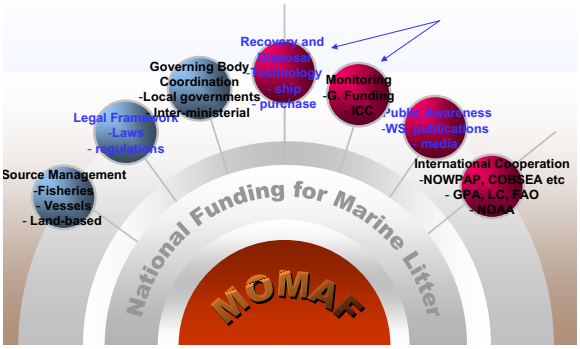
Holistic Approach to Marine Litter



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III. Fisheries Sector Efforts

✓ **Fishing Gear**

- Fisheries Ground Management Act(2000) prohibits abandoning and littering of fishing gears (amended : Dec 2006, entry into force : Dec 2008)
- Tagging of fishing gear is on going

✓ **Float**

- Set standard by Fisheries Ground Management Act(2000)
- currently focuses on the prevention of breakage of float

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Current Approach of National Action

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Fisheries Sector Efforts

✓ **Poly Tank**

- widely used in laver culture
- Poly Tank recovery
  - ~90% recovered ('01)
- Education and Public relations are on going

More works need to be addressed for Fisheries source management

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Next Generation of National Action

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Public Relations Example

✓ **Example of one media broadcasting**

✓ **Once a year campaign**

✓ **Synopsis**

A lady is sending a letter in a bottle in search of a good guy.

An ugly guy approaches to her showing how bad thing to throw bottle into ocean. Marine litter cases are showing.

She understood the negative impact of marine litter.

He found another lady throwing bottle. He chases her.

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IV. Summary and Recommendations

- ✓ **International efforts should be addressed more intensely**
  - example, MOMAF-NOAA on GPA cooperation in addition to current activities
- ✓ **Marine Litter preparedness and response system in time of natural disaster should be developed**
  - Typhoon, flooding, etc
- ✓ **Grass root movement should be more active**
  - Government control and funding has certain limit on marine litter implemetation
- ✓ **Powerful policy and legal instruments should support the National action**

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2nd NOWOPAP Marine Litter Workshop

Advertisement

E X P O 2012
YEOSU KOREA

- ✓ **Theme : "The Living Ocean and Coast: Diversity of Resources and Sustainable Activities"**
- ✓ **May 12 to August 12 in 2012 at Yeosu, Korea**

Support from NOWPAP member countries for hosting the Expo is highly appreciated !

Ministry of Maritime Affairs and Fisheries

Good things happen when Good people and Good intention Encounter !

You are witnessing the good thing happening in this Workshop!!!

MALITA Programme Implementation: Organizational Aspects of Effort Consolidation

Moninets, S.Yu.

Sea Protection Institute
Maritime State University named after Admiral G.I. Nevelskoy
50A Verkhneportovaya St., Vladivostok, Russia
tel./fax +7-4232-51-52-70
e-mail: moninets@msun.ru

MALITA programme implementation being started it has allowed to commence coordination of NOWPAP participating countries' work in finding a solution to a very pressing issue of polluting sea water areas with marine litter. As it has been already noted in reports by Russian experts for the RF Far East regions the problem of polluting the sea with litter is less topical than it is for the other NOWPAP participating countries. Among the reasons for this are smaller concentrations of population in the Russian Far Eastern territories and a decline in industrial manufacturing experienced in the 1990-s.

In the meantime the RF President and Government's attitude to the development of tourism areas in the Far East of Russia is well-known. Russia's initiative as to holding APR nations' summit in Vladivostok in 2012 and constructing a game zone of "Russian Las Vegas" in its vicinity falls within the same tideway. The prospects for the development of the southern part of Primorsky Krai are impressive and at the same time they impose certain obligations not only in respect of paying greater attention to the current state of ecology in the sea coastal areas accommodating most of recreational facilities but also in elaborating measures to solve environmental problems under the circumstances of the region's tremendous advance.

Activities in preventing the sea pollution with litter were carried out in Russia even before MALITA programme was started but those had been based on the standards of the Soviet time [report 1 on activity 6] and therefore they used to be and still are inefficient. Among a variety of causes for that state of things there the following:

- non-availability of an operating system of monitoring and revealing major sources of sea pollution;
- poor supervision of the system of receiving refuse and garbage from ships calling at Russian ports;
- lack of a mechanism for public influence upon municipal authorities in environment protection issues;

· lack of budget financing of environmental programmes.

The latter was partly accounted for by the non-availability of any organizations capable of carrying out large-scale environmental programmes.

In the Far East of Russia there have functioned and are currently functioning a lot of non-governmental organizations which have repeatedly been reported by Russian representatives in their presentations at NOWPAP events. These organizations attempted to attract public attention to the sea pollution issue, and, thereby, to exert influence on the agencies of local self-government, to impel them to take real actions for the enhancement of the environment within the region.

Thanks to newly acquired development prospects for the region, and, in many respects, thanks to the efforts taken by non-governmental organizations and research institutions, agencies of government in Primorsky Krai and Sakhalin Oblast have begun to pay more regard to environmental issues.

For instance, Sakhalin Oblast is on the list of pioneers in launching a territory oil spill response system and introducing a civilized waste management system in our country.

In Primorsky Krai "Waste" target-oriented programme has been initiated for the years of 2005-2010. An interdepartmental commission for coordinating and ensuring accord in activity of the executive agencies of the state power, the agencies of local self-government, research institutions, specialized nature protection companies and water body users has been established. The said measures make it possible to rectify the system of control on the part of the state for nature resource users' compliance with nature protection law requirements which suffered a considerable deterioration during "perestroika" years. In 2006 Primorsky Krai Administration sponsored and conducted "Nature Without Boundaries" First International Ecology Forum which addressed quite a number of issues relating to marine ecosystem protection and nature harmonious exploitation system development in coastal waters. A similar conference is scheduled for June 2007.

