모의IMO총회
The Mock IMO Assembly

Proposal for the IBIS

(Integrated Biofouling Information System)

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Background

What's Biofouling?

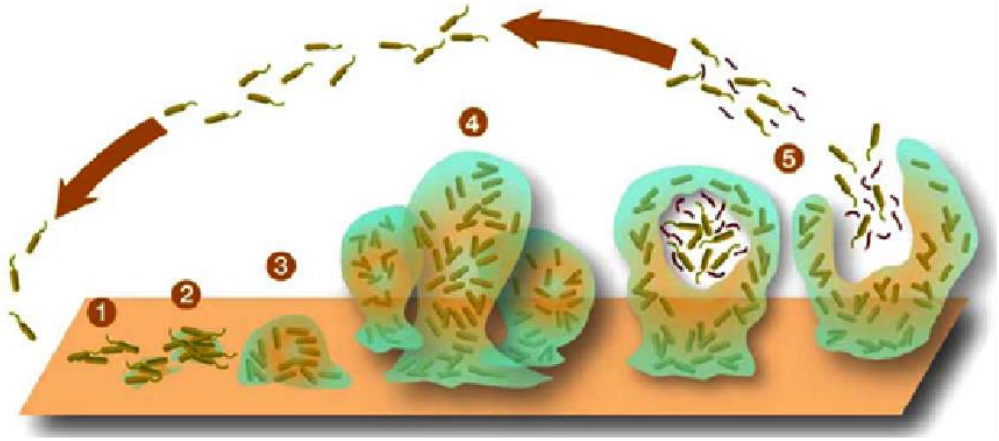
The accumulation of aquatic organisms such as micro-organisms, plants, and animals on surfaces and structures immersed in or exposed to the aquatic environment[1]

Macrofouling: large, distinct multicellular organisms visible to the human eye

Microfouling: microscopic organisms including bacteria and diatoms and the slimy substances that they produce

Causes of Biofouling

- **Biofilm** is the common cause of biofouling[2]
  - Cellular recognition of specific or non-specific attachment sites
  - Exposure of planktonic cells to sub-inhibitory concentrations of antibiotics



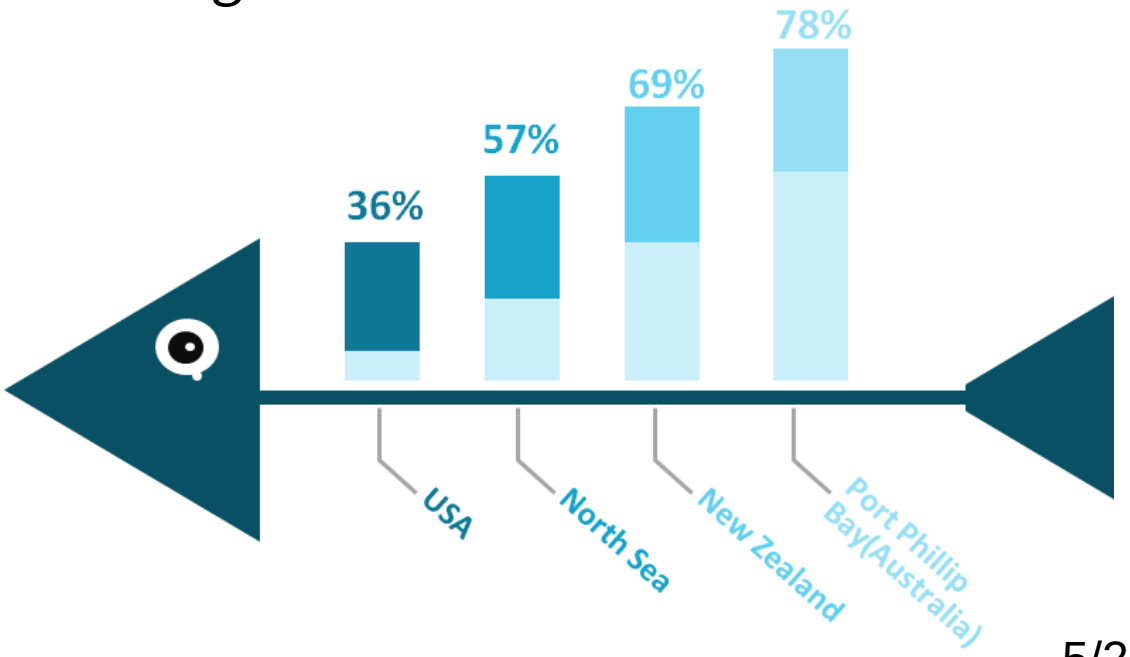
Impacts of Biofouling

◎ Flow of **Invasive Aquatic Species (IAS)**[3]

◎ **Destruction** of original marine ecosystems

◎ For many countries, biofouling is the **main cause** for flow of IAS.

