



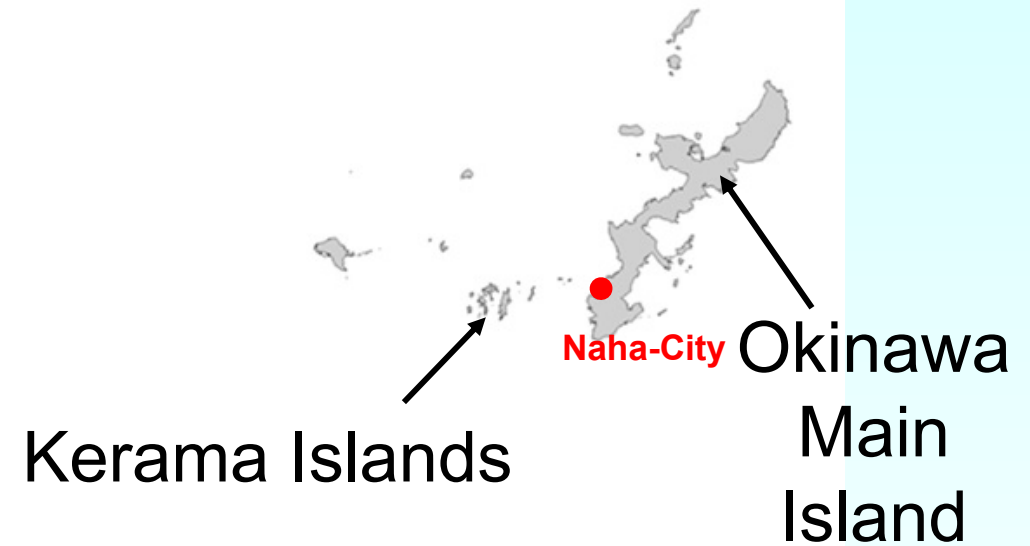
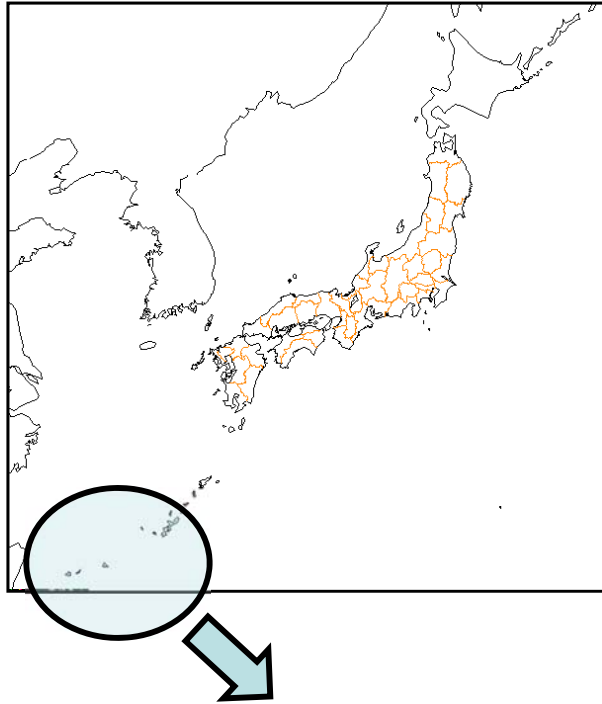
Results of the latest marine debris survey done by Okinawa Prefecture and their efforts on awareness and education of the issue.

July 24, 2015

**OKINAWA Pref. Environment Department
Waste Management Division
JAPAN NUS Co., Ltd.**



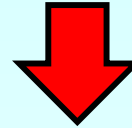
■ OKINAWA's location and major islands:



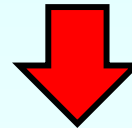
■ Recent History of Okinawa Prefecture's measures against Marine Debris



① 2009: Enforcement of the Law on Marine Debris; Acquirement of Budget



② March 2010: Formulation of Marine Debris Measure Plan of Okinawa Pref.



③ Since April 2010:

- Collection and investigation of Marine Debris.
- Consideration of systems to remove Marine Debris.
- Environmental Education and Public Awareness.

■ Countermeasures

- A) Survey on current situation of Marine Debris.**
- B) Collecting information and discussing possible measures.**
- C) Raising public awareness to reduce waste at source.**
- D) Removal of Marine Debris from coast**



Reflect the views of the Council consisting of experts, government agencies, civil organizations, etc.