With MALITA programme launch a united informational and organizational space for finding solution to the sea pollution problem has started to take shape. In March 2006 the first workshop on marine litter issues was conducted to have provided for a discussion of the prospects for MALITA programme implementation within Russia's territory. The workshop was attended not only by environmentalists and representatives of non-governmental organizations but also by officials from governmental agencies. The workshop participants could enjoy an opportunity to familiarize themselves with NOWPAP structure and MALITA programme. The meeting proved to be extremely useful and served as a starting point for the unification of ef-

forts of all concerned. There was formed a team of people of marked initiative who set to performing some of the MALITA activities.

1. Within the framework of activity 6 the "Review of national legal instruments and programmes provided by Russia in order to identify gaps and needs in the coverage of ML" was prepared.
2. Monitoring surveys into the extent of littering the coastlines in the south of Primorsky Krai, of the Island of Sakhalin, and of some parts of Khabarovsk Krai coast in the Tatar Strait were performed. Survey results were made public through reports and through presentations at the 1st NOWPAP Workshop on Marine Litter, June 2006, Incheon, Repbulic of Korea.
3. Technique of monitoring litter floating on the sea surface was perfected. The "Rif" yacht of Sea Protection Institute was made use of for the purpose.
4. Coastline cleanup actions were conducted in various parts of Primorsky Krai and Sakhalin Oblast coasts of recreational value.
5. Preparations are being made for conducting ICC action in Russia. A specific part of the coast is being selected and a source of funds is being sought out.
6. "City by the Sea" project has been started for the purpose of attracting wide circles of high school students to the study of marine ecosystems. A contest of papers will be conducted and by the contest results the best ones will be awarded.
7. Designing a teaching and methodical multimedia complex for high school students has been commenced, intended for the use by teachers of Russian Far East in conducting courses in ecology. The syllabus envisages several modules, and the first ones to be designed and saturated with multimedia demonstration material are the modules devoted to sea pollution with litter and oil.

Projects' outcomes and advancements were reported at the second workshop on marine litter issues held on March 1, 2007. Its materials are available in the bulletin published.

However, it is the third international scientific and practical conference "Marine Ecology-2007" that will be the most significant event of 2007, sea pollution traditionally being one of its major directions. Simultaneously "Clean Port" specialized exhibition is scheduled for the purpose of presentation of modern technologies in harbour waters' pollution prevention and cleanup. All the above-mentioned events will be held on the Maritime State University (Vladivostok) campus on October 3-5, 2007. The event of the kind was previously conducted in October, 2005, and then it demonstrated that there's a great concern on the part of maritime and governmental agencies and authorities.

A summary of the work done by MALITA programme at the Russian Federation territory will be made at “Marine Ecology 2007” Conference.

Thus, the efforts undertaken in the Russian Federation within the framework of MALITA programme are primarily aimed at forming of public position of the region’s residents in marine litter issue. It should be regretfully noted that there is an insufficient support of non-governmental organizations’ efforts in marine litter issue on the part of local authorities.

Maritime State University

Sea Protection Institute

MALITA Program Implementation: Organizational Aspects of Effort Consolidation

Presented by

SERGEY MONINETS

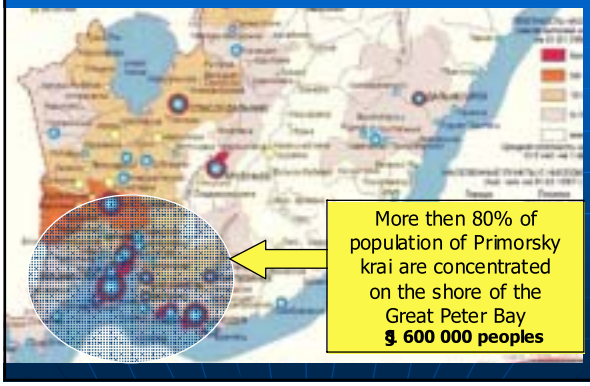
March 28-29, Toyama, Japan

Conclusions

The rating of ML Sources for the RF Far East

#	ML Source	Urgency
1	Municipal sewage	Very promptly
2	Waste dump	
3	Fishing instrument	Promptly
4	Sunk vessels and ammunition	
5	Shipping	
6	Navy fleet	
7	Tourism	Current work
8	Pleasure craft	
9	Others	

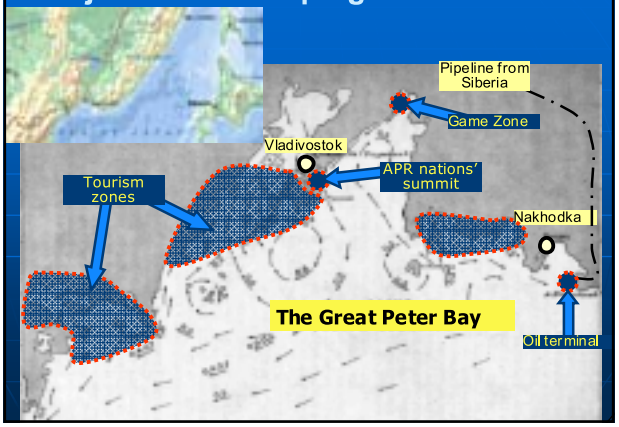
The most populated area on Russian Far East



Projects of developing of RF Far East

- Developing the biggest on the Far East tourism zone;
- Carrying out of APR nations' summit in Vladivostok in 2012;
- Creation the biggest on the Far East National Pacific University Center
- Constructing the oil pipeline from Siberia and the biggest in Russia oil terminal in Nakhodka bay (80 millions tons of oil per year)
- Constructing a game zone so called - "Russian Las Vegas" in vicinity of Vladivostok.

Projects of developing of RF Far East



Problems

- Lack of effective system of monitoring and revealing of sources of pollution;
- poor supervision of the system of receiving refuse and garbage from ships calling at Russian ports;
- lack of a mechanism for public influence upon municipal authorities in environment protection issues;
- lack of budget financing of environmental programs.