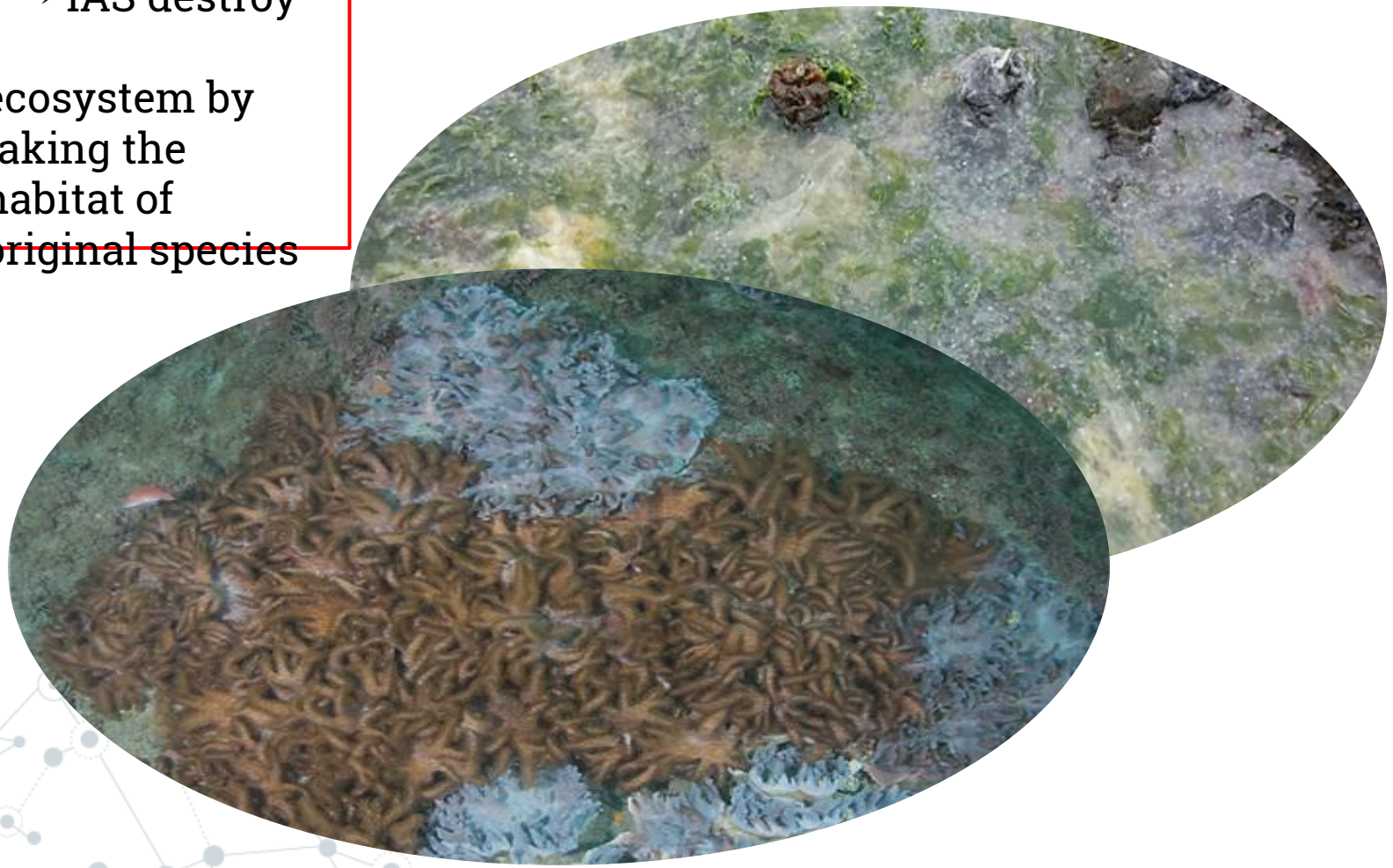
The Percentage of Biofouling on whole Flow of IAS ▶