Create and publish documents





■ Today's Outline

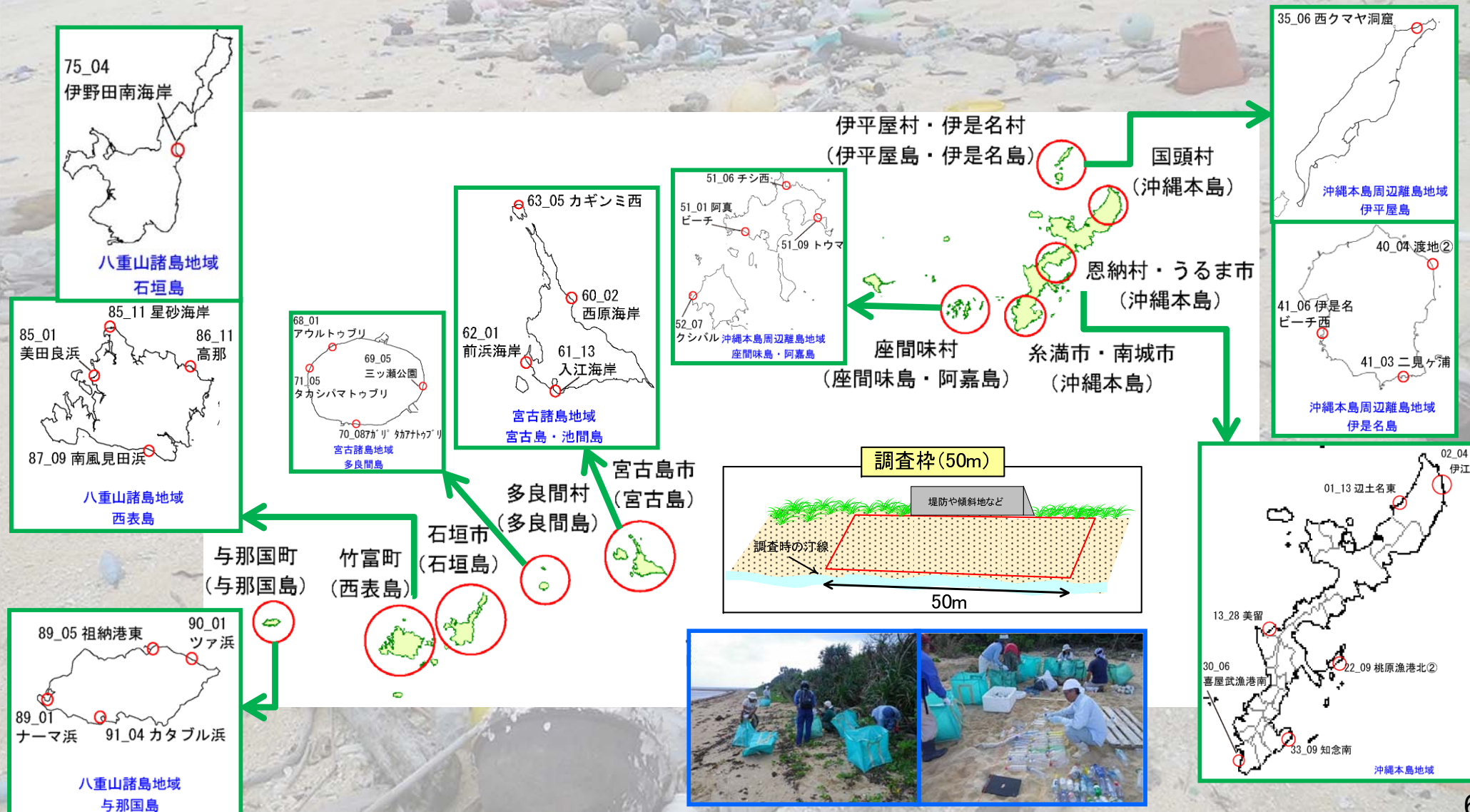
Introduction to some of the measures
Okinawa has taken up to 2014:

- ① **Monitoring Study of Marine Debris**
- ② **Basic study of Hazardous Substances in Marine Debris and Possible Effects on Organisms**
- ③ **Environmental Education and Awareness Development Program on Marine Debris**
- ④ **Okinawa Prefecture's Tasks on Marine Debris**