Sakhalin oblast

- Launching a territory oil spill response system
- Developing civilized waste management system

Primorsky krai

- Initiating "Waste" target-oriented program for the years of 2005-10
- Establishing the interdepartmental commission on clearing water areas of ports of Primorsky Krai
  - Coordination of activity of the state nature protection bodies, institutions of local government, the scientific organizations, the specialized nature protection companies and ports.
  - Restoration of the system of control on the part of the state for nature resource users' compliance with nature protection law requirements.

1st workshop on marine litter issues

Vladivostok, March 2005

Activities

- Within the framework of activity 6 the "Review of national legal instruments and programs provided by Russia in order to identify gaps and needs in the coverage of ML" was prepared (Under guide of DINRAC).

Activities

- Monitoring surveys into the extent of littering the coastlines in the south of Primorsky Krai, of the Island of Sakhalin, and of some parts of Khabarovsky Krai coast in the Tatar Strait were performed.

Activities

- Technique of monitoring litter floating on the sea surface was perfected.

Activities

- Coastline cleanup actions were conducted by NGO's in various parts of coasts of recreational value.
- Preparations are being made for conducting ICC action in Russia.

Activities

- "City by the Sea" project has been started for the purpose of attracting wide circles of high school students to the study of marine ecosystems.
- Designing a teaching and methodical multimedia complex for high school students has been commenced, intended for the use by teachers of Russian Far East in conducting courses in ecology.

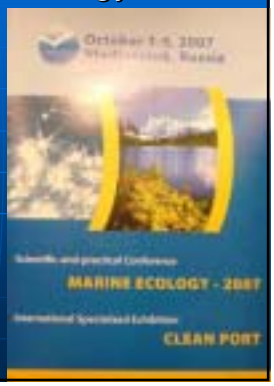
Welcome to the International Conference "Marine Ecology-2007"

October 3-5, 2007, Vladivostok

Contact information:

e-mail: **morec@msun.ru**

web: **exconf2007.msun.ru**
will be available from April



Session 6

Regional actions against marine litter

Marine Litter in the Seas of East Asia: Regional Review and Development of a Regional Strategy and Action Plan

Steve Raaymakers

EcoStrategic Consultants
PO Box 968, Edge Hill, Qld 4870, Australia
61-07-4053-5560
www.eco-strategic.com

The United Nations Environment Programme (UNEP) Regional Seas Programme and the Coordinating Body for the Seas of East Asia (COBSEA) are undertaking a Regional Review and developing a Regional Strategy and Action Plan on Marine Litter in the Seas of East Asia. These tasks are being undertaken as a consultancy by Steve Raaymakers of EcoStrategic Consultants, with support from National Consultants in each COBSEA Coastal State. The draft report on the Regional Review has recently been submitted, and currently concludes, *inter alia*:

- Marine litter, also known as marine debris and marine garbage, from both land and sea-based sources, is one of the major threats to the World's oceans.

- The problem of marine litter is particularly severe in the Seas of East Asia, due in part to the massive industrial and urban development under-way in the coastal zones of the region, combined with an exponential and sustained growth in shipping activity serving their rapidly expanding economies, the current lack of effective marine litter prevention and control measures in many East Asian countries, and major cultural and awareness barriers that impede political will to address the problem.

- As a component of the broader marine litter problem, Derelict Fishing Gear (DFG) is likely to be major concern in East Asia, due to extremely large size of the fishing industry and lack of effective regulation of the industry in the region, including an extremely high level of Illegal, Unregulated and Unreported (IUU) fishing in the region.

- Very little is known about the extent and nature of the problem in East Asia, including source differentiation, zones of accumulation and degree of ecological, environmental and socioeconomic impacts.

- All countries in the region face significant barriers to the effective prevention and control of marine litter, including cultural and capacity barriers.

The following recommendations are made from the Regional Review:

- The COBSEA member countries consider, review, further develop, finalise, adopt and implement the draft Framework for a Regional Strategy and Action Plan on Marine Litter in the Seas of East Asia, which is produced as a separate output of this consultancy, and which includes the following elements, amongst others.
    - A concerted and sustained awareness campaigns targeting political-level decision makers, port, shipping, fisheries and coastal tourism industries and coastal communities.

  - More effective implementation of the elements of the GPA NPAs that address land-based sources of marine litter, and more effective implementation of MARPOL Annex V at the national level, to address sea-based sources of marine litter.

  - Adopt a "no special fee" approach to port waste reception facilities in all countries in the region.

  - Stimulate the development of innovative technical and economic solutions to marine litter.

  - Establish national coordinated marine litter surveys and monitoring.

  - Provide for technical training and capacity building of relevant personnel from government, academia, coastal communities, NGOs and relevant industries.

  - Provide for ongoing financing and sustainability of the Regional as well as National plans, including greater use of the "user" and "polluter" pays principles.

- As a sub-set of the Regional Strategy and Action Plan, each country should develop and implement a National Strategy and Action Plan on marine litter, and which include further development of broader national integrated waste management arrangements, with management of marine litter integrated into these arrangements.

- All countries in the region should join International Coastal Cleanup (ICC), Clean-Up the World (CUTW) and PADI Project AWARE.

- A central, regional database should be established to which national administrations report annual statistics on the sources, causes, quantities and distribution of marine litter in their respective jurisdictions. The database could present outputs graphically on map-based Geographic Information System (GIS) – providing visual representation of the geographical spread of the problem. This would provide a powerful monitoring tool for assessing the true regional extent of the problem, including regional hot spots, as well as trends over time and the effectiveness or otherwise of management and control responses. Such a regional database could possibly be housed and maintained by the UNEP EAS/RCU, with appropriate support from COBSEA member governments.

- Marine litter trajectory models should be developed for each sub-regional sea in East Asia.

- Close coordination and sharing of lessons should be undertaken with neighbouring regions – especially NOWPAP which has highly a developed programme on marine litter. Japan should be invited to join the Regional Strategy and Action Plan in Marine Litter for the Seas of East Asia, as it has a lot to offer the other East Asian countries. Brunai Darusalaam should also be invited to join.

- Close coordination should be undertaken with PEMSEA / SDS-SEA in developing and implementing the Regional Strategy and Action Plan in Marine Litter, including ensuring that an appropriate share of SDS-SEA resources and funding are allocated to addressing

marine litter, including tosupport implementation of the Regional Strategy and Action Plan.