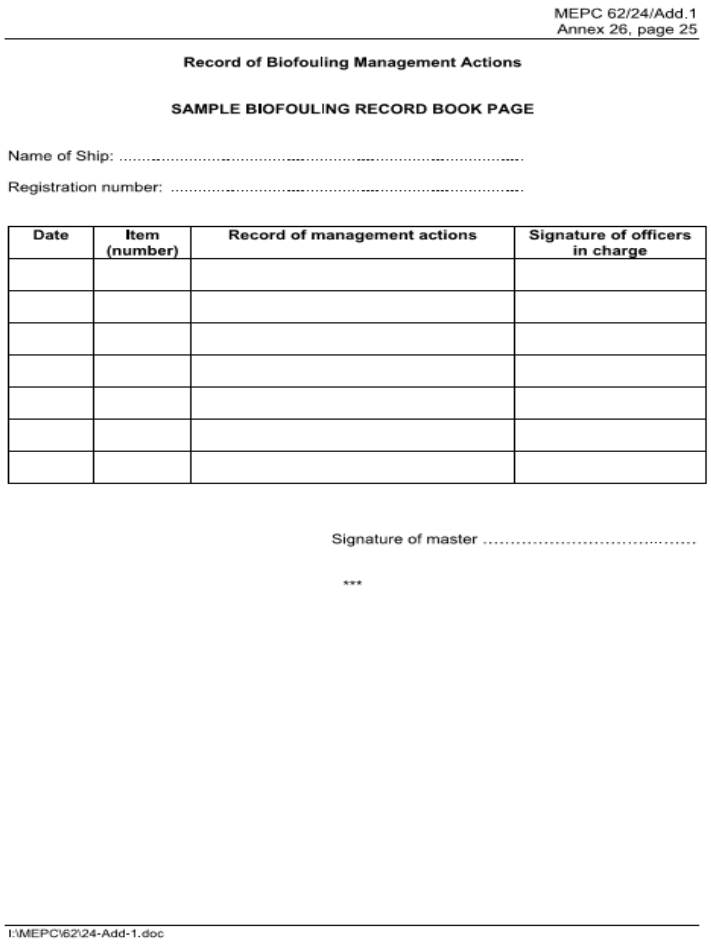
Background

Impacts of IAS on Ecosystem

❖ IAS in Jeju, Korea
→ IAS destroy the ecosystem by taking the habitat of original species



Record Book



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Record of Biofouling Management Actions

SAMPLE BIOFOULING RECORD BOOK PAGE

Name of Ship: .....

Registration number: .....

Date	Item (number)	Record of management actions	Signature of officers in charge

Signature of master .....

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- ◎ Currently, there's not enough information about biofouling
- ◎ Need to gather more specifically measured information
  - ○ Cannot gather the needed information with only with the current record book

Cleaning

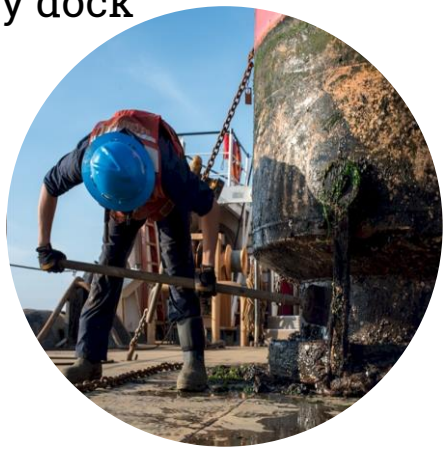
◎ Important part of the anti-fouling system

◎ No specific recommendations on the frequency of cleaning

◎ Threat of toxic coatings release while cleaning

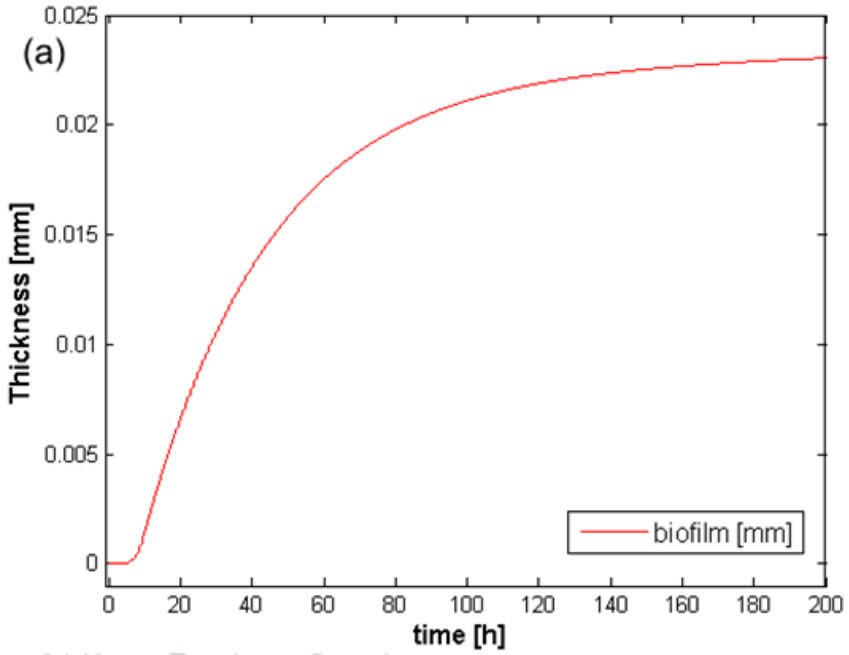
In-water cleaning: physical removal of biofouling from a ship while in the water