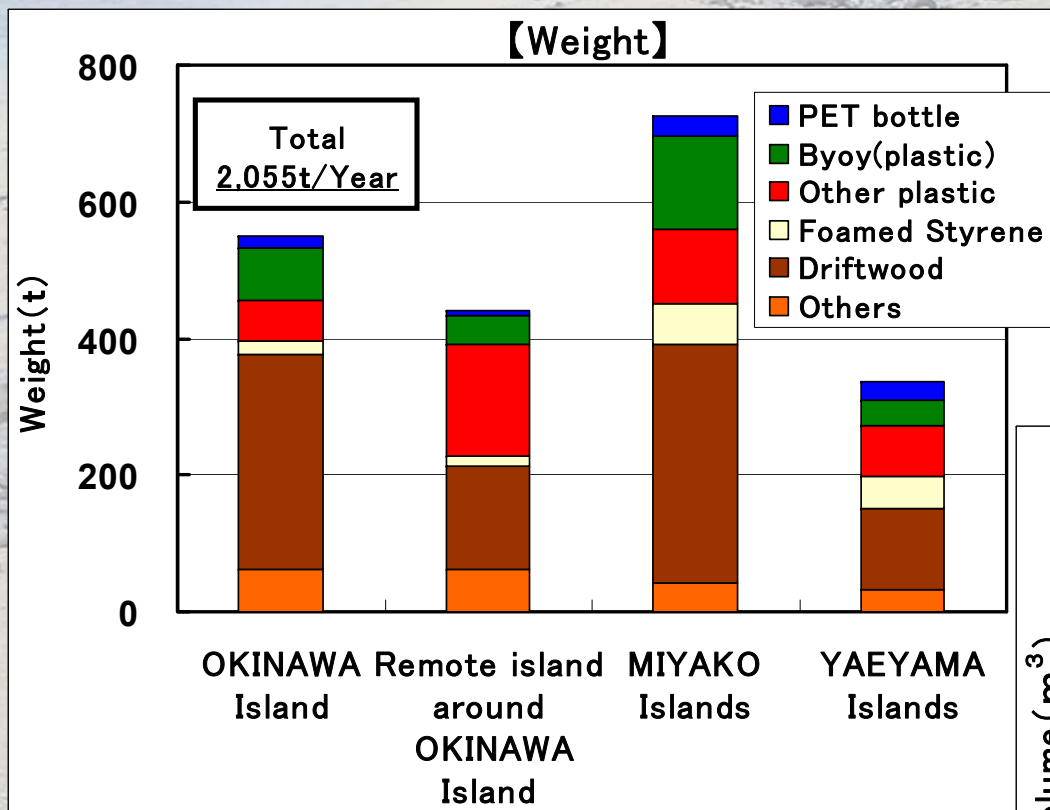
Measure① Monitoring study -1



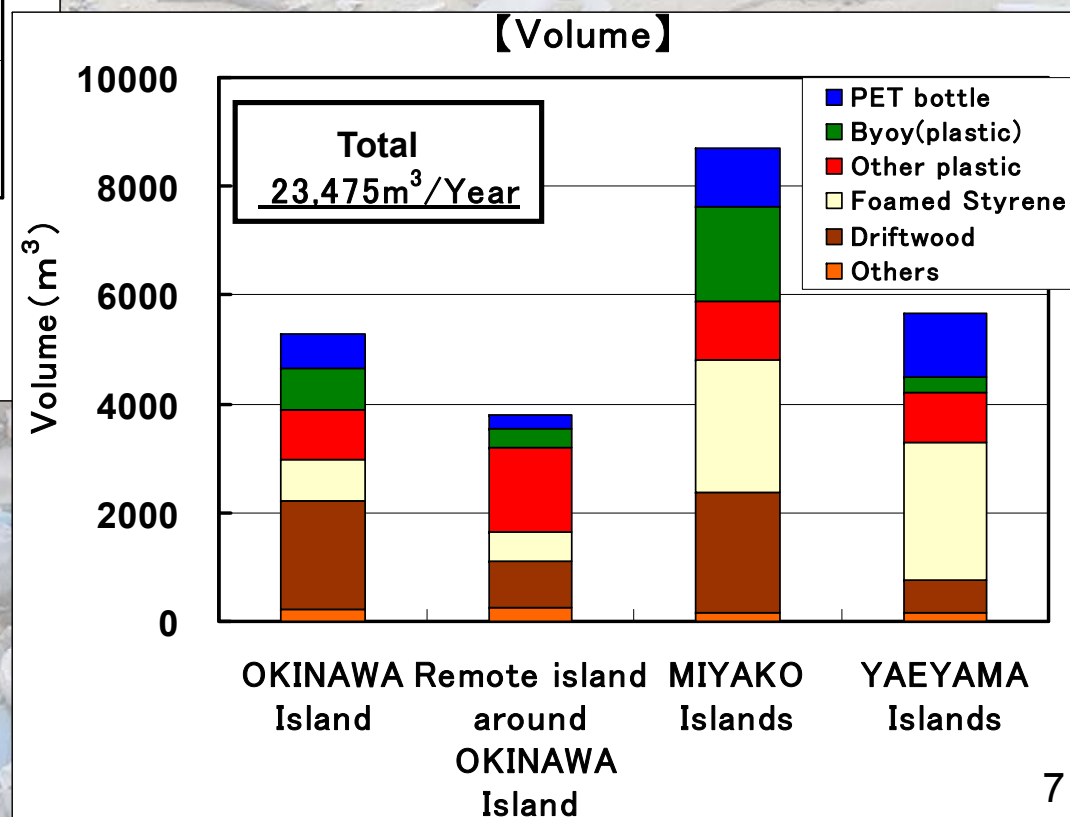
On going since 2010. Regular collection (sampling) of beach debris from 23 to 31 coasts to investigate seasonal and annual amounts on the coast.



Measure ① Monitoring study -2

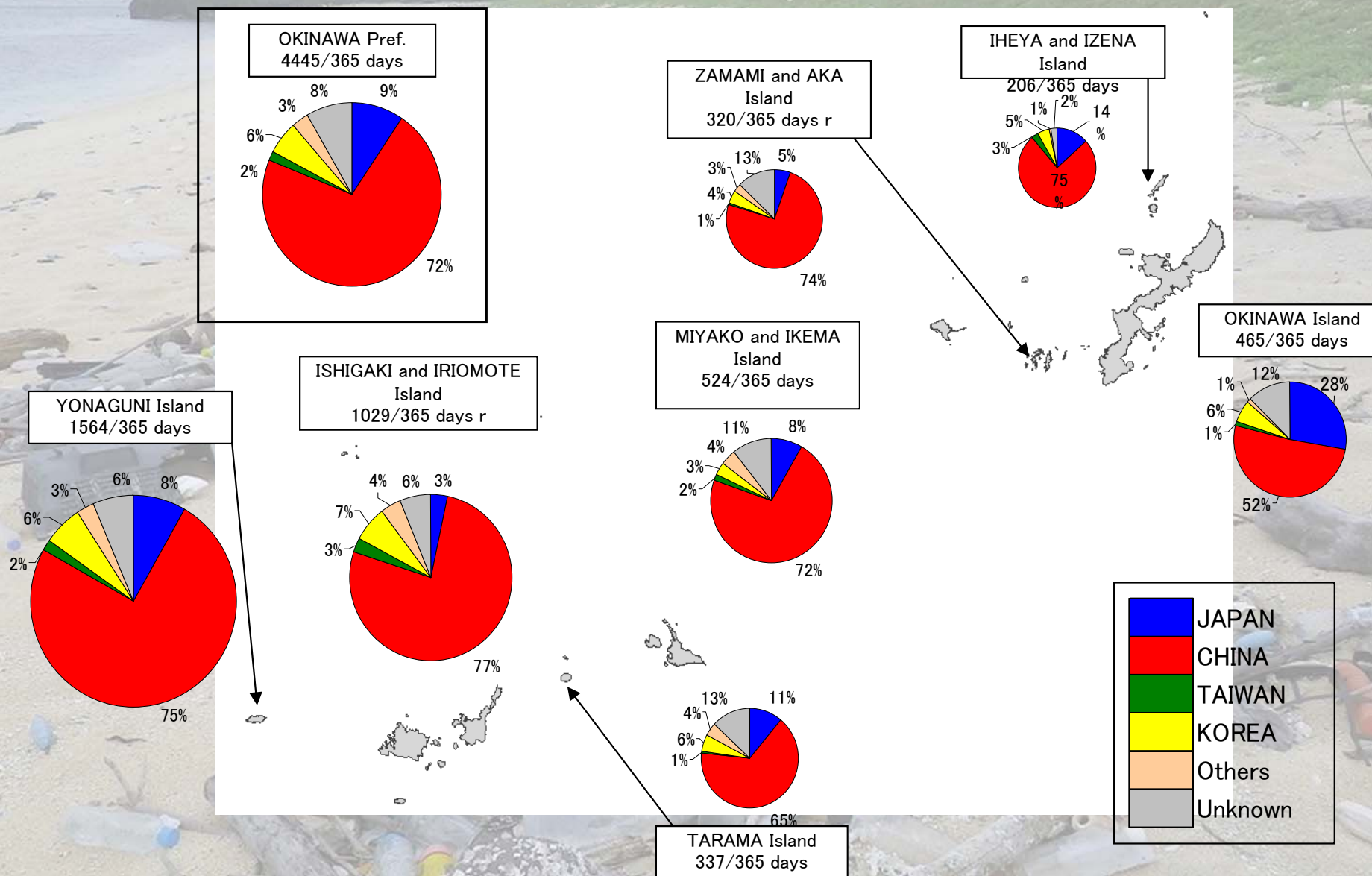


Estimated amount of Marine Debris from the Monitoring study
(November 2010~November 2011)





Measure ① Monitoring study -3



The amount of plastic bottles classified by country.