- Close coordination should also be undertaken with APEC and ASEAN on marine litter issues.

- Close coordination and joint activities should be undertaken with the Asia-Pacific Fishery Commission (APFIC), FAO, IMO and APEC Fisheries Working Group to address DFG in the region.

A Regional Strategy & Action Plan for Marine Litter in the Seas of East Asia: *Status Report*

UNEP Regional Seas Programme
Coordinating Body for the Seas of East Asia (COBSEA)
EcoStrategic Consultants

Steve Raaymakers
EcoStrategic Consultants
www.eco-strategic.com

Introduction & background

Marine litter – a major threat to World's oceans

- 6.4 million tonnes / year globally
- 5.6 million tonnes from shipping
- 46,000 pieces of plastic / square mile
- 3 x more garbage in as fish taken out
- N Pacific – 6 pounds of plastic / pound of plankton near surface
- Significant wildlife impacts
- Derelict Fishing Gear (DFG)
- Transfer fouling species

Introduction & background

The Seas of East Asia – COBSEA members

Introduction & background

The Seas of East Asia

- Most populous region in World (1.8 billion): 60% + coastal
- Massive and sustained (but not sustainable) economic growth
- Increasing urbanization and industrialization
- Continued exponential population growth
- Region embraces 4 sub-regional seas (Large Marine Ecosytems - LMEs)
  - East China Sea
  - South China Sea
  - Sulu-Celebes Sea
  - Indonesian Seas
- Also abuts Yellow Sea / NOWPAP Area

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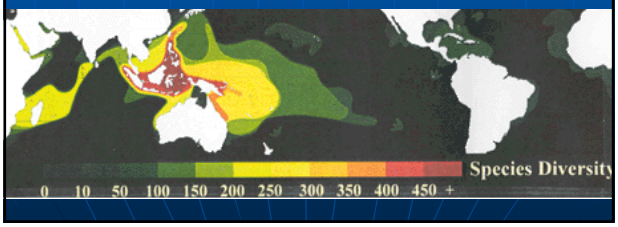
Introduction & background

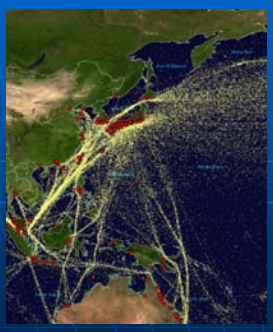
The Seas of East Asia

- The major global centre of coastal and marine biodiversity
- 30% World's coral reefs
- 30% World's mangroves
- 41% World's fish catch



Introduction & background

The Seas of East Asia



- One of World's densest concentrations of shipping
- Major port development
- Major fishing fleets inc. World's largest component of IUU

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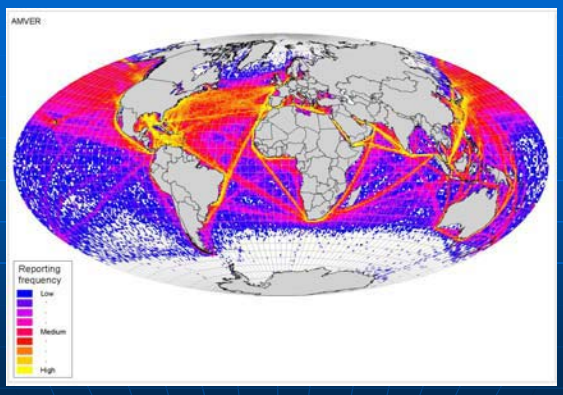


Objectives of the Review

Establish the current state-of-play, in the Seas of East Asia, at both the regional and national levels, with regard to:

- Existing knowledge and data on the problem
- Existing instruments, programmes and initiatives
- Barriers, gaps and needs

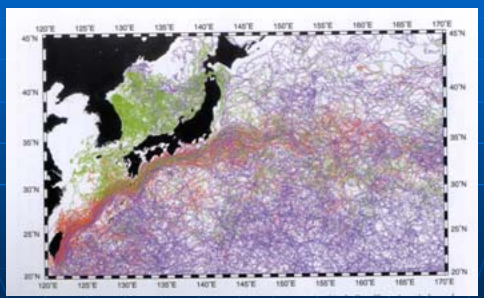
and to make recommendations and proposals for change.

Review Methods

- Desk-top study only. No field assessment
- Regional Consultant / National Consultants
- National Surveys
- Literature search and review

Existing Knowledge

Existing Knowledge



Existing Knowledge

- Very good knowledge of the problem in S Korea (also Japan)
- Some (ad hoc) data for Australia
- Very little information for other COBSEA countries
- Aust, Indonesia, Malaysia, Philippines, RO Korea , Singapore, Thailand and Vietnam part of ICC - China and Cambodia not yet

Existing Regional Actions

- APEC – MRC marine debris socioeconomic study
- ASEAN
- PEMSEA / SDS-SEA
- GEF sub-regional LME projects
  - East China Sea (underway)
  - South China Sea (underway)
  - Arafura & Timor Seas (proposed)
  - Sulu and Suluwesi Seas (proposed)
  - Yellow Sea (in NOWPAP area, abuts COBSEA)

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Existing National Actions

- Most countries no clear lead agency
- Environment and Maritime Admins
- Only Indonesia has National Task Force
- Other countries have Task Forces on related issues
- No countries have specific marine litter legislation (except for MARPOL)

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Existing National Actions

- All countries except Indonesia, Thailand and Vietnam parties to MARPOL Annex V
- Implementation is poor in most countries that are party
- All countries report that waste reception facilities are provided in ports
- Based on "user pays" – acts as a barrier
- Need "No Special Fee"

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Existing National Actions

- All countries report being signatories to GPA and have or are developing NPAs
- NPA implementation is poor
- All countries party to Basel Convention and have implementing National legislation
- All countries except Cambodia and China report having NGO involvement in marine litter

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Existing National Actions

- Most countries report having no economic instruments
- Most countries have problems with national integrated waste management systems