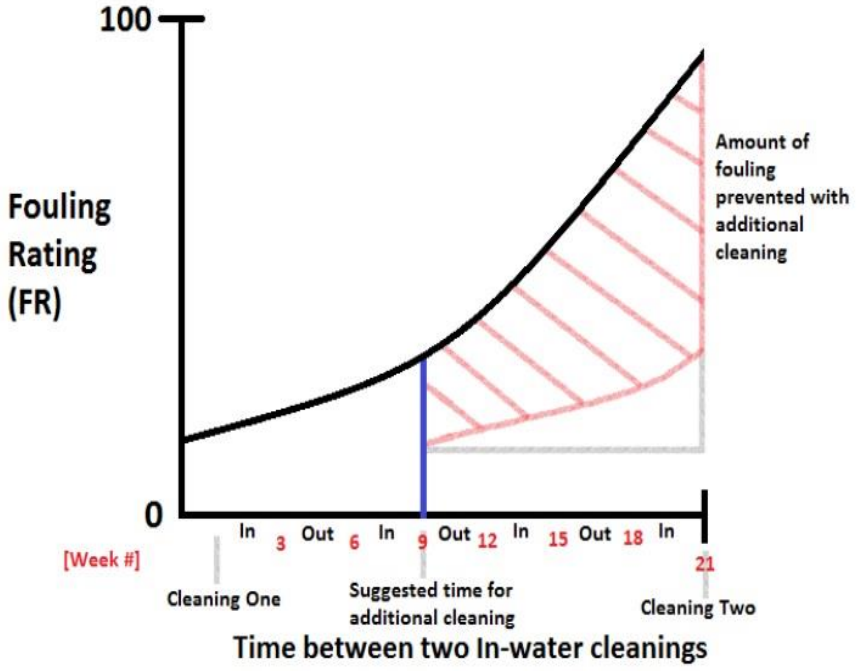
Dry dock cleaning: physical removal of biofouling from a ship in a dry dock



Cleaning

◎ A biofilm 1mm thick can increase the ship hull friction by about 80%[4]