■ Measure② Basic study on Hazardous Substances in Marine Litter and Possible Effects on Organisms (Since 2014) -1



Topics Covered in 2014

- ① **Collection and Organization of Information on Hazardous Substances in Marine Debris**
 - Example: Research on Heavy Metals by Emeritus Prof. Yamaguchi (National Defense Academy)
 - Example: Research on Organic Pollutants by Prof. Takada (Tokyo University of Agriculture and Technology; TUAT)
 - Organizing Information on the Effects on Coastal Ecosystems by Assoc. Prof. Fujita (Okinawa Prefectural University of Arts)
- ② **Preliminary Analysis of Hazardous Substances in local coast-dwelling organisms (Land Hermit Crabs)**
 - Analysis of Organic Pollutants: Prof. Takada (TUAT)
 - Analysis of Heavy Metals: Assoc. Prof. Watanabe (TUAT)



■ Measure② Basic study on Hazardous Substances in Marine Debris and possible effects on organisms (Since 2014) -2

Emeritus Prof. Yamaguchi (National Defense Academy)'s work on Heavy Metals

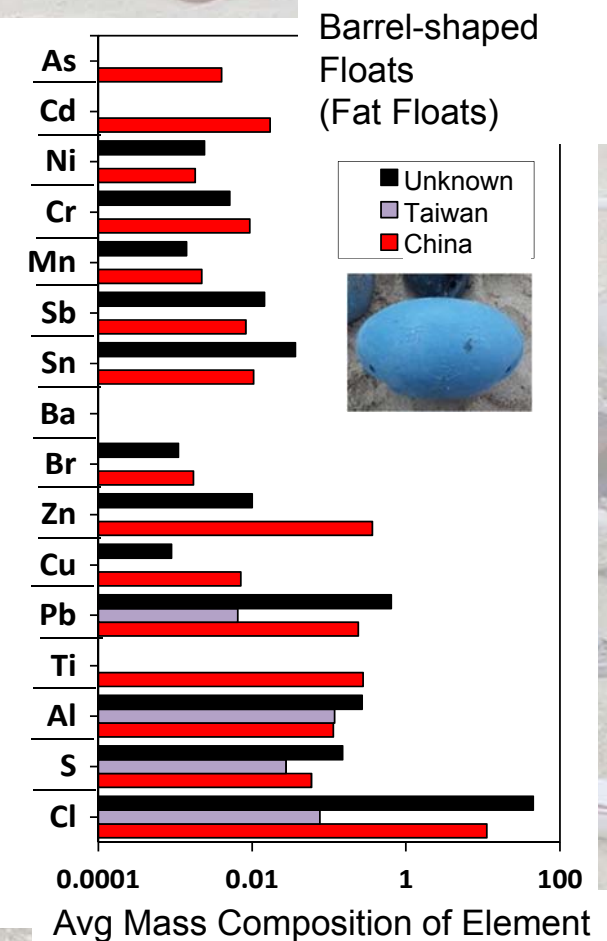
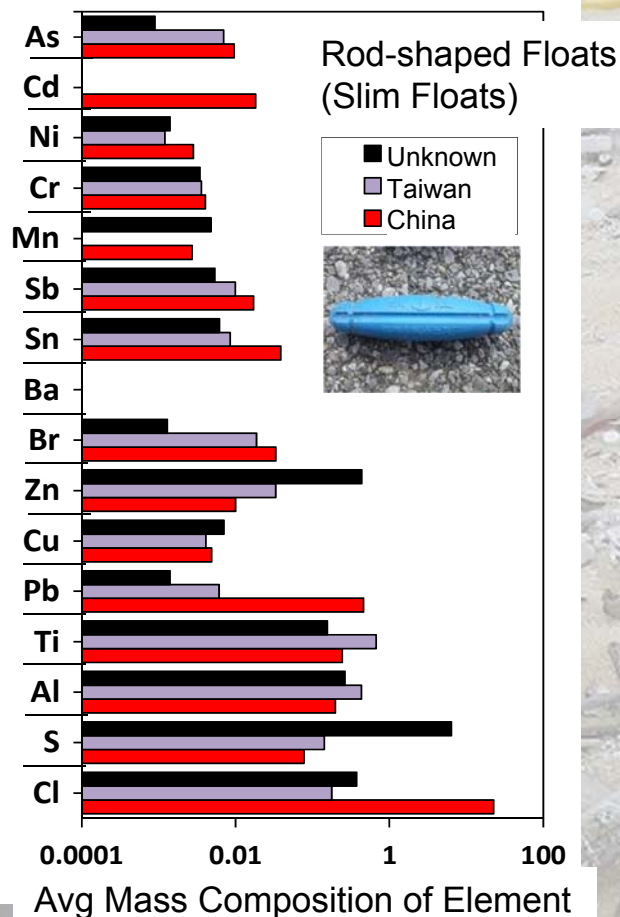
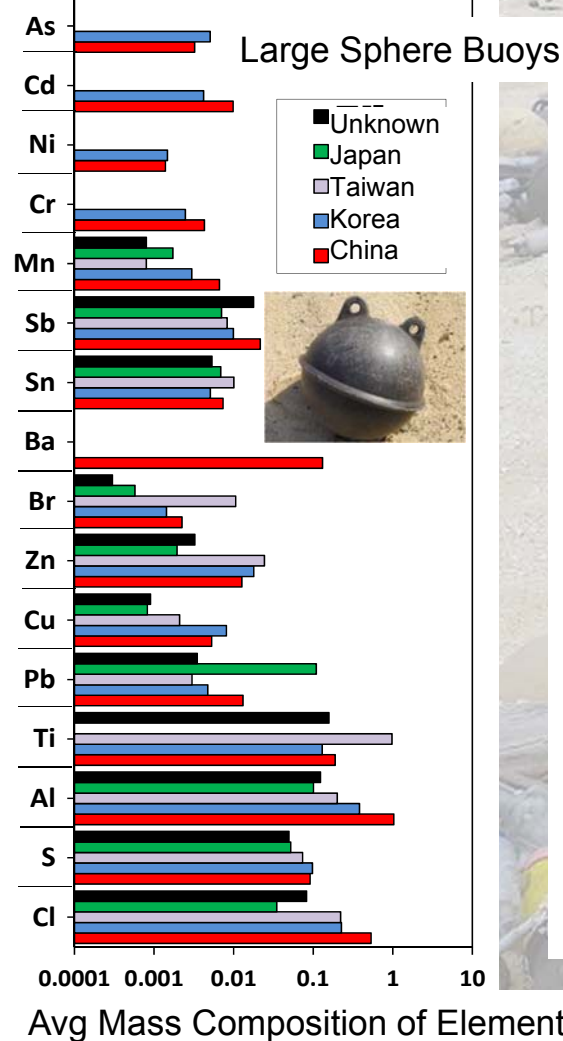
Samples		Type of Samples	Objective of Analysis
Plastic Wastes	Fishing Gears	Large Sphere Buoys, Small Floats, Hagfish traps	Evaluation of HC in material and leachate from various MD(different types and countries) Effect of pH on leaching
	Containers	For Drinks, Detergents etc.	Evaluation of HC in MD leachate from different countries Effect of pH on leaching
	Polystyrene Foams	Beached Polystyrene Foams (from Buoys), non-beached dummy Polystyrene Foams (from cushioning materials)	Evaluation of elemental composition (including HC) of the materials
	Resin Pellets	Raw material of plastic containers	Evaluation of leachability of HC
Open Burning Sand		Beach sand mixed with ashes from open burning of MD on the beach	Evaluation of leaching HC
Beach Sand Under Debris		Beach sand covered heavily with MD	Evaluation of leaching HC
Beach Sand (No Debris)		Beach sand from coasts with little effects of MD (near shoreline)	Comparison of HC content in leachate with open burning sand and beach sand under debris