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Barriers & Gaps

- Cultural and capacity barriers
- Very low awareness / political will
- Major push for economic development / competing national development priorities
- Lack of data on nature and extent of the problem
- No use of marine litter trajectory models
- Lack of regional multi-lateral legal instrument
- Poor implementation of existing instruments, action plans and laws (e.g. MARPOL, GPA-NPAs, FAO Code of Conduct)

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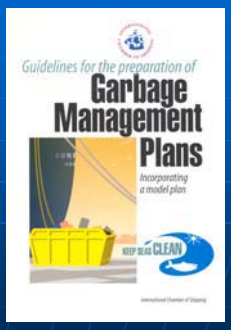

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Barriers & Gaps

- Poor coordination between govt. agencies
- Cost of using port waste reception facilities based on "user pays" – should be "no special fee"
- Lack of other economic instruments / incentive programmes
- Lack of or problems with broader national integrated waste management systems
- Lack of involvement of private sector (fisheries, shipping, ports, coastal tourism, waste management)

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Needs

A Regional Strategy & Action Plan on Marine Litter in the Seas of East Asia

To prevent and reduce marine litter, recognizing its transboundary nature and need for intra- and inter regional cooperation

- Legal and administrative arrangements (Regional Task Force?)
- Concerted, sustained and targetted awareness campaigns
- Surveys, monitoring & coastal clean-ups (inc. ICC)
- Trajectory models

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Needs

A Regional Strategy & Action Plan on Marine Litter in the Seas of East Asia

- Measures to implement MARPOL Annex V (ship sources)
- Measures to implement FAO Code of Conduct (DFG)
- Measures to support greater implementation of GPA NPAs (land-based sources)
- Technical training and capacity building
- Funding and sustainability – user pays, polluter pays, waste return deposits, product liability
- National plans which reflect above

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Process

- Draft Regional Review has been submitted to COBSEA
- Draft Framework Regional Strategy and Action Plan being developed
- Both will be considered at Regional Workshop in Jakarta 8-9 May 06
- Workshop will further develop Strategy
- Aim to submit to COBSEA IGM Jan 2008 (subject to country agreement)

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COBSEA & NOWPAP are linked

Must recognize sources and sinks

Must PREVENT the problem at SOURCE

Transboundary problem requires a transboundary response

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Together we can do it!

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Development of Sectoral Guidelines for Management of Marine Litter

Dr. Jeung Sook Park

Scientific Affairs Officer of NOWPAP Regional Coordinating Unit

408-1, Shirang-ri, Gijang-eup, Gijang-gun, Busan 619 902, Republic of Korea

jeungsook.park@nowpap.org

To address the marine litter problem in the Northwest Pacific region, NOWPAP has been implementing the Marine Litter Activity (MALITA) since November 2005. This project is being carried out by four NOWPAP Regional Activity Centres, NOWPAP Regional Coordinating Unit and representatives of NOWPAP member states.

During the last year, several MALITA components were successfully implemented, such as the collection and analysis of data and information available in this region; establishment of marine litter database (http://dinrac.nowpap.org/MALITA_Whatis.htm); preparation of a regional overview on the legal and institutional arrangements of the member states; and the development of the monitoring guidelines for marine litter found on beaches and shorelines.

The development of marine litter management guidelines for different sectors of industry is an important part of the MALITA.

This presentation will introduce the best management practices for marine litter in different sectors such as shipping, fisheries and tourism. The idea of this presentation is to show existing practices in other regions that are applicable to NOWPAP. Some of these practical approaches to improve the collection, separation, recovery and disposal of marine litter could be used in the Northwest pacific region.

Northwest Pacific Action Plan

NOWPAP Marine Litter Activity (MALITA)

Sectoral Guidelines for Marine Litter Management

Dr. Jeung Sook PARK
NOWPAP RCU

Northwest Pacific Action Plan

Any persistent, manufactured or processed **solid material** discarded, disposed of or abandoned in the marine and coastal environment

Observed and potential dangers

- Entangling divers and swimmers
- Trapping, wounding or killing fish, shellfish, birds and marine mammals
- Degrading marine ecosystem and sensitive habitats
- Damaging propellers and rudders of recreational, commercial and military vessels
- Endangering boat crews and passengers (vessel capsizing)

Northwest Pacific Action Plan

UNEP Strategy to address the marine litter problem

Development and implementation of the **Regional Action Plan for Marine Litter**

- Phase I Assessment of the regional situation
- Phase II Preparation of the Regional Strategy (including a regional meeting of experts and national authorities)
- Phase III Integration of the Regional Strategy into the Programme of work of the respective RSP and implementation of the Regional Strategy at the national and regional level

Northwest Pacific Action Plan

NOWPAP MALITA November 2005

http://dinrac.nowpap.org/MALITA_Whatis.htm

ML Database | Workshop (June 2006) | ICC (September 2006)

Monitoring Guidelines | Brochures/Leaflets

√ Workshop (Toyama, March 2007) — Development of Sectoral Guidelines

ICC (Busan, September 2007) — Draft NOWPAP RAP MALI

Northwest Pacific Action Plan

Shipping

Fisheries

Tourism

Development of Sectoral Guidelines

To improve the collection transportation, separation, recovery and disposal of solid waste

http://www.nowpap.org/new_projects_sub06.php

Northwest Pacific Action Plan

Best Management Practices for Shipping Sector

About 30~40% of marine litter originated from ships at se (merchant ships, cruise liners, government and service vessels, recreational/commercial fishing boats and oil/gas platforms)

bottles | plastic bags | aluminum cans | food/beverage containers

paper | cardboard | cigarette-related | fishing nets | others

Northwest Pacific Action Plan

Wise Management Plan
to prevent and reduce marine litter from all kinds of ships

Best Management Practices for Shipping Sector
(California, Connecticut, Ohio, Texas, etc.)