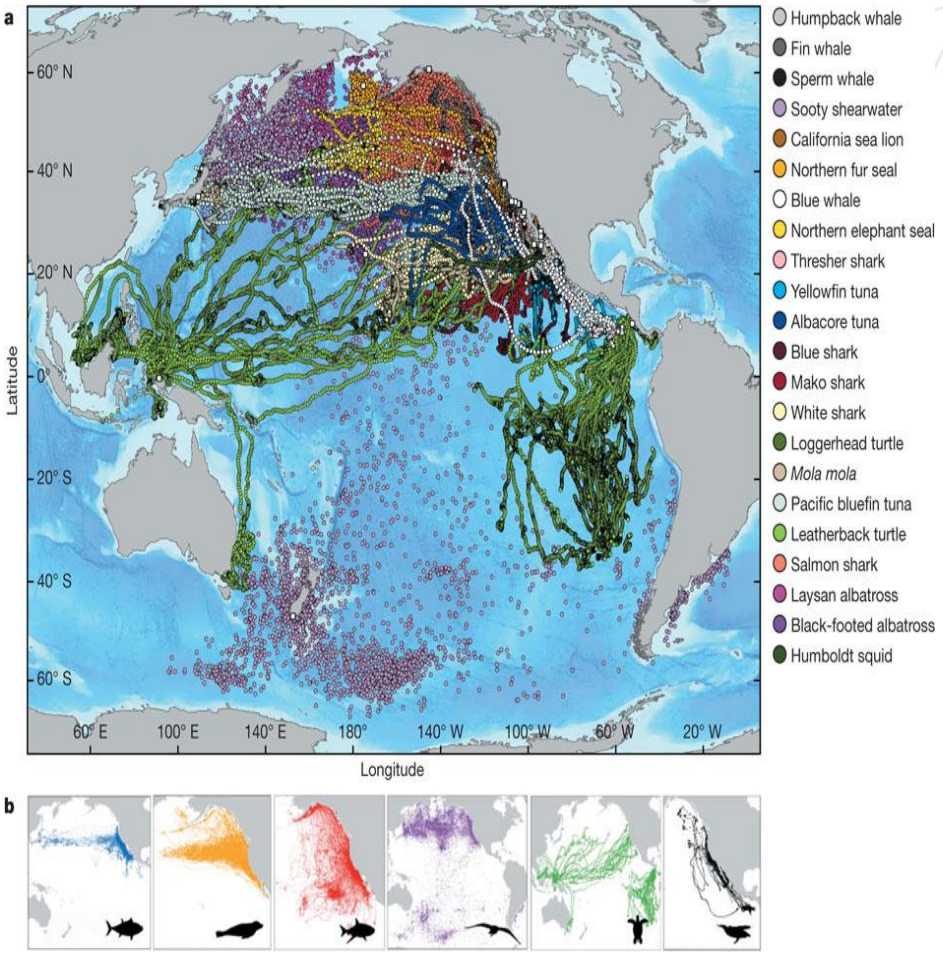


Latitude Restrictions

◎ Water temperature vary

- Change in amount of Dissolved oxygen

- Distribution of marine Organisms show a tendency **depending on latitude**[5]



Coating of a vessel

◎ Various methods for coating a vessel

◎ Paints are commonly used

◎ TBT was effective, but banned for its toxicity[6]

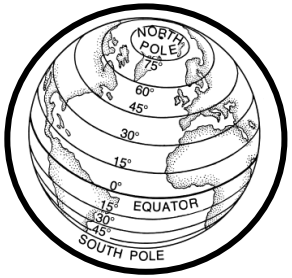
◎ Currently, copper based paints are widely used

- resistance developed by IAS[7]

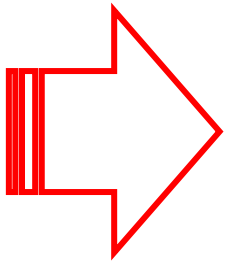
How can we solve these problems?

Record Book

Cleaning



Latitudinal



IBIS

Coating

Amendments

Record book

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Record of Biofouling Management Actions

SAMPLE BIOFOULING RECORD BOOK PAGE

Name of Ship: .....

Registration number: .....

Date	Item (number)	Record of management actions	Signature of officers in charge

Signature of r...er .....

5.7 Information that should be recorded in a Biofouling Record Book includes the following:

.1 details of the anti-fouling systems and operational practices used (where appropriate as recorded in the Anti-fouling System Certificate), where and when installed, areas of the ship coated, its maintenance and, where applicable, its operation;

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.2 dates and location of dry-dockings/slippings, including the date the ship was re-floated, and any measures taken to remove biofouling or to renew or repair the anti-fouling system;

.3 the date and location of in-water inspections, the results of that inspection and any corrective action taken to deal with observed biofouling;

.4 the dates and details of inspection and maintenance of internal seawater cooling systems, the results of these inspections, and any corrective action taken to deal with observed biofouling and any reported blockages; and

.5 details of when the ship has been operating outside its normal operating profile including any details of when the ship was laid-up or inactive for extended periods of time

❖ **Record books have to be collected periodically for accumulation of information and check ups**

❖ **Record book should also include information of the location of the ship and route of travel**

Amendments

Cleaning

- cathodic protection anodes;
- anchor chain and chain lockers;
- free flood spaces inherent to the ships' design;
- sea chest and thruster tunnel grates;
- echo sounders and velocity probes;
- overboard discharge outlets and sea inlets; and
- areas prone to anti-fouling coating system damage or grounding (e.g., areas of the hull damaged by fenders when alongside, leading edges of bilge keels and propeller shaft "y" frames).

7.4 Dive and remotely operated vehicle (ROV) surveys can be practical options for in-water inspections although they do have limitations regarding visibility and available dive time compared with the area to be inspected, and difficulties with effectively accessing many biofouling prone niches. Such surveys should be undertaken by persons who are suitably qualified and experienced and familiar with biofouling and associated invasive aquatic species risks and the safety risks relating to in-water surveys. Regulatory authorities may have recommended or accredited biofouling inspection divers.

In-water cleaning and maintenance

7.5 In-water cleaning can be an important part of biofouling management. In-water cleaning can also introduce different degrees of environmental risk, depending on the nature of biofouling (i.e. microfouling versus macrofouling), the amount of anti-fouling coating system residue released and the biocidal content of the anti-fouling coating system. Relative to macrofouling, microfouling can be removed with gentler techniques that minimize degradation of the anti-fouling coating system and/or biocide release. Microfouling removal may enhance a ship's hull efficiency, reducing fuel consumption and greenhouse gas emissions. It is, therefore, recommended that the ship's hull is cleaned when practical by soft methods if significant microfouling occurs. In-water cleaning can also reduce the risk of spreading invasive aquatic species by preventing macrofouling accumulation

7.6 It may be appropriate for States to conduct a risk assessment to ev in-water cleaning activities and minimize potential threats to their environment, property and resources. Risk assessment factors could include the following:

.1 biological risk of the biofouling organisms being removed from the ship (including viability of the biofouling organisms or the ability to capture biofouling material);

.2 factors that may influence biofouling accumulation, such as changes to the operating profile of the ship;

.3 geographical area that was the source of the biofouling on the ship, if known; and

.4 toxic effects related to substances within the anti-fouling coating system that could be released during the cleaning activity, and any subseque damage to the anti-fouling coating system.