■ Measure② Basic study on Hazardous Substances in Marine Debris and possible effects on organisms (Since 2014) -3



An Example of Emeritus Prof. Yamaguchi's work on Heavy Metal Composition of Beached Marine Debris (1)

Average weight% composition of HC in MD from various countries

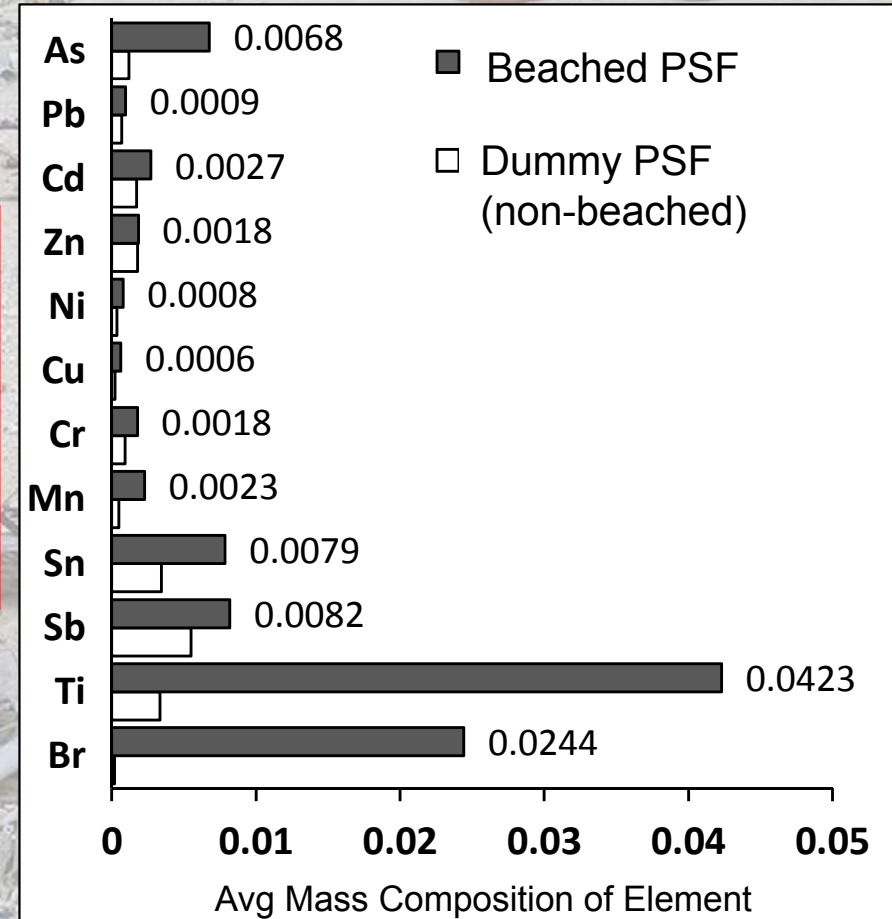
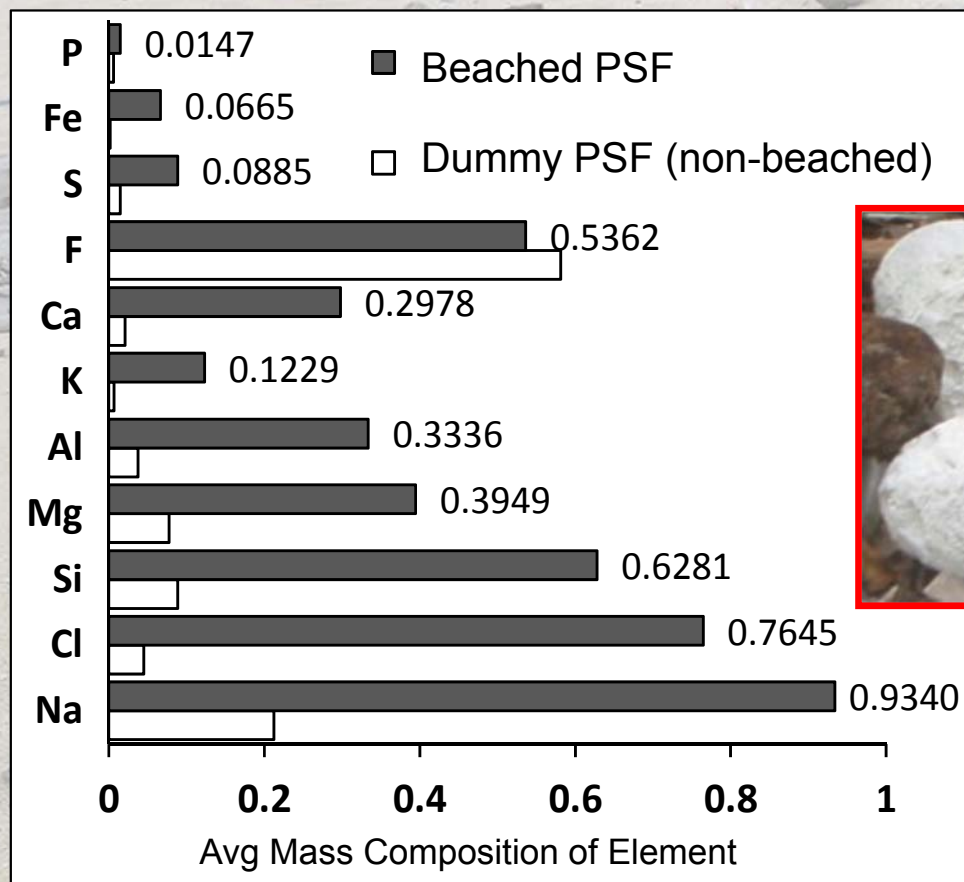