No Dumping in principle

- Do not put litter or recycling containers on docks
- Provide adequate and convenient litter receptacles
- Place covered litter receptacles
- If practical, lock litter receptacles at night
- Provide convenient recycling containers
- Purchase products made with (from) recycled material

Northwest Pacific Action Plan

Best Management Practices for Shipping Sector

- Stow goods securely on-board (accidental overboard discharge)
- Use non-disposable products rather than plastic and polystyrene cups and food containers and other disposable goods
- Train employees to pick up litter as a daily practice
- Educate employees about separation requirement and your recycling programme
- Provide convenient recycling facilities
  - Whatever is collected in your community
  - If you have significant fishing populations, provide recycling for fishing lines and nets

Northwest Pacific Action Plan

Best Management Practices for Marine Protection in Shipping Sector

Marine Litter Management

Cleaning and Maintenance
Sewage Management
Oil and Fuel
Hazardous Waste
Sewage Handling
Fish Waste
Aquatic Nuisance Species

Port Reception Facilities

Northwest Pacific Action Plan

Best Management Practices for Fisheries Sector

Ghost fishing

- Fishing nets (entire or pieces of nets)
- Crab and shrimp traps and pots
- Strings, cords and plastic ropes and lines
- Foam and plastic buoys
- Crates and cardboard boxes
- Salt bags
- Rubber gloves
- Dirty rags
- Plastic floats and lures
- Plastic motor oil and lubricant bottles
- Light bulbs
- Other recreational or commercial harvest equipments

Northwest Pacific Action Plan

Best Management Practices for Fisheries Sector

- Properly dispose of beverage cans, food wrappers and bags and discarded fishing tackle including fishing lines and lead weights
- Stress that nothing other than ice is ever thrown into the water
- Retrieve litter that accidentally falls overboard
- Leave unnecessary packages and wrapping on shore
- Use biodegradable products when possible
- Use fish cleaning stations and properly dispose of fish offal

Northwest Pacific Action Plan

Best Management Practices for Fisheries Sector

Other helpful practices

- Secure items that may be blown overboard
- Use permanent cups instead of foam or plastic cups and be sure to use permanent cup holders on your vessel
- Use recyclable/reusable materials instead of disposable ones
- Retrieve litter encountered in the water
- Remove tangled and snagged fishing line from water
- Stow away fishing weights, boxes, bags and plastic sacks so they do not accidentally end up overboard
- Keep the engine maintained properly to prevent fuel or oil leaks

Northwest Pacific Action Plan

Derelict Fishing Gear Removal Project
by Washington Department of Fish and Wildlife

1. Locating and Reporting: divers, fishermen, boaters, beach-goers and anyone involved with the marine environment can report sightings of derelict fishing gear in the water or on shore
2. Verifying and Prioritizing: a dataset of reported gear will help sets priorities for removal efforts based on threats to public safety and marine resources, hazards to navigation and other criteria
3. Removing
4. Reusing, Recycling and Disposing

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Derelict Fishing Gear Removal Project
by Washington Department of Fish and Wildlife

Establishment of Database

Location
Types of Gear
Details (Date)
Contact Name

Northwest Pacific Action Plan

Best Management Practices for Tourism Sector

Environmental purity
Resource efficiency
Biological diversity
Physical integrality
Cultural richness

Economic viability
Visitor fulfillment

Waste management
by national/local governments
Tourist manner
Public awareness

Employment
Community wellbeing
Local prosperity
Social Equity

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Best Management Practices for Tourism Sector

Minimizing the physical impact of tourist activity including environmental degradation caused by marine litter

For Beach-Going

- Keep the beach clean (bring a litter bag along with you)
- Follow marked paths to the beach, rather than walking across sensitive sand dunes and other natural shoreline areas
- Refrain from using pesticides and fertilizers (follow regulations when you dispose of pollutants e.g. automotive oil and antifreeze)
- Educate yourself, your friends and family on how human actions can affect the shoreline environment
- If you live on or near the coast, get involved in local development and land use issues

Northwest Pacific Action Plan

Best Management Practices for Tourism Sector

Minimizing the physical impact of tourist activity including environmental degradation caused by marine litter

For Diving and Snorkeling

- Use companies that abide by and promote eco-friendly diving practices when booking dive and travel plans
- Don't pluck living organisms like corals or sponges
  - Instead, capture see life with a camera
- Never feed, touch or otherwise disturb marine animals/plants (may disrupt their feeding, scare them, interrupt mating or provoke them)
- Volunteer to help record a fish census or to get involved in underwater cleanups and other public education efforts

Northwest Pacific Action Plan

Best Management Practices for Tourism Sector

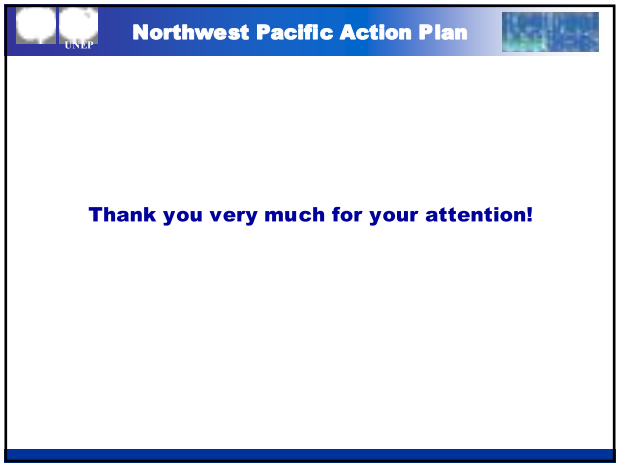
Minimizing the physical impact of tourist activity including environmental degradation caused by marine litter

For Nature-Watching

- Use eco-friendly tour companies for your travel
- Respect local culture and tradition and learn from native people about the way they live in harmony with nature
- Respect and protect wildlife and habitats
  - Keep your distance from animals and don't feed them
- Don't take shells, corals, sponges or any other living things for souvenirs from your excursion
- Leave an area as clean when you came
  - Bring along a litter bag


Northwest Pacific Action Plan
Best Management Practices for Different Sectors
Analyzing conditions, problems and opportunities
Identifying objectives and making choices
Suggesting policies and action programmes
Guiding policies and actions of the ministry and its agencies such as national organizations
Stimulating the potential investors and general public
Providing a framework for policies and actions


Northwest Pacific Action Plan
NOWPAP Sectoral Guidelines: Simple Things We Can Do
"Changing our behaviours and attitudes"
should be implemented in the NOWPAP region
and
help to enforce the existing international conventions/agreements
Don't Litter!
Pick Up Litter!