- ❖ **Set an exact period/date of cleaning according to the type and sailing route of a ship and include it as 7.5.1 of the resolution MEPC 270(62)**

- ❖ **Ships containing extremely invasive species on their surfaces should proceed the cleaning process with caution.**

Amendments

Latitudinal

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7.7 Personnel proposing to undertake in-water cleaning should be aware of any regulations or requirements for the conduct of in-water cleaning, including any regulations regarding the discharge of chemicals into the marine environment and the location of sensitive areas (such as marine protected areas and ballast water exchange areas). Where significant macrofouling growth is detected, it should be removed or treated (if this can be done without damaging the anti-fouling system) in accordance with such regulations. Where available, appropriate technology should be used to minimize the release of both anti-fouling coating or paint debris, and viable adult, juvenile, or reproductive stages of macrofouling organisms. The collected material should be disposed of in a manner which does not pose a risk to the aquatic environment.

7.8 For immersed areas coated with biocidal anti-fouling coatings, cleaning techniques should be used that minimize release of biocide into the environment. Cleaning heavily fouled anti-fouling coating systems can not only generate biofouling debris, but prematurely depletes the anti-fouling coating system and may create a pulse of biocide that can harm the local environment and may impact on future applications by the port authority for the disposal of dredge spoil. Depleted anti-fouling coating systems on hulls will rapidly re-foul. In-water cleaning or scrubbing of hulls for the purpose of delaying dry-dockings beyond the specified service life of the coating is, therefore, not recommended.

7.9 Immersed areas coated with biocide-free anti-fouling coating systems may require regular in-water cleaning as part of planned maintenance to maintain hull efficiency and minimize the risk of transferring invasive aquatic species. Cleaning techniques should be used which do not damage the coating and impair its function.

7.10 Any maintenance or repair activities should take care not to impede future in-service cleaning and/or maintenance, e.g., care should be taken to ensure sea chest grates do not become welded shut during repair work.

7.11 Care should be taken to ensure that any MGPSs installed are operating effectively to prevent accumulation of biofouling.

7.12 Regular polishing of uncoated propellers to maintain operational efficiency will also minimize macrofouling accumulation. Uncoated propeller shafts may require cleaning at the same time as the propeller. As a ship's routine propeller polishing will involve the use of divers, it is recommended that this opportunity is taken to assess sea chests, and other similar areas, for macrofouling.

7.13 Internal seawater cooling systems need to be regularly monitored to ensure effective biofouling control is maintained. Seawater cooling systems that operate while the ship is in port may be vulnerable to biofouling accumulation, and should be closely monitored. If seawater cooling systems become fouled, they should be appropriately treated. Any discharge of treated water from internal seawater cooling systems should be undertaken in accordance with applicable regulations.

Include as 7.14 of the resolution MEPC 207(62):

- **When ships travel latitudes with certain differences, cleaning should be recommended**
- **Ships should be cleaned before entering specific regions which have a high possibility of exotic species invading**

Amendments

Coating

.1 Small niches and sheltered areas should be excluded from the ship as far as practical, e.g., flush mounting pipes in sea chests. Where not practical, these should be designed so that they may be easily accessed for inspection, cleaning and application of anti-fouling measures.

.2 Rounding and/or bevelling of corners, gratings and protrusions to promote more effective coverage of anti-fouling coating systems, and hinging of gratings to enable diver access.

.3 Providing the capacity to blank off the sea chest and other areas, such as moon pools, floodable docks and other free flood spaces, for treatment and/or cleaning.

8.2 Internal seawater cooling systems should be designed and made of appropriate material to minimize biofouling and constructed with a minimum of bends, kinks and flanges in seawater piping.

8.3 To avoid creation of avoidable niches while ensuring effective safety and operation of the ship, where practical, particular attention should be given to avoidance of unfilled gaps in all skin fittings and the detailed design of the items as follows:

.1 sea chests – minimize size and number, and use smooth surfaces to maximize flow efficiency, fit MGPS, and steam or hot water cleaning systems, grills and their opening arrangements designed for in-water inspection and maintenance;

.2 retractable fittings and equipment – avoid external reinforcement (such as stiffeners) where possible, design for in-water inspection and maintenance;

.3 tunnel thrusters – tunnels to be above light water line or accessible to divers, grills and their opening arrangements designed for in-water inspection, maintenance and operation;

.4 sponsons and hull blisters – use fully enclosed in preference to free flooding types, with access provisions made for in-water inspection, cleaning and maintenance;

.5 stern tube seal assemblies and rope guards – design for in-water inspection, cleaning and maintenance; and

.6 immersible and seabed equipment – ensure facilities for equipment washdown during retrieval and enclosed washdown areas for cleaning of

Include as 8.4 of the resolution MEPC 270(62):

- **Specify which type of coating material should be used/should not be used for ships of certain type/each part of the ship for effective antifouling**
- **Specify the period for which the coating of the ship needs to be recoated**

IBIS

(Integrated Biofouling Information System)

❖ To supplement the resolution and to make it more effective, we came up with the IBIS

Why IBIS?