■ Measure② Basic study on Hazardous Substances in Marine Debris and possible effects on organisms (Since 2014) -4

An Example of Emeritus Prof. Yamaguchi's work on Heavy Metal Composition of Beached Marine Debris (2)

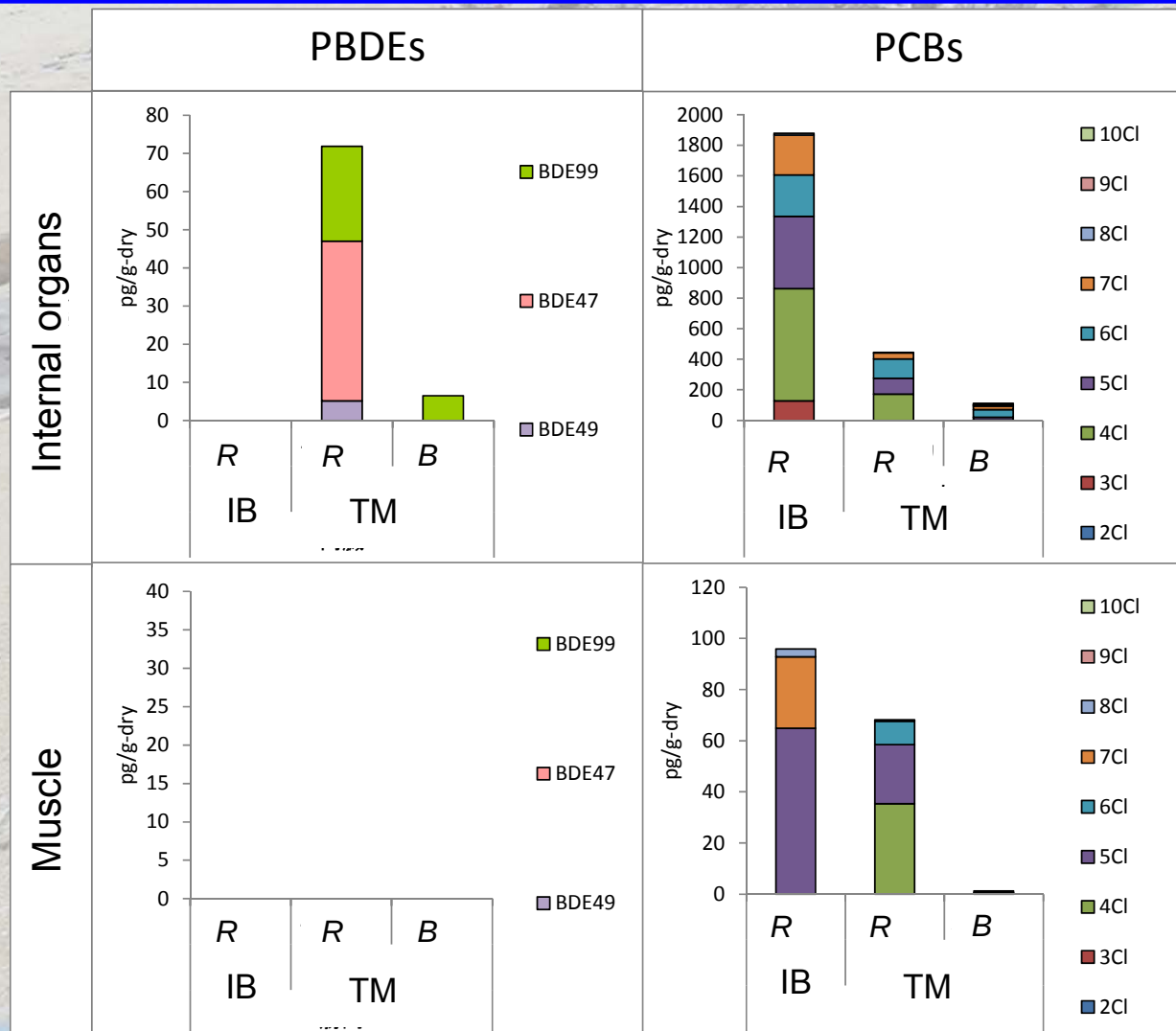
Comparison of average detected element composition between 2 polystyrene foams (PSF)