Northwest Pacific Action Plan
Thank you very much for your attention!

List of Participants

List of Participants

People's Republic of China

Mr. Xiangbin PEI
Officer
Marine Division
State Environmental Protection Administration
No.115 Xizhimennei, Nanxiaojie, Beijing, 100035, P.R. China
Tel: +86-10-66556276
Fax: +86-10-66556272
E-mail: pei.xiangbin@sepa.gov.cn

Dr. Linlin HU
Assistant Director, ML FP
Institute of Environmental Standards, State Environmental Protection Administration
No.8 Dayangfang, Anwai,Beijing,100012, P.R.China
Tel: +86-10-84931980
Fax: +86-10-84919396
E-mail: hull@craes.org.cn

Mr. Yudong ZHU
Senior Researcher
Data and Information Network Regional Activity Center (DINRAC)
No. 1 Yuhuinanlu, Chaoyang District, Beijing 100029, P.R.China
Tel: +86-10-84640869
Fax: +86-10-84630849
E-mail: zhu@sepa.gov.cn

Mr. Jiangning CHEN
Secretary-general
Dalian Environmental Protection Volunteers Association
No.1 Huale St. Zhongshan District, Dalian 116001 P.R. China
Tel: +86-411-82704122
Fax: +86-411-82704102
E-mail:dlchenjn@126.com/dlchenjn@sina.com

Republic of Korea

Dr. Won-Tae SHIN
Deputy Director
Marine Environment Division, Marine Policy Bureau
Ministry of Maritime Affairs and Fisheries (MOMAF)
140-2 Gye-dong, Jongno-gu, Seoul 110-793, Republic of Korea
Tel: +82-2-3674-6545
Fax: +82-2-3674-6546
E-mail: wtshin@momaf.go.kr

Mr. Chul-Sung KIM
Deputy Director
Marine Conservation Division
Ministry of Maritime Affairs and Fisheries (MOMAF)
140-2 Gye-dong, Jongno-gu, Seoul 110-793, Republic of Korea
Tel: +82-2-3674-6564
Fax: +82-2-3674-6565
E-mail: chulsung@momaf.go.kr

Dr. Jeong-Hwan OH
Senior Researcher
Marine Environmental Emergency Preparedness and Response Regional Activity Centre (MERRAC)
P.O. Box 23, Yuseong, Daejeon 305-600, Republic of Korea
Tel: +82-42-868-7205
Fax: +82-42-868-7738
E-mail: jhoh@moeri.re.kr

Dr. Rho-Taek JUNG
Senior Researcher
Maritime & Ocean Engineering Research Institute (KORDI)
P.O. Box 23, Yuseong, Daejeon 305-600, Republic of Korea
Tel: +82-42-868-7215
Fax: +82-42-868-7738
E-mail: rtjung@moeri.re.kr

Dr. Yoon Chan CHOI
Research Fellow
Busan Development Institute
City of Busan
Water Authority Bldg., 9F, 273-20
Busanjin-gu, Busan, 614-052,
Republic of Korea
Tel: +82-51-860-8763
Fax. +82-51-860-8787
E-mail: cyc2001@bdi.re.kr

Mr. Seong Oh IM
Team Member
Environment Business Team
Korea Marine Pollution Response
Corporation (KMPRC)
HaeGong Building, 71, Samseong-dong,
Gangnam-gu, Seoul, 135-090,
Republic of Korea
Tel: +82-2-3498-8699
Fax: +82-2-3498-8695
E-mail: san94@hanmail.net

Dr. Seong-Gil KANG
Senior Researcher
Marine Environmental Emergency
Preparedness and Response Regional
Activity Centre (MERRAC)
P.O. Box 23, Yuseong, Daejeon 305-600,
Republic of Korea
Tel: +82-42-868-7205
Fax: +82-42-868-7738
E-mail: kangsg@moeri.re.kr

Ms. Hyon-Jeong NOH
Expert
Marine Environmental Emergency
Preparedness and Response Regional
Activity Centre (MERRAC)
P.O. Box 23, Yuseong, Daejeon 305-600,
Republic of Korea
Tel: +82-42-868-7205
Fax: +82-42-868-7738
E-mail: hjnoh@moeri.re.kr

Russian Federation

Dr. Sergey MONINETS
Director
Sea Protection Institute
Maritime State University named after
Admiral G.I. Nevelskoy
50A Verkhneportovaya street, Vladivostok,
690059, Russian Federation
Tel: +7-4232-51-52-70
Fax: +7-4232-51-52-70
E-mail: moninets@msun.ru

Dr. Anatoly KACHUR
Director
Pollution Monitoring Regional Activity
Centre (POMRAC)
7 Radio Street, Vladivostok, 690041
Russian Federation
Tel/Fax: +7-4232-31-2833
E-mail: kachur@tig.dvo.ru

Mr. Artur MAYSS
Senior Staff Member
ISAR-Far East
197 Svetlanskaya Street, Vladivostok,
690000, Russian Federation
Tel: +7-4232-26-96-06
E-mail: koryak@yandex.ru

Ms. Yana BLINOVSKAYA
Researcher
Sea Protection Institute, Maritime State
University named after Admiral G.I.
Nevelskoy
50A Verkhneportovaya street, Vladivostok,
690059, Russian Federation
Tel: +7-4232-51-52-70
Fax: +7-4232-51-52-70
E-mail: blinovskaya@msun.ru

Japan

Dr. Tatsuro MATSUOKA
Dean, Professor
Faculty of Fisheries
Kagoshima University
4-50-20 Shimoarata, Kagoshima City,
Kagoshima, 890-0056 Japan
Tel/Fax: +81-99-286-4241
E-mail: matsuoka@fish.kagoshima-u.ac.jp