- ❖ Important parts of current resolutions have connection to each other.
- ❖ Efficient to handle each part with an integrating system.

→ **Introduction of IBIS(Integrated Biofouling Information System)**

How IBIS Works

- With gathered information from different ships traveling different routes
  - ➢ compare/ relate/ feedback/ learn something from each case
    - find the best cleaning period/ coating method etc for a certain ship

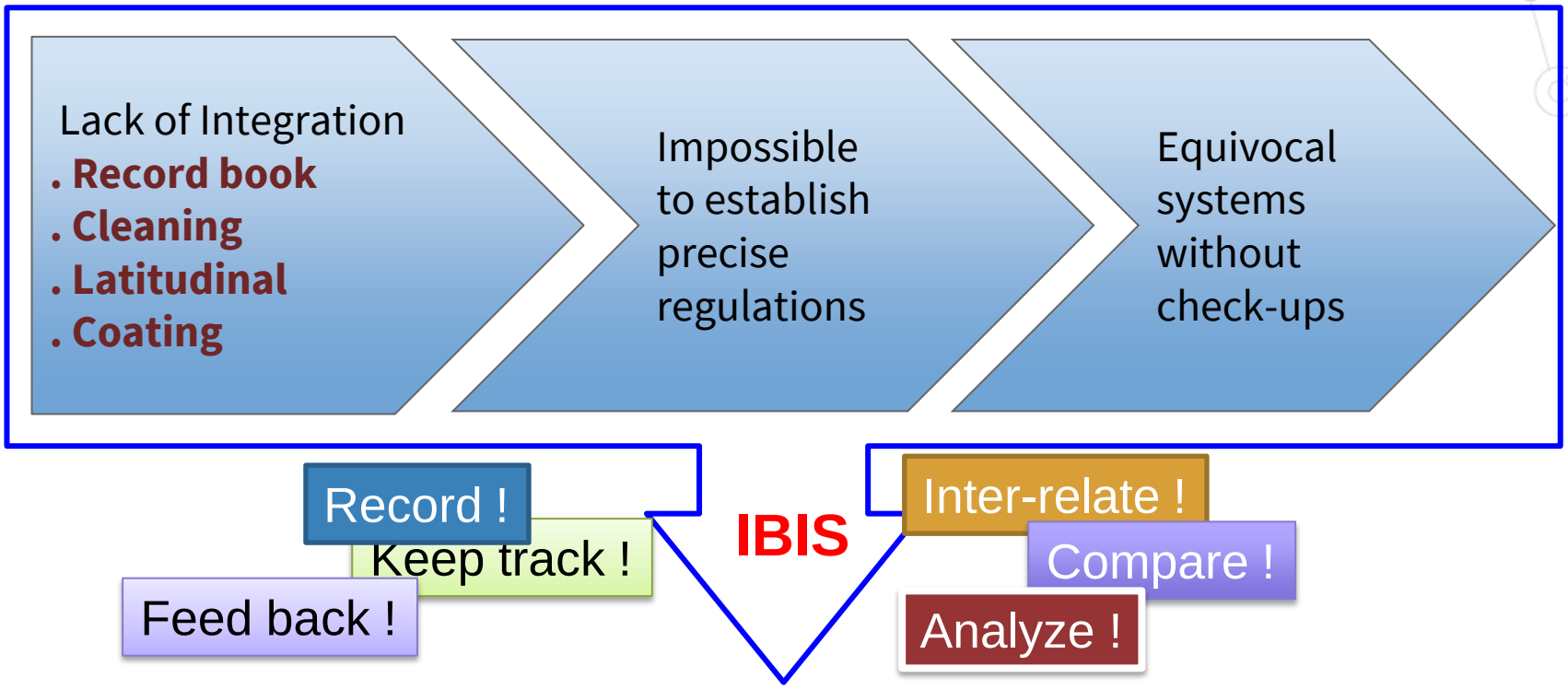
Better planning and management of ship's biofouling

Application of IBIS

- **Exchange information** with a similar type of a ship or a ship traveling a similar route
  - ex. increase fuel efficiency
- Nations can learn of the **potential dangers of invasive species** in their harbor with the shared information (record book)