■ Measure② Basic study on Hazardous Substances in Marine Debris and possible effects on organisms (Since 2014) -5

An Example of Prof. Takada's work in the Preliminary Analysis of Organic Pollutants in Land Hermit Crabs



PBDEs detected from Land Hermit Crabs sampled from coasts heavily covered with MD

R: *Coenobita rugosus*

B: *Coenobita brevimanus*

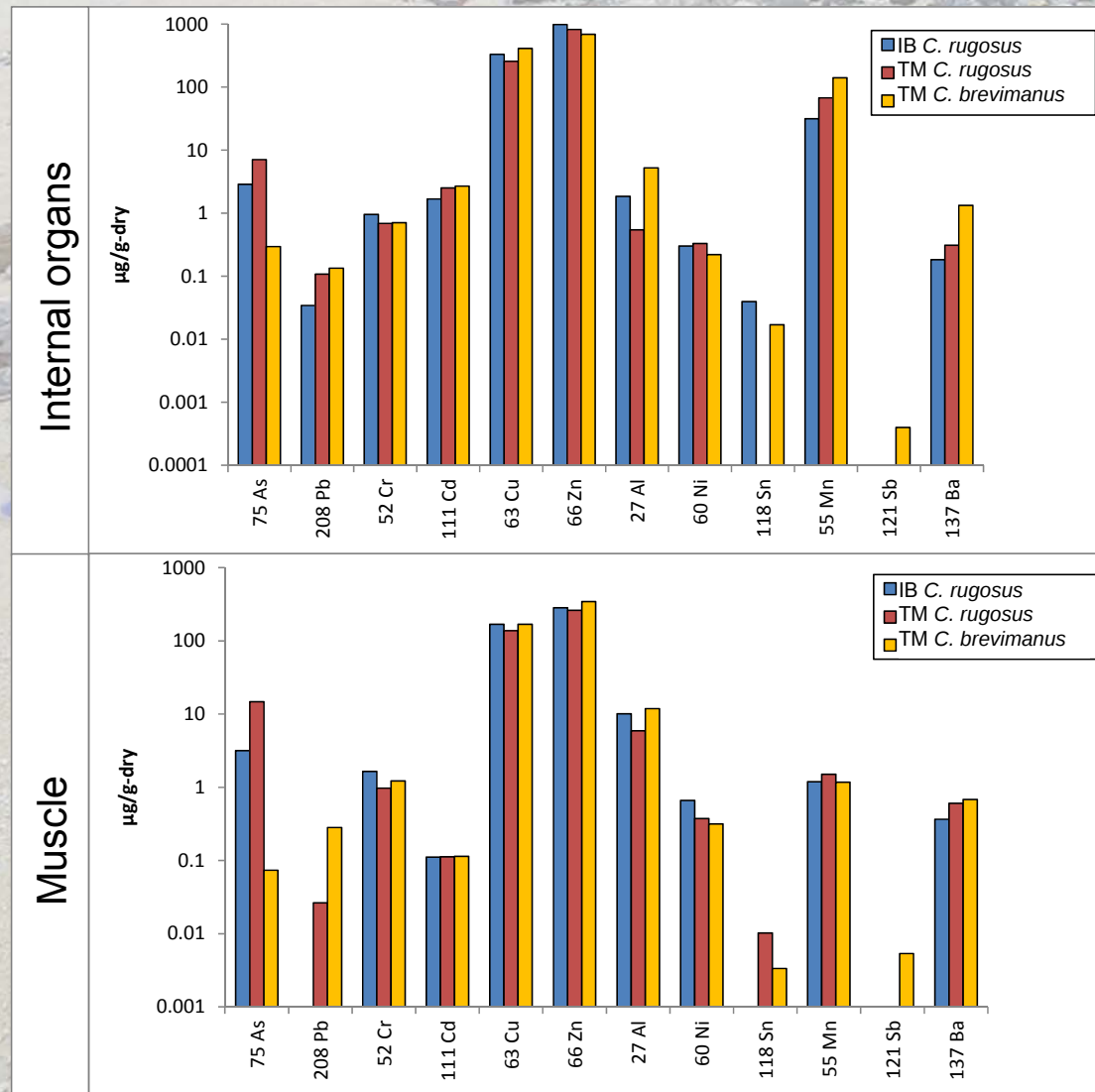
IB: Beach not often covered with MD

TM: Beach heavily covered with MD

■ Measure② Basic study on Hazardous Substances in Marine Debris and possible effects on organisms (Since 2014) -6



An Example of Assoc. Prof. Watanabe's work in the Preliminary Analysis of Trace Elements in Land Hermit Crabs



Higher concentration of Lead(Pb), Barium(Ba) and Antimony(Sb) detected from land hermit crabs sampled from coast heavily covered with Marine Debris

IB: Beach not often covered with MD
TM: Beach heavily covered with MD

■ Measure② Basic study on Hazardous Substances in Marine Debris and possible effects on organisms (Since 2014) -7



Studies of the heavy metal content in marine debris and preliminary analysis of hazardous chemicals in land hermit crabs suggest possibility of beached plastics as source of hazardous chemicals detected from the land hermit crabs.



Plans for research in 2015 to continue and further investigate the current state of Okinawa's coasts

■ Measure③ Environmental Education and Awareness Development Program -1



Since 2010, a working group was created to develop and implement various awareness projects to reduce marine debris. The working group includes representatives from various civilian organizations including NPOs.