Dr. Shigeru FUJIEDA
Associate professor
Faculty of Fisheries
Kagoshima University
4-50-20 Shimoarata, Kagoshima City
Kagoshima, 890-0056 Japan
Tel: +81-99-286-4252
Fax: +81-99-286-4255
E-mail: fujieda@fish.kagoshima-u.ac.jp

Dr. Takashi KUSUI
Professor
Department of Environmental Systems
Engineering, College of Technology
Toyama Prefectural University
5180 Kurokawa, Imizu City, Toyama,
939-0398 Japan
Tel: +81-766-56-7500
Fax: +81-766-56-0396
E-mail: kusui@pu-toyama.ac.jp

Mr. Toshifumi SHIWAKU
Researcher
The Foundation for Environmental
Rehabilitation and Redevelopment of
Mizushima
13-23 Nishisakae-cho, Mizushima,
Kurashiki-City Okayama, 712-8034 Japan
Tel: +81-86-440-0121
Fax: +81-86-446-4620
E-mail: shiwaku@mizushima-f.or.jp

Ms. Yoshiko OHKURA
Japan Environmental Action Network
(JEAN)
Komatsu Bldg. 3F, 3-23-2 Minami-cho
Kokubunji City, Tokyo, 185-0021 Japan
Tel: +81-42-322-0712
Fax: +81-42-324-8252
E-mail: y_ohkura@jean.jp

Mr. KENTARO TOMINAGA
Deputy Director
Global Environmental Issues Division
Ministry of the Environment
1-2-2, Kasumigaseki, Chiyoda-ku, Tokyo
100-8975 Japan
Tel: +81-3-5521-8246
Fax: +81-3-3581-3348
E-mail: KENTARO_TOMINAGA@env.go.jp

Mr. KAZUHITO TAMAI
Official
Global Environmental Issues Division
Ministry of the Environment
1-2-2, Kasumigaseki, Chiyoda-ku, Tokyo
100-8975 Japan
Tel: +81-3-5521-8246
Fax: +81-3-3581-3348
E-mail: KAZUHITO_TAMAI@env.go.jp

Mr. Tatsuhiro IWAMOTO
Director-General
Civic Affairs, Environment & Culture
Department
Toyama Prefecture
1-7 Shin-Sougawa, Toyama City, Toyama,
930-8501 Japan
Tel: +81-76-444-9163
Fax: +81-76-444-3477
E-mail: tatsuhiro.iwamoto@pref.toyama.lg.jp

Mr. Shinya TSUDA
Deputy Director-General
Civic Affairs, Environment & Culture
Department
Toyama Prefecture
1-7 Shin-Sougawa, Toyama City Toyama,
930-8501 Japan
Tel: +81-76-444-9164
Fax: +81-76-444-3477
E-mail: shinya.tsuda@pref.toyama.lg.jp

Mr. Yukio ABURAMOTO
Deputy Chief
TESC
17-1 Nakataikouyama, Imizu City, Toyama,
939-0363 Japan
Tel: +81-766-56-2835
Fax: +81-766-56-1416
E-mail: yukio.aburamoto@pref.toyama.lg.jp

Mr. Shinichi NAKADA
Director of Environmental Department
Toyama City
7-38, Shinsakura-machi,Toyama City,
Toyama, 930-8510 Japan
Tel: +81-76-443-2053
Fax: +81-76-443-2122

Mr. Kazufumi MINABE
Environmental Department
Toyama City
7-38, Shinsakura-machi,Toyama City,
Toyama, 930-8510 Japan
Tel: +81-76-443-2053
Fax: +81-76-443-2122

Dr. Motoyuki SUZUKI
Chairperson
Northwest Pacific Region Environmental
Cooperation Center (NPEC)

Mr. Tetsuro MITA
Executive Director& Secretary General
Northwest Pacific Region Environmental
Cooperation Center (NPEC)
5-5 Ushijimashin-machi, Toyama City,
Toyama, 930-0857 Japan
Tel: +81-76-444-1571
Fax: +81-76-444-1581
E-mail: mita@npec.or.jp

Mr. Junichi HASHIMOTO
Director
Research & Studies Department
Northwest Pacific Region Environmental
Cooperation Center (NPEC)
5-5 Ushijimashin-machi Toyama City,
Toyama, 930-0857 Japan
Tel: +81-76-444-1571
Fax: +81-76-444-1581
E-mail: hashimoto@npe.or.jp

UNEP/FAO Consultants

Mr. Steve RAAYMAKERS
Director
ECOSTRATEGIC Consultants
(Consultant to UNEP/FAO)
PO Box 968, Edge Hill, Qld 4870, Australia
Tel: +61-07-4053-5560
E-mail: steve@eco-strategic.com

COBSEA

Ms. Birgitta LISS
Junior Professional Officer
UNEP, EAS/RCU
East Asian Seas Regional Coordinating Unit
(EAS/RCU)
United Nations Environment Programme
(UNEP)
United National Building, Floor 2, Block
Rajdamnern Nok Avenue,Bangkok 10200
Thailand
Tel: +66 2 288 2214
Fax: +66 2 281 2428
E-mail: liss@un.org

NOWPAP RCU

Mr. Xiaodong ZHONG
Deputy Coordinator
NOWPAP Regional Coordinating Unit
Busan Office
408-1, Shirang-ri, Gijang-up, Gijang-gun,
Busan 619 902, Republic of Korea
Tel: +82-51-720-3000
Fax: +82-51-720-3009
E-mail: xiaodong.zhong@nowpap.org

Dr. Jeung Sook PARK
Scientific Affairs Officer
NOWPAP Regional Coordinating Unit
Busan Office
408-1, Shirang-ri, Gijang-up, Gijang-gun,
Busan 619 902, Republic of Korea
Tel: +82-51-720-3000
Fax: +82-51-720-3009
E-mail: jeungsook.park@nowpap.org

Mr. Norio BABA
Administrative Officer
NOWPAP Regional Coordinating Unit
Toyama Office
5-5 Ushijimashin-machi Toyama City,
Toyama, 930-0856 Japan
Tel: +81-76-444-1611
Fax: +81-76-444-2780
E-mail: norio.baba@nowpap.org