IBIS

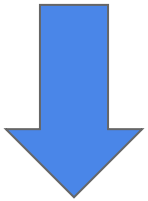
(Integrated Biofouling Information System)



IBIS will do it's job as surveillance, current state of affairs and statistical data provision

Conclusion

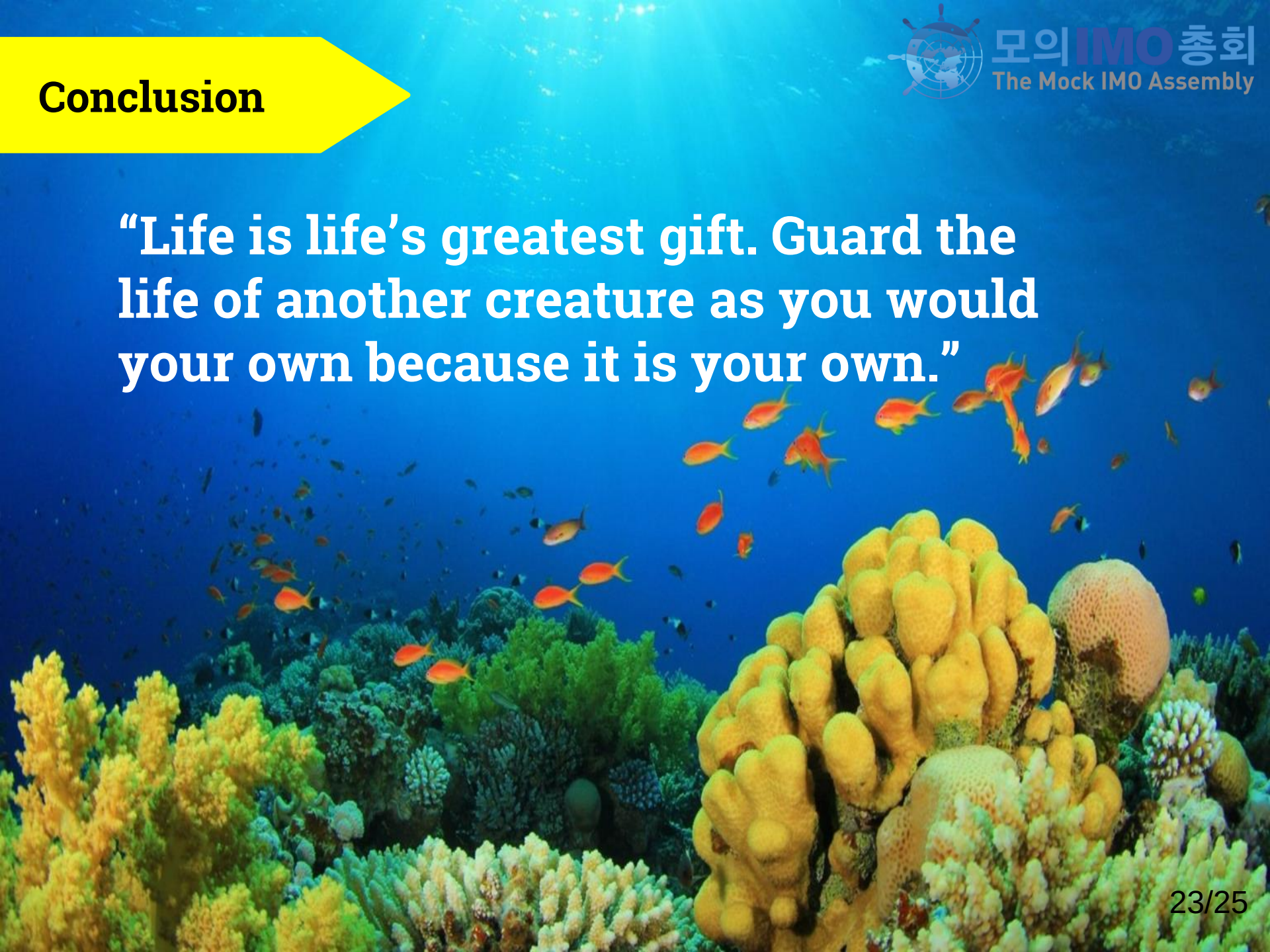
- ❖ Current resolution on record book/cleaning/coating is **vague**
- ❖ No article on **latitudinal move** of ships
- ❖ All parts of resolution being handled **separately**



- ❖ Modification of current resolution → **specification**
- ❖ Introduction of **guideline depending on the route of ships**
- ❖ **IBIS** for efficient management of biofouling

Conclusion

“Life is life’s greatest gift. Guard the life of another creature as you would your own because it is your own.”



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Thank You~!