Creation of Educational Materials to Raise Awareness and discussion on its effective use

Organization of a Working Group (since 2010)

Human Resource Development Activities



【13 members】

NGO and NPOs	4
Nature Guides	3
Educators	1

Volunteer beach cleaning organizations 5

Organization of Workshops

Taiwan Exchange Program

■ Measure③ Environmental Education and Awareness Development Program -2 Educational Materials



[Marine Litter15] A presentation style educational material that teaches topics on marine debris through 15 stories



- Amount of marine debris that washes up on Okinawa Pref.
- Different types and dangerous types of marine debris
- What's the problem?
→Scenery, Plastics breaking down into small pieces and remaining in the environment, Accidental ingestion by marine organisms etc.
- Where does it come from?
→Littering at sea and coasts, illegal waste dumping, city's storm drains etc.
- Where does it go?
→Litter from Japan drifts to Midway Atoll
- What individuals can do
→Beach cleaning, dispose trash properly, trash-free lifestyle

■Measure③ Environmental Education and Awareness Development Program -3 Educational Materials



A poster about marine debris that teaches “where does it come from”, “where does it go”, “what’s the problem”, “what individuals can do to reduce them” etc.



私たちの便利な暮らしが生んだゴミは あちこちで大きな迷惑を生んでいます。

海のゴミは海流に乗って旅を続け 遠く離れた場所で多くの問題を生み続けているのです。



■ Measure③ Environmental Education and Awareness Development Program -4 Educational Materials



Creation of an educational version of Atsuko Quirk's film "It's Everybody's Ocean" and development of an educational program for primary school students.



**Creation of
Educational Version**

Creation of a 90 minutes educational program where students watch the film and think on their own about the problems of marine debris and how we can solve them.



■ Measure③ Environmental Education and Awareness Development Program -5 Workshops



Workshop held in Naha City, March 2014. Attended by various governmental and non-governmental organizations. Organized in a World Café style to freely discuss the problems in countermeasures against marine debris.



Organized and shared what are the desired countermeasures in Okinawa.

[Sharing and transmitting information]

→Sharing information among gov and non-gov organizations, providing more information for volunteers etc.

[Environmental Education and Awareness Development]

→Expand the audience from children to adults, government, private sectors etc.

[Reinforcement of governmental measures]

→Reinforcing volunteer support, appropriate funding, enforce organization etc.

[Reinforcing measures for less populated remote islands]

→resolving problems of funding and human resource

■ Measure③ Environmental Education and Awareness Development Program -6 Human Resource Development



Visit less populated, remote islands where beach cleaning and education on marine litter is limited. Lecture on cleaning and discussion on how to continue the effort.

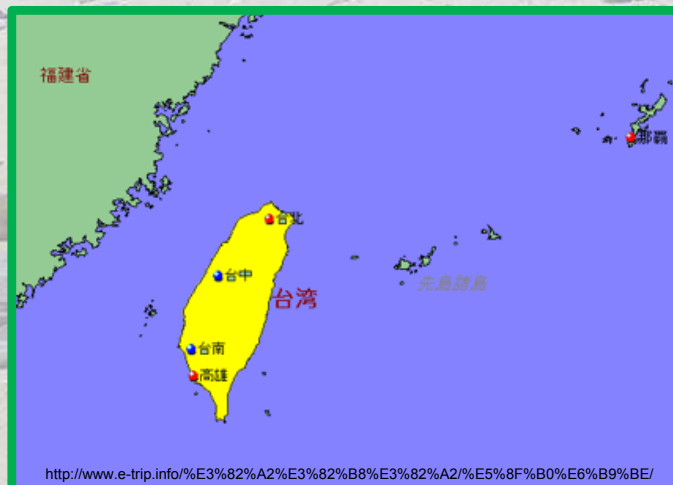


- **Sharing information on marine debris and examples of countermeasures**
- **Spreading methods of beach cleaning and sorting marine litter**
- **Discussions on organizing beach cleaning and environmental education activities fit for the local area**
- **Promotion of training exchange with skilled environmental educators from other region etc.**

■ Measure③ Environmental Education and Awareness Development Program -7 Taiwan Exchange



Exchange program began in 2014 between the two geographically close islands: Okinawa Pref. and Taiwan. Governmental bodies and private sectors will share information, discuss countermeasures against marine debris and environmental education, and collaborate to raise awareness and prevent generation of marine debris.



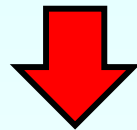
- More than 30 participants including members of private organizations from both Okinawa Pref. and New Taipei City attended the meeting.
- Joint beach cleaning events and workshops were held in October 2014 at Ishigaki City (Okinawa Pref.) and in January 2015 at Keelung City (Taiwan). Discussed each other's problems concerning marine debris, future organization and topics for the exchange program.
- Okinawa Pref. will host and continue this exchange program. In addition, information will be shared on a daily basis via Facebook.



■ The main Tasks of Okinawa Pref.-1

【Collection and disposal】

- No disposal facilities in most islands.
- Drift of plastic containing hazardous heavy metals to islands.
- Impact on valuable flora, fauna, and ecosystem.
- Lack of volunteers in less populated areas.
- Administrative manpower shortage.
- Insufficient cooperation between government and private sectors.



【Measures】

- Establishment of a collecting system, acquirement of budget.
- Gathering information about harmful wastes and discussion of measures.
- Strengthen cooperation between government and private sectors.



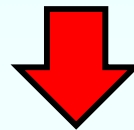
■ The main Tasks of OKINAWA Pref.-2

【 Waste reduction at source 】

- Difficulty to take measures for marine debris coming from other countries.
- Increasing domestic litter and illegal dumping of waste in populated areas, resulting in an increase of marine debris.

【Public awareness and Environmental education】

- Difficulty to develop human resources due to few volunteer and environmental education activities.
- Difficulty of information exchange and cooperation between regions, because Okinawa consists of many islands.
- Requirement of public awareness and environmental education to adults.
- Insufficient chances to share information.



【 Measures 】

- Human resources development and securing of human resources.
- Sharing information on measures and challenges, and raising public awareness about them.
- Information sharing and cooperation with neighboring countries.



Let's protect our beautiful ocean !